Public Administration and Public Policy 93

Handbook of Global Environmental Policy and Administration

edited by
Dennis L. Soden
Brent S. Steel

Handbook of Global Environmental Policy and Administration

Handbook of Global Environmental Policy and Administration

edited by

Dennis L. Soden
University of Texas at El Paso
El Paso, Texas

Brent S. Steel
Oregon State University
Corvallis, Oregon

MARCEL DEKKER, INC. NEW YORK • BASEL

ISBN: 0-8247-1989-1

This book is printed on acid-free paper.

Headquarters
Marcel Dekker, Inc.
270 Madison Avenue, New York, NY 10016
tel: 212-696-9000; fax: 212-685-4540

Eastern Hemisphere Distribution
Marcel Dekker AG
Hutgasse 4, Postfach 812, CH-4001 Basel, Switzerland
tel: 41-61-261-8482; fax: 41-61-261-8896

World Wide Web
http://www.dekker.com

The publisher offers discounts on this book when ordered in bulk quantities. For more information, write to Special Sales/Professional Marketing at the headquarters address above.

Current printing (last digit):
10 9 8 7 6 5 4 3 2 1

PRINTED IN THE UNITED STATES OF AMERICA

To our mentor and friend

NICHOLAS P. LOVRICH

for years of support and guidance

Preface

In recent decades the world has increasingly focused on environmental and natural resource problems. The list of issues has expanded beyond traditional concerns of air and water pollution or the overharvesting of resources to include climate change, atmospheric ozone depletion, loss of biodiversity, regeneration of fishery stocks, and an array of other environmental concerns that no longer respect national boundaries. Today's increasingly international concerns have forced policy and decision makers to rethink environmental management. The paradigm of resource management that guided the world throughout the twentieth century seems less suitable for addressing transnational and international problems that have moved to the forefront of the environmental agenda. Today's concerns have begun to clash with the traditional extraction-oriented policies that have dominated the use of our natural resources and environment ever since the beginning of the Industrial Revolution. In the advanced industrial countries, the result has often been an acrimonious national and international controversy and frequent conflict about which paradigm to choose for resource management. At one extreme, developmentalist orientations continue to push predominantly economic agendas, with little regard for long-term consequences of overexploitation. At the other extreme, preservationism has reached heightened levels of importance in policy deliberations in both the developed and developing worlds. At the heart of this debate are differing philosophical, economic, cultural, and political views about the natural environment and appropriate human relationships to that environment. These views in turn are connected to different conceptions of how natural resources and the environment ought to be managed, especially in the many traditionally resource-dependent communities throughout the world that have banked their future on harvesting raw resources.

The analysis of environmental issues from a cross-cultural and comparative perspective, consequently, is integral to finding acceptable solutions for fundamental and often contentious environmental and natural resource management problems. With this in mind, the intent of this book is to provide an international versus solely state-centric perspective on national and international environmental problems and policies. Contributors to the volume represent the academic disciplines of anthropology, forest and rangeland resources, environmental science, philosophy, sociology, economics, oceanography, and political science. In addition, contributors come from a variety of countries including

Nepal, Korea, Hungary, Australia, Japan, Canada, and the United States. As a group, they have extensive experience working with natural resource and environmental issues in a variety of contexts and countries, including Africa, Latin America, Asia, Western Europe, and Eastern Europe. To undertake this project, we looked for a representative group of contributors who have demonstrated in their past work that they placed environmental problems within a global perspective. In much the same way that business economics has had to contend with globalization and free trade, this set of scholars likewise has a global perspective. This perspective represents a maturing of environmental administration and policy studies that has emerged among what might be called the second generation of contributors to this field since its emergence in the late 1960s and early 1970s. All but one of the contributions were written specifically for this book. From this effort a volume that tells a great deal about global issues in environmental policy and administration has developed. Yet, like all efforts of its type there are, no doubt, important issues that could not be included or places in the world with environmental problems we should pay more attention to. Overall, however, our goal is to provide a "state-of-the-art" book on the knowledge in the field, and we believe that we have largely achieved this goal. From one point of view, we see this work providing experienced hands with more evidence of the global nature of environmental dilemmas and an opportunity to become better acquainted with the policy and policy processes of areas of the world they are less knowledgeable about but are inclined to view with a sympathetic eye because of the belief that somewhere someone is facing similar dilemmas as a result of governing structures and administrative roadblocks. For those with less experience in the topic area, we see this volume as a reader for graduate seminars in a broad range of environmental programs, including policy, forestry, range management, oceanography, and soil sciences. Perhaps we are more inclined to favor its use by students as a result of our own experience in graduate school where we had to piece together the literature from a less concentrated array of scholarship than students enjoy today.

This book is organized into four parts. The first part provides an introduction and general overview of the various approaches used to study environmental policy and management: some of the tools of the trade that prevail in the current literature. Because of the complexity of environmental and natural resource management issues, we are strong supporters of using multiple methodologies to analyze these issues. The chapters in this part cover such approaches as geographic information systems, survey research, ecosystem management, market-based incentives versus regulation, collaborative policy and dispute resolution, contingent valuation, environmental ethics, and a host of other topics.

The second part of the book focuses on environmental policy and management in developing and industrializing countries. Chapters in this part examine environmental policy in less developed countries that are closely connected to the use and management of natural resources because of the rural nature of their population and/or overwhelming dependence on natural resource extraction and polluting industries for their economic well-being. The third part of the book examines environmental policy in advanced industrial countries where the consumption rate of natural resources is very high and, concomitantly, there is a high level of environmental consciousness and the proliferation of environmental groups.

The final part of the book examines international environmental policy and administration issues. Many, if not most, environmental issues are transboundary. As such, they are not defined by political borders, thereby thwarting attempts by sovereign states to control and manage. From management of our coastal and deep oceans to fisheries to

atmospheric ozone depletion, environmental problems have taken on a distinctly global perspective in recent years. This new realization is symbolized by the 1992 U.N. Conference on Environment and Development held in Rio de Janeiro, Brazil (i.e., the 1993 Rio Summit). The chapters in this part reveal the complexities and political problems associated with transboundary environmental policy issues.

In the effort to put this project together, we had the support of the Public Policy Research Center at the University of Texas at El Paso and the Public Affairs Program at Washington State University, Vancouver. Lawrence Gatei and Mathew McElroy are especially appreciated for keeping manuscripts in order in the case of the former and for reworking graphics that came in all shapes, forms, and colors in the case of the latter. In addition, several institutions and government agencies provided time and resources to all the contributors. We are especially indebted to Nicholas P. Lovrich, under whose guidance we have both grown as academics and who early in our own careers encouraged us to work together. We are forever grateful to him and to our partners and children, Becky and Ryan, Jan, Erin, and Traci, who have suffered through this and other projects over the years with the earnest promise that "next summer I'm really going to take some time off."

Dennis L. Soden
Brent S. Steel

This page intentionally left blank

Contents

Contributors

Tsuneo Akaha, Ph.D. Graduate School of International Policy Studies, Monterey Institute of International Studies, Monterey, California

Leslie R. Alm, Ph.D. Public Policy and Administration, Department of Political Science, Boise State University, Boise, Idaho

C. Richard Bath, Ph.D. Department of Political Science, University of Texas at El Paso, El Paso, Texas

Joseph K. Berry, M.B.A, Ph.D. Berry and Associates/Spatial Information Systems, Inc., Fort Collins, Colorado

Robert E. Bowen, Ph.D. Department of Environmental, Coastal and Ocean Sciences, University of Massachusetts at Boston, Boston, Massachusetts

Mark Brunson, Ph.D. Department of Forest Resources, Utah State University, Logan, Utah

Nina Burkardt, M.A. Midcontinent Ecological Science Center, U.S. Geological Survey, Fort Collins, Colorado

Robert G. Carey, M.A. The Nature Conservancy, Mt. Vernon, Washington

Catherine A. Crumbley, M.S. Lowell Center for Sustainable Production, University of Massachusetts at Lowell, Lowell, Massachusetts

Russell J. Dalton, Ph.D. Department of Political Science, University of California, Irvine, Irvine, California

John L. Dobra, Ph.D. Natural Resource Industry Institute and Department of Economics, University of Nevada, Reno, Reno, Nevada

Harvey Doerksen, Ph.D. Office of Policy Analysis, U.S. Department of the Interior, Washington, D.C.

Dirk D. Draper Balloffet and Associates, Inc., Fort Collins, Colorado

Riley E. Dunlap, Ph.D. Departments of Sociology and Rural Sociology, Washington State University, Pullman, Washington

Curtis Durrant, M.S. Solid Waste and Financial Assistance Program, Washington State Department of Ecology, Spokane, Washington

Hillary Egna, Ph.D. Pond Dynamics/Aquaculture Collaborative Research Support Program, Office of International Research and Development, Oregon State University, Corvallis, Oregon

Earl R. Ekstrand, Ph.D. Economics Group, U.S. Bureau of Reclamation, Denver, Colorado

Patricia J. Fredericksen, Ph.D. Department of Public Policy and Administration, Boise State University, Boise, Idaho

Robert L. Friedheim, Ph.D. School of International Relations, University of Southern California, Los Angeles, California

Alec M. Gallup The Gallup Organization, Princeton, New Jersey

George H. Gallup, Jr. George H. Gallup International Institute, Princeton, New Jersey

Andrea K. Gerlak, Ph.D. Department of Political Science, Guilford College, Greensboro, North Carolina

Michael Healey, Ph.D. Institute for Resources and Environment, University of British Columbia, Vancouver, British Columbia, Canada

Timothy M. Hennessey, Ph.D. Department of Political Science, University of Rhode Island, Kingston, Rhode Island

Aynsley Kellow, Ph.D. School of Government, University of Tasmania, Hobart, Tasmania, Australia

Mark Andrew Kelso, Ph.D. Department of Political Science, Queens College, Charlotte, North Carolina

Sung-Chul Kim, Ph.D. Department of Pubic Administration, Myong-Ji University, Seoul, Korea

Berton Lee Lamb, Ph.D. Social, Economic, and Institutional Analysis Section, Midcontinent Ecological Science Center, U.S. Geological Survey, Fort Collins, Colorado

Kara L. Lamb, M.A. Eastern Colorado Area Office, U.S. Bureau of Reclamation, Loveland, Colorado

Nicholas P. Lovrich, M.A., Ph.D. Department of Political Science and Division of Governmental Studies and Services, Washington State University, Pullman, Washington

Donna Lybecker Department of Political Science, Colorado State University, Fort Collins, Colorado

Masahiko Matsuoka Japan Educational Corporation, Washington, D.C., and Tokyo, Japan

Maureen R. McCarney Kearney/Buffalo County Area Domestic Violence Coalition, Kearney, Nebraska

Stephen P. Mumme, Ph.D. Department of Political Science, Colorado State University, Fort Collins, Colorado

Howard D. Neighbor, Ph.D. Professor Emeritus, Department of Political Science, University of Texas at El Paso, El Paso, Texas

Meredith A. Newman, Ph.D. Department of Political Science, Washington State University, Vancouver, Washington

Sushil Pandey, Ph.D. Department of Political Science, Tribhuvan University, Kathmandu, Nepal

Chun-Oh Park, Ph.D. Department of Public Administration, Myong-Ji University, Seoul, Korea

Steven Parker, Ph.D. Department of Political Science, University of Nevada, Las Vegas, Las Vegas, Nevada

Laura J. Parisi University of Arizona, Tucson, Arizona, and Hollins University, Roanoke, Virginia

Laszlo Perneczky Regional Environmental Center for Central and Eastern Europe (REC), Budapest, Hungary

John C. Pierce, Ph.D. Department of Political Science, University of Colorado at Colorado Springs, Colorado Springs, Colorado

Cathleen Rineer-Garber Washington State University, Vancouver, Washington

Debra J. Salazar, Ph.D. Department of Political Science, Western Washington University, Bellingham, Washington

Irving Schiffman, J.D., Ph.D. Department of Political Science, California State University, Chico, California

William D. Schreckhise, Ph.D. Department of Political Science, University of Arkansas, Fayetteville, Arkansas

Bruce Shindler, Ph.D. Department of Forest Resources, Oregon State University, Corvallis, Oregon

Benjamin M. Simon, M.S., M.P.P. Office of Policy Analysis, U.S. Department of the Interior, Washington, D.C.

Dennis L. Soden, Ph.D. Public Policy Research Center and Department of Political Science, University of Texas at El Paso, El Paso, Texas

Terry Sprouse, Ph.D. Border Water Coordinator, Santa Cruz Active Management Area, Arizona Department of Water Resources, Nogales, Arizona

Brent S. Steel, Ph.D. Department of Political Science, Oregon State University, Corvallis, Oregon

Glen Sussman, Ph.D. Department of Political Science, Old Dominion University, Norfolk, Virginia

John R. Tennert Center for Public Administration and Policy, Virginia Polytechnic Institute and State University, Blacksburg, Virginia

Edward Chiu-Yeng Tseng, Ph.D. Department of Political Science and Uyeno Center for International Education, California Lutheran University, Thousand Oaks, California

Taketsugu Tsurutani, Ph.D. Professor Emeritus, Washington State University, Pullman, Washington

Rebecca L. Warner, Ph.D. Department of Sociology, Oregon State University, Corvallis, Oregon

William G. Weaver, M.A., J.D., Ph.D. Department of Political Science, University of Texas at El Paso, El Paso, Texas

Edward P. Weber, Ph.D. Department of Political Science, Washington State University, Pullman, Washington

Jeanne Wendel, Ph.D. Department of Economics, University of Nevada, Reno, Reno, Nevada

Patrick C. West, Ph.D. School of Natural Resources and Environment, University of Michigan, Ann Arbor, Michigan

Pia Christina Wood, Ph.D. Department of Political Science, Old Dominion University, Norfolk, Virginia

I

Approaches to the Study of Environmental Policy and Administration

Few fields are focused on one best way of developing knowledge and documenting the experiences that direct inquiry. Since its blossoming in the 1970s into a highly recognizable field of study, the environmental sciences, including the policy and administrative sciences, as well as the physical and natural sciences, have explored multiple issues using an entire range of approaches. The debate over which approach best captures the essence of a problem or best supports our efforts at theory building clearly has value in developing intellectual capital, but it is the range of methods, theories, and frameworks that work in combination to help us explore the environmental crises and resource management dilemmas faced by practitioners and policymakers, as well as the scholarly community, that draws our attention in this section.

Scholarship in the area of environmental policy is, in many ways, not dramatically different than other areas of the social sciences. At one extreme is a cadre of data gatherers who arm themselves with empirical studies to insure that an overwhelming set of data can prove the case they are making. At the other extreme, normativists continue dialogues with roots in the classics to prescribe what ought to be done to develop the mindset necessary to insure protection of species and habitat, including the human race itself. Yet, overall, the approaches used over the last few decades are not particular new. Doomsayers may predict a total failure of the ecosystem, but most rest their argument on Malthusian doctrines. Optimistic forces that see technology and man's innate ability to salvage himself from the brink of disaster are reflective of industrial age thinking that has led to the advances of the twentieth century. The debate between these forces is the hallmark of environmental policy. As we shall see in the chapters in this part and the three following it, the difference between optimistic forces that see a cornucopia of natural resources versus the "informed prophets of the dangers posed by over-consumption" is a wide breach that is not easily bridged (Ehrlich et al. 1997).

For those in environmental policy and administrative studies with an environmental focus, traditional training in one or more of the social sciences has led to an array of contributions including Eastern philosophy, economics, political science, anthropology, and history, among others. In the chapters in Part I, the way in which we have approached environmental administration and policy is captured by reviewing some of the "lens" that have served as focal points. In many ways, these reflect the eclecticism of the administrative and social sciences. Together they are indicative of how environmental

concerns have broadly captured economists, policy analysts, philosophers, and political scientists, both inside and outside of government, as well as academia. They also show how the newest thinking and latest technologies have been brought to bear on environmental issues. In the 30 years since Rachel Carson, a biologist, provided many predictions that ignited the environmental movement in her moving book *Silent Spring*, the social sciences, perhaps more than any other discipline, rapidly developed an ability to look at what were seemingly only natural and physical problems before. As noted by Lynton Caldwell, one of the early students of international environmental policy, we have moved from a propensity to learn to a propensity to solve (Caldwell 1990). The chapters in this part are indicative of moving from learning to doing by taking the best ideas that the policy and administrative sciences have and applying them to real-time problems that have an affect on all the residents of the global commons (Hardin 1968).

The thirteen chapters that make up Part I provide us with an overview, not only of how many ways we can look at problems, but also why we need to incorporate thinking that looks at a problem or sets of problems from more than one perspective. Earlier scholars have described the need for mixed scanning, looking at both the micro (incremental) and macro (rationalistic) aspects and implications in developing policy choices (Etzioni 1967). More recently, organizational studies strongly encourage thinking from multiple perspectives, discounting a single theoretical preference or performance measure to enhance, through the widest network of information and variables, the decision-making process (Morgan 1986). These chapters reflect this need and should encourage further inquiry with multiple methods, including methods from the social sciences that often challenge the notions of the natural and physical sciences (Soden et al. 1998).

To begin, Riley E. Dunlap, George H. Gallup, and Alec M. Gallup review public opinion as it relates to the environment. Public opinion surveys have been a regular avenue for documenting public interest and concern about environmental issues, in both a domestic and comparative respect. Dunlap and his associates report on the findings of the Health of the Planet Survey conducted by the international network of the Gallup organization. Their findings are a clear indicator of the heightened importance that the environment takes among people of all nations regardless of level of development. In part, this is a direct challenge to a large part of the literature that suggests environmental concern is a postmaterialist issue, versus a basic human concern consistent with basic human needs. Because of the high value placed on survey research among the social sciences, we believed this chapter serves as a logical starting point, not only as an approach, but as a means for documenting the degree to which environmental issues are of global concern and come to bear on policy and decision making.

Timothy M. Hennesey and Dennis L. Soden discuss ecosystems management, a widely used approach among the physical and natural sciences, from a policy perspective. They contend that the complexity of ecosystems management is made even more complex because of values, vested interests among stakeholders, ingrained organizational cultures, and administrative whims. Yet, they point out that ecosystems management has been useful in committing all interests to "genuine discourse," enhancing the dialogue among parties by providing a conceptual framework that most institutions and actors, both inside and outside of government, have found usable and flexible.

An approach that has received rapid recognition similar to the rise in ecosystems management is geographical information systems (GIS). In his chapter, Joseph K. Berry, a true leader in the GIS field, discusses the emergence of GIS technology and illustrates its value as a tool for environmental management. The role of information flows in the

environmental arena has been broadly documented. Not only is the field dominated by complexity in the available data, there is a voluminous amount. GIS has developed into one of the tools that allow for the automation of these volumes of data. But, as Berry points out, it still needs to be fully incorporated into the policy process and viewed as routine and necessary for understanding the spatial context of issues, as opposed to the anomaly it currently is perceived to be by many in the policy process.

The environmental policy arena has been the venue for a major discussion about regulation and its economic impact since the rise of the environmental movement. Economists have been at the forefront of this debate. On the one hand, free market approaches downplay a role for government in favor of the private sector controlling itself based on protection of its self-interest. On the other, externalities brought about by failure to take adequate measures to protect the environment have led another school of thought to favor regulation through government control. John L. Dobra and Jeanne Wendel provide a primer on market approaches and incentives that are designed to favor the environment without exacting a high cost through regulation in their chapter, "Pursuing Environmental Goals: Regulations Versus Markets." They suggest that while regulation has been successful in many instances, the future will favor a market-based system that will "promote the achievement of environmental goals more efficiently."

Economists also contribute to approaches to policy and administration through contingent value methodology. Contingent valuation explores individual "willingness-to-pay" for natural resource and environmental amenities using a hypothetical market and survey research. As Earl R. Ekstrand and Dirk D. Draper point out in their chapter, "Contingent Valuation Method," the technique has become a useful instrument for policy and decision making that allows a value or utility to be placed on goods and services that previously were difficult to value. The use of contingent valuation provides increased opportunity for determining accrued benefits of resources that are not marketable and can be expected to be a primary instrument in environmental management and planning for some time to come.

Economics come to bear on national parks as discussed by Benjamin M. Simon and Harvey Doerksen in "Financing National Park Service Activities Through Entrance Fees." In an era when agencies are doing more with less and budgets are annually scrutinized to trim off any excess, agencies are looking for new ways to sustain their operations. The U.S. National Park Service has addressed the issue of increased fees and the need to direct them into the Service's account instead of the general funds of the U.S. Treasury. Simon and Doerksen succinctly explore the options for fee charges and discuss the implementation and political obstacles that fees programs must overcome.

Moving away from economic questions, Edward P. Weber, discusses how alternative dispute resolution has developed in environmental policy. In a society that has a vibrant legal system, early environmental disputes wound their way through the court system creating a zero sum policy process in most cases. Over the years, both protectionist forces and developmental forces have shifted to a collaborative policy setting and alternative dispute resolution. In "The Theory and Practice of Collaborative Policy and Dispute Resolution Mechanisms: The Case of Environmental Policy," Weber discusses the benefits of collaboration, when it is a useful alternative, and what problems exist in dispute resolution as a policy process mechanism. He encourages policymakers to consider increased collaboration early in the process as a means for increasing accountability and representation. But his recommendations come with caveats, explaining that alternative dispute resolution is not a cure to conflicts that define deliberation, but an aid to

achieving workable and less costly outcomes than the legal process has provided in the past.

An enhanced role for the public in environmental affairs has been a major thrust of environmental management study for the past three decades. "Documenting Public Concerns: The Effects of Alternative Methods," by Maureen R. McCarney, William D. Schreckhise, and Nicholas P. Lovrich, provides a useful overview of how multiple methods for discovering public concerns provide greater insight into differing publics and their respective concerns about sensitive environmental issues. Moreover, in their case analysis of the Hanford nuclear reservation in the state of Washington, they demonstrate how public participation is enhanced by using a variety of involvement strategies. In turn, these strategies provide more public input but also reach out to groups and interests that are often excluded in pro forma public participation efforts. Beyond the discussion of representativeness, Berton Lee Lamb, Nina Burkardt, and Donna Lybecker go a step further by examining decision-making patterns through institutional actors and special interests. "Decision Analysis Tools: Use of the Legal-Institutional Analysis Model" reports on the use of a decision analysis technique developed by the federal government to assist in determining how agencies and other representatives share goals or are at great odds in the bargaining process. Their discussion of the use of the legal-institutional analysis model provides a glimpse of the importance of tracking actors in decision-making settings and provides an example of one method for doing so.

Few frameworks for determining the extent of concern for the environment exceed risk analysis. Despite a huge literature, John Tennert and Dennis L. Soden suggest risk analysis does less than we may believe in enhancing the dialog about environmental issues. The components of risk analysis have garnered considerable attention and are fundamental concepts for public participation, but they argue that little has emerged in terms of tangible results and that continued refining of the principles of risk analysis is required.

In his discussion of indigenous peoples, Patrick C. West explores the conflicts that emerge in attempting to protect natural areas in the world when, in the course of protection, people living at the margins are often permanently displaced. West explores the critical social and ethical issues in preservation when people's fates are enmeshed in the policy process. These at-risk individuals become the externalities of a policy process that ignores some basic human rights in a quest to protect ecosystems. West calls for a reality check in the policy process to make sure that our efforts to protect include all the inhabitants and protect basic human rights, as well as the rights of nature.

In two closely linked chapters, "Environmental Justice and Equity" by Mark Kelso and "Ethical Discourse: An Exploration of Theories in Environmental Ethics" by Kara L. Lamb, the normative concerns of environmental policy are discussed. Kelso explores environmental justice from the perspective of levels of responsibility for environmental degradation and the obligation to help address environmental problems, especially among those who have harvested resources with little regard for the consequences for decades. Following this thinking, he discusses how developing nations can protect their environmental interests from a resource-hungry industrialized world. He sees environmental justice as a key issue in international environmental policymaking and administration for some time to come. Lamb follows in a discussion of theories of environmental ethics and suggests what we should or ought to do is a shared perspective among theories and that they differ from each other only in marginal ways. In the end, she proposes that

theories of environmental ethics achieve very similar effects, alerting society about threats to our natural world.

REFERENCES

Caldwell, Lynton. 1990. *International Environmental Policy*, 2nd ed. Durham, NC: Duke University Press.

Ehrlich, Paul R., Gretchen C. Daily, Scott C. Daily, Norman Myers, and James Salzman. 1997. "No Middle Way on the Environment." *Atlantic Monthly* December: 98–104.

Etzioni, Amitai. 1967. "Mixed-Scanning: A 'Third' Approach to Decision-making." *Public Administration Review* 27: 385–392.

Hardin, Garret. 1968. "The Tragedy of the Commons." *Science* 162: 1243–1248.

Morgan, Gareth. 1986. *Images of Organization*. Newbury Park, CA: Sage Publications.

Soden, Dennis L., Berton Lee Lamb, and John Tennert. 1998. *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

This page intentionally left blank

1

Of Global Concern*

Results of the Health of the Planet Survey

Riley E. Dunlap
Washington State University, Pullman, Washington

George H. Gallup, Jr.
George H. Gallup International Institute, Princeton, New Jersey

Alec M. Gallup
The Gallup Organization, Princeton, New Jersey

INTRODUCTION

Conventional wisdom has long held that concern about environmental quality is limited primarily to residents of wealthy, industrialized nations. Residents of the poorer, nonindustrialized nations are assumed to be too preoccupied with economic and physical survival to be concerned about environmental problems (Beckerman 1974). Not only has this assumption been widely held, but it has also been supported by social science analyses of environmentalism.

In accounting for the development of green parties and public support for environmental protection, political scientists typically argue that environmentalism stems from the emergence of "postmaterialist values" (Muller-Rommel 1989). Such values, it is argued, have resulted from post–World War II affluence in the industrialized nations and represent a growing emphasis on quality of life over economic welfare among generations that take the latter for granted (Inglehart 1990). Similarly, sociologists have viewed environmentalism as an exemplar of the new social movements—including the peace, antinuclear, and feminist movements—that have arisen within the wealthy, industrialized societies and that pursue life-style and quality-of-life goals rather than economic interests

*From *Environment* 35 (November): 6–15, 33–39. 1993. Reprinted with permission of the Helen Dwight Reid Educational Foundation. Published by Heldref Publications, 1319 Eighteenth Street, NW, Washington, DC 20036-1802.

(Buttel 1992). Finally, economists widely regard environmental quality as a "luxury good" that is likely to be of concern only to those who do not have to worry about food, housing, and economic survival (Baumol and Oates 1979). Because the emergence of postmaterialist values and the new social movements that espouse them are presumably dependent upon widespread, sustained affluence, it follows that most residents of the economically poor, nonindustrialized nations should view environmental quality as a luxury they cannot yet afford (Brechin and Kempton 1994; O'Riordan 1976).

The early emergence of environmentalism and green parties in the industrialized world (primarily in North America and Europe) lends support to the above perspectives (Brechin and Kempton in press; Rudig 1991; O'Riordan 1976), as did the wary reaction of nonindustrialized nations to the 1972 UN Conference on the Human Environment in Stockholm (Founex Report 1982). However, the more enthusiastic participation of such nations in the 1992 UN Conference on Environment and Development in Rio de Janeiro—a follow-up to the 1972 conference—and the gradual emergence of environmental activism in many nonindustrialized nations clearly pose challenges to conventional wisdom (Enge and Malkenes 1993; Haas et al. 1992; McCormick 1991; Durning 1989). It could be argued, however, that these phenomena are atypical and represent only the responses of government elites or tiny portions of the residents of poorer nations. In other words, conventional wisdom regarding differences in environmental concern between rich and poor nations might hold true at the level of the general public.

Existing surveys of public opinion toward environmental issues provide little insight into this issue because they tend to be confined to North America, Europe, and Japan (The Roper Organization 1992; United Nations Environment Programme 1988; Commission of the European Communities 1986). Indeed, little is known about the general public's views of environmental issues in nonindustrialized nations. Filling this void was a major goal of an international survey of public opinion about the environment sponsored by the George H. Gallup International Institute. Conducted in 24 nations and covering a wide range of geographical regions and economic levels, Gallup's "Health of the Planet" (HOP) survey was the largest environmental opinion survey ever conducted. Results of the survey allow for an in-depth examination of possible differences in citizens' views of environmental issues among both rich and poor nations.

SURVEY METHODOLOGY

The HOP survey was coordinated by the George H. Gallup International Institute and conducted by members of the worldwide network of Gallup affiliates. The selection of countries was dependent upon the existence of a Gallup affiliate or willing partner in each country and the availability of adequate funding.[1] Two dozen nations were included, but poorer, less economically developed nations (especially African nations) are underrepresented. The intent, however, was not to conduct a survey whose results could be generalized to the entire world (an unrealistic goal); rather, the goal was to survey citizens in a wide range of nations varied in both geographical location and level of economic development, and thereby go beyond existing multinational surveys that have been limited primarily to Europe and North America. The survey was reasonably successful in this respect, as it covered a greater number and wider range of nations than have ever been included in an environmental survey[2] (see Table 1) (Louis Harris and Associates 1989).

The affiliates were responsible for translating the questionnaire into the appropriate

Table 1 Nations Included in Health of the Planet Survey

Region/nation	Sample size	Survey organization
North America		
Canada	1011	Gallup Canada, Toronto
United States	1032	The Gallup Organization, Princeton, NJ
Latin America		
Brazil	1414	Instituto Gallup De Opiniao Publica, São Paulo
Chile	1000	Gallup Chile S.A., Santiago
Mexico	1502	IMOP S.A. de C.V., Gallup Mexico, Mexico City
Uruguay	800	Gallup Uruguay, Montevideo
East Asia		
Japan	1434	Nippon Research Center, Ltd., Tokyo
South Korea	1500	Korea Survey (Gallup Polls) Ltd., Seoul
Philippines	1000	Asia Research Organization, Inc., Manila
Other Asia		
India	4984	Indian Institute of Public Opinion, New Dehli
Turkey	1000	Piar Marketing Research Co., Ltd., Istanbul
Eastern Europe		
Hungary	1000	Gallup Hungary, Budapest
Poland	989	Demoskop, Warsaw
Russia	964	Institute of Sociology of the Russian Academy of Sciences, Moscow
Scandinavia		
Denmark	1019	Gallup—Denmark, Copenhagen
Finland	770	Suomen Gallup Oy, Helsinki
Norway	991	Norsk Gallup Institutt A/S, Oslo
Other Europe		
Germany	1048	EMNID—Institut GmbH & Co., Bielefeld
Great Britain	1105	Social Surveys (Gallup Poll) Ltd., London
Ireland	928	Irish Marketing Surveys, Ltd., Dublin
Netherlands	1011	NIPO, Amsterdam
Portugal	1000	NORMA, Lisbon
Switzerland	1011	ISOPUBLIC, Zurich
Africa		
Nigeria	1195	Research and Marketing Services, Ltd., Lagos

language(s) for their nations, and then the Gallup International Institute had them "back-translated" into English to ensure comparability. The surveys were conducted via face-to-face, in-home interviews, thus minimizing problems of illiteracy, and were all completed during the first quarter of 1992. Nationally, representative samples were used in all nations but India, where rural areas and regions experiencing terrorism were underrepresented (and thus caution must be used in generalizing the results to the nation as a whole). Sample sizes ranged from a low of 770 in Finland to nearly 5000 in India, and most were within the 1000–1500 range. The samples, therefore, yielded results that should have margins of error of approximately 3% of the entire national populations (Dunlap et al. 1993a).

The 24 nations included in the survey include 11 classified as high-income nations by the World Bank on the basis of per-capita gross national product (GNP) and 13

covering the remaining categories of high-medium, low-medium, and low-income nations (World Bank 1992).[3] To facilitate comparisons across nations, the results are presented here grouped in two sets of a dozen nations each, labeled "industrialized nations" and "developing nations." (Portugal was classified among the industrialized nations, even though it ranks just below South Korea—the wealthiest of the developing nations in the survey—in per-capita GNP because of Portugal's geographical proximity and cultural similarity to other European nations in the survey.) Comparing citizens' views of environmental issues across these two sets of nations should provide a reasonable test of the popular notion that public concern for environmental quality is much stronger among the wealthy, industrialized nations than among their less economically developed counterparts (Dunlap et al. 1993a).

The HOP survey included a wide range of questions dealing with perceptions of the seriousness of environmental problems and support for environmental protection. This chapter, however, will discuss only the responses to those questions that are particularly relevant to testing conventional wisdom about differences between residents of the wealthy nations and those of the poorer ones. The existence of frequent large variations within the two sets of nations will be downplayed in the interest of brevity, but the variations are evident in the figures detailing the survey's results.

THE IMPORTANCE OF ENVIRONMENTAL PROBLEMS

The environment competes with many other problems for public attention, and it has been argued in the United States that, although the U.S. public expresses proenvironmental opinions when given the opportunity to do so, environmental problems are not considered terribly important. In other words, it has been suggested that the environment is not a "salient" issue, one that is on people's minds and is a high priority to them. Salience is often measured by asking people open-ended questions about the "most serious problem(s)" facing their nation, and problems that are volunteered most frequently are judged to be the most salient (Dunlap 1989). To obtain an indicator of the salience of environmental problems, the HOP survey began with the question—before respondents were aware of the survey's particular emphasis on environmental issues—"What do you think is the most important problem facing our nation today?" The percentages of people who volunteered some type of environmental problem are shown in Figure 1.

In the United States, economic problems, such as unemployment and inflation, and international tensions, such as wars and the threat of nuclear war, tend to dominate responses to such questions, and seldom have more than 10% of respondents volunteered environmental problems.[4] Indeed, very few problems consistently reach the 10% level because "most serious problem" responses are volatile and vary with media and policy-making attention. Consequently, only small fractions of the publics in the industrialized nations were expected to volunteer environmental problems, and hardly any were expected to do so in the developing nations. The expectations were wrong.

Although economic problems are the most frequently volunteered problems in most (22 out of 24) nations, environmental problems are prominently mentioned in many of them, as shown in Figure 1. In 16 of the 24 countries, environmental problems are among the top three most frequently mentioned national problems. Among the industrialized nations, the percentages volunteering environmental problems as their nation's most serious problem ranged from a low of 3% in Great Britain to an amazing high of 39% in the Netherlands and Ireland (although, in the latter country, respondents had been clued

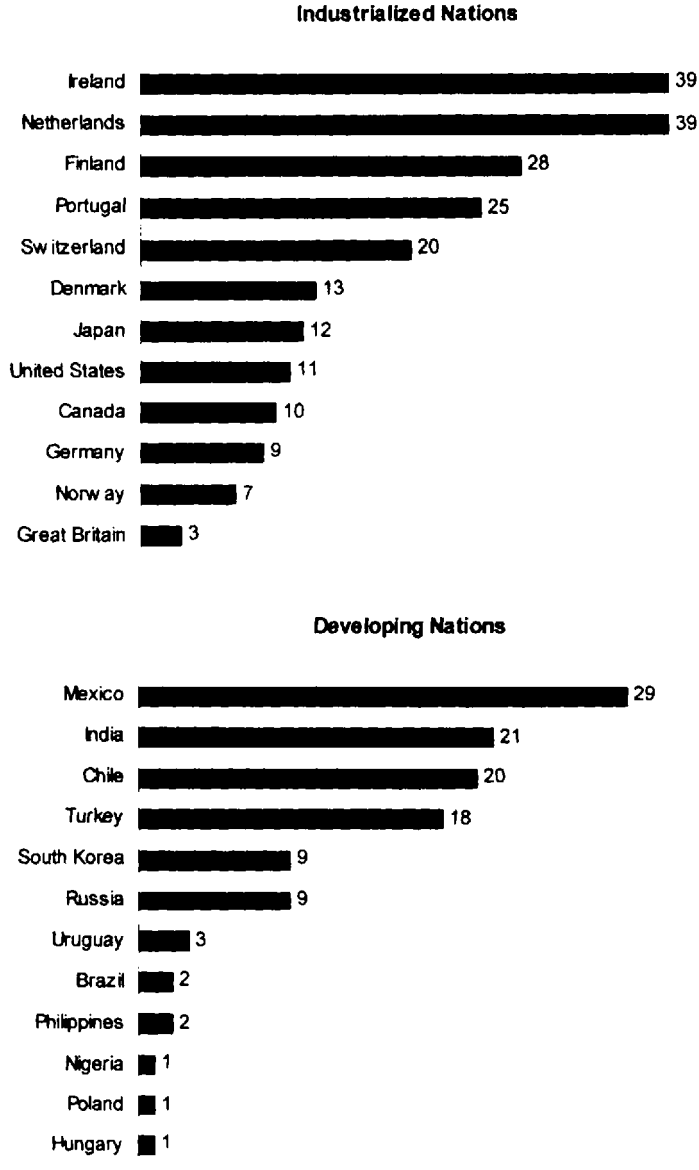

Figure 1 "What do you think is the most important problem facing our nation today?" Percentages of respondents volunteering that environmental problems are the most important problem facing their nation. (From Dunlap et al. 1993a.)

about the survey's interest in environmental issues at the outset, likely biasing the responses to this item).[5] Even more surprising is that substantial percentages of respondents in several of the developing nations volunteered environmental problems: 9% or more did so in six developing countries.

Although environmental problems are more likely to be volunteered in the industrialized nations (showing up among the top three mentions in 10 industrialized countries, compared to six of the developing nations), it is significant that they are mentioned frequently in several of the developing nations and are at least detectable in all of them (the 1% in Nigeria, Poland, and Hungary matches levels often reported in the United States during the 1970s and 1980s). This suggests that environmental issues have penetrated the public agendas of all of the nations in the survey and have become very salient in most of the industrialized nations and in several of the developing nations. Despite the enormous range of problems facing developing nations, it is clear that environmental quality has become a major issue in many of them.

Another way in which survey researchers try to measure the relative importance of an issue is to ask about it in the context of other issues (Dunlap 1989), which was done in the second question. Again before respondents were aware of the survey's special focus on the environment, researchers read them "a list of issues and problems currently facing many countries," including hunger and homelessness, crime and violence, poor health care, high cost of living, and prejudice and discrimination, along with the environment. Respondents were asked to rate the seriousness of each of these issues in their nations. The percentages of people rating environmental issues as "very serious" are shown in Figure 2.

Strikingly, environmental quality is widely seen as a serious problem throughout the countries and as more serious among residents of the developing nations than among those of the industrialized countries. Not surprisingly, however, residents of the developing nations are more likely to rate all of the problems as very serious than are their counterparts in the industrialized world. The low rating given to the environment in countries like the Netherlands stems from the fact that few of the problems are rated as very serious there. In fact, despite their overall lower ratings in the industrialized nations, environmental problems are among the three (out of six) most likely to be rated as "very serious" in eight of the industrialized nations compared to only three of the developing nations.

It is debatable whether the absolute percentages rating environmental problems as "very serious" in their nations or the ranking of those percentages relative to those for the other five problems is the better measure of "environmental concern." It is also beside the point in the present context because the results indicate that public concern over environmental problems is widespread and certainly not limited primarily to the industrialized nations in the survey.

This conclusion is bolstered by responses to another question, asked after researchers had informed respondents of the survey's particular interest in environmental issues. Employing a standard indicator of environmental concern, researchers asked respondents directly, "How concerned are you personally about environmental problems?" The results for this question are the most surprising yet reported, both because of the exceptionally high levels of environmental concern reported throughout most of the nations and because the reported levels of concern tend to be higher in the developing than in the industrialized nations (see Figure 3). Majorities in 21 of the 24 nations report at least a fair amount of concern about environmental problems; and in 10 of the developing countries—as compared to only seven of the industrialized countries—70% or more re-

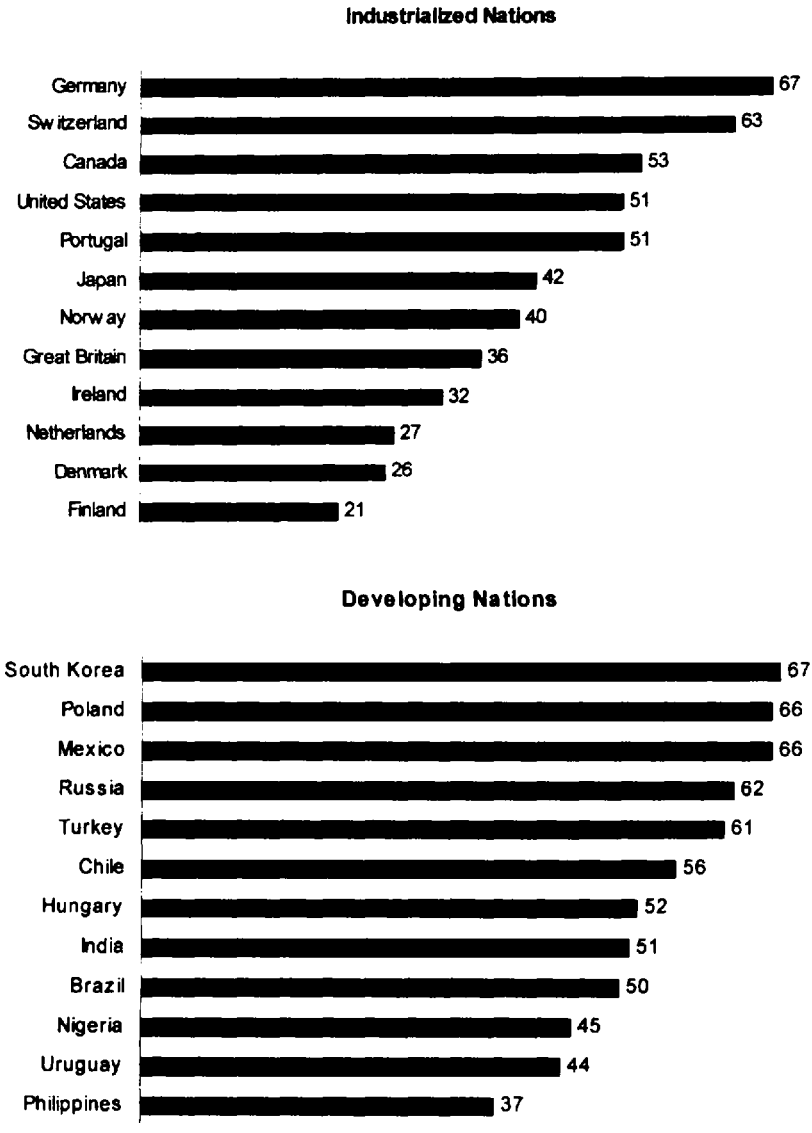

Figure 2 "I'm going to read a list of issues and problems currently facing many countries. For each one, please tell me how serious a problem you consider it to be in our nation—very serious, somewhat serious, not very serious, or not at all serious?" Percentages of respondents who say that environmental problems are a "very serious" issue in the nation. (From Dunlap et al. 1993a.)

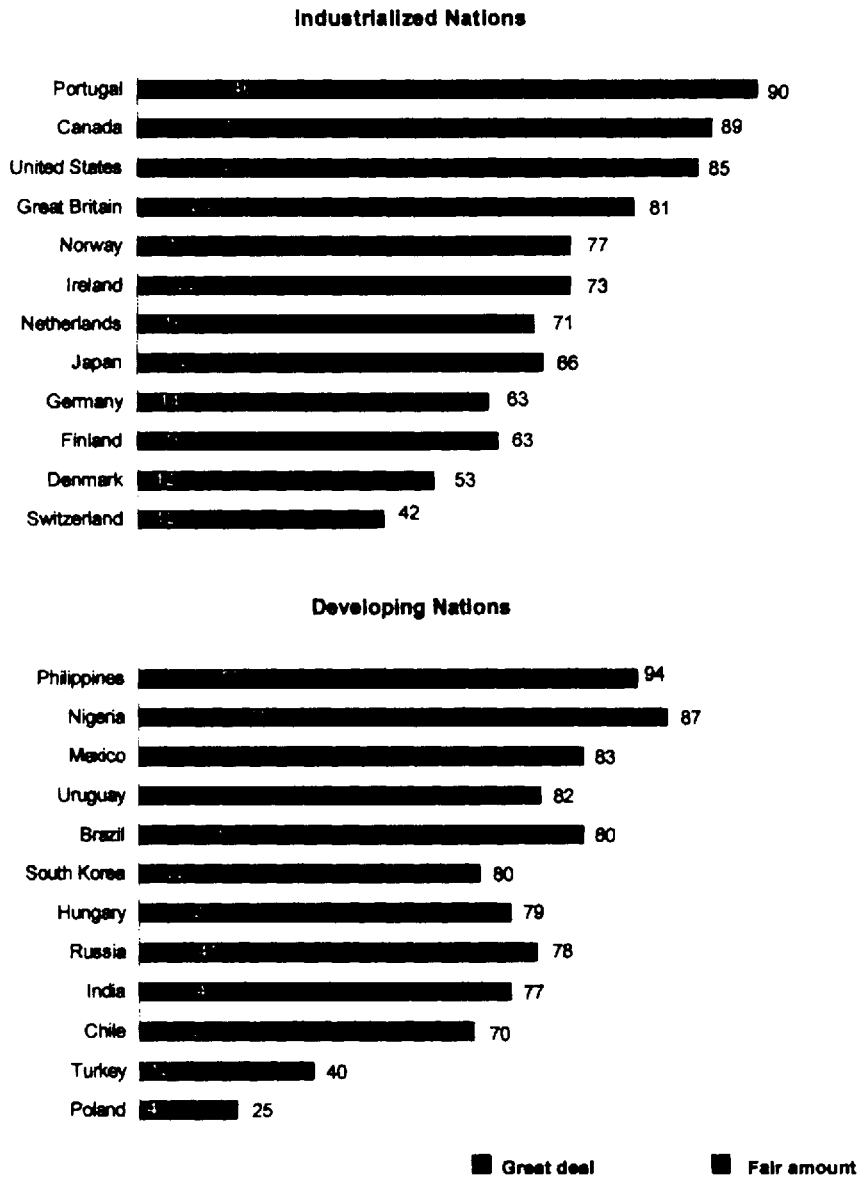

Figure 3 "How concerned are you personally about environmental problems—would you say a great deal, a fair amount, not very much, or not at all?" Percentages of respondents who say they are personally concerned about the environment a "great deal" or a "fair amount." (From Dunlap et al. 1993a.)

port this degree of concern. (The low level of concern reported in Poland likely stems from the question being poorly translated as "How much attention do you give to environmental problems?" which was discovered after the fact.) The percentages reporting "a great deal" of concern follow the same pattern and are especially high in some of the poorest nations—Nigeria,[6] the Philippines, Brazil, and Mexico (Mumme 1991).

The results in Figure 3 contradict the conventional wisdom that citizens of the industrialized nations are more concerned about such problems than are those of the developing nations. Combined with the results of the first two survey questions, they suggest that conventional wisdom is in need of revision. Although the patterns vary somewhat depending on the question asked, overall, it seems fair to say, there is little difference in reported levels of environmental concern between the people of poor, less economically developed nations and those of the richer, highly industrialized nations.

RATINGS OF ENVIRONMENTAL QUALITY

To get a sense of why people around the world are so concerned about environmental problems, the researchers asked them to rate the quality of the environment at the national, local, and world levels. This question also served as a transition to the specifically environmental focus of the questionnaire (it was asked immediately prior to the one in Figure 3) and as a means of clarifying exactly what was meant by environment. After defining environment as "your surroundings—both the natural environment—the air, water, land, and plants and animals—as well as buildings, streets, and the like," researchers asked respondents to "rate the quality of the environment" for their nation, then for their local community, and finally for the world as a whole. The results for all three ratings are shown in Figure 4, where the percentages saying "very bad" or fairly bad" are reported.

A number of patterns in the ratings of the three levels of environment are worth noting. First, consistent with prior findings, respondents are generally more likely to rate their nation's environment negatively than they are their local community's environment, with Turkey and Finland the only exceptions (Murch 1971). They are also more likely to see the world's environment as worse than their nation's, with six exceptions. In the three Eastern European nations (Russia, Hungary, and Poland), Nigeria, India, and the increasingly industrialized South Korea, a higher proportion of respondents gave their nation's environment a poor rating than gave the world's environment such a rating. In the remainder of the countries (with the exception of Turkey and Finland, as noted above), the more distant the environment, the more negatively it was rated.

Notable differences also exist between the environmental ratings of citizens of the industrialized nations and those of the developing nations. Overall, those residing in the industrialized nations are much less likely to rate their community environments negatively than are those living in the developing nations. In eight of the developing nations, more than 40% of those surveyed rate their community environments negatively, while the highest figure for an industrialized nation is 31% (in Japan). A similar pattern holds for ratings of the national environment: majorities in eight of the developing countries rate their national environments negatively, while this is true only of Japan among the industrialized nations.

A different pattern emerges in ratings of the world's environment. In all 12 of the industrialized nations, two-thirds or more of the respondents rate the world environment negatively, while this is the case in "only" six of the developing nations (although majorities rate the world environment negatively in nine of the latter). In general, however,

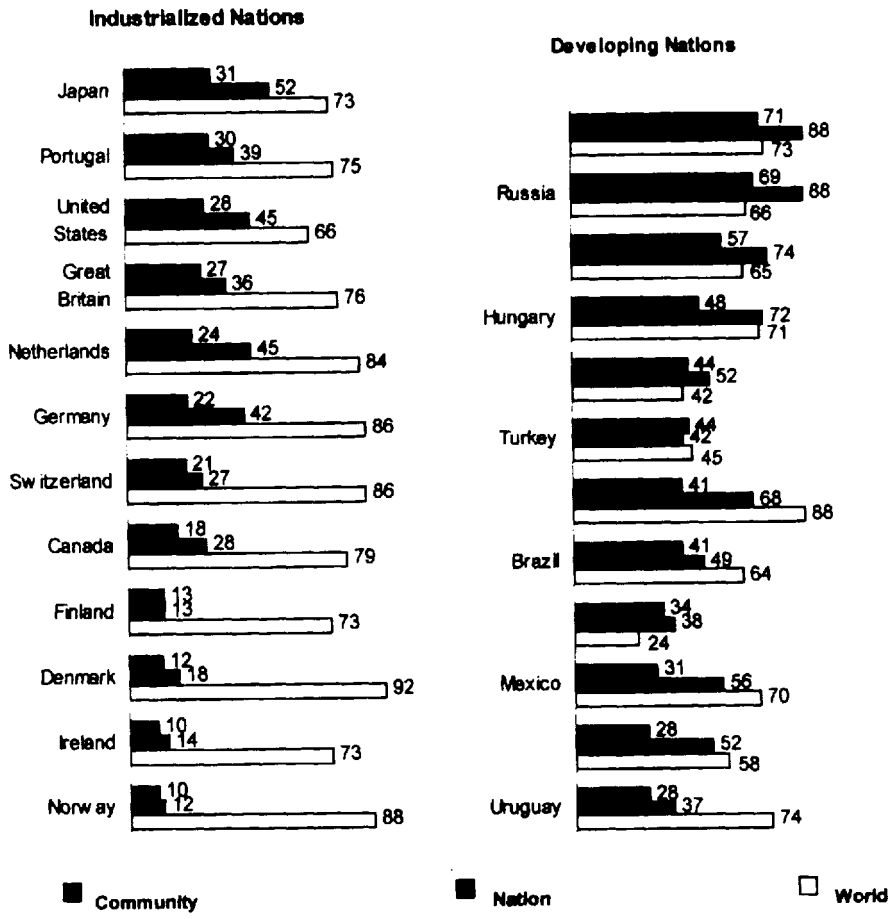

Figure 4 "Overall, how would you rate the quality of the environment (1) in our nation, (2) here in your local community, (3) of the world as a whole? Very good, fairly good, fairly bad, or very bad?" Percentages of respondents who rate the quality of their environments as "very" or "fairly" bad. (From Dunlap et al. 1993a.)

there is less difference between the industrialized and developing nations in ratings of the world environment than in ratings of national and community environments. This pattern probably reflects the fact that perceptions of worldwide environmental quality are heavily shaped by the media, which is somewhat standardized around the world, while perceptions of national and especially local environments are shaped relatively more by first-hand experiences[7] (see Dunlap et al. 1993a: tables 5 and 6).

The ratings of community and national environments correspond to the general images of variation in environmental quality across these nations. The local and national environments are rated as "very" or "fairly" bad most frequently by respondents in the three Eastern European nations and South Korea, which are known to be heavily polluted, and least frequently by respondents in the three Scandinavian nations and Ireland, all of which have reputations for clean environments (French 1991; World Resources Institute 1990). Such patterns support the general validity of the survey's findings and

thus lend support to the prior, unexpected findings on citizen concern about environmental quality.

The ratings of environmental quality also provide insight into the probable evolution of the current widespread international concern about environmental quality. In some nations, particularly those that have suffered severe levels of environmental degradation, the national and even community environments are seen as being in bad condition. In other countries, the local and national environments are viewed positively, but the global environment is not. This implies that the high levels of environmental concern reported earlier likely have multiple sources, including first-hand observation of or experience with environmental deterioration and information about distant and imperceptible problems, such as ozone depletion. The former seems more probable within the poorer nations, and the latter more so within the richer nations. That environmental problems may range from local to global and that people living in areas with good environments are aware that many others do not have such environments likely served to generate worldwide concern.

ENVIRONMENTAL PROBLEMS AS HEALTH THREATS

At the time of the 1972 Stockholm conference, environmental problems were often viewed as mainly aesthetic issues or threats to the beauty of nature. In fact, this perception probably accounted for the cool reception given to environmental protection by the developing nations at that time (Founex Report 1982). In the past two decades, however, there has been a growing awareness that environmental problems pose threats to human health, and this realization appears to have contributed to the rising concern about environmental deterioration observed in the United States and Europe (Dunlap and Scarce 1992). To determine if poor environmental conditions are viewed as health threats in other nations and whether this perception varies between the industrialized and developing countries, researchers asked respondents to indicate "how much, if at all, you believe environmental problems now affect your health." They were then asked if it affected their health 10 years ago, and if they thought it would "affect the health of your children and grandchildren—say over the next 25 years." The results for these three questions are shown in Figure 5, where the two sets of nations are each ranked according to the percentages saying that environmental problems affected their health either "a great deal" or "a fair amount" 10 years ago.

The most striking feature of the results is the strong increase in reported health effects over time. Although majorities in only four nations report having experienced significant health effects 10 years ago, majorities in 16 nations report present health effects. Furthermore, majorities in all 24 countries believe that environmental problems will affect the health of their children and grandchildren over the next 25 years. In fact, in 19 countries, more than 70% believe this, which indicates that perception of environmental problems as a health threat—especially for the next generation—has become commonplace around the world. Residents of developing nations are a bit more likely to report health effects 10 years ago and much more likely to do so at present than residents of industrialized countries. Majorities in 11 developing nations (all except Uruguay) say their health is now being affected by environmental problems at least a fair amount, compared to majorities in "only" five of the industrialized nations. The figures are especially high in Russia, Poland, and South Korea, three of the most polluted nations in the

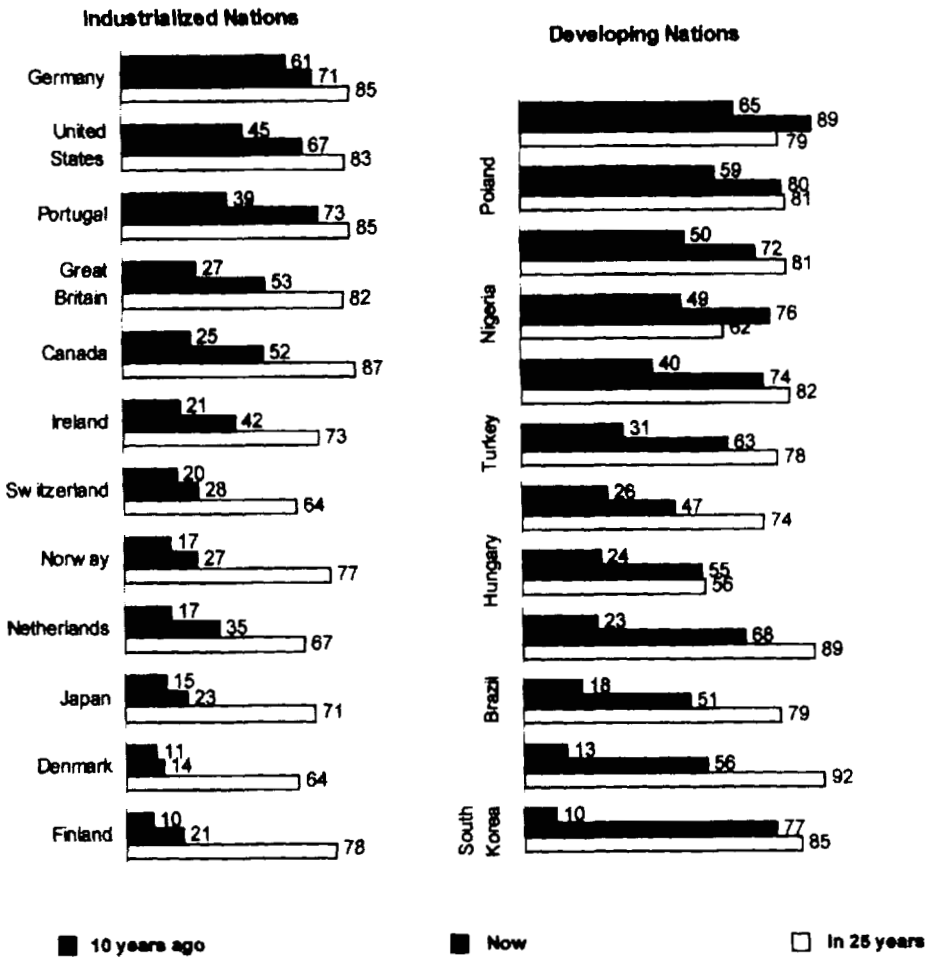

Figure 5 "How much, if at all, do you believe environmental problems (1) now affect your health, (2) affected your health in the past—say 10 years ago, (3) will affect the health of our children and grandchildren—say over the next 25 years? A great deal, a fair amount, not very much, or not at all?" Percentage of respondents who say that environmental problems affect their health "a great deal" or "a fair amount." (From Dunlap et al. 1993a.)

survey, and quite low in the Scandinavian countries and Japan. There is less difference between the two sets of nations in perceived health effects 25 years from now, as large majorities in most countries think that the health of their children and grandchildren will be affected by environmental problems. However, this perception is somewhat stronger in the developing nations.

Overall, then, residents of the poorer nations—which often suffer from poor water quality and high levels of urban air pollution—are much more likely to see their health as being negatively affected by environmental problems at present. When the focus is on perceived health impacts 25 years from now, majorities in all nations believe that future generations will be affected (the discrepancy between perceptions of current and future

conditions is especially large in several industrialized nations). This belief helps explain the surprisingly high levels of concern about environmental quality among residents of all types of nations. Environmental problems are no longer viewed as just a threat to quality of life and, thus, as primarily of concern to postmaterialists but are considered a fundamental threat to human welfare (for more on the international dimensions of environmental problems, see Dunlap 1994). This threat is especially great in poor nations, where people often depend directly on the immediate environment for sustenance (food, water, fuel, and building materials) and environmental degradation therefore threatens their very survival (Durning 1989).

ENVIRONMENTAL PROTECTION AND ECONOMICS

Despite the increasing emphasis being placed on the goal of sustainable development, or the achievement of economic growth without environmental deterioration, environmental protection is still widely viewed as often conflicting with economic growth (Redclift 1992; Lele 1991). Although aware of the potential shortcomings of questions that put the environment and economy in opposition, researchers nonetheless included a couple of questions that forced respondents to make trade-offs between the two. Such questions are relevant to policymaking because they deal with a topic that in theory should most clearly differentiate residents of poor countries from those of wealthy ones. Indeed, it could be argued that, although the poor may be as concerned about their environment as the rich, poor people should of necessity be less willing to make any economic sacrifices needed to protect the environment.

The first question that posed the "environment-versus-economy" trade-off at the societal level was one frequently used in the United States (Dunlap and Scarce 1991: 668). The respondents were asked whether "protecting the environment should be given priority, even at the risk of slowing down economic growth," or whether "economic growth should be given priority, even if the environment suffers to some extent." (Volunteered responses of "both equally" were also coded and exceeded 10% in 17 nations.) Surprisingly, the percentages choosing environmental protection exceed those choosing economic growth in every nation except Nigeria, and majorities choose environmental protection in all but Nigeria, India, and Turkey (see Figure 6). Environmental protection is endorsed by pluralities in the latter two—only 31% in India and 17% in Turkey choose economic growth—and the remainders are split between "equal priority" and either "don't know" or "no answer." Even more surprising is the fact that there is not a major difference between the industrialized and the developing nations in relative emphasis on environmental protection over economic growth. The widespread assumption that residents of poor nations are willing to accept environmental degradation in return for economic growth is not supported by these results. Overall, citizens of the developing nations are only slightly less enthusiastic in their support for environmental protection at the expense of economic growth (should that be necessary).

The next question, which is also used in the United States, turned from the societal to the personal level, asking respondents if they would be willing to pay higher prices so that industry could better protect the environment (Dunlap and Scarce 1991: 669). In view of the enormous differences in per-capita income levels across the 24 nations (World Bank 1992), dramatic differences were expected between residents of the rich and poor countries in willingness to pay for environmental protection. For example, 1990

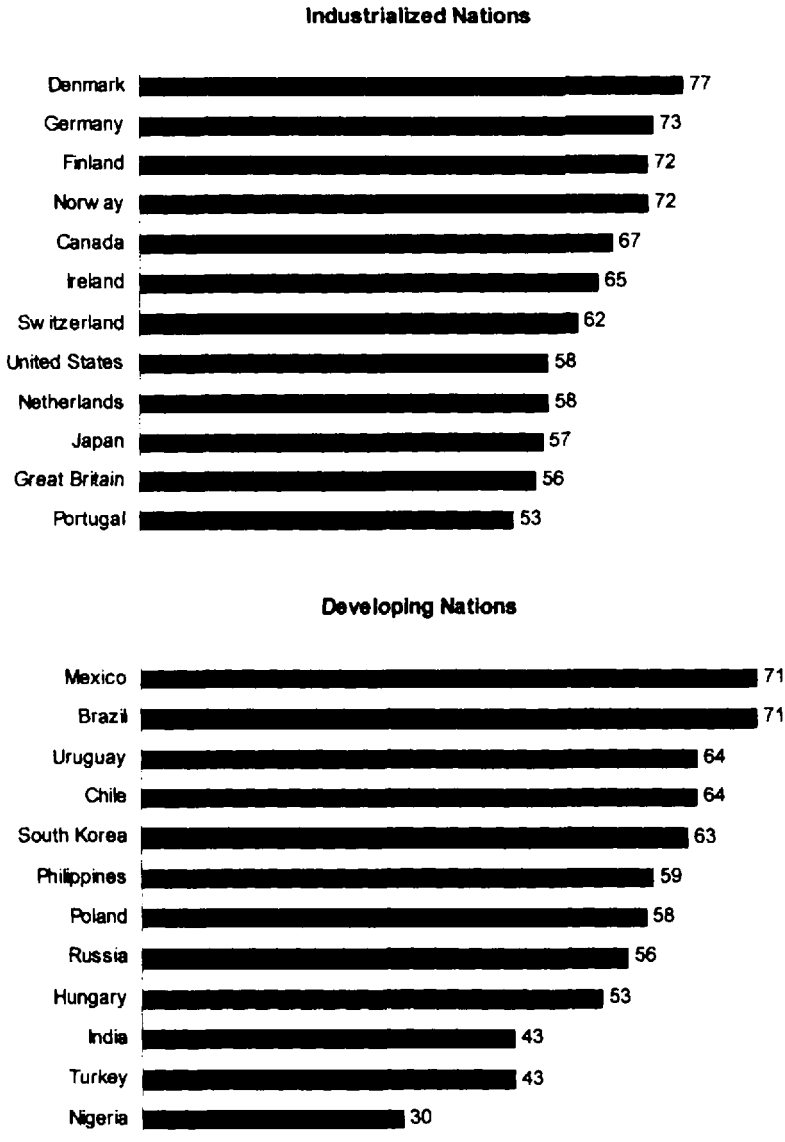

Figure 6 "With which of these statements about the environment and the economy do you most agree" protecting the environment should be given priority, even at the risk of slowing down economic growth, (or) economic growth should be given priority, even if the environment suffers to some extent?" Percentage of respondents who choose protecting the environment over economic growth. (From Dunlap et al. 1993a.)

per-capita gross national product ranges from a low of $290 in Nigeria to a high of $32,680 in Switzerland. Again, the results came as a surprise. Consistent with prior evidence of worldwide concern about the environment, majorities in 17 nations and pluralities in four nations say they are willing to pay higher prices (see Figure 7). In only three nations—Nigeria, the Philippines, and Japan—do pluralities say they are not willing to pay higher prices (the percentages saying "not sure" or "don't know" are often sizable).

Although residents of the industrialized nations are clearly more likely to say they are willing to pay higher prices for environmental protection than are residents of the developing nations, the differences are not as large as one might expect in view of the much larger variation in the "ability" to pay and in residents' relative impact on the environment. It has been estimated, for example, that the environmental impact of the average U.S. resident is 35 times that of the average resident of India (Ehrlich and Ehrlich 1990). The results of this question and the prior one suggest that, even when it comes to trade-offs between environmental protection and economic welfare, citizens of the poorer, nonindustrialized nations are not that much less supportive of environmental quality than are their counterparts in the wealthier, industrialized nations. Policies that avoid the economy-environment trade-off by pursuing economic growth that is ecologically sustainable and especially policies calling for equitable contributions toward environmental protection from residents of rich and poor countries should receive even stronger support within the developing nations.

THE ROLE OF CITIZEN ACTION

Individuals can, of course, do much more to protect the environment than pay higher prices, and the current worldwide attention to environmental quality has been stimulated in large part by citizen activism—ranging from international campaigns such as those waged by Greenpeace and other large organizations to local, grass-roots efforts. Although environmental activism has been widespread in the United States, it has been argued that a key factor preventing U.S. citizens from taking more action is that the environment is widely viewed as an institutional problem (Dunlap 1991); that is, environmental problems are seen as being caused by one institution—business—and their solutions are thought to rest with another institution—government—leaving little role for individual citizens. To examine the prevalence of such a perception internationally, researchers asked respondents about who "should have the primary responsibility for protecting the environment in (their) nation—the government, business and industry, or individual citizens and citizens groups."

Majorities in seven nations and pluralities in another eight said that government has the primary responsibility to protect the environment. In only four countries—Poland, Korea, the Netherlands, and Finland—did pluralities assign primary responsibility to business and industry. In the remaining five nations of Chile, Mexico, Uruguay, Brazil, and Switzerland, primary responsibility was assigned by pluralities to citizens and citizens groups (see Figure 8). It is apparent that this response is somewhat more likely in the developing than in the industrialized nations and is especially pronounced among the Latin American nations. This pattern would be more distinct were it not for the abnormally low levels of responsibility assigned to citizens in Russia and Poland, which could reflect the low levels of citizen efficacy in these formerly totalitarian nations.

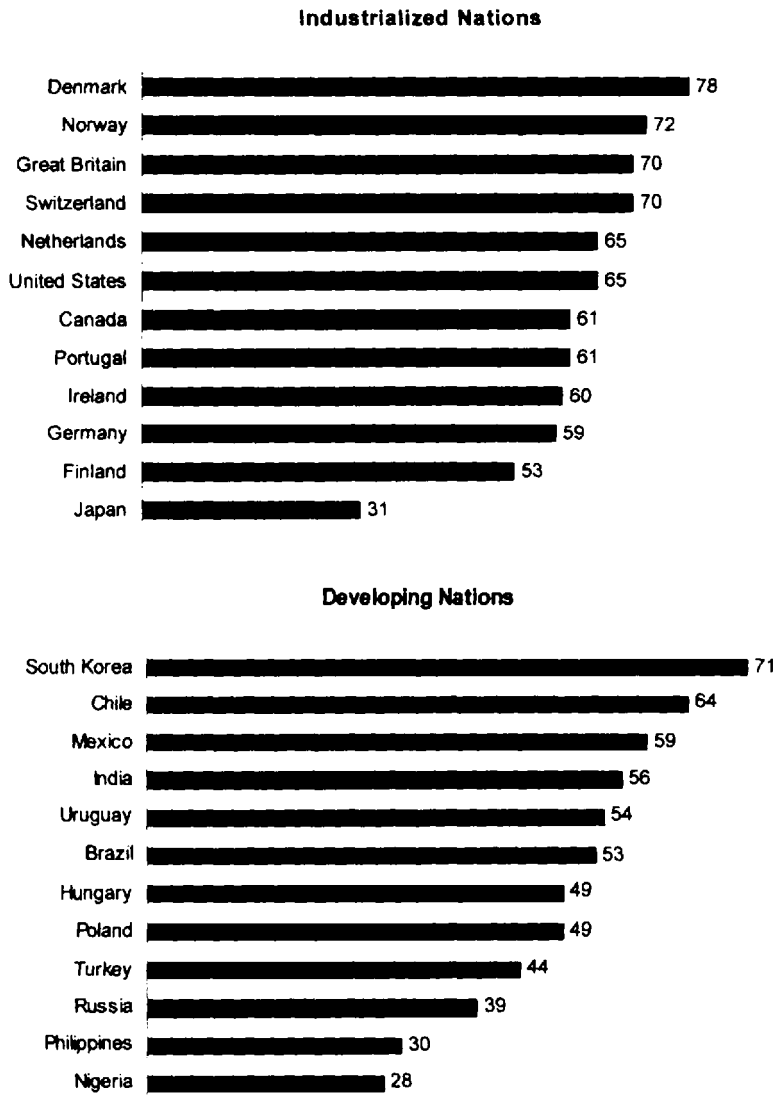

Figure 7 "Increased efforts by business and industry to improve environmental quality might lead to higher prices for the things you buy. Would you be willing to pay higher process so that industry could better protect the environment or not?" Percentage of respondents who say they are willing to pay higher prices to protect the environment. (From Dunlap et al. 1993a.)

A subsequent question dealt more directly with the perceived efficacy of citizen action, as researchers asked, "How much effect can individual citizens and citizens groups have on solving our environmental problems?" The percentages responding "a great deal" are shown in Figure 9, and the pattern of results is parallel to those in Figure 8. Overall, residents of the developing nations are more likely than their counterparts in the industrialized nations to think that citizens can play an effective role in solving

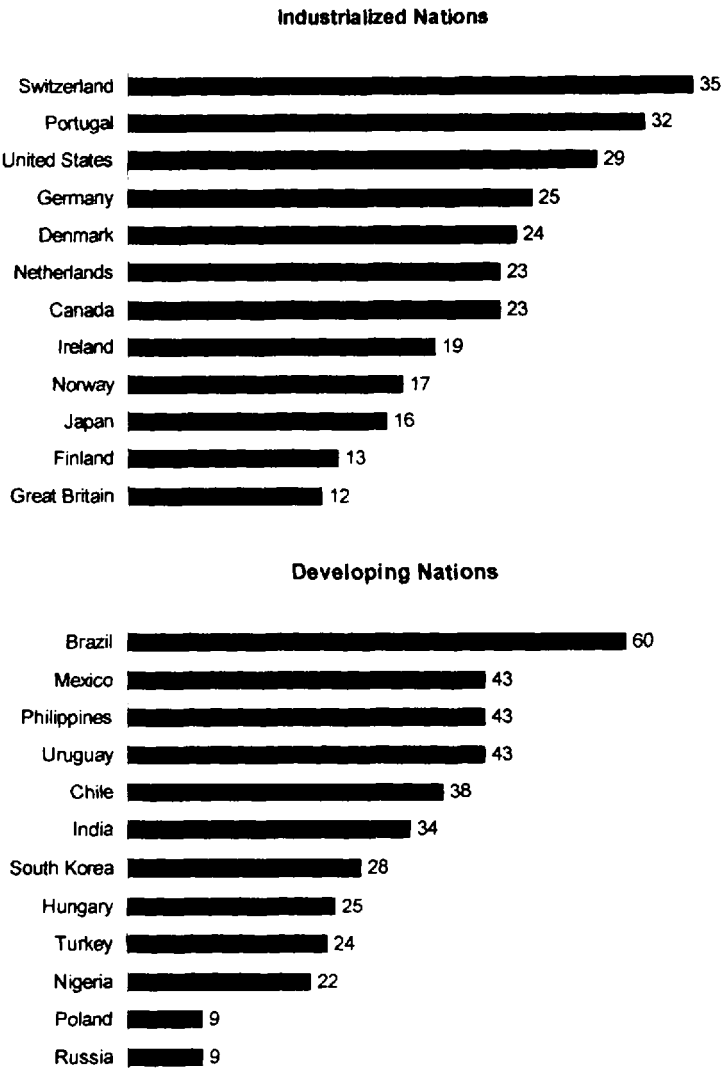

Figure 8 "Which one of these do you believe should have the primary responsibility for protecting the environment in our nation—the government, business and industry, or individual citizens and citizens of groups?" Percentages of respondents who say citizens should have primary responsibility for environmental protection. (From Dunlap et al. 1993a.)

environmental problems, with the three Eastern European nations being striking exceptions.

Together, the results of these two questions suggest that viewing environmental quality as a problem to be solved by institutions is more prevalent in the wealthier countries. Residents of the developing nations are somewhat more likely to think that citizens should be responsible for environmental protection and are even more likely to think that citizen action can be effective in this regard. In part, this divergence may stem

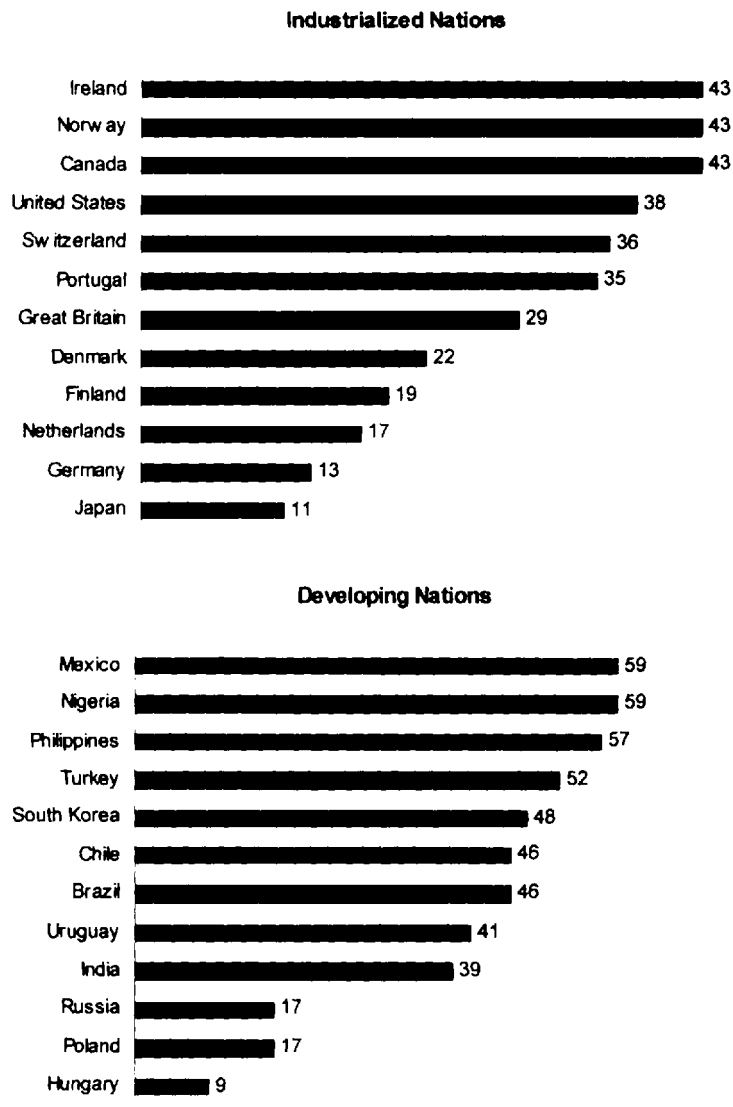

Figure 9 "In your opinion, how much of an effect can individual citizens' groups have on solving our environmental problems?" Percentage of respondents who say individuals and citizens groups can have "a great deal" of effect on solving environmental problems. (From Dunlap et al. 1993a.)"

from perceived differences in the ability of governments to protect the environment, but it may also reflect the growing reliance on citizen action to achieve environmental protection within poorer nations (Enge and Malkenes 1993; Durning 1989). Although these results seem to predict a continuing heavy emphasis on the efforts of nongovernmental organizations (NGOs) to protect environmental quality in the developing nations, the vulnerability of citizen action to political repression in nondemocratic countries will con-

tinue to pose a severe challenge to these efforts. Increased democracy, in turn, will probably depend on reductions in economic inequalities (especially land tenure). Therefore, at least some advocates of sustainable development emphasize the pursuit of environmental protection, political democracy, and socioeconomic equity as interdependent goals (Redclift 1992; Lele 1991). Examples of repression of environmental activists are by no means confined to developing nations (Day 1989).

ANALYZING THE RESULTS

The inescapable conclusion to be drawn from the results of the HOP survey is that conventional wisdom is wrong about the existence of major differences in levels of environmental concern between citizens of rich and poor nations. Environmental problems are salient and important issues in both wealthy and poor nations, and residents of poor nations express as much concern about environmental quality as do those living in wealthy nations. In part, this unexpected finding may stem from the fact that people living in the poorer nations are more likely to see their local and national environments as being in poor condition and their health as being negatively affected by these conditions than are their counterparts in the wealthy nations. Even when it comes to environment-versus-economic trade-offs, little difference exists between those living in the wealthy, industrialized nations and those in the developing nations: Both give strong endorsement to environmental protection. Finally, residents of the poorer nations are more likely to assign responsibility for environmental protection to citizens and to have a greater sense of efficacy in citizen action.

Although surprising, these findings are consistent with the enthusiastic participation of nations from all economic strata in the 1992 UN Conference on Environment and Development in Rio de Janeiro and especially with the high level of citizen participation via NGOs at the nongovernmental Global Forum held in conjunction with the conference. NGOs from developing nations were particularly active at the Global Forum, and the survey's results suggest that environmentalism within these nations is likely to continue to be driven by local, grassroots efforts—in contrast to the major roles played by green parties and large, national organizations in Europe and North America. Of course, the results also suggest that efforts to protect the environment will continue to draw widespread public support throughout the world.

Conventional wisdom about social affairs is often proven wrong by research, especially research that focuses on previously unexamined assumptions, as in the present case. But what makes the survey's results so interesting is that they also call into question widely held theoretical perspectives throughout the social sciences about the sources of environmentalism and environmental concern. The idea that environmental quality is a luxury affordable only by those who have enough economic security to pursue quality-of-life goals is inconsistent with the high levels of public concern for environmental problems found in many developing nations. Although the survey probably would have indicated greater differences had it been possible to conduct surveys in nations facing desperate situations—such as Ethiopia, Somalia, and Bangladesh—countries like Nigeria, India, and the Philippines are nonetheless poor countries by any reasonable standard.

In part, the findings of strong environmental concern throughout the 24 nations may reflect the fact that environmental quality is no longer seen as a postmaterialist value and that environmental degradation is increasingly recognized as a direct threat to

human health and welfare. Indeed, protecting one's family from environmental hazards seems to be joining the provision of food, clothing, and shelter as a basic human goal. But in part, the results of the survey may also reflect the fact that social science analyses of environmentalism—which have focused primarily on industrialized nations—have downplayed the role of direct human experience with environmental degradation, which is especially noticeable at the local levels in the poorer nations (Buttel 1992). These analyses have also largely ignored the growing credibility of the core tenet of an environmental worldview, a worldview that has emerged in modern societies, that the Earth may be unable to cope with the increasing scale of human impact (Caldwell 1992; Oates 1989). This worldview has been given enormous credibility by the growing scientific consensus on the reality—if not the specifics—of human-induced global environmental change (Stern et al. 1992). Personal experience, combined with increased awareness of the global impact of human activities, has likely made people around the world begin to recognize that their welfare is inextricably related to that of the environment. High levels of environmental awareness and concern throughout the world, especially in the nonindustrialized countries, may stem more from worldwide emergence of this ecological perspective (Dunlap et al. 1993b) than from the growth of postmaterialist values (Steger et al. 1989) within affluent nations.

Whatever their origins, the high levels of citizen concern for environmental quality documented in the HOP survey will come as welcome news to those eager to further efforts to protect the global environment. Despite the fact that translating environmental concern into action, whether at the individual or governmental level, is always problematic (O'Riordan 1976; Dunlap 1991)—and will be especially so at the international level—the existence of such concern seems a requisite for effective action. That strong public concern for environmental protection exists throughout the world, including regions where it was assumed to be absent, is important news.

ENDNOTES

1. Grants were received from the governments of Norway and the United States; the Audubon Society; the Teresa and H. John Heinz III Foundation; the Winslow Foundation; the World Wide Fund for Nature, International, Distribuidora Chilectra Metroopolitana, S.A.; the Life Insurance Corporation of India; the East Asiatic Company, Ltd; Novo Nordisk A/S; Barcardi y Compania and Landscape (Switzerland); and ASIC/Swiss Society of Consulting Engineers.

2. The most comprehensive effort prior to Gallup's Health of the Planet Survey was a 16-nation survey conducted by Louis Harris and Associates for UNEP in 1988 and 1989. However, in most of the nations included in that study, the samples were quite small (ranging from 300 to 600), resulting in large sampling errors. Furthermore, in the nonindustrialized nations, the samples were typically limited to residents of large urban areas, and consequently the results cannot be generalized to the adult populations of those nations.

3. Because figures for Russia were unavailable in the 1992 report, that nation's classification was determined by figures provided by the Institute of Sociology at the Russian Academy of Sciences.

4. "Most serious problem" questions that ask for the two or three most important problems sometimes yield higher results (Dunlap and Scarce 1991).

5. In Ireland, the HOP questions were included in a larger questionnaire, and environment was mentioned in a transition from the other questions.

6. The exceptionally high level of environmental concern recorded in Nigeria may stem from the fact that the last Saturday of every month is devoted to "national environmental sanitation day," during which sewage systems, homes, and local environments are cleaned up. Local cleanup efforts are enforced by the government and encouraged by voluntary associations and industries, and widespread participation in them may underlie the high level of environmental concern reported by Nigerians.

7. This pattern is reinforced by responses to two other questions in the survey. Residents of the developing nations are much more likely to rate a list of six local community environmental problems (for example, water quality, air pollution, and sewage) as very serious than are their counterparts in the industrialized nations. However, the latter are only a little more likely to rate a list of seven global environmental problems (for example, loss of rain forest, ozone depletion, and climate change) as very serious than are those living in the developing nations.

REFERENCES

Baumol, W.J. and W.E. Oates. 1979. *Economics, Environmental Policy, and the Quality of Life.* Englewood Cliffs, NJ: Prentice-Hall.

Beckerman, W. 1974. *Two Cheers for the Affluent Society.* New York: St. Martin's Press.

Brechin, S.R. and W. Kempton. 1994. "Global Environmentalism: A Challenge to the Postmaterialism Theses?" *Social Science Quarterly* 75: 245–269.

Buttel, F.H. 1992. "Environmentalization: Origins, Processes, and Implications for Rural Social Change." *Rural Sociology* 57: 1–27.

Caldwell, L.K. 1992. *Between Two Worlds: Science, the Environmental Movement and Policy Choice.* New York: Cambridge University Press.

Commission of the European Communities. 1986. *The Europeans and Their Environment 1986.* Brussels: CEC.

Day, D. 1989. *The Environmental Wars.* New York: Ballantine Books.

Dunlap, R.E. 1994. "International Attitudes Toward Environment and Development." Pp. 115–126 in H.O. Bergesen and G. Parmann (eds.), *Green Globe Yearbook 1994.* New York: Oxford University.

Dunlap, R.E. 1992. "Trends in Public Opinion Toward Environmental Issues: 1965–1990." Pp. 89–116 in R.E. Dunlap and A.G. Mertig (eds.), *American Environmentalism: The U.S. Environmental Movement, 1970–1990.* Washington, DC: Taylor and Francis.

_____. 1991. "Public Opinion in the 1980s: Clear Consensus, Ambiguous Commitment." *Environment* October, 10, 32–36.

_____. 1989. "Public Opinion and Environmental Policy." Pp. 121–130 in J.P. Lester (ed.), *Environmental Politics and Policy.* Durham, NC: Duke University Press.

Dunlap, R.E., G.H. Gallup, Jr., and A.M. Gallup. 1993a. *Health of the Planet.* Princeton, NJ: George H. Gallup International Institute.

Dunlap, R.E., et al. 1993b. "Measuring Endorsement of an Ecological Worldview: A Revised NEP Scale." Paper presented at the annual meeting of the Rural Sociological Society, Pennsylvania State University, State College, August.

Dunlap, R.E. and R. Scarce. 1991. "The Polls—Poll Trends: Environmental Problems and Protection." *Public Opinion Quarterly* 55: 651–72.

Durning, A. 1989. "Mobilizing at the Grassroots." Pp. 154–173 in L.R. Brown, et al. *State of the World 1989.* New York: Norton.

Ehrlich, P.R. and A.H. Ehrlich. 1990. *The Population Explosion.* New York: Touchstone.

Enge, E. and R.I. Malkenes. 1993. "Non-Governmental Organizations at UNCED: Another Successful Failure?" Pp. 25–33 in H.O. Bergesen and G. Parmann (eds.), *Green Globe Yearbook 1993.* New York: Oxford University Press.

Founex Report. 1982. "Environment and Development" *International Conciliation*, no. 56, January.

French, H.F. 1991. "Restoring the East European and Soviet Environments." Pp. 93–112 in L.R. Brown et al. (eds.), *State of the World 1991*. New York: Norton.

Haas, P.M., M.A. Levy, and E.A. Parsons. 1992. "Appraising the Earth Summit: How Should We Judge UNCED's Success?" *Environment*, October, 6.

Inglehart, R. 1990. *Culture Shift in Advanced Industrial Society*. Princeton, NJ: Princeton University Press.

Lele, S.M. 1991. "Sustainable Development: A Critical Review." *World Development* 19: 607–621.

Louis Harris and Associates, Inc. 1989. *Public and Leadership Attitudes to the Environment in Four Continents*. New York: Louis Harris and Associates.

McCormick, J. 1991. *Reclaiming Paradise: The Global Environmental Movement*. Bloomington: Indiana University Press.

Muller-Rommel, F. (ed.). 1989. *New Politics in Western Europe: The Rise and Success of Green Parties and Alternative Lists*. Boulder, CO: Westview Press.

Mumme, S.P. 1991. "Clearing the Air: Environmental Reform in Mexico." *Environment*, December, 6.

Murch, A.W. 1971. "Public Concern for Environmental Pollution." *Public Opinion Quarterly* 35: 102–108.

Oates, D. 1989. *Earth Rising: Ecological Belief in an Age of Science*. Corvallis: Oregon State University Press.

O'Riordan, T. 1976. *Environmentalism*. London: Pion.

Redclift, M. 1992. "The Meaning of Sustainable Development." *Geoform* 23: 395–403.

The Roper Organization, Inc. 1992. *Environmental Behavior: North America, Canada, Mexico, United States*. New York: Roper.

Rudig, W. 1991. "Green Party Politics Around the World." *Environment* October, 6.

Steger, M.E., J.C. Pierce, B.S. Steel, and N.P. Lovrich. 1989. "Political Culture, Postmaterial Values, and the New Environmental Paradigm: A Comparative Analysis of Canada and the United States." *Political Behavior* 11: 233–254.

Stern, P.C., O.R. Young, and D. Druckman (eds.). 1992. *Global Environmental Change: Understanding the Human Dimensions*. Washington, DC: National Research Council.

United Nations Environment Programme. 1988. *The Public and the Environment—1988*. Nairobi: UNEP.

World Bank. 1992. *World Development Report 1992*. Washington, DC: World Bank.

World Resources Institute. 1990. *World Resources: 1990–91*. New York: Oxford University Press.

2

Ecosystem Management: The Governance Approach

Timothy M. Hennessey
University of Rhode Island, Kingston, Rhode Island

Dennis L. Soden
University of Texas at El Paso, El Paso, Texas

INTRODUCTION

The ecosystem paradigm is emerging as the dominant approach to managing natural resources in the United States. This shift away from the management of individual resources to the broader perspective of total ecosystems has not been confined to academia and "think tanks" where it first began, but is beginning to take root in government policy and programs (Soden et al. 1998a). Indeed, since the late 1980s, many federal agency officials, scientists, and policy analysts have advocated a new, broader approach to managing the nation's lands and natural resources, which recognizes that plant and animal communities are interdependent and interact with their physical environment (soil, water, and air) to form distinct ecological units called ecosystems, which span federal and nonfederal lands. Similar commitments have been made by a variety of state and local managers and nongovernmental organizations involved in natural resource management. This chapter identifies those aspects of ecosystem management that are important and interesting challenges to social science researchers and managers of large natural areas. To this end, the chapter consists of six sections. The first section discusses the problems of defining ecosystems and is illustrative of the problem of concept definition that, more often than not, "haunts" scientific pursuits. The second section reviews government activity in the area of ecosystem management. The third section reviews the scientific perspective on ecosystem management as presented by the Ecological Society of America (1995). The fourth section summarizes the main themes surrounding the ecosystem concept in the scholarly and government literature, primarily as reviewed by Grumbine (1994: 27–33). The fifth section considers the practical constraints to government implementation of the ecosystem concept. The sixth and final section develops the concept of the governance of estuaries as well as the implementation of ecosystem policy—what

we refer to as the ecology of governance. In the concluding section we speculate about the future direction of ecosystem governance by suggesting that researchers who are concerned about the "fit" between the spatial and temporal scales of government jurisdictions, on the one hand, and ecosystems, on the other, should investigate ways to connect "nested" ecosystems through "networked institutions" at the federal, state, local, tribal, and NGO levels. How these institutions are to be designed in order to deal with the complexity of the ecosystem and the complexity of the governance system to achieve an optimal mix of benefits and costs is the fundamental question facing both researchers and practitioners.

DEFINING ECOSYSTEM MANAGEMENT

What is ecosystem management? One of the most perplexing elements of ecosystem management is the inability to establish coherent definitions across various disciplines. Governments at all levels, scientists, advocates from various perspectives, and academics, all put forth various definitions about what they think ecosystem management means. This may be referred to as perplexing rather than problematic, because it is not clear that this diversity in definitions is to be considered a roadblock in understanding and using ecosystem management as a conceptual and policy tool.

Ecosystem management, as defined by Grumbine (1994), entails a broad, systems approach to resource management, which examines environmental issues at multiple levels across ecological, as opposed to political, boundaries. It places a premium on ecological integrity and sustainability through a process of data collection, monitoring, and "adaptive management" (Grumbine 1994). From a social science or managerial perspective, a number of goals are of particular interest when considering the effectiveness of the ecosystem management approach. From an administrative perspective, the broad goals of interagency cooperation and organizational change are critical to the effective use of ecosystem management. Moreover, incorporating humans and their values into the scheme of large-scale ecosystems requires a great deal of cooperation and compromise. Hennessey (1998) points out that a major problem with a great deal of research on ecosystems is that the majority of authors are from the hard sciences and tend to underestimate policy implications and the complexities of incorporating human values into the management process.

A fundamental difficulty in achieving this task, as Normand and Salazar (1998) note, is that "ecosystem management has been defined in varying and often incompatible ways." They suggest, as can be expected, that where you stand depends upon where you sit. Specifically, they feel that environmental advocates have a strong tendency toward an ecocentric view of ecosystem management, which emphasizes maintaining the health of the environment; where the preference is toward the inherent values of ecosystems as a whole. Conversely, in their study agency managers were found to be much more anthropocentric, framing ecosystem management in a human context, and emphasizing the social value of environments, such as the value of resource extraction for economic use (Normand and Salazar 1998).

There is, however, disagreement about the terms used to define ecosystem management. Normand and Salazar (1998) also argue that while ecological integrity most often involves scientific knowledge to maintain ecosystems as they are, sustainability in this context can be interpreted from either an anthropocentric or biocentric perspective. This

point is also made vivid by Steel et al. (1998) when they argue that "the current debate about the disposition of ecosystems in the U.S. is, at heart, not only a professional and technological debate, but a debate about how . . . ecosystems should be defined philosophically. The differences between the more traditional, anthropocentric view of forests and the emerging bio-centric view thus cannot be settled by an appeal to the facts alone." Hence, the need to address the various social implications of ecosystem management is imperative for effective use and understanding of it as a management approach.

FEDERAL GOVERNMENT ACTIVITY TOWARD ECOSYSTEM MANAGEMENT

Since 1992, all four of the primary land management agencies, the National Park Service, the Bureau of Land Management, the Fish and Wildlife Service, and the Forest Service, have independently announced that they are implementing or will implement an ecosystem approach to managing their lands and natural resources and each has been working to develop its own strategy (General Accounting Office 1993). Moreover, several other agencies, the Soil Conservation Service, the National Oceanic and Atmospheric Administration, the Department of Defense, the Department of Energy, the Bureau of Indian Affairs, the Bureau of Mines, the Bureau of Reclamation, the Minerals Management Service, the National Biological Survey, the U.S. Geological Survey, the Environmental Protection Agency, and the National Aeronautics and Space Administration have engaged in significant ecosystem management activities (Congressional Research Service 1994).

Moreover, the September 1993 report *The National Performance Review: Creating a Government that Works Better and Costs Less* (Executive Office of the President 1993) recommended that the President issue an executive order establishing ecosystem management policies across the federal government and that the concept be phased in using selected demonstration projects. Subsequently, four demonstration projects were funded: the old growth forests of the Pacific Northwest; South Florida, including the Everglades and Florida Bay; the urban watershed of the Anacostia River in Maryland and the District of Columbia; and Alaska's Prince William Sound, damaged by the oil spill from the Exxon *Valdez*. It is also significant that in the budget document supporting these projects the administration considered the following ecosystem management principles: (1) managing along ecological boundaries; (2) ensuring coordination among federal agencies and increased collaboration with state local and tribal governments, the public, and the congress; (3) using monitoring assessment and the best science available; and (4) considering all natural and human components and their interactions. Also, in 1993, the White House Office of Environmental Policy established an Interagency Ecosystem Task Force to implement an ecosystem approach to environmental management.

THE SCIENTIFIC PERSPECTIVE ON ECOSYSTEM MANAGEMENT

Ecologists have long been exploring the concept of ecosystem management while at the same time prodding government to adopt such an approach to managing natural resources. To this end scientific groups have formulated analytical and theoretical princi-

ples for ecosystem management. The Ecological Society of America, for example, recently published a monograph, *The Scientific Basis for Ecosystem Management*, which contains the views of noted scientists. They define ecosystem management as "a system driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem structure and function" (Ecological Society of America 1995). For them ecosystem management contains eight elements:

Long-term sustainability as a fundamental value. This assumes intergenerational sustainability; that is to say, managing so as to assure provision of the resources we enjoy today to future generations (Ecological Society of America 1995).

Clearly defined goals. Goals must be stated in terms of "desired future trajectories" and "desired future behaviors" for the ecosystem components and processes necessary for sustainability. Furthermore they emphasize that these goals should be stated in terms that can be measured and monitored. In another parallel effort to specify the goals of ecosystems, Costanza and colleagues (1992) argue for an ecosystem health index, $HI = V*O*R$, which is also a measure of sustainability and where V = system vigor, a cardinal measure of system activity, metabolism, or primary productivity; O = the system organization index, a 0–1 index of the relative degree of the system's organization, including its diversity and connectivity; and R = a system resilience index, a 0–1 index of the degree of the system's resilience.

Sound ecological models and understanding. Ecosystem management is based on sound principles and depends on research performed at all levels of organization from investigations of morphology, physiology, and behavior of individual organisms through studies of the structure and dynamics of populations and communities, to analysis of patterns and processes at the level of ecosystems and landscapes (Ecological Society of America 1995).

Complexity and connectedness. Ecosystems are complex and contain a large array of interconnections, such as biological diversity and structural complexity, which underlie their functions, and with complexity comes uncertainty and imprecision in prediction. As the report emphasizes, "Ecosystem management cannot eliminate surprises or uncertainty: rather it acknowledges that, given time and space, unlikely events are certain to happen" (Ecological Society of America 1995: 9).

Recognition of the dynamic character of ecosystems. Evidence of management failures suggests that individual resources should not be managed outside of the context of all other ecosystem components and processes and that "the spatial and temporal domains of critical ecological processes are rarely congruent with the spatial boundaries and temporal schedules of management" (Ecological Society of America 1995: 10).

Context and scale. Ecosystem processes operate over a wide range of spatial and temporal scales. Hence there is no single appropriate scale or time frame that will fit all ecosystems. Therefore, the design of management systems must be carefully crafted to suit specific conditions. But because of our lack of knowledge and/or propensity to manage single resources, most of our management jurisdictions do not "fit" ecosystemic needs. The importance of context and scale in determining the behavior of ecosystems is revealed in the research on such topics as the "landscape approach" (Noss and Harris 1986: 299–309) and the "large marine ecosystem concept" (Sherman 1991: 4).

Humans as ecosystem components. Scientists have acknowledged that humans present some of the greatest challenges to long-run sustainability. But they are also integral ecosystem components that must be part of any effort to achieve sustainability goals.

Adaptability and accountability. Since ecosystem knowledge is incomplete and subject to change (Connel and Sousa 1983: 789–824) management should be experimental and include the means to learn from our experiments (Holling 1978; Walters 1986; Likens 1992). This concept of management as an experiment is the basis for adaptive management (Simpson and Christensen 1997).

> To be adaptable and accountable management objectives must be stated in operational terms, informed by the best models of ecosystem functioning, and tested by carefully designed monitoring programs that provide accessible and timely feedback to managers. Public understanding and acceptance of the experimental nature of all natural resource management is critical to implementation of ecosystem management protocols (Ecological Society of America 1995).

ECOSYSTEM MANAGEMENT: A GENERAL REVIEW OF THE CENTRAL THEMES

In an excellent review of the ecosystem management literature Grumbine (1994: 29–30) identified ten dominant themes.

Hierarchical context. A focus on any one level of the biodiversity hierarchy (genes, species, populations, ecosystems, landscapes) is not sufficient. He stresses a systems perspective that requires that when working on a problem at any level or scale managers must seek the connections between all levels.

Ecological boundaries. Management requires working across administrative/political boundaries and defining ecological boundaries at appropriate scales.

Ecological integrity. This requires managing for ecological integrity so as to protect total native diversity and the ecological patterns and processes that maintain that diversity.

Data collection. Ecosystem management requires more research and data collection on habitat inventories/classification, disturbance regime dynamics, baseline species, and population assessment as well as better management and use of existing data (Grumbine 1994: 29–30).

Monitoring. Monitoring is necessary because the data it provides serves the manager by allowing him to track the results of his actions.

Adaptive management. Following Holling (1978) and Walters (1986), Grumbine (1994) emphasizes the importance of adaptive management, which assumes that knowledge is provisional and makes management a learning process or continuous experiment in terms of which to incorporate the results of previous actions and allows managers to remain flexible and adapt to uncertainty.

Interagency cooperation. The use of ecological boundaries necessitates cooperation between federal, state, and local management agencies as well as private parties. Therefore, managers must learn to work together and integrate conflicting legal mandates and management goals.

Organizational change. Implementing ecosystem management requires changes in the structure and operation of management agencies. According to Grumbine (1994), these may range from the simple (forming an interagency committee) to the complex (changing professional norms, altering power relationships).

Humans embedded in nature. People cannot be separated from nature because they are fundamental influences on ecosystems and are in turn affected by them.

Values.—Regardless of the role of scientific knowledge, human values play a dominant role in ecosystem management, goals.

Perhaps most important for our purposes, Grumbine (1994: 31) found that the themes least referred to in the literature are organizational change, adaptive management, and values. The majority of authors who are scientists tended to underestimate the policy implications of changing power relationships as well as the complexities of incorporating human values into the management process. Moreover, while knowledge of organizational structure and behavior as well as the policy process are fundamental to ecosystem management, none of the five government agency treatments of ecosystem management reviewed mentioned organizational change, nor do they discuss the policy process at all. Grumbine also emphasized that current resource management in the United States is based on maximizing the production of goods and services while the new goal of protecting ecological integrity is just coming on-line. For him the problem will be to reconcile these two goals. Finally, he applauds agencies such as the Forest Service for recognizing the importance of partnerships between scientists, managers, and citizens while he laments the fact that they are unaware of the radical implications of creating such partnerships. The implications of organizational change in governmental operations and the analytical considerations that are pertinent to these new institutional designs will be covered in subsequent sections. In what follows, we shall turn to a consideration of the practical constraints to government implementation of ecosystem management.

PRACTICAL CONSTRAINTS TO GOVERNMENT IMPLEMENTATION OF ECOSYSTEM MANAGEMENT

Many of the principles of ecosystem management identified in the themes above are being used by agencies engaged in ecosystem management while other have been underplayed or ignored altogether. Ecosystem management, however, requires translating these principles into practical steps that identify what must be done. And despite evidence of progress toward ecosystem management by federal agencies, the General Accounting Office (GAO) (1993) identified barriers to implementation that are particularly relevant to social science researchers interested in ecosystem management. The study calls for four practical steps to apply ecosystemic principles: delineating ecosystems; understanding their ecologies; making management choices; and adapting management on the basis of new information (see Figure 1).

The GAO study identifies the following barriers to ecosystem management:

The goals of ecosystem management are not clearly specified: a minimum level of ecosystem integrity and functioning needs to be defined. How does the goal of ecosystem health stack up against human activities when the two conflict? The government is silent on this point. There is no mention in the relevant legislation that governs the operations of the agencies about sustainability, health, integrity, functioning, and so on. Indeed, "no acts or implementing regulations define or delineate ecosystems or specifically require federal agencies to act to maintain or restore the health of ecosystems" (General Accounting Office 1993: 37–39).

Ecosystem boundaries need to be delineated. Although one of the fundamental principles of the administration's budget is to manage along ecological lines rather than political or administrative jurisdictions, the fact is that the existing boundaries of federal lands were not drawn along ecological lines. Hence much attention will have to be de-

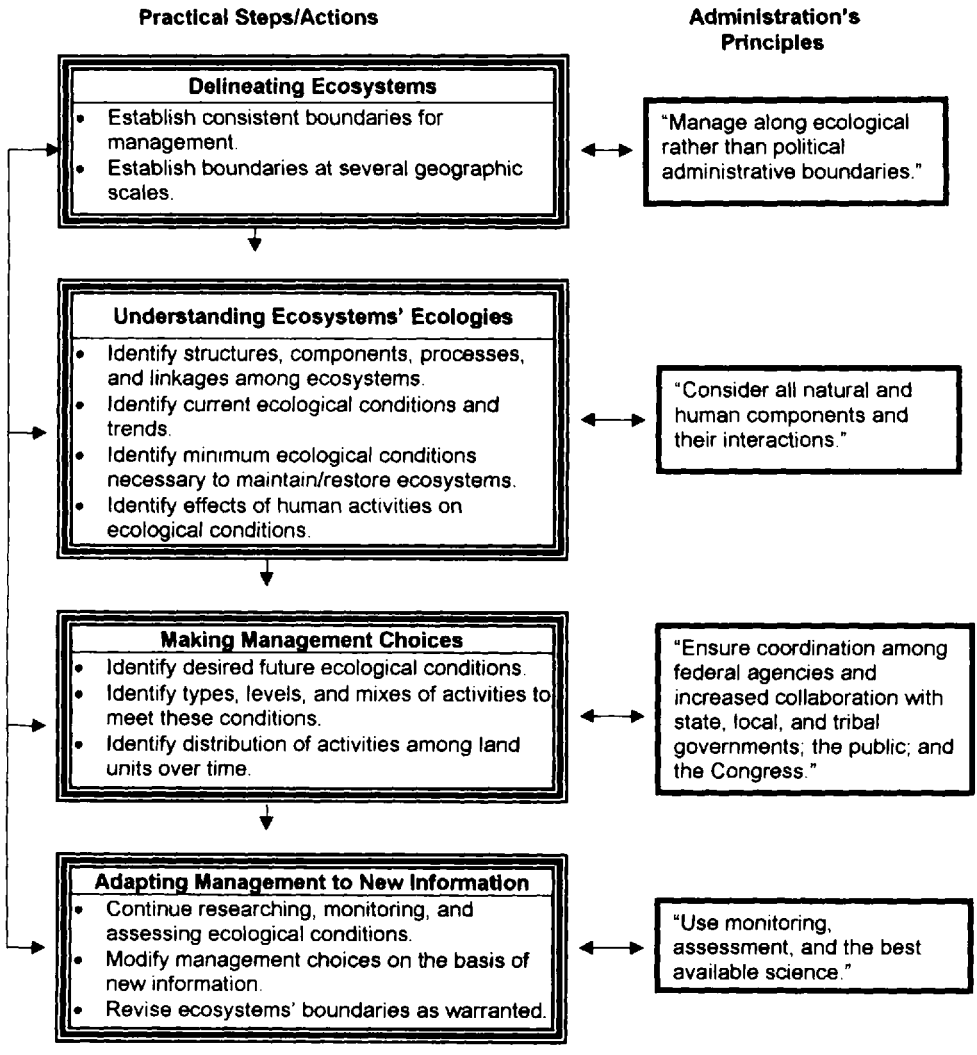

Figure 1 Steps for applying ecosystems management principles. (From GAO 1994: 41.)

voted to delineating the boundaries of ecosystems, especially determining their special scale. But such delimitations are problematic, according to the GAO, because: several smaller ecosystems may exist within a larger one; ecosystems are interlinked and difficult to separate; boundaries of ecosystems expand and contract over time in response to natural disturbances and human activities; and ecosystems are ecological—rather than legislatively or administratively established units (General Accounting Office 1993: 42). Nevertheless, delineating jurisdictional boundaries is a necessary condition for budgeting funds and managing activities in these ecological areas. Some scientists have suggested meeting this requirement by using the physical components of river basins and smaller watersheds as the primary units of ecosystem management. Scientists advocate the use of this approach because river basins and watersheds are: relatively well defined; can

have major ecological importance; are systematically related to one another; are already used in some water management efforts; and are easily understood by the public. The criterion for delineating ecosystems most agreed upon during a national symposium (Keystone Center 1991) was that boundaries should not be so large that managers will not be able to adequately focus on specific local problems or issues of mutual concern. Nor should they be so small that managers will be unable to address the effects on the ecosystem of activities originating across ownership boundaries.

The ecosystems approach will require coordination of activities among federal agencies managing resources in the same ecosystem. But the coordination necessary among federal agencies within an ecosystem is constrained by differing missions and separate planning processes that are rooted in the existing federal management framework. A telling example of this problem cited by the GAO concerned the conflicting views held by the Fish and Wildlife Service (FWS), on the one hand, and the Forest Service, on the other, about the listing of species under the Endangered Species Act. The Forest Service opposed FWS's listing of the Jemez Mountains salamander as endangered because it believed that the listing would place limitations on the agency's management of the Santa Fe National Forest. Similarly, the Forest Service did not comply with the requirements to protect the Northern Spotted Owl in the Pacific Northwest (General Accounting Office 1993: 56).

Procedural requirements for long-range planning create barriers to interagency cooperation. For example, a team assembled to study ecosystem management in the forests of the Pacific Northwest found that when they considered NEPA, the Endangered Species Act, the Clean Water Act, the Clean Air Act, and other laws that "the objectives of some of these laws were not the same, their substantive and procedural requirements were not uniform and their interpretation fell to different agencies" (General Accounting Office 1993: 56).

Collaboration and consensus building with state, local, and tribal governments and the public will be difficult because of incentives, authorities, and interests that are beyond the scope or authority of the federal government. Many of these barriers can be addressed only by states and localities. Therefore, "efforts to establish effective collaboration and achieve consensus with other federal and nonfederal parties in support of ecosystem objectives will necessarily require an approach largely based on voluntary cooperation and incentives" (General Accounting Office 1993: 59).

There is still much uncertainty about how ecosystems function, which contributes to differences in the interpretation of scientific evidence. Understanding the ecology of the ecosystem will require gathering and linking large volumes of scientific and social scientific data to establish critical relationships between human activities and ecological conditions.

The need to expand pilot projects to other areas. The four pilot projects now being conducted in the old growth forests of the Pacific Northwest, south Florida including the Everglades and Florida Bay, the urban watershed of the Anacostia River in Maryland and the District of Columbia, and Prince William Sound in Alaska should help test ecosystem management's potential to avoid or mitigate conflicts. But since these demonstration projects are located in areas where conflicts may be intractable, other projects have been proposed that offer a better chance to test the potential of ecosystem management. Those mentioned in the GAO report are the following, some of which may already be underway: the greater Yellowstone area; the southern Appalachian Highlands; the Sierra Nevada ecosystem; the Rio Grande Valley (Colorado, New Mexico, and

Texas); the Great Lakes; the Great Plains grasslands (Minnesota, North Dakota, South Dakota, Nebraska); the California Central Valley Bay delta; Monterey Bay; the coastal Louisiana wetlands; and the upper Mississippi/Missouri River flood zone.

One of the principal findings of the GAO report was that because ecosystems exist at several geographical scales, so too should efforts to coordinate activities that affect them. This raises the fundamental issue that *ecosystem management is essentially intergovernmental and intersectoral.* This is why federal agencies will have to identify barriers to interagency coordination and why they must develop alliances and partnerships with nonfederal agencies and private sector stakeholders. In the next section we shall focus on these issues of ecosystem governance.

VALUES AS A CONSTRAINT TOO OFTEN IGNORED BY THE "HARD SCIENCES"

As Normand and Salazar (1998) note, "Definitions of ecosystem management reflect the values underlying them." Thus, an inability to come to definite terms about what ecosystem management should mean is more a reflection of the inherent value conflicts than a flaw in the conceptual or practical frameworks. Nevertheless, this is a substantial roadblock to effective use of the ecosystem perspective. How can resource managers effectively function in an environment where stakeholders have conflicting and competing values that determine how these stakeholders will react? As Hennessey (1998) notes, "management occurs within an institutional setting that more or less successfully reconciles the differing values and objectives of a variety of user groups and the general public and then provides the means for implementing chosen objectives."

Inherent in ecosystem management approaches is the need to incorporate as wide a perspective as possible. Therefore, participants and stakeholders are asked to set aside their own agendas, or at least be open to the perspective of others, in an attempt to achieve a higher goal. Subsequently, as Mangun and Mangun (1998) point out, "natural resource managers must learn to navigate this shifting social landscape to understand and respond to public resource values."

But any attempt to incorporate value structures within some policy framework is an arduous task to say the least. As Aaron et al. note, values are fluid, complex, and difficult to quantify and understand. They argue: "[T]he idea that values can change, combined with the recognition that responses to policies depend on people's preferences—that is, their values—leads to thinking about how public policy might change values directly or indirectly and thereby change the responses to public policies themselves" (Aaron et al. 1994: 3). And, as Hennessey (1998) has noted, in congruence with others' assertions that many social scientists take values and preferences as given, a great deal of the literature on ecosystem management leaves out the human dimension despite assertions to the contrary.

One of the most critical roadblocks to ecosystem management is its emphasis on ecological as opposed to political boundaries. Ecosystems are defined systemically and the goal is to achieve broad management goals from a holistic and overlapping perspective. Shindler and Collson (1998) argue that the lay public also supports the widespread belief that management should be made based on science, not politics. Within the ecosystem management framework, there is a broad consensus in many of the chapters in this book that leadership for ecosystem management must come from resource managers in

federal agencies. But, as Doerksen (1998) notes, there is a perception from many critics of ecosystem management that federal agencies and their counterparts are trying to partition up land throughout the United States, both private and public, in the name of ecosystem management. Doerksen proposes that this is not the case, but contends efforts to implement ecosystem management will be hampered if public agencies are forced to stay within the political boundaries drawn around public lands. Given these competing claims to knowledge and expertise, combined with the problems of incorporating "the facts," this reliance on the facts may not be possible.

Furthermore, Schiffman (1998) notes in his review of the property rights system and how it relates to ecosystems management that "many critical ecological areas are under private ownership in cities, towns and counties across America where local governments have primary decision-making responsibility for their use and administration." How can federal agencies and local governments effectively manage from an ecosystem standpoint when they are unable to regulate beyond their political jurisdiction? Schiffman argues, this is not just a case of jurisdictional problem, but a problem of values. He accurately points out that "ecosystem management has the potential to bring a new focus to land use planning and to accommodate environmental objectives and development, but it can also be a divisive and ineffective force, particularly when it comes up against American beliefs about property rights. . . . This is but one more chapter in the continuing American drama wherein an evolving conception of the public interest conflicts with individual rights in property and the outcome is still in the process of determination" (Schiffman 1998).

If this isn't enough discouragement, consider the problems noted by Soden et al. (1998b) in their case study of ecosystem management along the Rio Grande basin. How can managers effectively implement ecosystem management across various city, county, and state jurisdictions, with conflicting public and private ownership, and working between two national entities, whose level of development represents the virtual continuum between developed and developing? How can managers hope to implement and adequately address ecosystem management when their international counterparts do not even have proper waste treatment facilities and are unable to maintain even the most essential air quality standards? Thus, questions about ecosystems, and ecosystem management, are not just questions about science; they ultimately become dilemmas about priorities, abilities, economics, and values.

THE GOVERNANCE OF ECOSYSTEMS AND THE ECOLOGY OF GOVERNANCE

It is clear from our review that ecosystems present a special set of challenges to natural resource managers. The most fundamental of these challenges is that *ecosystem management must be able to cope with the uncertainty associated with the complexity of ecosystems as natural systems and the organizational and institutional complexity of the implementation environment.* We refer to these institutional structures and processes as the ecology of governance. To manage such a system managers must have the capacity to learn in order to adjust to new information as it becomes available. Scholars have noted that conventional, synoptic planning and program designs will not meet this challenge because they require high levels of information, low uncertainty, and few decision makers—conditions that are not present in ecosystem management. Adaptive management

would seem to be the most promising approach to coping with the uncertainty facing multiple decision makers within a federal system as they try to manage ecosystems.

Adaptive management is learning by doing, that is, by treating programs as experiments. The implementation of the program creates opportunities to test and improve the scientific basis of action. These learning opportunities are part of a planning system that utilizes information produced by implementation of the program. As Lee (1993: 9) observes: "Adaptive management is an approach to natural resource policy that embodies a simple imperative *policies are experiments; learn from them.*" He notes that in order to live we must use the resources of the world, but we do not understand nature well enough to know how to live harmoniously within environmental limits. Adaptive management takes that uncertainty seriously, treating human interventions in natural systems as experimental probes. Its practitioners take special care with information. First, they are explicit about what they expect, so they can design methods and apparatus to take measurements. Second, they collect and analyze information so that expectations can be compared with actuality. Finally, they transform comparison into learning—they correct errors, improve their imperfect understanding, and change action and plans. Linking science and human purpose, adaptive management provides reliable knowledge that serves as a compass for us to use for a sustainable future (Lee 1993: 9). But the establishment of adaptive management is by no means easy in real-world institutions. Lee (1993: 11) discusses the institutional conditions affecting the establishment and maintenance of ecosystem management in Table 1.

Learning from adaptive management is imperative for the management of large-scale ecosystems-territories with a measure of ecological integrity. But the setting for implementing ecosystems must be modeled and studied to identify the organizational and institutional constraints that may inhibit or enhance the implementation of sound ecosystem management. Indeed, we have identified a number of these in the preceding sections (e.g., interagency coordination, common procedural requirement, collaborative relationships with state, local, and tribal entities, etc.). Perhaps the most fundamental observation about the institutional environment of ecosystem management is made by Lee (1993: 12) when he observes that social learning is most needed in large-scale ecosystems "whose governance presents challenges of science, management and politics. We should study how human institutions deal with the interdependence created when human boundaries cut across ecological continuities . . . what makes an ecosystem 'large' is not acreage but interdependent use: the large ecosystem is socially constructed" (Lee 1993: 11). These conditions direct our attention to issues of governance and the design and analysis of relevant institutions. *In this sense ecosystems are arenas of interdependence for human uses and laboratories of institutional invention.*

Thus, the nature of the ecosystem and the incentive systems associated with human usage of it present a dual challenge to the design and management of ecosystems. The governance system must not only manage individual human uses of the ecosystem but must account for the interrelationships that exist among human uses and the impact of these on the ecosystem. Because of this interdependence of uses and users, the management of ecosystems consists of more than passing data from scientists to decision makers. Management occurs within an institutional setting that more or less successfully reconciles the differing values and objectives of a variety of user groups and the general public and then provides the means for implementing chosen objectives. We refer to this institutional framework and process as the governance system. Governance includes not only the laws, regulations, and programs for environmental control and the uses of the

Table 1 Institutional Conditions Affecting Adaptive Management

There is a mandate to take action in the face of uncertainty. But experimentation and learning are at most secondary objectives in large ecosystems. Experimentation that conflicts with primary objectives will often be pushed aside or not proposed.

Decision makers are aware that they are experimenting anyway. But experimentation is an open admission that there may be no positive return. More generally, specifying hypotheses to be tested raises risk of perceived failure.

Decision makers care about improving outcomes over biological time scales. But the costs of monitoring, controls, and replication are substantial, and they will appear especially high at the outset when compared with the costs of unmonitored trial and error. Individual decision makers rarely stay in office over times of biological significance.

Preservation of pristine environments is no longer an option, and human intervention cannot produce desired outcomes predictably. And remedial action crosses jurisdictional boundaries and requires coordinated implementation over long periods.

Resources are sufficient to measure ecosystem-scale behavior. But data collection is vulnerable to external disruptions, such as budget cutbacks, changes in policy, and controversy. After changes in the leadership, decision makers may not be familiar with the purposes and value of an experimental program.

Theory, models, and field methods are available to estimate and infer ecosystem-scale behavior. But interim results may create panic or a realization that the experimental design was faulty. More generally, experimental findings will suggest changes in policy; controversial changes have the potential to disrupt the experimental program.

Hypotheses can be formulated. And accumulating knowledge may shift perceptions of what is worth examining via large-scale experimentation. For this reason, both policy actors and experimenters must adjust the trade-offs among experimental and other policy objectives during the implementation process.

Organizational culture encourages learning from experience. But the advocates of adaptive management are likely to be staff, who have professional incentives to appreciate a complex process and a career situation in which long-term learning can be beneficial. Where there is tension between staff and policy leadership, experimentation can become the focus of an internal struggle for control.

There is sufficient stability to measure long-term outcomes; institutional patience is essential But stability is usually dependent of factors outside the control of experimenters and managers.

Source: Lee 1993: 85.

ecosystem but also the key actors and organizations that determine and implement such laws, regulations, and programs (Hennessey 1994; Healey and Hennessey 1994; Imperial et al. 1993). In short, given the organizational complexity of the policy and implementation environment, the most effective approach to ecosystem decision making is an adaptive, interactive, learning process that combines the appropriate scientists, political actors, and the public in a governance framework to make decisions about the management of resources. This type of decision making process helps governance institutions arrive at decisions that are both politically feasible and accessible to adaptive implementation approaches.

Scholars have argued for adaptive implementation approaches because they establish a process that allows policy to be modified, specified, and revised—in a word, adapted—according to the unfolding interaction of the policy with its institutional setting. This adaptive implementation approach has several important characteristics: active participation by relevant actors; adjustment of policy to the constraints of the policy situation; policy deliverers learn by doing rather than mechanically following a "how to" procedure and implementation is used to clarify policy. In effect you discover "what policy is as you carry it out" (Berman 1980).

And just as ecosystems have a number of dynamic parts operating at a variety of levels so do the policy and institutional elements of the governance system reflecting a dynamic system of interdependence and complexity. This institutional complexity is more apparent as we think about the implementation of an integrated ecosystem policy for a particular geographical area containing a delineated set of resources. Here the operative word is *integrated* because this the most important characteristic of ecosystem management. Resources are no longer viewed as separate to be managed individually. *Ecosystem management requires that we unify by putting the parts together into an integrated whole using a single unifying concept.* But if we are to do this what criteria must we use to evaluate the policy we formulate and the institutions we design? This question has particular relevance for the establishment of ecosystem boundaries, the selection of policies and issues, the designation of the lead agency, the rationalization of operating procedures and planning time frames among and between agencies, and the establishment of partnerships between levels of government and appropriate partners.

Underdal (1980: 159) suggests several evaluative criteria in terms of which to address the integration question. He argues that to qualify as integrated a policy must meet three requirements: comprehensiveness, aggregation, and consistency. For him comprehensiveness (scope) can be measured along four dimensions: time, space, actors, and issues. Time refers to the need to evaluate the policy over a long time period. Space refers to the extension of the geographical area for which the consequences of the policy decisions are recognized as relevant decision premises. The actors dimension is the proportion of actors within a given activity that is considered part of the reference group—the group from whose perspective policy options are being evaluated. Finally, along the issue dimension integration can be measured in terms of *the proportion of interdependent issues that is subsumed under a common policy framework.* In this approach the ideal scope of an ecosystem management area and policy frame would be "where all of the significant consequences and implications of the policy decisions are recognized as premises in the making of these decisions. In other words the scope of the policy premises should equal the scope of the policy consequences" (Underdal 1980: 180).

Aggregation refers to the extent to which policy alternatives are evaluated from an overall perspective rather than from the perspective of each actor, sector, or agency. And

since the policy frequently proceeds through the establishment of a new overarching agency there is a danger that actors at a variety of levels will be left out of the process in the effort to look at the "larger picture." This would be a mistake because the uncertainty of the implementation environment requires that a multiplicity of actors express their preferences and bargain with respect to policy formulation and implementation. The federal system is designed to do just this by providing a multicentered government that relates to the complexity of the ecosystem being managed.

The consistency requirement refers to a policy that "is in harmony with itself—one whose different components accord with each other" (Underdal 1980: 161). Consistency has a horizontal and vertical dimension. The vertical dimension refers to the accord between policy levels. A consistent policy is one where specific implementation measures conform with general guidelines and policy goals. Along the horizontal dimension consistency means that only one policy can be pursued at a time by the executive agencies involved. The vertical dimension is more difficult to implement because it involves different policy arenas at the state, local, and nongovernmental levels. These different actors and preferences make it difficult for policy principles to penetrate downward. This is particularly the case in our federal system, which is multiple centered or polycentric leading to a great diversity of interpretation of policies formulated by the executive branch at the state and local level—no matter how integrated they are designed to be. In sum, the purpose of an integrated policy is to ensure that links among the issue aspects or issue areas are not neglected in the making of policy decisions.

Another important criterion noted by Underdal is the extent to which ecosystem policy reinforces interdependent links. "What is to be integrated should not be determined on the basis of physical notions of 'wholes' but rather on the basis of what empirically constitutes distinct interaction systems—characterized by internal interdependence and external autonomy" (Underdal 1980: 180). In this sense ecosystem management must go beyond general heuristics to ecosystem area delimitation and the specification of policies that conform to integration principles.

One approach to the integration challenge is to move issues vertically upward from the local to the national level. This is essentially what the federal agency strategies described above are attempting to do. But they may also wish to move issues horizontally from a narrow sector agency to one with a broader perspective. This raises an important question concerning which of the agencies discussed above should be given the largest responsibility for ecosystem management. Should there be a new "superagency" to coordinate work done by specialized agencies? And if the latter were to be created, what would prevent this superagency from ignoring the preferences of other agencies and the state, local, and nongovernmental players in the name of integrated comprehensive policy?

This issue of governance complexity is raised by Ostrom in her groundbreaking research on institutional analysis and design. She argues that "any governance system that is designed to regulate complex biological systems must have as much variety in the actions that it can take as there exists in the system being regulated." In her research on the governance of natural resources around the world she found that "the most notable similarity among the successful systems is the sheer perseverance of institutions which have the capacity to modify their rules over time according to a set of collective choice and constitutional choice rules in environments which are complex, uncertain, and interdependent" (Ostrom 1995: 34). She found that all of the sustainable management institutions had clearly defined boundaries; a congruence between appropriation and provision

rules and local conditions; collective choice arrangements; monitoring; graduated sanctions; conflict resolution mechanisms; minimum recognition of rights to organize; and nested enterprises (Ostrom 1995: 35–40). She views what we have called the ecology of governance in the following way:

> The problem that we face is not pitting one level of government against another as a solitary source for authoritative decisions. Rather, the problem is developing institutional arrangements at multiple levels that enhance the likelihood that individual incentives lead participants toward sustainable uses of biodiversity rather than imprudent uses. Given the diversity of biological scales involved, Ashby's rule of requisite variety commends a variety of institutional arrangements at diverse scales. One key to understanding how to craft nested institutional arrangements at many levels is the analysis of how actions at one level change the incentives of actors at another level (Ostrom 1995: 41).

She has developed an analytical framework for analyzing institutions that refers to a range of costs to be considered when designing such institutions. Coordination costs, the information costs of time and place and scientific information, and the strategic costs of free riding and rent seeking are fundamental factors in her approach to institutional analysis. She suggests that overall institutional performance be judged by the criteria of efficiency, fiscal equivalence, redistribution, accountability, and adaptability—the latter two of which we have already identified as fundamental to the list of the costs that are associated with the design and operation of such institutions (see Table 2).

The governance of ecosystems and the ecology of governance are important features of ecosystem management, yet they have not been emphasized in the governmental and scientific treatments of ecosystem management reviewed above. But there is a growing literature on aspects of ecosystem governance as these apply to particular types of ecosystems. For example, there has been an interesting treatment of the politics of ecosystem management in the Yellowstone ecosystem by Cawley and Freemuth (1993) and Freemuth and Cawley (1997). Moreover, a particularly intriguing body of research is being conducted by Stankey and Shindler (1997) on the 10 adaptive management areas (AMAS) created in compliance with the Northwest Forest Plan. The management of watershed ecosystems has been eloquently addressed by Healey (1997). Healey and Hennessey have investigated the role of science in the management of estuarine ecosystems in Canada and the United States (Healey and Hennessey 1994). Hennessey has investigated issues of governance and adaptive management for estuarine ecosystems in the evolution of the Chesapeake Bay Program (Hennessey 1994). And Imperial and his associates (1993) have done extensive analysis and evaluation of ecosystem management in the 28 estuaries undergoing analysis and planning as part of EPA's National Estuary Program. Hennessey and Imperial are now conducting a study of institutional changes underway with the implementation of a watershed approach to the management of nonpoint-source pollution under the 6217 Amendments to the Coastal Zone Management Act. MacKenzie (1996) has conducted research evaluating the ecosystem approach to the management of the Great Lakes Basin and Sherman is conducting research on 49 large marine ecosystems in oceans around the world (Sherman 1991: 4).

It is clear that the definition and boundaries of ecosystems vary considerably, for example, from large marine ecosystems to watersheds to bioregions to ecoregions to estuaries. But when one considers the need to have a "fit" between the delineation of the ecosystem and government program jurisdictions to implement policy and regulations,

Table 2 Costs Associated with Design and Operation of Institutions

Intermediate performance criteria, provision costs
Transformation costs
Transaction costs
Coordination costs
Information costs
Time and place
Scientific
Strategic costs
Free riding
Rent seeking
Corruption
Intermediate performance criteria, production costs
Transformation costs
Transaction costs
Coordination costs
Information costs
Time and place
Scientific
Strategic costs
Shirking
Corruption
Adverse selection/moral hazard
Overall performance criteria
Efficiency
Fiscal equivalence
Redistribution
Accountability
Adaptability

Source: Ostrom et al. 1995: 124.

then the geographical size of the system must be "manageable." And if government jurisdictions matter, and they must for practical implementation purposes, then there is a high probability that we will have a variety of ecosystems under some form of management, many of which will overlap (i.e., ecosystem management grids overlay each other). These areas could and probably will be managed through cooperative agreements between federal agencies (horizontal integration) and between the federal government and state, local, and NGOs (vertical integration), which utilize adaptive management principles for both science and program implementation. These ecosystem management systems will have to be "linked" to each other through some form of cooperative agreements to take account of "spillovers" from one system to the other and from one level of government to another. In short, we may end up with a system of *linked or networked ecosystem management programs intellectually unified by large-scale ecosystem heuristics (e.g., ecoregions, bioregions) that contain the imperative to look at connections/links between ecosystems.* This type of heuristic could be a part of the large-scale planning documents while the *nested* ecosystems would be under day-by-day management. In light of these considerations, the most important task for researchers will be to determine the mix of benefits and costs associated with alternative institutional designs for ecosystem management.

ECOSYSTEM MANAGEMENT AND PUBLIC POLICY

The goal then becomes reconciling these conflicts between participants by changing the way that we organize and structure relationships among participants. In his case study of the Interior Columbia River Basin, Luton (1998) concludes that relationships must cease being hierarchical in favor of a more systemic approach to organizing relationships among participants. The need to readjust and reevaluate traditional methods and approaches ultimately forces social scientists to examine the policy perspectives of ecosystem management at multiple levels. To be sure, ecosystem management is important and of interest to many social scientists, specifically because of its policy implications.

How, then, do you accomplish substantial results when, as noted above, many of the subsequent parties involved take incompatible and conflicting stances? Social science has been extremely useful in developing and setting forth the complexities of ecosystem management. We suggest, however, that social science has failed in our attempts to provide coherent and viable solutions. Social science, with respect to ecosystem management, has been primarily descriptive rather than prescriptive.

The problem is that we as social scientists want ecosystem management as science, as method, and as policy to do something it fundamentally cannot do. That is, social scientists look to ecosystem management, broadly or narrowly, to tell them what to do. When asked "how should we manage our resources?" many social scientists look to ecosystem management for answers that it is fundamentally unable to provide. "However much ecology is to be welcomed for its recognition of human limitations . . . it cannot, after all, tell us what to do. A crucial reason for this is ecology's frequent reliance on the unattainable modernist notion of truth as perfect correspondence with reality" (Szerszynski 1996: 11).

The assumption being made here is that ecology, the study or science of ecosystems, provides concrete answers about the way the world really is, the way nature meant it to be. The difficulty here is that this strategy works exceptionally well until one tries to include human social systems in the mix. As demonstrated above, a great deal of the definitions of ecosystem management places a premium upon including the human dimension in understanding ecosystems.

Once we try to take into account the impacts upon and by humans on ecosystems, we end up back where we started: that is, looking for acceptable definitions and definitions of definitions, never coming to agreement, because at some point, there may be no agreement to be found. The problems and roadblocks to effective use and implementation of ecosystem management cited here are the same difficulties that were cited by the U.S. General Accounting Office in one of the first government assessments of ecosystem management policies (General Accounting Office 1994). Moreover, throughout the time since its adoption among government policymakers and their agencies, these same problems keep cropping up. And all the experts can't solve this problem.

Perhaps the real fallacy is to think that this is a problem at all. We began this chapter by asserting that the myriad of definitions of ecosystem management were perplexing, but not necessarily problematic. This is because having a multitude of definitions simply means that we, as a society and as scientists, have not come to any widespread agreement about how our values about natural resources are to be structured. Ecosystem management as a conceptual framework, or as a concrete planning initiative, will never provide us with answers. Ecosystem management is only a tool; what we do with that tool is ultimately up to us. Owning a hammer does not make a person a master carpenter;

only practice, concentration, and experience can do that. Moreover, as we develop our skills as carpenters, we will replace our hammers with newer tools that help us to do a different job, or the same job in some perceptually better way.

Debate about goals and definitions of ecosystem management should not be perceived as troublesome or a sign of its ultimate failure to do its job. If ecosystem management fails to become entrenched in policy, if it fails to do the job that we want it to do, it will not fail because we have not properly incorporated a social exchange perspective, or because we have not properly defined it. It will fail because a complex and overwhelming amount of factors have come to play, such as irreconcilable values among various stakeholders, or firmly entrenched organizational cultures, or simply a change of administration. Similarly, if ecosystem management succeeds, it also will not be a result of any of these factors above. It will be a result of some combination.

Success or failure is probably not a useful way to describe this area of policy. More likely is that the characteristics and attributes of ecosystem management, most of which do not represent any kind of broad paradigm shift, will be used sporadically, in different places, under different circumstances, and described by different words. At this point in the history of our attempts to control and determine the outcomes of nature, many of us in the social sciences find ourselves in the crossroads where we feel threatened by our inability to come up with concrete results for our problems. But when we are forced to work with each other, concrete results may not be an option. Perhaps only piecemeal accomplishments made on an incremental basis is all that we can hope for. This conclusion is certainly open to debate, but if this is the case, it does not reflect a failure of science or of people.

Are there any useful lessons to be learned from the essays and case studies presented herein? Perhaps two can be asserted, but by no means will they be wholeheartedly agreed upon. The first is that irreconcilable differences of opinion and values are irreconcilable for a reason. The hallmark of human civilizations has been irreconcilable values. To expect participants to become open and receptive to the precepts of ecosystem management is not a useful assumption. Humans in civilized society must constantly struggle with, at one time, being open to alternative values, points of view, life-styles, and at the same time, recognize that there are values we simply are unable to accept. Thus, we should not be surprised that there are people who will try to undermine our position if they feel it threatens them.

The second, and perhaps the most important and more durable, lesson from ecosystem management is its commitment to dialogue. No amount of science or expert opinion can accomplish what widening the sphere of discussion can. Ecosystem management is exceptionally useful for social scientists because it is committed to including people from all spheres of interest into genuine discourse. As Steel and his associates note (1998), "Broadening the circle of those responsible for ecosystem management planning and information exchange will not be easy, nor will it be a relatively quick fix. The tide of cynicism is not likely to turn on one or two good deeds. However, the long-term outcomes will be inherently more durable because of their social acceptability."

REFERENCES

Aaron, Henry J., Thomas E. Mann, and Timothy Taylor. 1994. "Introduction," p. 3, in Henry J. Aaron, Thomas E. Mann, and Timothy Taylor (eds.), *Values and Public Policy*. Washington, DC: Brookings Institute.

Berman, Paul. 1980. "Thinking About Programmed and Adaptive Implementation: Matching Strategies to Situations." In Helen M. Ingram and Dean E. Mann (eds.), *Why Policies Succeed or Fail*. Beverly Hills, CA: Sage Publications.

Cawley, R.M. and J. Freemuth. 1993. "Tree Farms, Mother Earth, and Other Dilemmas: The Politics of Ecosystem Management in Greater Yellowstone." *Society and Natural Resources* 6: 41–53.

Congressional Research Service. 1994. *Ecosystem Management: Federal Agency Activities*. Washington, DC: Congressional Research Service, Library of Congress.

Connel, J.H. and W.P. Sousa. 1983. "On the Evidence Needed to Judge Ecological Stability or Persistence." *American Naturalist* 121: 789–824.

Costanza, R., B. Norton, and B. Haskell (eds.). 1992. *Ecosystem Health, New Goals for Environmental Management*. Washington, DC: Island Press, pp. 248–249.

Doerksen, Harvey R. 1998. "Inter-agency Ecosystem Management Task Force." In Dennis L. Soden, Berton Lee Lamb and John Tennert (eds.), *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

Ecological Society of America. 1995. *The Scientific Basis for Ecosystem Management*. Washington, DC: Ad hoc Committee on Ecosystem Management.

Executive Office of the President. 1993. *The National Performance Review: Creating a Government that Works Better and Costs Less*. Washington, DC: Government Printing Office.

Freemuth, J. and R.M. Cawley. 1997, Forthcoming. "Science and the Public: The Politics of Ecosystem Management." *Landscape and Urban Planning*.

General Accounting Office. 1993. *Endangered Species: Factors Associated with Delayed Listing Decisions*. (Washington, DC: GAO/RCED-93-152.

General Accounting Office. 1994. *Ecosystems Management—Additional Actions Needed to Adequately Test a Promising Approach*. GAO/RCED-94-111. Washington, DC: U.S. General Accounting Office.

Grumbine, R.E. 1994. "What Is Ecosystem Management?" *Conservation Biology* 8: 27–33.

Healey, M.C. Forthcoming, 1997. "Paradigms, Policies and Prognostication." In R.J. Naiman and R.E. Bilby (eds.), *Ecology and Management of Streams and Rivers in the Pacific Coastal Ecoregion*.

Healey, M.C. and T.M. Hennessey. 1994. "The Utilization of Scientific Information in the Management of Estuarine Ecosystems." *Ocean and Coastal Management* 23: 167–191.

Hennessey, T.M. 1994. "Governance and Adaptive Management for Estuarine Ecosystems: The Case of Chesapeake Bay." *Coastal Management* 22: 119–143.

Hennessey, Timothy. 1998. "Ecosystems Management: The Governance Approach." In Dennis L. Soden, Berton Lee Lamb and John Tennert (eds.), *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

Holling, C.S. 1978. *Adaptive Environmental Management and Assessment*. New York: Wiley.

Imperial, M., T. Hennessey, and D. Robadue. 1993. "The Evolution of Adaptive Management for Estuarine Ecosystems: The National Estuary Program and Its Precursors." *Ocean and Coastal Management* 20: 147–180.

Keystone Center. 1991. *Final Consensus Report on the Keystone Policy Dialogue on Biological Diversity on Federal Lands*. Keystone, CO: Keystone Center.

Lee, Kai N. 1993. *Compass and Gyroscope: Integrating Science and Politics for the Environment*. Washington, DC: Island Press.

Likens, G. 1992. *An Ecosystem Approach: Its Use and Abuse: Excellence in Ecology Book 3*. Oldendorf/Luhe Germany: Ecological Institute.

Luton, Larry S. 1998. "The Administrative Challenges of Ecosystem Management: A Case Study of the Interior Columbia Basin Ecosystems Management Project." In Dennis L. Soden, Berton Lee Lamb and John Tennert (eds.), *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

MacKenzie, S.H. 1996. *Integrated Resource Planning and Management: The Ecosystem Approach in the Great Lakes Basin*. Covelo, CA: Island Press.

Mangun, Jeanne C. and William R. Mangun. 1998. "Reciprocal Relations Between Humans and ecosystems: Toward a social Exchange Perspective." In Dennis L. Soden, Berton Lee Lamb and John Tennert (eds.), *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

Normand, Valerie J. and Debra J. Salazar. 1998. "Assessing the Meaning of Ecosystems Management in the North Cascade." In Dennis L. Soden, Berton Lee Lamb and John Tennert (eds.), *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

Noss, R.F. and L.D. Harris. 1986. "Nodes, Networks and MUMS: Preserving Diversity at all Scales," *Environmental Management* 10: 299–309.

Ostrom, E. 1995. "Designing Complexity to Govern Complexity." In S. Hanna and M. Munasinghe (eds.), In *Property Rights and the Environment: Social and Ecological Issues*. Washington, DC: Beijer Institute of Ecological Economics and World Bank, p. 34.

Schiffman, Irving. 1998. "Ecosystem Management and Property Rights." In Dennis L. Soden, Berton Lee Lamb and John Tennert (eds.), *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

Sherman, K. 1991. "The Large Marine Ecosystem Concept : A Research and Management Strategy." *Ecological Applications* 1: 4.

Shindler, Bruce and Peter Collson. 1998. "Assessing Public Preferences for Ecosystem Mangement Practices." In Dennis L. Soden, Berton Lee Lamb and John Tennert (eds.), *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

Simpson, D. and N. Christensen. 1997. *Ecosystem Function and Human Activities: Reconciling Economics and Ecology*. New York: Chapman & Hall.

Soden, Dennis L., Berton Lee Lamb, and John Tennert (eds.). 1998a. *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

Soden, Dennis L., C. Richard Bath, and Ronald Ketter. 1998b. "Ecosystems Management in Border Regions: Finger-Pointing through Scientific Management or the Tragedy of the Commons?" In Dennis L. Soden, Berton Lee Lamb and John Tennert (eds.), *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

Stankey, G. H. and B. A. Shindler. 1997. *Adaptive Management Areas: Achieving the Promise, Avoiding the Peril*. Paper delivered at the 1997 International Symposium on Human Dimensions of Natural Resource Management in the Americas, Feb. 25–28, Belize City, Belize, CA.

Steel, Brent, Bruce Shindler, and Mark Brunson. 1998. "Social Acceptability of Ecosystem Management in the Pacific Northwest." In Dennis L. Soden, Berton Lee Lamb and John Tennert (eds.), *Ecosystems Management: A Social Science Perspective*. Dubuque, IA: Kendall-Hunt.

Szerszynski, B. 1996. "On Knowing What to Do: Environmentalism and the Modern Problematic." In S. Lash, B. Szerszynski, and B. Wynne (eds.), *Risk, Environment and Modernity: Towards a New Ecology*. Thousand Oaks, CA: Sage Publications, p. 111.

Underdal, A. 1980. "Integrated Marine Policy: What, Why, How?" *Marine Policy* July, p. 159.

Walters, C. 1986. *Adaptive Management of Renewable Resources*. New York: Macmillan.

3

GIS Technology in Environmental Management

A Brief History, Trends, and Probable Future

Joseph K. Berry
Berry and Associates/Spatial Information Systems, Inc., Fort Collins, Colorado

INTRODUCTION

Environmental management is inherently a spatial endeavor. Its data are particularly complex as they require two descriptors: namely, the precise location of what is being described, as well as a clear description of its physical characteristics. For hundreds of years, explorers produced manually drafted maps that served to link the "*where* is *what*" descriptors. With an emphasis on accurate location of physical features, early maps helped explorers and navigators chart unexplored territory.

Today, these early attributes of maps have evolved from exploratory guides to physical space into management tools for exploring spatial relationships. This new perspective marks a turning point in the use of maps, setting the stage for a paradigm shift in environmental planning and management—from one emphasizing physical descriptions of geographic space, to one of interpreting mapped data and communicating spatially based decision factors. What has changed is the purpose for which maps are used. Modern mapping systems provide a radically different approach to addressing complex environmental issues. An understanding of the evolutionary stages of the new technology, its current expression, and probable trends are essential for today's environmental policymakers and administrators.

EVOLUTIONARY STAGES

Since the 1960s, the decision-making process has become increasingly quantitative, and mathematical models have become commonplace. Prior to the computerized map, most spatial analyses were severely limited by their manual processing procedures. Geographic information systems (GIS) technology provides the means for both efficient handling of voluminous data and effective spatial analysis capabilities (Carter 1989; Coppock and

Rhind 1991). From this perspective, GIS is rooted in the digital nature of the computerized map.

COMPUTER MAPPING

The early 1970s saw *computer mapping* automate the map-drafting process (Brown 1949; McHarg 1969; Steinitz et. al. 1976; Berry and Ripple 1994). The points, lines, and areas defining geographic features on a map are represented as an organized set of X,Y coordinates. These data drive pen plotters that can rapidly redraw the connections at a variety of colors, scales, and projections. The map image, itself, is the focus of this automated cartography.

The pioneering work during this period established many of the underlying concepts and procedures of modern GIS technology (Abler et al. 1971; Muehrcke and Muehrcke 1980; Cuff and Matson 1982; Robertson et al. 1982). An obvious advantage of computer mapping is the ability to change a portion of a map and quickly redraft the entire area. Updates to resource maps, such as a forest fire burn, which previously could take several days, can be done in a few hours. The less obvious advantage is the radical change in the format of mapped data—from analog inked lines on paper, to digital values stored on disk.

SPATIAL DATABASE MANAGEMENT

During the early 1980s, the change in format and computer environment of mapped data were utilized. *Spatial database management systems* (SDBMS) were developed that linked computer mapping capabilities with traditional database management capabilities (Burrough 1987; Shepherd 1991). In these systems, identification numbers are assigned to each geographic feature, such as a timber harvest unit or wildlife management parcel. For example, a user is able to point to any location on a map and instantly retrieve information about that location. Alternatively, a user can specify a set of conditions, such as a specific vegetation and soil combination, and all locations meeting the criteria of the geographic search are displayed as a map.

During the early development of GIS, two alternative data structures for encoding maps were debated (Maffini 1987; Piwowar et al. 1990; Pueker and Christman 1990). The *vector* data model closely mimics the manual drafting process by representing map features as a set of lines, which, in turn, are stored as a series of X,Y coordinates. An alternative structure, termed *raster*, establishes an imaginary reference grid over a project area and then stores resource information for each cell in the grid. Early debates in the GIS community attempted to determine the universally best data structure. The relative advantages and disadvantages of both were viewed in a competitive manner that failed to recognize the overall strengths of a GIS approach encompassing both formats.

By the mid-1980s, the general consensus within the GIS community was that the nature of the data and the processing desired determined the appropriate data structure. This realization of the duality of mapped data structure had significant impact on geographic information systems. From one perspective, maps form sharp boundaries that are best represented as lines. Property ownership, power line right-of-ways, and road networks are examples where the lines are real and the data are certain. Other maps, such

as soils, ground water flows, and steep slopes, are abstract characterizations of terrain conditions. The placement of lines identifying these conditions are subject to judgment, statistical analysis of field data, and broad classification of continuous spatial distributions. From this perspective, the sharp boundary implied by a line is artificial and the data itself are based on expert opinion or probabilistic estimates.

This era of rapidly increasing demand for mapped data focused attention on data availability, accuracy, and standards, as well as data structure issues. Hardware vendors continued to improve digitizing equipment, with manual digitizing tablets giving way to automated scanners at many GIS facilities. A new industry for map encoding and database design emerged and a marketplace for the sales of digital map products emerged. Regional, national, and international organizations began addressing the necessary standards for digital maps to insure compatibility among systems. This period saw GIS database development move from being expensed as individual project costs to a corporate investment in a comprehensive information resource.

GIS MODELING

As the technology continued its evolution, the emphasis turned from descriptive "geo-query" searches of existing databases to prescriptive analysis of mapped data. For the most part, the earlier eras of GIS concentrated on automating traditional mapping practices. If a user had to repeatedly overlay several maps on a light-table, an analogous procedure was developed within the GIS. Similarly, if repeated distance and bearing calculations were needed, systems were programmed with a mathematical solution. The result of this effort was GIS functions that mimicked the manual procedures in a user's daily activities. The value of these systems was the savings gained by automating tedious and repetitive operations.

By the mid-1980s, the bulk of the geo-query operations were available in most GIS systems and a comprehensive theory of spatial analysis began to emerge. The dominant feature of this theory is that spatial information is represented numerically, rather than in analog fashion as inked lines on a map. These digital maps are frequently conceptualized as a set of "floating maps" with a common registration, allowing the computer to "look" down and across the stack of digital maps (Figure 1). The spatial relationships of the data can be summarized (database geo-queries) or mathematically manipulated (analytic processing). Because of the analog nature of traditional map sheets, manual analytic techniques are limited in their quantitative processing. Digital representation, on the other hand, makes a wealth of quantitative (as well as qualitative) processing possible. The application of this new modeling theory to environmental management is revolutionary. Its application takes two forms—spatial statistics and spatial analysis.

Spatial statistics have been used by geophysicists for many years in characterizing the geographic distribution, or spatial pattern, of field data (Ripley 1981; Meyers 1988; Cressie 1991, 1993; Cressie and Ver Hoef 1993). The statistics describe the spatial variation in the data, rather than assuming a typical response is everywhere. For example, field measurements of snow depth can be made at several plots within a watershed. Traditionally, these data are analyzed for a single value (the average depth) to characterize the watershed. Spatial statistics, on the other hand, uses both plot locations and the recorded measurements to generate a map of relative snow depth throughout the entire watershed.

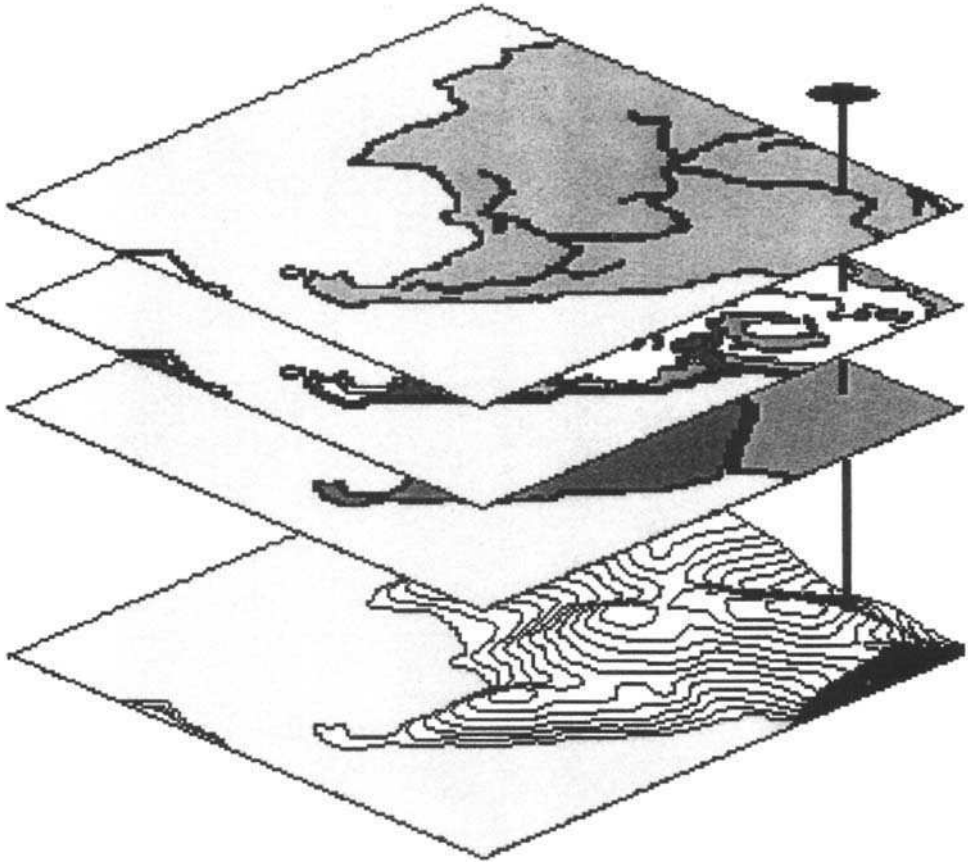

Figure 1 Conceptualization of GIS processing. GIS processing can be conceptualized as a stack of floating maps that are geographically registered making information for any location readily accessible.

More recently, spatial statistics has evolved from descriptive, to predictive, to optimization models. Precision farming, for example, uses GIS modeling to investigate the spatial relationships between crop yield and soil nutrients (Berry 1996). The Global Positioning System (GPS) continuously locates a harvester in a field (Leick 1990) and, for each second, an onboard data card stores the geographic position and yield/moisture of the grain flow. The result is a yield map composed of tens of thousands of sample points throughout a field. Soil samples are analyzed for nutrient levels, such as phosphorous and potassium and then spatially interpolated into maps tracking the spatial patterns of the variations (Burgess and Webster 1980; Webster and Burgess 1980; Lam 1983). Predictive techniques from simple regression to knowledge-based modeling are used to relate the dependent (yield) and independent (nutrients) mapped variables. The derived relationship can be used to determine the optimal fertilizer rates throughout the field.

Traditional "whole-field" management involves a similar analysis, except field averages are used to derive a single application rate for the entire field. In highly variable

fields, most areas receive either too much or too little fertilizer. Some farmers (encouraged by the chemical industry) hedge their bets on a good crop by applying fertilizer at a higher rate in hopes of bringing up the yield in the nutrient poor areas. The result can be overapplication on more than half the field. Precision farming, on the other hand, uses "site-specific" management involving a "prescription map" derived by spatial statistics and variable rate technology. As a spray rig moves through the field, GPS locates its position on the prescription map and the injected blend of nutrients is adjusted "on-the-fly."

Many other applications, from retail market forecasting to forest management, are using spatial statistics to relate mapped variables. The environmental sciences have a rich heritage in the quantitative expression of their systems. Spatial statistics provides a new set of tools for explaining spatially induced variance—variations in geographic space rather than numeric space. From this perspective the floating maps in Figure 1, represent the spatial distributions of mapped variables. In traditional mathematical terms, each map is a "variable," each location is a "case," and each map value is a "measurement." The GIS provides a consistent spatial registration of the numbers. The full impact of this map-ematical treatment of maps is yet to be determined. The application of such concepts as spatial correlation, statistical filters, map uncertainty, and error propagation await their translation from other fields.

Spatial analysis, on the other hand, has a rapidly growing number of current resource and environmental applications (Ripple 1987, 1994; Maguire et al. 1991a; Goodchild et al. 1993). For example, a forest manager can characterize timber supply by considering the relative skidding and log-hauling accessibility of harvesting parcels. Wildlife managers can consider such factors as proximity to roads and relative housing density to map human activity and incorporate this information into habitat delineation. Landscape planners can generate visual exposure maps for alternative sites for a proposed facility to sensitive viewing locations, such as recreational areas and scenic overlooks. Soil scientists can identify areas with high sediment loading potential based on proximity to streams and intervening terrain slope, vegetative cover, and soil type. Similarly, groundwater and atmospheric scientists can simulate the complex movement of a release as it responds to environmental factors affecting its flow through geographic space.

Just as spatial statistics have been developed by extending concepts of conventional statistics, a mathematics supporting spatial analysis has evolved (Unwin 1981; Berry 1987a; Goodchild 1987; Ripple 1989; Johnson 1990; Maguire et al. 1991b). This "map algebra" uses sequential processing of spatial operators to perform complex map analyses (Berry 1987b; Tomlin 1990). It is similar to traditional algebra in that primitive operations (e.g., add, subtract, exponentiate) are logically sequenced on variables to form equations. However, in map algebra, entire maps composed of thousands or millions of numbers represent the variables of the spatial equation.

For example, the change in lead concentrations in an aquifer can be estimated by evaluating the algebraic expression:

$$\%\ change = ((new\ value - old\ value)/old\ value) \times 100$$

by substituting the average values for two time periods. Map algebra replaces the simple averages with spatially interpolated maps based on the same sets of field data used to calculate the averages. The *% change* equation is evaluated at each map location, resulting

in a map percent change (Figure 2). Areas of unusual change can be identified by evaluating the standard normal variable (SNV) expression:

$$SNV = ((new\ value - \%\ change\ average)/\%\ change\ standard\ deviation) \times 100$$

This normalizes the map of changes in lead concentration, with areas of statistically unusual increase having SNV values over 100. These potentially hazardous areas can be overlaid on demographic maps to determine the level of environmental risk.

Most of the traditional mathematical capabilities, plus an extensive set of advanced map-processing operations, are available in modern GIS software. You can add, subtract, multiply, divide, exponentiate, root, log, cosine, differentiate, and even integrate maps. After all, maps in a GIS are just organized sets of numbers. However, with this "mapematics," the spatial coincidence and juxtapositioning of values among and within maps create new operations, such as effective distance, optimal path routing, visual exposure density and landscape diversity, shape, and pattern.

For example, distance is traditionally defined as "the shortest straight line between two points." Both a ruler (analog tool) and the Pythagorean theorem (mathematical tool) adhere to this strict definition. The simple definition of distance is rarely sufficient for most environmental applications. Often "between two points" must be expanded to "among a set of points" to account for proximity, such as buffers around streams. And "straight line" needs to be expanded to "not necessarily straight line," as nothing in the real world moves in a straight line (even light bends in the atmosphere). In a GIS, the concept of movement replaces distance by introducing the location of absolute and relative barriers into the calculations (Muller 1982; Elridge and Jones 1991). An effective butterfly buffer "reaches" out around a stream capturing an appropriate amount of butterfly habitat (function of vegetation cover and slope/aspect), instead of simply reaching out a fixed number of feet regardless of habitat.

Another example of advanced spatial analysis tools involves landscape analysis. The ability to quantify landscape structure is a prerequisite to the study of landscape function and change. For this reason considerable emphasis has been placed on the development of landscape metrics (Turner 1990; McGarigal and Marks 1995). Many of these relationships are derived through analysis of the shape, pattern, and arrangement of landscape elements spatially depicted as patches (individual polygons), classes of related patches (polygons of the same type/condition), and entire landscape mosaics (all polygons). The convexity index compares each patch's perimeter to its area, with an increase in perimeter per unit area indicating more irregularly shaped parcels. The mean proximity index indicates the average distance between the patches within a class as a measure of the relative dispersion. The fractal dimension of a landscape assesses the proportion of edge versus interior of all patches, summarizing whether the mosaic is primarily composed of simple shapes (circle- or square-like) or complex shapes with convoluted, plane-filling perimeters. These, plus a myriad of other landscape indices, can be used to track the fragmentation induced by timber harvesting and relate the changes to impacts on wildlife habitat.

This GIS modeling "toolbox" is rapidly expanding. A detailed discussion of all of the statistical and analysis tools is beyond the scope of this chapter. It suffices to note that GIS technology is not simply automating traditional environmental approaches, but radically changing environmental science. It is not just a faster mapper, nor merely an easier entry to traditional databases. Its new tools and modeling approach to environmen-

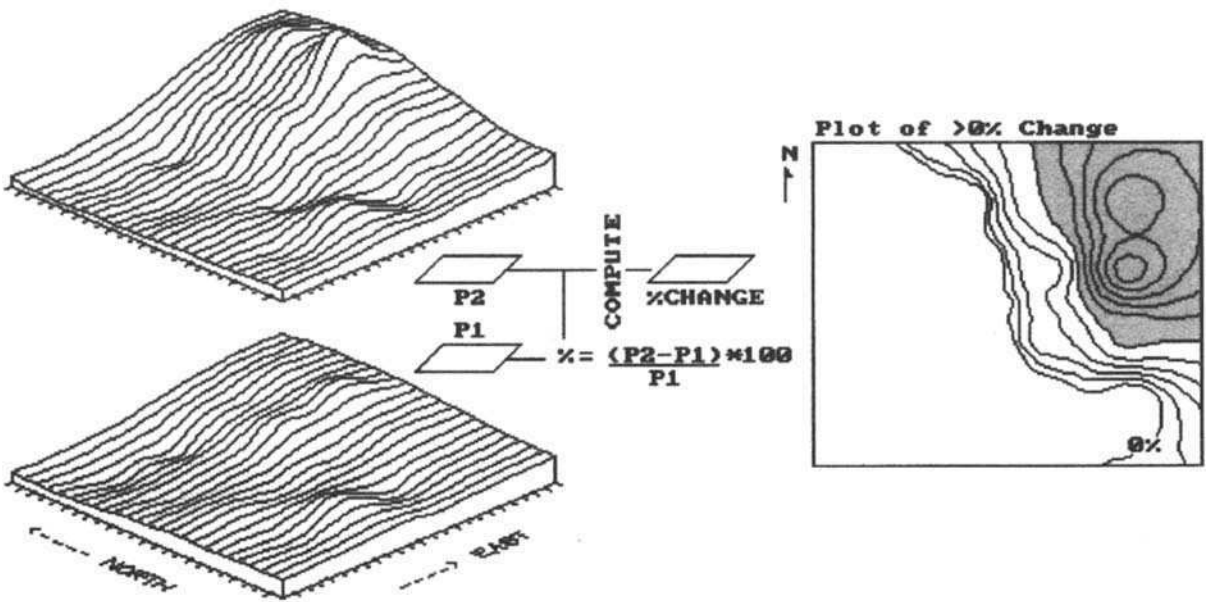

Figure 2 Percent change map. Algebraic equations, such as percent change, can be evaluated using entire maps as variables.

tal information combine to extend record-keeping systems and decision-making models into effective decision support systems (Parent and Church 1989; Densham 1991; Pereira and Duckstein 1993).

SPATIAL REASONING AND DIALOGUE

The 1990s are building on the cognitive basis, as well as the databases, of current geographic information systems. GIS is at a threshold that is pushing beyond mapping, management, and modeling, to *spatial reasoning and dialogue*. In the past, analysis models have focused on management options that are technically optimal—the scientific solution. Yet in reality, another set of perspectives must be considered—the social solution. It is this final sieve of management alternatives that most often confounds resource and environmental decision making. It uses elusive measures, such as human values, attitudes, beliefs, judgment, trust, and understanding. These are not the usual quantitative measures amenable to computer algorithms and traditional decision-making models.

The step from technically feasible to socially acceptable options is not so much an increase in scientific and econometric modeling, as it is communication (Calkins 1991; Epstein 1991; King and Kraemer 1993; Medyckyj-Scott and Hernshaw 1993). Basic to effective communication is involvement of interested parties throughout the decision-making process. This new participatory environment has two main elements—consensus building and conflict resolution. *Consensus building* involves technically driven communication and occurs during the alternative formulation phase. It involves the resource specialist's translation of the various considerations identified by a decision team into a spatial model. Once completed, the model is executed under a wide variety of conditions and the differences in outcome are noted.

From this perspective, a single map rendering of an environmental plan is not the objective. It is how the plan changes as the different scenarios are tried that becomes information for decision making. "What if avoidance of visual exposure is more important than avoidance of steep slopes in siting a new haul road? Where does the proposed route change, if at all?" Answers to such analytic queries focus attention on the effects of differing perspectives. Often, seemingly divergent philosophical views result in only slightly different map views. This realization, coupled with active involvement in the decision-making process, often leads to group consensus.

If consensus is not obtained, *conflict resolution* is necessary. Such socially driven communication occurs during the decision formulation phase. It involves the creation of a "conflicts map," which compares the outcomes from two or more competing uses. Each management parcel is assigned a numeric code describing the conflict over the location. A parcel might be identified as ideal for wildlife preservation, a campground, and a timber harvest. As these alternatives are mutually exclusive, a single use must be assigned. The assignment, however, involves a holistic perspective that simultaneously considers the assignments of all other locations in a project area.

Traditional scientific approaches are rarely effective in addressing the holistic problem of conflict resolution. Most are deterministic models and involve a succession, or cascade, of individual parcel assignments. The final result is strongly biased by the ordering of parcel consideration, mathematical assumptions, and the assignment of discrete model parameters. Even if a scientific solution is reached, it is viewed with suspicion by the layperson. Modern resource information systems provide an alternative approach

involving human rationalization and trade-offs. This process involves statements like "If you let me harvest this parcel, I will let you set aside that one as a wildlife preservation." The statement is followed by a persuasive argument and group discussion. The dialogue is far from a mathematical optimization, but often closer to an effective decision. It uses the information system to focus discussion away from broad philosophical positions, to a specific project area and its unique distribution of conditions and potential uses.

THE CURRENT FRONTIER

The elements for computer mapping and spatial database management are in place, and the supporting databases are rapidly coming on-line. The emerging concepts and procedures supporting GIS modeling and spatial reasoning/dialogue are being refined and extended by the technologists. There is a growing number of good texts (Star and Estes 1990; Berry 1993, 1995b; Korte 1993; Douglas 1995) and college courses on GIS technology are becoming part of most land-related curricula. What seems to be lacking is a new spatial paradigm among the user communities. Many are frustrated by the inherent complexity of the new technology. Others are confused by new approaches beyond those that simply automate existing procedures. Fundamental to the educational renaissance demanded by GIS is a clear understanding of the questions it can address.

SEVEN BASIC QUESTIONS

Seven basic questions encompassing most GIS applications are identified in Table 1. The questions are progressively ordered from inventory-related (data) to analysis-related (understanding) as identified by their function and approach. The most basic question,

Table 1 Basic Questions GIS Can Address[a]

Questions for GIS	Function	Approach
1. Can you map that?	Mapping	(Description)
		DATA
2. Where is what?	Management	|
		|
3. Where has it changed?	Temporal	|
		|
4. What relationships exist?	Spatial	INFORMATION
		|
5. Where is it best?	Suitability	|
		|
6. What effects what?	System	|
		UNDERSTANDING
7. What if . . . ?	Simulation	(Prescription)

[a]Seven types of questions are addressed by GIS technology. The first three are inventory-related; the latter four are analysis-related investigating the interrelationships among mapped data beyond simple spatial coincidence.

"*Can you map that?*" is where GIS began 30 years ago—automated cartography. A large proportion of GIS applications still involve the updating and timely output of map products. As an alternative to a room full of draftspersons and drafting pens, the digital map has a clear edge. Applications responding to this question are easily identified in an organization and the "payoffs" in productivity apparent. Most often, these mapping applications are restatements of current inventory-related activities.

Questions involving "*Where is what?*" exploit the linkage between the digital map and database management technology. These questions are usually restatements of current practices as well. They can get a group, however, to extend their thinking to geographic searches involving coincidence of data they had not thought possible. The nature and frequency of this type of question provide valuable insight into system design. For example, if most applications require interactive map queries of a common database from a dispersed set of offices, a centralized GIS provides consistency and control over the shared data. However, if the queries are localized and turnaround is less demanding, a distributed GIS might suffice. The conditions surrounding the first two questions are the primary determinants of the character and design of the GIS implemented in an organization. The remaining questions determine the breadth and sophistication of its applications. They also pose increasing demands on the education and computer proficiency of its users.

The third type of question, "*Where has it changed?*" involves temporal analysis. These questions mark the transition from inventory-related data searches to packaging information for generating plans and policies. Such questions usually come from managers and planners, whereas the previous types of questions support day-to-day operations. A graphic portrayal of changes in geographic space, whether it is product sales or lead concentrations in well water, affords a new perspective on existing data. The concept of "painting" data, which are normally viewed as tables, might initially be a bit uncomfortable—it is where GIS evolves from simply automating current practices to providing new tools.

"*What relationships exist?*" questions play heavily on the GIS toolbox of analytic operations. "Where are the steep areas?" "Can you see the proposed power plant from over there?" "How far is the town from the contamination spill?" and "Is vegetation cover more diverse here, or over there?" are a few examples of this type of question. Whereas the earlier types involved query and repackaging of base data, spatial relationship questions involve derived information. Uncovering of these questions within an organization is a bit like the eternal question—"Did the chicken or the egg come first?" If users are unaware of the different things a GIS can do differently, chances are they are not going to ask it to do anything different. Considerable training and education in spatial reasoning approaches are needed to fully develop GIS solutions to these questions. Their solution, however, is vital to the treatise of the remaining two types of questions.

Suitability models spring from questions of "*Where is it best?*" Often these questions are the end products of planning and are the direct expression of goals and objectives. The problem is that spatial considerations historically are viewed as input to the decision process—not part of the "throughput." Potential GIS users tend to specify the composition (base and derived maps) of "data sandwiches" (map layers), which adorn the walls during discussion. The idea of using GIS modeling as an active ingredient in the discussion is totally foreign. Suitability questions usually require the gentle coaxing of the "visceral visions" locked in the minds of the decision makers. They require an

articulation of various interpretations of characteristics and conditions and how they relate within the context of the decision at hand.

"*What effects what?*" questions involve system models—the realm of the scientist and engineer. In a manner of speaking, a system model is like an organic chemist's view of a concoction of interacting substances, whereas a suitability model is analogous to simply a recipe for a cake. Whereas suitability models tend to incorporate expert opinion, a system model usually employs the tracking of "cause and effect" through empirically derived relationships. The primary hurdle in addressing these applications is the thought that GIS simply provides spatial summaries for input and colorful maps of model output. The last 100 years have been spent developing techniques that best aggregate spatial complexity, such as stratified random sampling and the calculation of the average to represent a set of field samples. The idea that GIS modeling retains spatial specificity throughout the analysis process and responds to spatial autocorrelation of field data is a challenging one.

"*What if . . . ?*" questions involve the iterative processing of suitability or system models. For suitability models, they provide an understanding of different perspectives on a project—"What if visual impact is the most important consideration, or if road access is the most important; where would it be best for development?" For system models, they provide an understanding of uncertain or special conditions—"What if there was a 2-in. rainstorm, or if the ground was saturated; would the surface runoff require a larger culvert?"

In determining what GIS can do, the first impulse is to automate current procedures. Direct translations of these procedures often are sufficient for the first few types of questions. As GIS moves beyond mapping to the application modeling required to address the latter questions, attention is increasingly focused on the considerations embedded in the derivation of the "final" map. The map itself is valuable, but the thinking behind its creation provides the real insights for decision making. From this perspective, the model becomes even more useful than the graphic output.

GIS MODELING APPROACH AND STRUCTURE

Consider the simple model outlined in the Figure 3. It identifies the suitable areas for a residential development considering basic engineering and aesthetic factors. Like any other model it is a generalized statement, or abstraction, of the important considerations in a real-world situation. It is representative of one of the most common GIS modeling types—a suitability model. First, note that the model is depicted as a flowchart with boxes indicating maps, and lines indicating GIS processing. It is read from left to right. For example, the top line tells us that a map of elevation (ELEV) is used to derive a map of relative steepness (SLOPE), which in turn is interpreted for slopes that are better for a campground (S-PREF).

Next, note that the flowchart has been subdivided into compartments by dotted horizontal and vertical lines. The horizontal lines identify separate submodels expressing suitability criteria—the best locations for the campground are (1) on gently sloped terrain, (2) near existing roads, (3) near flowing water, (4) with good views of water, and (5) westerly oriented. The first two criteria reflect engineering preferences, whereas the latter three identify aesthetic considerations. The criteria depicted in the flowchart are

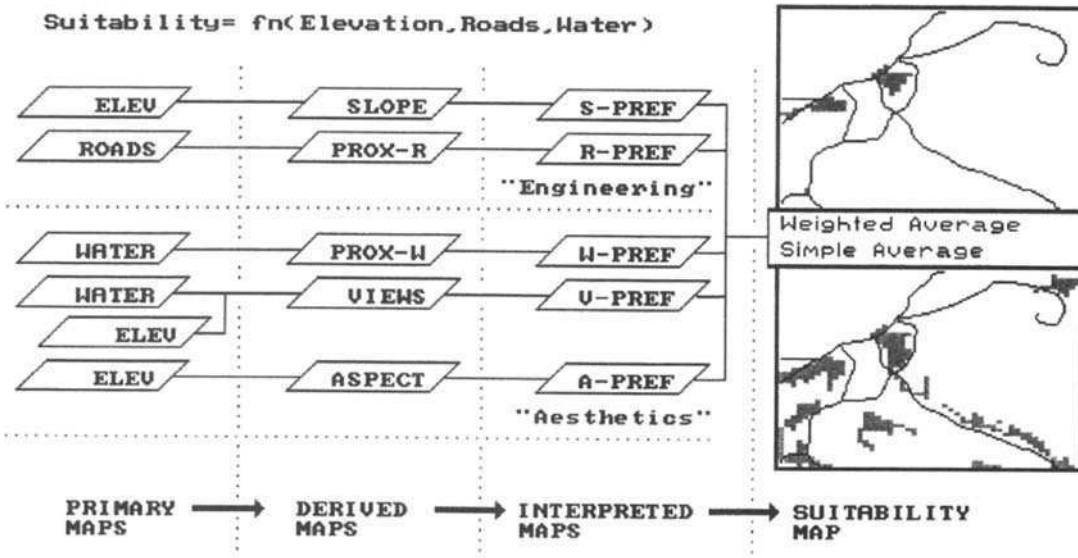

Figure 3 Development suitability model. Flowchart of GIS processing determining the best areas for a development as gently sloped, near roads, near water, with good views of water, and a westerly aspect.

linked to a sequence of GIS commands (termed a command *macro*), which are the domain of the GIS specialist. The linkage between the flowchart and the macro is discussed latter; for now concentrate on the model's overall structure. The vertical lines indicate increasing levels of abstraction. The left-most *primary maps* section identifies the base maps needed for the application. In most instances, this category defines maps of physical features described through field surveys—elevation, roads, and water. They are inventories of the landscape, and are accepted as fact.

The next group is termed *derived maps*. Like primary maps, they are facts; however, these descriptors are difficult to collect and encode, so the computer is used to derive them. For example, slope can be measured with an Abney hand level, but it is impractical to collect this information for all of the the 2500 quarter-hectare locations depicted in the project area. Similarly, the distance to roads can be measured by a survey crew, but it is just too difficult. Note that these first two levels of model abstraction are concrete descriptions of the landscape. The accuracy of both primary and derived maps can be empirically verified simply by taking the maps to the field and measuring.

The next two levels, however, are an entirely different matter. It is at this juncture that GIS modeling is moved from fact to judgment: from the description of the landscape (fact), to the prescription of a proposed land use (judgment). The *interpreted maps* are the result of assessing landscape factors in terms of an intended use. This involves assigning a relative "goodness value" to each map condition. For example, gentle slopes are preferred locations for campgrounds. However, if proposed ski trails were under consideration, steeper slopes would be preferred. It is imperative that a common goodness scale is used for all of the interpreted maps. Interpreting maps is like a professor's grading of several exams during an academic term. Each test (vis. primary or derived map) is

graded. As you would expect, some students (vis. map locations) score well on a particular exam, while others receive low marks.

The final *suitability map* is a composite of the set of interpreted maps, similar to averaging individual test scores to form an overall semester grade. In the figure, the lower map inset identifies the best overall scores for locating a development, and is computed as the simple average of the five individual preference maps. However, what if the concern for good views (V-PREF map) was considered 10 times more important in siting the campground than the other preferences? The upper map inset depicts the weighted average of the preference maps showing that the good locations, under this scenario, are severely cut back to just a few areas in the western portion of the study area. But what if gentle slopes (S-PREF map) were considered more important? Or proximity to water (W-PREF map)? Where are best locations under these scenarios? Are there any consistently good locations?

The ability to interact with the derivation of a prescriptive map is what distinguishes GIS modeling from the computer mapping and spatial database management activities of the earlier eras. Actually, three types of model modifications can be made—weighting, calibration, and structural. *Weighting* modifications affect the combining of the interpreted maps into an overall suitability map, as described above. *Calibration* modifications affect the assignment of the individual "goodness ratings." For example, a different set of ranges defining slope "goodness" might be assigned, and its impact on the best locations noted.

Weighting and calibration simulations are easy and straightforward —edit a model parameter, resubmit the macro, and note the changes in the suitability map. Through repeated model simulation, valuable insight is gained into the spatial sensitivity of a proposed plan to the decision criteria. *Structural* modifications, on the other hand, reflect changes in model logic by introducing new criteria. They involve modifications in the structure of the flowchart and additional programming code to the command macro. For example, a group of decision makers might decide that forested areas are better for a development than open terrain. To introduce the new criterion, a new sequence of primary, derived, and interpreted maps must be added to the "aesthetics" compartment of the model reflecting the group's preference. It is this dynamic interaction with maps and the derivation of new perspectives on a plan that characterize spatial reasoning and dialogue.

GIS IN CONSENSUS BUILDING AND CONFLICT RESOLUTION: A CASE STUDY

By their nature, all land use plans contain (or imply) a map. The issue is determining "what should go where," and as noted above, a lot of thinking goes into a final map recommendation (Berry and Berry 1988; Gimblett 1990). One cannot simply geo-query a database for the recommendation any more than it can arm a survey crew with a "land use-ometer" to measure the potential throughout a project area. The logic behind a land use model and its interpretation by different groups are the basic elements leading to an effective decision. During the deliberations, an individual map is merely one rendering of the thought process.

The potential of "interactive" GIS modeling extends far beyond its technical implementation. It promises to radically alter the decision-making environment itself. A "case

study" might help in making this claim. The study uses three separate spatial models for allocating alternative land uses of conservation, research, and residential development. In the study, GIS modeling is used in consensus building and conflict resolution to derive the "best" combination of competing uses of the landscape.

The study takes place on the western tip of Caribbean island of St. Thomas (Berry 1991). Base maps of roads, shoreline, elevation, and current flow formed the basis of the application. Separate suitability models were developed for three alternative land uses—conservation, research, and development. The final model addressed the best allocation of land, by simultaneously considering all three potential landscape uses. The departure from "traditional" analysis is that the GIS was used in "real time" to respond to the questions and concerns of decision makers. In doing so, the modeling contributed to group consensus building and conflict resolution, as well as the graphic portrayal of the final plan.

A map of accessibility to existing roads and the coastline formed the basis of the *conservation areas model*. In determining access, the slope of the intervening terrain is considered. The "slope-weighted proximity" from the roads and from the coastline was used. In these calculations, areas that appear geographically near a road may actually be considered inaccessible if there are steep intervening slopes. For example, the coastline might be a "stone's throw away" from the road, but if it lands at the foot of a cliff it is effectively inaccessible for recreation. The two maps of weighted proximity were combined into an overall map of accessibility. The final step of the model involved interpreting relative access into conservation uses (Figure 4). Recreation was identified for those areas near both roads and the coast. Intermediate access areas were designated for limited use, such as hiking. Areas effectively far from roads were designated as preservation areas.

The characterization of the *research areas model* first used an elevation map to identify individual watersheds. The set of all watersheds was narrowed to just three based on scientists' preferences that they require relatively large and wholly contained areas for their research (Figure 5). A submodel used the prevailing current to identify coastal areas influenced by each of the three terrestrial research areas.

The *development areas model* determined the "best" locations for residential development. The model structure used is nearly identical to that of the development suitability model described in the section above. Engineering, aesthetic, and legal factors were considered. As before, the engineering and aesthetic considerations were treated independently, as relative rankings. An overall ranking was assigned as the weighted average of the five preference factors. Legal constraints, on the other hand, were treated as critical factors. For example, an area within the 100-meter setback was considered unacceptable, regardless of its aesthetic or engineering rankings.

Figure 6 shows a composite map containing the simple arithmetic average of the five separate preference maps used to determine development suitability. The constrained and undesirable locations are shown as white. Note that approximately half of the land area is ranked as "acceptable" or better (gradient of darker tones). In averaging the five preference maps, all criteria were considered equally important at this step.

The analysis was extended to generate a series of weighted suitability maps. Several sets of weights were tried. The group finally decided on

View preference times 10 (most important)
Coast proximity times 8

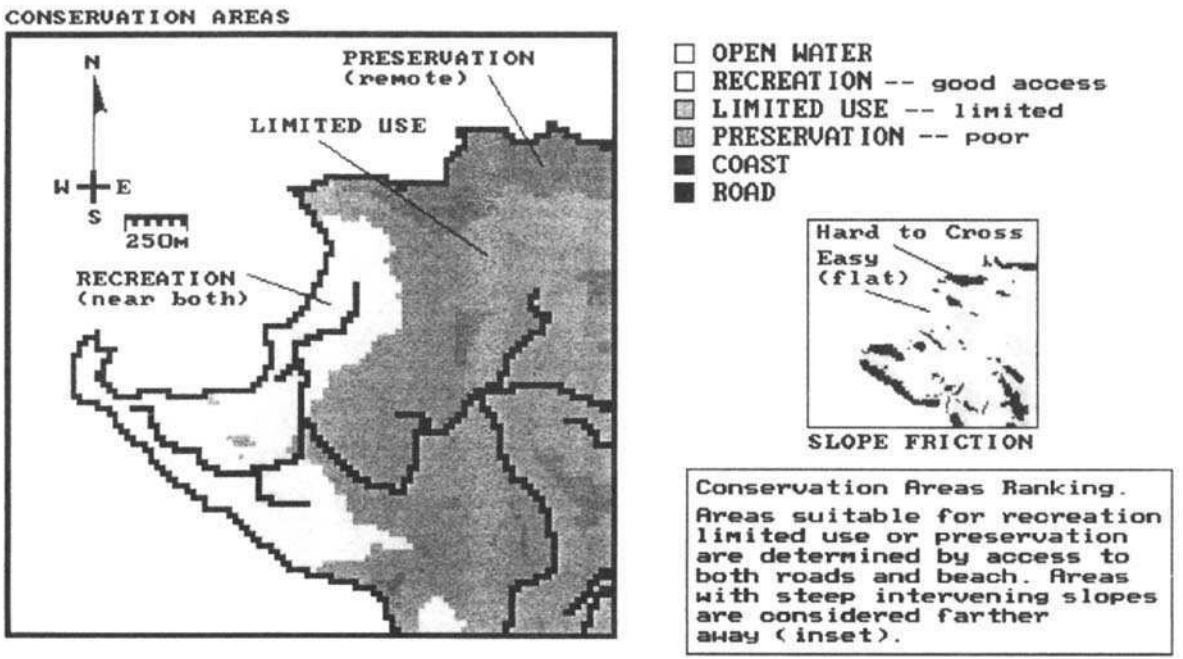

Figure 4 Conservation areas map. Maps of relative accessibility to roads and the coastline formed the basis for locating various conservation uses.

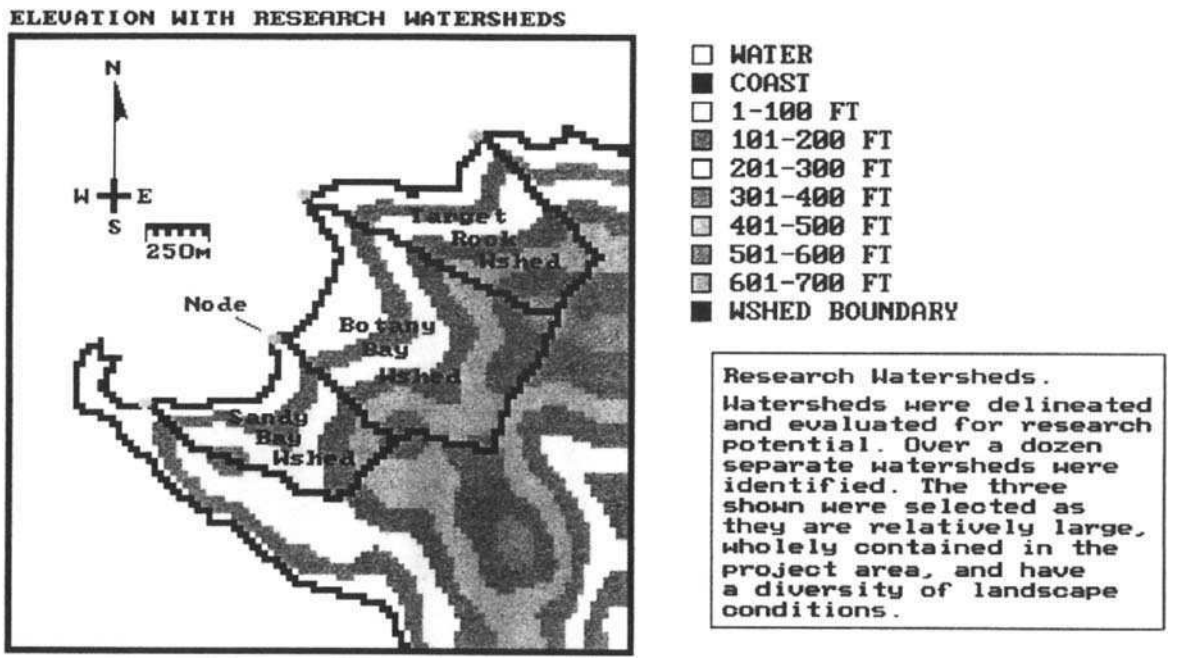

Figure 5 Research areas map. Three watersheds were chosen as research areas as they are relatively large and contain a diversity of landscape characteristics.

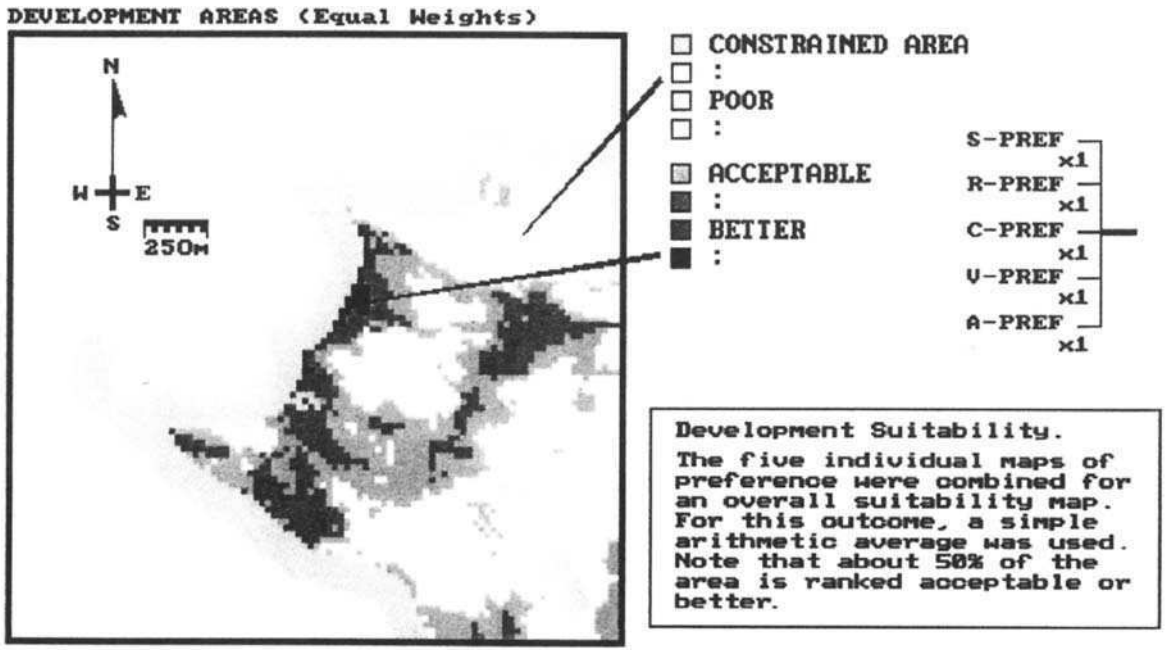

Figure 6 Development areas map (simple average). The best areas for development were first determined through equal consideration of the five criteria.

Road proximity times 3
Aspect preference times 2
Slope preference times 1 (least important).

The resulting map of the weighted averaging is presented in Figure 7. Note that a smaller portion of the land is ranked as "acceptable" or better. Also note the spatial distribution of these prime areas is localized to distinct clusters.

The group of decision makers were actively involved in development of all three of the individual models—conservation, research, and development. While looking over the shoulder of the GIS specialist, they saw their concerns translated into map images. They discussed whether their assumptions made sense. Debate surrounded the "weights and calibrations" of the models. They saw the sensitivity of each model to changes in its parameters. In short, they became involved and understood the map analysis taking place. The approach is radically different from viewing a "solution" map with just a few alternatives developed by a sequestered set of GIS specialists. It enables decision makers to be just that—decision makers, not choice choosers constrained to a few predefined alternatives. The involvement of decision makers in the analysis process contributes to *consensus building*. At this stage, the group reached consensus on the three independent land use possibilities.

The three analyses, however, determined the best use of the project area considering the possibilities in a unilateral manner. What about areas common to two or more of the maps? These areas of conflict are where the decision makers need to focus their attention. Three basic approaches are used in GIS-based *conflict resolution*—hierarchical dominance, compatible use, and trade-off. *Hierarchical dominance* assumes certain land uses are more important and, therefore, supersede all other potential uses. *Compatible use*, on the other hand, identifies harmonious uses and can assign more than one to a single location. *Trade-off* recognizes mutually exclusive uses and attempts to identify the most appropriate land use for each location. Effective land use decisions involve elements of all three of these approaches.

From a map-processing perspective, the hierarchical approach is easily expressed in a quantitative manner and results in a deterministic solution. Once the political system has identified a superseding use, it is relatively easy to map these areas and simply assign the dominant use. Similarly, compatible use is technically easy from a map analysis context, though often difficult from a policy context. When compatible uses can be identified, both uses are assigned to all areas with the joint condition.

Most conflict, however, arises when potential uses for a location are justifiable and incompatible. In these instances, quantitative solutions to the allocation of land use are difficult, if not impossible, to implement. The complex interaction of the spatial frequency and juxtapositioning of several competing uses is still most effectively dealt with by human intervention. GIS technology assists decision making by deriving a map that indicates the set of alternative uses vying for each location. Once the data are in this graphic form, decision makers can assess the patterns of conflicting uses and determine land use allocations. Also, GIS can aid in these deliberations by comparing different allocation scenarios and identifying the areas of change.

In the case study, the hierarchical dominance approach was tried, but resulted in total failure. At the onset, the group was uncomfortable with identifying one land use as always being better than another. However, the approach was demonstrated by identifying development as least favored, recreation next, and the researchers' favorite watershed

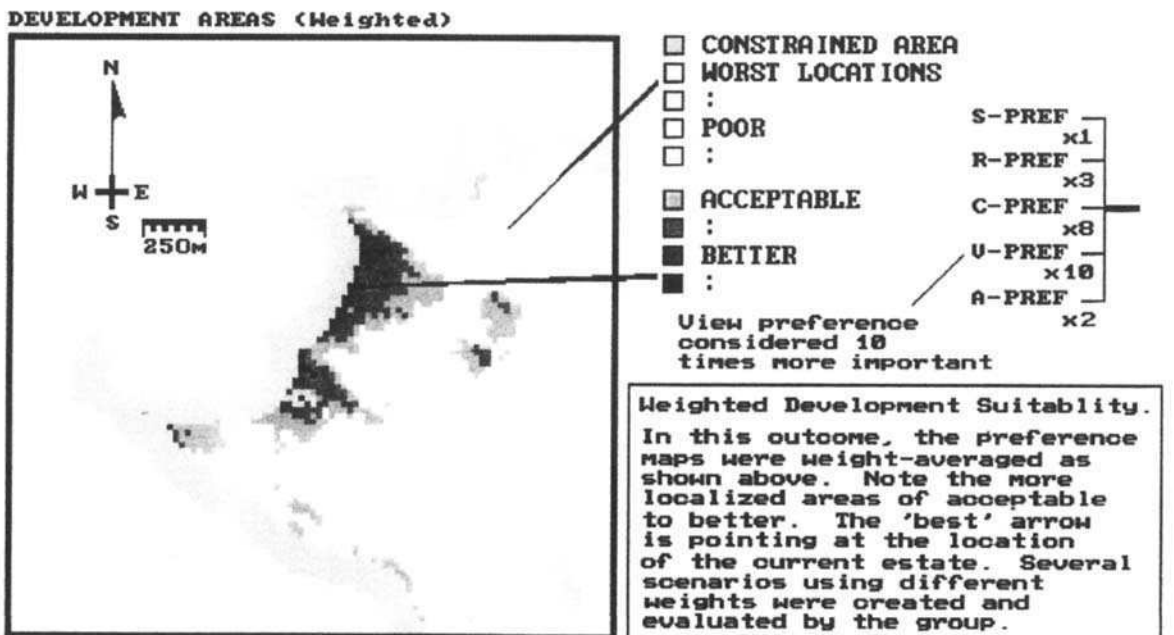

Figure 7 Development areas map (weighted average). Weighted averaging of the maps expressing the five criteria narrowed the acceptable areas for development, reflecting the relative preferences of the group.

taking final precedence. The resulting map was unanimously rejected as it contained very little area for development, and what areas were available were scattered into disjointed parcels. It graphically illustrated that even when decision makers are able to find agreement in "policy space," it is frequently muddled in the complex reality of geographic space.

The alternative approaches of compatible use and trade-off faired better. Both approaches depend on generating a map indicating all of the competing land uses for each location—a comprehensive *conflicts map*. Figure 8 is such a map considering the conservation areas, research areas, and development areas maps. Note that most of the area is without conflict (lightest tone). In the absence of the spatial guidance in a conflict map, the group had a tendency to assume that every square inch of the project area was in conflict. In the presence of the conflict map, however, their attention was immediately focused on the unique patterns of actual conflict.

First, the areas of actual conflict were reviewed for compatibility. For example, it was suggested that research areas could support limited use hiking trails, and both activities were assigned to those locations. However, most of the conflicts were real and had to be resolved "the hard way." Figure 9 presents the group's "best" allocation of land use. Dialogue and group dynamics dominated the trade-off process. As in all discussions, individual personalities, persuasiveness, rational arguments, and facts affected the collective opinion. The easiest assignment was the recreation area in the lower portion of the figure as this use dominated the area. The next breakthrough was an agreement that the top and bottom research areas should remain intact. In part, this made sense to the group as these areas had significantly less conflict than the central watershed. It was decided that all development should be contained within the central watershed. Structures would be constrained to the approximately 20 contiguous hectares identified as best for development, which was consistent with the island's policy of encouraging "cluster" development. The legally constrained area between the development cluster and the coast would be for the exclusive use of the residents. The adjoining research areas would provide additional buffering and open space, thereby enhancing the value of the development. In fact, it was pointed out that this arrangement provided a third research setting to investigate development, with the two research watersheds serving as control. Finally, the remaining small "salt and pepper" parcels were absorbed by surrounding "limited or preservation use" areas.

In all, the group's final map is a fairly rational land use allocation, and one that is readily explained and justified. Although the decision group represented several diverse opinions, this final map achieved consensus. In addition, each person felt as though he actively participated and, by using the interactive process, better understood both the area's spatial complexity and the perspectives of others.

This last step involving human intervention and trade-offs might seem anticlimactic to the technologist. After a great deal of rigorous GIS modeling, the final assignment of land uses involved a large amount of group dynamics and subjective judgment. This point, however, highlights the capabilities and limitations of GIS technology. Geographic information systems provide significant advances in how we manage and analyze mapped data. It rapidly and tirelessly assembles detailed spatial information. It allows the incorporation of sophisticated and realistic interpretations of landscape factors, such as weighted proximity and visual exposure. It does not, however, provide an artificial intelligence for land use decision making. GIS technology greatly enhances decision-making capabilities, but does not replace them. In a sense, it is both a *toolbox* of ad-

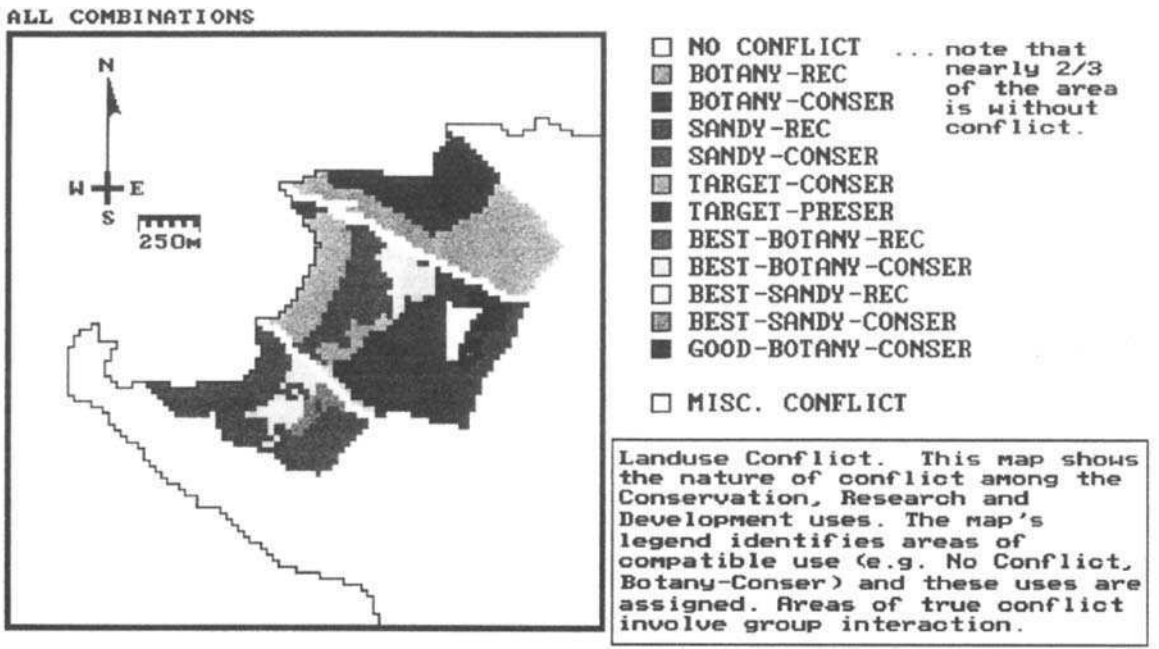

Figure 8 Conflicts map. The conservation areas, research areas, and development areas maps were overlaid to identify locations of conflict that are deemed best for two or more uses.

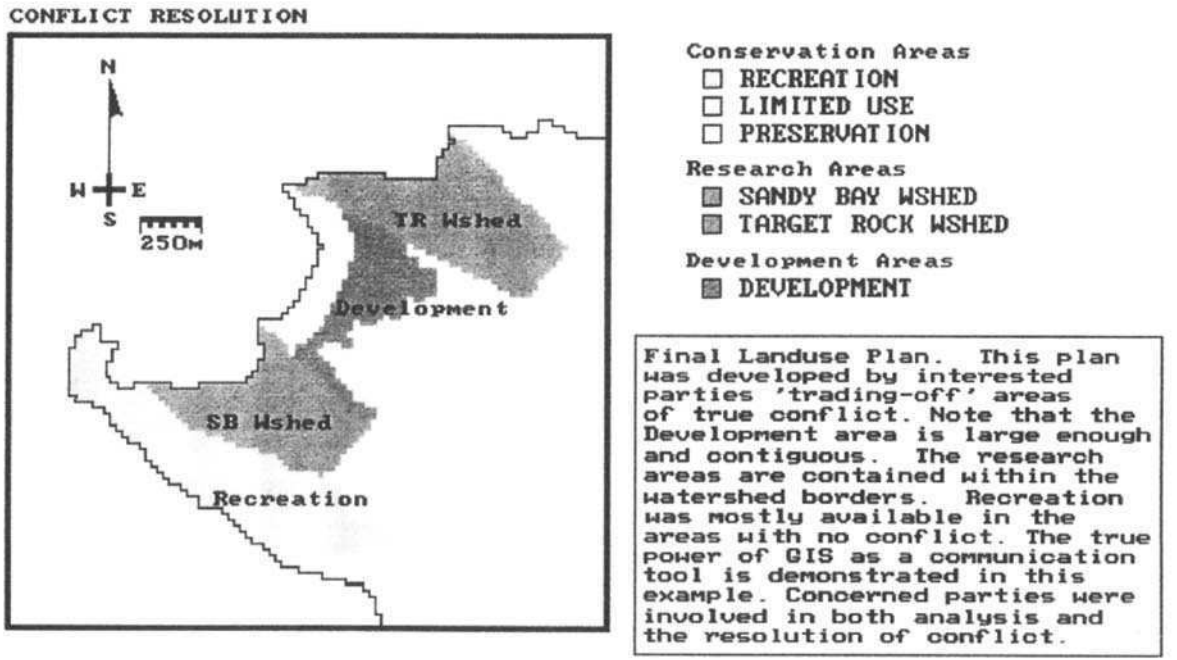

Figure 9 Final map of land use recommendations. The final map was created by conflict "trade-offs" supported by extensive discussion among the decision makers.

vanced analysis capabilities and a *sandbox* to express decision-makers' concerns, inspirations, and creativity.

AN ENABLING TECHNOLOGY

The movement from descriptive to prescriptive mapping has set the stage for revolutionary concepts in map structure, content, and use. The full potential for GIS in decision making, however, has not been realized and this is, at least in part, due to: (1) the inherent complexity of a developing technology; (2) the unfamiliar nature of its products; and (3) the "user-abusive" nature of its use.

Digital maps derived through spatial modeling are inherently different from traditional analog maps, composed of inked lines, shading, and graphic symbols used to identify the precise placement of physical features. The modeled map is a reflection of the logical reasoning of the analyst—more a spatial expression (application model) than a simple geo-query of the coincidence of base map themes (data sandwich). Until recently, this logic was concealed in the technical language of the command macro. The general user required a GIS specialist as a translator at every encounter with the technology. The concept of a dynamic map pedigree uses a graphical user interface to communicate the conceptual framework of a spatial model and facilitate its interactive execution. As GIS systems adopt a more humane approach, end users become directly engaged in map analysis and spatial modeling—a situation that is changing the course of GIS technology.

A HUMANE GIS

Within an application model, attention is focused on the considerations embedded in an analysis, as much as it is focused on the final map's graphical rendering. The map itself is valuable, yet the thinking behind its creation provides the real insight for generating programs, plans, and policy. A *dynamic map pedigree* is an emerging concept for communicating spatial reasoning that links a flowchart of processing (logic) to the actual GIS commands (macro) (Davies and Medyckyj-Scott 1994; Wang 1994; Berry 1995a). GIS users need to interact with a spatial model at several levels—casual, interactive, and developer. Figure 10 shows the extension of the flowchart for development siting model previously described (Figure 3) into an interactive user interface linking the flowchart to the actual GIS code and map database. At one level (casual), a user can interrogate the model's logic by mouse clicking on any box (map) or line (process) and the specifications for that step of the model pops up. This affords a look into the spatial reasoning supporting the application and facilitates understanding of the model.

At another level (interactive), a user can change the specifications in any of the dialog boxes and rerun the model. The updated macro is automatically time-stamped and integrated into the legend of the newly modeled map. This provides an intuitive interface to investigating "what if . . . " scenarios. For example, the processing depicted in Figure 10 shows changing the averaging of the preference maps so proximity to roads (R-PREF TIMES 10) is 10 times more important in determining suitability. The suitability map generated under these weights can be compared to other model runs, and changes in spatial arrangement of relative development suitability are automatically highlighted. At

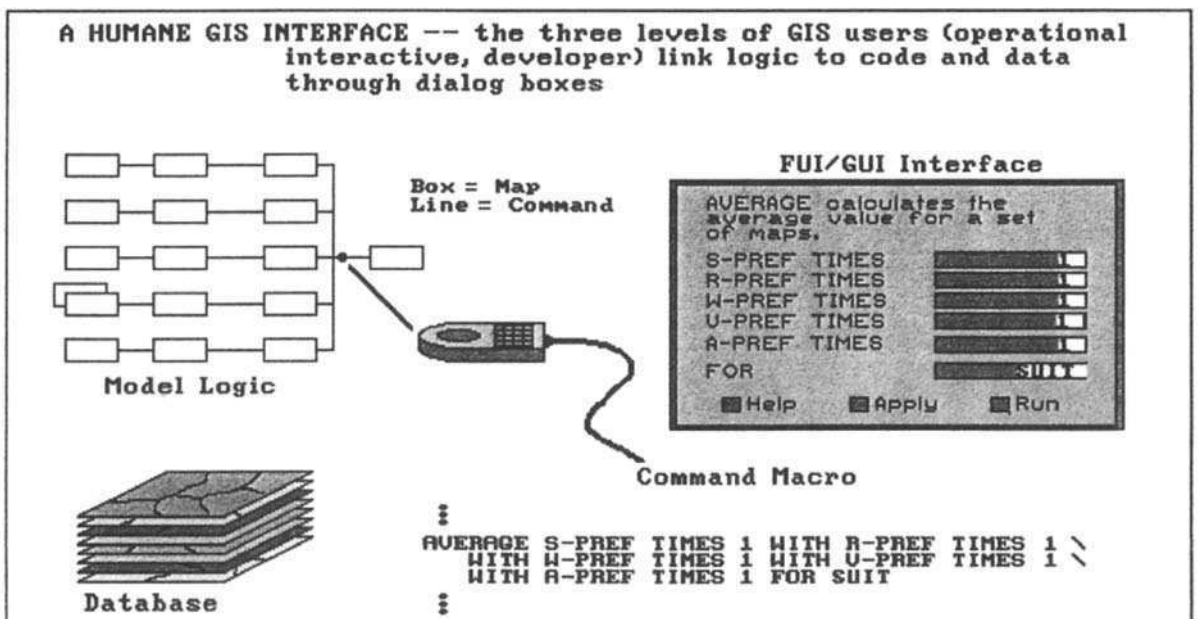

Figure 10 Dynamic map pedigree. The flowchart of a GIS model is dynamically linked to GIS code through "pop-up" dialog boxes at each step.

the highest level (developer), a user can modify the logical structure of a model. The flowchart can be edited (e.g., cut/paste, insert, delete) and the corresponding GIS code written and/or updated.

The dynamic map pedigree provides three major improvements over current approaches. First, the graphical interface to spatial models releases users from the burden of directly generating GIS code and thereby avoiding its steep learning curve. Second, it furnishes an interactive stamp of model logic and specifications with each map generated. Finally, it establishes a general structure for spatial modeling that is not directly tied to individual GIS systems. In short, it provides an interface that stimulates spatial reasoning without requiring a GIS degree to operate—a humane GIS.

TRENDS, DIRECTIONS, AND CHALLENGES

What began in the 1960s as a cartographer's tool has quickly evolved into a revolution in many disciplines (Thomas and Huggett 1980; Goodchild et al. 1992; Berry 1994; Maguire and Dangermond 1994; Ottens 1994; Rix 1994). As general users become more directly engaged, the nature of GIS applications changes. Early applications emphasized mapping and spatial database management. Increasingly, applications are emphasizing modeling of the interrelationships among mapped variables. Most of these applications have involved *cartographic modeling*, which employs GIS operations that mimic manual map processing, such as map overlay and simple buffering around features. The new wave of applications concentrates on *GIS modeling*, which employs spatial statistics and advanced analytical operations. These new applications can be grouped into three categories: (1) data mining; (2) predictive modeling; and (3) dynamic simulation.

TECHNOLOGICAL ADVANCES

Data mining uses the GIS to discover relationships among mapped variables. For example, a map of dead and dying spruce/fir parcels can be statistically compared to maps of driving variables, such as elevation, slope, aspect, soil type, and depth to bedrock. If a strong spatial correlation (coincidence) is identified for a certain combination of driving variables, this information can be used to direct management action to areas of living spruce/fir under the detrimental conditions. Another form of data mining is the derivation of empirical models. For example, the geographic distribution of lead concentrations in an aquifer can be interpolated from water samples taken at local wells as described previously. Areas of unusually high concentrations (more than one standard deviation above the average) can be isolated. If a time series of samples is considered and the maps of the high concentrations are animated, the contamination will appear to move through the aquifer—forming an empirical ground water model. A "blob" moving across the map indicates an event, whereas a steady "stream" indicates a continuous discharge of a pollutant. The locations in front of the animated feature can be assumed to be the next most likely area to be affected. Data investigation and visualization will increasingly extend beyond the perspective of traditional map renderings.

Most *predictive modeling* is currently nonspatial. Environmental data are collected by sampling large areas and then using these data to solve a mathematical model, such as a regression equation, establishing an equation linking the variable to predict to other

more easily obtainable variables. The model is applied by collecting data on the driving variables for another area or period in time, reducing the measurements to typical values (arithmetic averages), and then evaluating the prediction equation. An analogous spatially based approach was discussed within the context of precision farming in which map variables of yield and soil nutrients were used.

Another example involves the derivation of a prediction equation for the amount of breakage during timber harvesting. Breakage is defined in terms of percent slope, tree diameter, tree height, tree volume, and percent defect—with big, old, rotten trees on steep slopes having the most breakage. A traditional nonspatial approach ignores the geographic distribution of variation in field-collected data by assuming that the "average tree on average terrain" is everywhere. Its prediction is a single level of breakage for the entire area, extended within a range of probable error (standard deviation). In a mathematical sense, the nonspatial approach assumes that the variables are randomly, or uniformly, distributed throughout a project area and that the variables are spatially independent. Both parts of the assumption are diametrically opposed to ecological theory and evidence. Most environmental phenomena coalesce into niches responding to a variety of physical and social factors.

The GIS modeling solution spatially interpolates the data into maps of each variable and then solves the equation for all locations in space. This approach generates a map of predicted breakage with "pockets" of higher and lower breakage than expected clearly identified. The coincidence of the spatial patterns of the variables is preserved, thereby relaxing the unrealistic assumptions of random/uniform geographic distribution and spatial independence. The direct consideration of the spatial patterns and coincidence among mapped data will increasingly refine environmental predictions and management actions making them more responsive to the unique conditions in a project area.

Dynamic simulation allows the user to interact with a GIS model. If model parameters are systematically modified and the induced changes in the final map tracked, the behavior of the model can be investigated. This "sensitivity analysis" identifies the relative importance of each mapped variable, within the context of the unique geographic setting it is applied. In the timber breakage example, the equation may be extremely sensitive to steep slopes. However, in a project area with a maximum slope of only 10%, tree height might be identified as the dominant variable. A less disciplined use of dynamic simulation enables a GIS to act like a spatial spreadsheet and address "what if . . . " questions. Such queries address natural curiosity as much as they provide insights into system sensitivities. Both simulation versions aid decision makers in understanding the linkages among the variables and help identify critical ranges. The use of dynamic simulation will increasingly involve decision makers in the analysis (through put) phase of environmental policy and administration.

TECHNOLOGY VERSUS SCIENCE

In many respects, the emerging applications of data mining, predictive modeling, and dynamic simulation have "the technological cart in front of the scientific horse." GIS can storehouse tremendous volumes of descriptive data and overlay a myriad of maps for their coincidence. It has powerful tools for expressing the spatial interactions among mapped variables. However, there is a chasm between GIS technology and applied science. The bulk of scientific knowledge lacks spatial specificity in the relationships among

variables. Now that there is a tool that can characterize spatial relationships (cart), the understanding of its expression in complex systems (horse) becomes the void.

For example, a GIS can characterize the changes in the relative amount of edge in a landscape by computing a set of fractal dimension maps. This, and over 60 other landscape analysis indices, allows tracking of changes in landscape structure, but the impact of the changes on wildlife is beyond current scientific knowledge. Similarly, a GIS can characterize the effective sediment loading distance from streams as a function of slope, vegetative cover, and soil type. It is common sense that areas with a stable soil on gentle, densely vegetated intervening slopes are effectively farther away from a stream than areas of unstable soils with steep, sparsely vegetated intervening slopes. But how is effective sediment loading distances related to the survival of fish? Neighborhood variability statistics allow us to track the diversity, interspersion, and juxtapositioning of vegetative cover—but how are these statistics translated into management decisions about elk herd populations?

The mechanics of GIS in integrating multiple phenomena is well established. The functionality needed to relate the spatial relationships among mapped variables is in place. What is lacking is the scientific knowledge to exploit these capabilities. Until recently, GIS was thought of as a manager's technology focused on inventory and record keeping. Even the early scientific applications used it as an electronic planimeter to aggregate data over large areas for input into traditional, nonspatial models. The future will see a new era of scientific research in which spatial analysis plays an integral part and its results are expressed in GIS modeling terms. The opportunity to have both the scientific and managerial communities utilizing the same technology is unprecedented. Until then, however, frustrated managers will use the analytic power of GIS to construct their own models based on common (and uncommon) sense.

The direct engagement of general users will increasingly question the traditional concepts of a map and its use. To more effectively portray a unified landscape, GIS must step beyond its classical disciplines. Traditional concepts of a map: (1) distort reality of a three-dimensional world into a two-dimensional abstraction; (2) selectively characterize just a few elements from the actual complexity of the spatial reality; and (3) attempt to portray environmental gradients and conceptual abstractions as distinct spatial objects. The imposition of our historical concept of a map constructed of inked lines, shading, and symbols thwarts the exploitation of the full potential of mapped data expressed in digital form.

The concepts of "synergism," "cumulative effects," and "ecosystem management" within the environmental and natural resources communities are pushing at the envelope of GIS's ability to characterize a unified landscape. Historically, system models have required a discrete piecemeal approach; however, a unified landscape is by nature a holistic phenomenon. For example, consider how a hiking trail that maximizes cover type diversity might be identified. An *atomistic* approach would begin at the trailhead, test the neighborhood around each location, and step to a different cover type whenever possible. This approach, however, could commit to a monotonous path after the first few diverse steps. However, if a few seemingly suboptimal steps were made at the start it might have lead to a much more diverse route.

A *holistic* modeling approach requires the assimilation of an entire system at the onset of an analysis. Conventional mapping and GIS modeling approaches characterize the landscape in an atomistic fashion. GIS can benefit from the advancements in holistic modeling made by artificial intelligence, chaos theory, and fuzzy logic. These approaches

attempt to account for inference, abrupt changes, and uncertainty. Instead of a deterministic solution with a single map portrayal, they establish the "side bars" of system response. If applied to GIS these emerging map-ematical techniques might provide a more realistic description of a system "whose whole is greater than the sum of its individual parts."

Equally important is the recognition of *perception* as an additional element of a landscape. Each individual has a unique set of spiritual, cultural, social, and interpersonal experiences that form their perspective of a landscape. The ability to map these considerations requires a closer marriage between GIS and the social sciences. As the future of GIS unfolds, maps will be viewed less as a static description of the landscape and more as an active process accounting for inherent variability in perception, as well as spatial descriptors. To make this move from tool development to a true discipline, GIS needs an infusion of ideas from a wealth of "neo-related fields" not traditionally thought of as its bedfellows, such as the social sciences.

CONCLUSION

Environmental policy and administration have always required information as their cornerstone. Early information systems relied on physical storage of data and manual processing. With the advent of the computer, most of these data and procedures have been automated during the past two decades. As a result, environmental information processing has increasingly become more quantitative. Systems analysis techniques developed links between descriptive data of the landscape to the mix of management actions that maximizes a set of objectives. This mathematical approach to environmental management has been both stimulated and facilitated by modern information systems technology. The digital nature of mapped data in these systems provides a wealth of new analysis operations and an unprecedented ability to spatially model complex environmental issues. The full impact of the new data form and analytic capabilities is yet to be determined.

Effective GIS applications have little to do with data and everything to do with understanding, creativity, and perspective. It is a common observation of the Information Age that the amount of knowledge doubles every 14 months or so. It is believed, with the advent of the information super highway, this periodicity will likely accelerate. But does more information directly translate into better decisions? Does the Internet enhance information exchange or overwhelm it? Does the quality of information correlate with the quantity of information? Does the rapid boil of information improve or scorch the broth of decisions?

GIS technology is a prime contributor to the landslide of information, as terra bytes of mapped data are feverishly released on an unsuspecting (and seemingly ungrateful) public. From a GIS-centric perspective, the delivery of accurate base data is enough. However, the full impact of the technology is in the translation of "where is what, to so what." The effects of information rapid transit on our changing perceptions of the world around us involve a new expression of the philosophers' view of the stages of enlightenment—data, information, knowledge, and wisdom. The terms are often used interchangeably, but they are distinct from one another in some subtle and not-so-subtle ways.

The first is data, the "factoids" of our Information Age. *Data* are bits of information, typically, but not exclusively, in a numeric form, such as cardinal numbers, percentages, statistics, and so on. It is exceedingly obvious that data are increasing at an incredible rate. Coupled with the barrage of data is a requirement for the literate citizen of the

future to have a firm understanding of averages, percentages, and to a certain extent, statistics. More and more, these types of data dominate the media and are the primary means used to characterize public opinion, report trends, and persuade specific actions.

The second term, information, is closely related to data. The difference is that we tend to view information as more word-based and/or graphic than numeric. *Information* is data with explanation. Most of what is taught in school is information. Because it includes all that is chronicled, the amount of information available to the average citizen substantially increases each day. The power of technology to link us to information is phenomenal. As proof, simply "surf" the exploding number of "home pages" on the Internet.

The philosophers' third category is *knowledge*, which can be viewed as information within a context. Data and information that are used to explain a phenomenon become knowledge. It probably does not double at fast rates, but that really has more to do with the learner and processing techniques than with what is available. In other words, data and information become knowledge once they are processed and applied.

The last category, *wisdom*, certainly does not double at a rapid rate. It is the application of all three previous categories, and some intangible additions. Wisdom is rare and timeless, and is important because it is rare and timeless. We seldom encounter new wisdom in the popular media, nor do we expect a deluge of newly derived wisdom to spring forth from our computer monitors each time we log on.

Knowledge and wisdom, like gold, must be aggressively processed from tons of near-worthless overburden. Simply increasing data and information does not assure the increasing amounts of the knowledge and wisdom we need to solve pressing environmental and resource problems. Increasing the processing "thruput" by efficiency gains and new approaches might.

How does this philosophical diatribe relate to GIS technology? What is GIS's role within the framework? What does GIS deliver—data, information, knowledge, or wisdom? Actually, if GIS is appropriately presented, nurtured, and applied, it can affect all four: that is, provided the technology's role is recognized as an additional link that the philosophers failed to note.

Understanding sits at the juncture between the data/information and knowledge/wisdom stages of enlightenment. *Understanding* involves the honest dialog among various interpretations of data and information in an attempt to reach common knowledge and wisdom. Note that understanding is not a "thing," but a process. It is how concrete facts are translated into the slippery slope of beliefs. It involves the clash of values, tempered by judgment based on the exchange of experience. Technology, and in particular GIS, has a vital role to play in this process. It is not sufficient to deliver spatial data and information; a methodology for translating them into knowledge and wisdom is needed.

Tomorrow's GIS builds on the cognitive basis, as well as the spatial databases and analytic operations of the technology. This new view pushes GIS beyond data mapping, management, and modeling, to spatial reasoning and dialogue focusing on the communication of ideas. In a sense, GIS extends the analytical toolbox to a social "sandbox," where alternative perspectives are constructed, discussed, and common knowledge and wisdom distilled.

This step needs to fully engage the end-user in GIS itself, not just its encoded and derived products. It requires a democratization of GIS that goes beyond a graphical user interface and cute icons. It obligates the GIS technocrats to explain concepts in layman

terms and provide access to their conceptual expressions of geographic space. In turn, it requires environmental professionals to embrace the new approaches to spatial reasoning and dialogue. GIS has an opportunity to empower people with new decision-making tools, not simply entrap them in a new technology and an avalanche of data. The mapping, management, and modeling of spatial data are necessary, but not sufficient, for effective solutions. Like the automobile and indoor plumbing, GIS will not be an important technology in environmental policy and administration until it fades into the fabric of the decision-making process and is taken for granted. Its use must become second nature for both accessing spatial data/information *and* translating it into the knowledge/wisdom needed to address increasingly complex environmental issues.

REFERENCES

Abler, R.J., J. Adams, and P. Gould. 1971. *Spatial Organization: The Geographer's View of the World*, Englewood Cliffs, NJ: Prentice Hall.

Berry, J.K. 1987a. "Fundamental Operations in Computer-Assisted Map Analysis." *International Journal of Geographical Information Systems* 1:119–136.

Berry, J.K. 1987b. "A Mathematical Structure for Analyzing Maps." *Journal of Environmental Management* 11(3): 317–325.

Berry, J.K. 1991. "GIS in Island Resource Planning: A Case Study in Map Analysis." In *Geographic Information Systems: Principles and Applications* ed. D.J. Maguire, M.F. Goodchild, and D.W. Rhind, Essex, UK: Longman Scientific and Technical Press, Vol 2: 285–295.

Berry, J.K. 1993. *Beyond Mapping: Concepts, Algorithms and Issues in GIS*, Fort Collins, CO: GIS World Books.

Berry, J.K. 1994. "A Brief History and Probable Future of GIS in Natural Resources." *Compiler* 12(1): 8–10.

Berry, J.K. 1995a. "Characterizing and Interacting with GIS Model Logic." In *The CGI Source Book for Geographic Systems*, London: Association for Geographic Information, 57–62.

Berry, J.K. 1995b. *Spatial Reasoning for Effective GIS*, Fort Collins, CO: GIS World Books.

Berry, J.K. 1996. "Inside the GIS Toolbox: The Big Picture of Precision Farming." *agINNOVATOR* 4(2): 4.

Berry, J.K. and J.K. Berry. 1988. "Assessing Spatial Impacts of Land-Use Plans." *Journal of Environmental Management* 27: 1–9.

Berry, J.K. and W. Ripple. 1994. "Emergence and Role of GIS in Natural Resource Information Systems." In *The GIS Applications Book: Examples in Natural Resources*, Falls Church, VA: American Society of Photogrammetry and Remote Sensing, 3–20.

Brown, L.A. 1949. *The Story of Maps*. Boston: Little, Brown.

Burgess, T. and R. Webster. 1980. "Optimal Interpolation and Isarithmic Mapping of Soil Properties: The Semi-Variogram and Punctual Kriging." *Journal of Soil Science* 31: 315–331

Burrough, P.A. 1987. *Principles of Geographical Information Systems for Land Resources Assessment*. Oxford, UK: Oxford University Press.

Calkins, H.W. 1991. "GIS and Public Policy." In *Geographic Information Systems: Principles and Applications*, ed. D.J. Maguire, M.F. Goodchild, and D.W. Rhind, Essex, UK: Longman Scientific and Technical Press, Vol 2: 233–245.

Carter, J.R. 1989. "On Defining the Geographic Information Systems." In Fundamentals of Geographic Information Systems: A Compendium, ed. W. Ripple, Bethesda, MD: American Society of Photogrammetry and Remote Sensing, 3–9.

Coppock, J. and D. Rhind. 1991. "The History of GIS." In *Geographic Information Systems: Principles and Applications* ed. D.J. Maguire, M.F. Goodchild, and D.W. Rhind, Essex, UK: Longman Scientific and Technical Press, Vol 1: 45–54.

Cressie, N. 1991. *Statistics for Spatial Data*. New York: Wiley.

Cressie, N. 1993. "Geostatistics: A Tool for Environmental Modelers." In *Environmental Modeling with GIS*, ed. M.F. Goodchild, B.O. Parks, and L.T. Steyaert, Oxford, UK: Oxford University Press, 414–421.

Cressie, N. and J.M. Ver Hoef. 1993. "Spatial Statistical Analysis of Environmental and Ecological Data." In *Environmental Modeling with GIS*, ed. M.F. Goodchild, B.O. Parks, and L.T. Steyaert, Oxford, UK: Oxford University Press, 404–413.

Cuff, D.J. and M.T. Matson. 1982. *Thematic Maps*. New York: Methuen.

Davies, C. and D. Medyckyj-Scott. 1994. "GIS Usability: Recommendations Based on the User's View." *International Journal of Geographical Information Systems* 8: 175–189.

Densham, P.J. 1991. "Spatial Decision Support Systems." In *Geographic Information Systems: Principles and Applications*, ed. D.J. Maguire, M.F. Goodchild, and D.W. Rhind, Essex, UK: Longman Scientific and Technical Press, Vol 1: 403–412.

Douglas, W.J. 1995. *Environmental GIS Applications to Industrial Facilities*. New York: Lewis Publishers.

Elridge, J. and J.Jones. 1991. "Warped Space: A Geography of Distance Decay." *Professional Geographer* 43(4): 500–511.

Epstein, E.F. 1991. "Legal Aspects of GIS." In *Geographic Information Systems: Principles and Applications*, ed. D.J. Maguire, M.F. Goodchild, and D.W. Rhind, Essex, UK: Longman Scientific and Technical Press, Vol 1: 489–502.

Gimblett, H.R. 1990. "Visualizations: Linking Dynamic Spatial Models with Computer Graphics Algorithms for Simulating Planning and Management Decision." *Journal of Urban and Regional Information Systems* 2(2): 26–34.

Goodchild, M.F. 1987. "A Spatial Analytical Perspective on Geographical Information Systems." *International Journal of Geographical Information Systems* 1(4): 327–334.

Goodchild, M.F. R. Haining, and S. Wise. 1992. "Integrating GIS and Spatial Data Analysis: Problems and Possibilities." *International Journal of Geographical Information Systems* 6(5): 407–423.

Goodchild, M.F., B.O. Parks, and L.T. Steyaert (eds). 1993. *Environmental Modeling with GIS*. Oxford, UK: Oxford University Press.

Johnson, L.B. 1990. "Analyzing Spatial and Temporal Phenomena Using Geographical Information Systems: A Review of Ecological Applications." *Landscape Ecology* 4(1): 31–43.

King, J.L. and K.L. Kraemer. 1993. "Models, Facts and the Policy Process: The Political Ecology of Estimated Truth." In *Environmental Modeling with GIS*, ed. M.F. Goodchild, B.O. Parks, and L.T. Steyaert, Oxford, UK: Oxford University Press, 353–360.

Korte, G.B. 1993. *The GIS Book*. New York: OnWord Press.

Lam, N.S. 1983. "Spatial Interpolation Methods: A Review." *American Cartographer* 10: 129–149.

Leick, A. 1990. *GPS Satellite Surveying*. New York: Wiley.

Maffini, G. 1987. "Raster versus Vector Data Encoding and Handling: A Commentary." *Photogrammetric Engineering and Remote Sensing* 53(10): 1397–1398.

Maguire, J.D., M.F. Goodchild, and D.W. Rhind (eds). 1991a. *Geographic Information Systems: Principles and Applications*, Vol. 2 (Applications). Essex, UK: Longman Scientific and Technical Press.

Maguire, J.D., M.F. Goodchild, and D.W. Rhind (eds). 1991b. *Geographic Information Systems: Principles and Applications*, Vol. 1 (Principles). Essex, UK: Longman Scientific and Technical Press.

Maguire, D.J. and J. Dangermond. 1994. "Future of GIS Technology." In *The CGI Source Book for Geographic Systems*. London: Association for Geographic Information 113–120.

McGarigal, K. and B. Marks. 1995. *FRAGSTATS: Spatial Pattern Analysis Program for Quantifying Landscape Structure*, Portland, OR: USDA-Forest Service, Technical Report PNW-GTR-351.

McHarg, I.L. 1969. *Design with Nature*. Garden City, NJ: Doubleday/Natural History Press.

Medyckyj-Scott, D. and H.M. Hernshaw (eds). 1993. *Human Factors in Geographical Information Systems*. London: Belhaven Press.

Meyers, D.E. 1988. "Multivariate Geostatistics for Environmental Monitoring." *Sciences de la Terra* 27: 411–427.

Muehrcke, P.C. and J.O. Muehrcke. 1980. *Map Use: Reading, Analysis and Interpretation*. Madison, WI: J.P. Publications.

Muller, J.C. 1982. "Non-Euclidean Geographic Spaces: Mapping Functional Distances." *Geographical Analysis* 14: 189–203.

Ottens, H. 1994. "Relevant Trends for Geographic Information Handling." *Geo-Info Systems* 4(8): 23.

Parent, P. and R. Church. 1989. "Evolution of Geographic Information Systems as Decision Making Tools." In *Fundamentals of Geographic Information Systems: A Compendium*, ed. W. Ripple, Bethesda, MD: American Society of Photogrammetry and Remote Sensing, 9–18.

Pereira, J.M. and L.Duckstein. 1993. "A Multiple Criteria Decision-Making Approach to GIS-Based Land Suitability Evaluation." *International Journal of Geographical Information Systems* 7(5): 407–424.

Pueker, T. and N. Christman. 1990. "Cartographic Data Structures." *American Cartographer* 2(1): 55–69.

Piwowar, J.M., et al. 1990. "Integration of Spatial Data in Vector and Raster Formats in a Geographic Information System." *International Journal of Geographic Information Systems* 4(4): 429–444.

Ripley, B.D. 1981. *Spatial Statistics*. New York: Wiley.

Ripple, W. (ed.). 1987. *GIS for Forest Management: A Compendium*. Bethesda, MD: American Society of Photogrammetry and Remote Sensing.

Ripple, W. (ed.). 1989. *Fundamentals of Geographic Information Systems: A Compendium*. Bethesda, MD: American Society of Photogrammetry and Remote Sensing.

Ripple, W. (ed.). 1994. *The GIS Applications Book: Examples in Natural Resources*. Bethesda, MD: American Society of Photogrammetry and Remote Sensing.

Rix, D. 1994. "Recent Trends in GIS Technology." In *The CGI Source Book for Geographic Systems*. London: Association for Geographic Information, 25–39.

Robertson, A., R. Sale, and J. Morrison. 1982. *Elements of Cartography*, 4th ed. New York: Wiley.

Shepherd, J.D. 1991. "Information Integration and GIS." In *Geographical Information Systems: Principles and Applications* ed. D.J. Maguire, M.F. Goodchild, and D.W. Rhind, Essex, UK: Longman Scientific and Technical Press, Vol. 1, 337–360.

Star, J. and J. Estes. 1990. *Geographic Information Systems: An Introduction*. Englewood Cliffs, NJ: Pretice-Hall.

Steinitz, C.F., et al. 1976. "Hand Drawn Overlays: Their History and Prospective Uses." *Landscape Architecture* 66: 444–455.

Thomas, R. and R. Huggett. 1980. *Modelling in Geography: A Mathematical Approach*. London: Harper & Row.

Tomlin, C.D. 1990. *Geographic Information Systems and Cartographic Modeling*. Englewood Cliffs, NJ: Prentice-Hall.

Turner, M.G. 1990. "Spatial and Temporal Analysis of Landscape Patterns." *Landscape Ecology* 4:21–30.

Unwin, D. 1981. *Introductory Spatial Analysis*. London: Methuen.

Wang, F. 1994. "Towards a Natural Language User Interface: An Approach of Fuzzy Query." *International Journal of Geographical Information Systems* 8: 143–162.

Webster, R. and T. Burgess. 1980. "Optimal Interpolation and Isarithmic Mapping of Soil Properties: Changing Drift and Universal Kriging." *Journal of Soil Science* 31: 505–524.

4

Pursuing Environmental Goals

Regulations Versus Markets

John L. Dobra and Jeanne Wendel
University of Nevada, Reno, Reno, Nevada

THE SUCCESSES AND FAILURES OF COMMAND AND CONTROL REGULATIONS

Environmental regulation in the United States and other countries has largely focused on "command and control" (C&C) approaches. C&C regulations prohibit or require specific activities. These regulations require that air and water quality standards be met, for example, or that specific "best available technologies" be applied to deal with various environmental pollutants.

Most analysts would acknowledge that the C&C approach, embodied in the Clean Air and Clean Water Acts beginning in the 1960s and later acts, has successfully reduced air and water pollution in U.S. communities. Extensions of the C&C approach to the protection of other environmental goods such as wildlife (with the Endangered Species Act of 1973), wildlife habitat such as wetlands, "wild and scenic rivers," and even to junkyards 50 years old and older (for their value as "antiquities") have succeeded in preserving and protecting these environmental values. One can argue about whether certain "environmental values" are worth protecting, e.g., junkyards and some nuisance species, but there is relatively little disagreement that the C&C approach has led to some improvement in environmental quality.

As a consequence, even critics of the C&C approach acknowledge that, initially, relatively large marginal gains were achieved at relatively low marginal cost. However, critics point out that during the ensuing 30 years, gains have been smaller and have come at higher costs. This raises the question of whether new and/or stricter C&C standards can yield benefits that exceed costs and produce those benefits efficiently.

Raising the question of the efficiency of C&C environmental regulations does not deny the value of environmental goods or a legitimate public interest to be served by protecting them. Indeed, to an economist, it is the logical extension of acknowledging that environmental goods have value. If environmental goods are valuable, then individu-

als will (and do) trade other goods for them and, by definition, forgo some environmental quality or goods for nonenvironmental goods. Balancing these trade-offs is the means by which efficiency is achieved for individuals through personal choice and for society at large through public policy.

For example, when early C&C regulations prohibited dumping industrial wastes into rivers, enforcing the regulations came at relatively low cost to the American public (albeit at a relatively larger cost to some industries) and generated significant improvement in water quality. In these cases, a relatively high marginal benefit was achieved at a relatively low marginal cost. However, as new regulations have been brought into effect, smaller and smaller gains have generally come at higher and higher costs to the point where, by 1990, the full cost of environmental regulations was estimated at between $434 and $508 billion year, or about $2000 per U.S. citizen (Hahn and Hird 1991).

As an example of the relationship between marginal costs and benefits of pursuing C&C regulations, the Environmental Protection Agency (EPA) estimates that proposed ozone and particulate emission regulations will cost $10 billion and save 20,000 lives per year, or $500,000 per life saved. Since the EPA values human life at $5 million, it is argued that the proposed rule would generate $100 billion per year in benefits at a cost of $10 billion and that the regulations are well worth adopting. Even if one accepts these assumptions about the value of life and the effects of the regulations, the question remaining is how many lives could be saved if an additional $10 billion per year were spent on cancer research or research on automobile safety?

The EPA's cost and benefit estimates are also problematic. Critics of the proposed regulations argue that $5 million per premature death avoided is ridiculous since, in reality, we are talking about an average person living until age 72 and one month instead of 72 years. This, however, is an argument over the objective value of something that is inherently subjective.

On the other side, proponents of the regulations argue that cost estimates are overstated and, indeed, this argument has some merit. In the debate over the 1990 Clean Air Amendments business lobbyists argued that cleaning up sulfur dioxide emissions would cost $1600 per ton. The Bush administration estimated the cost at $1000 per ton. However, pollution permits currently sell for less than $100 per ton suggesting that the cost of avoiding discharge of sulfur dioxide is far less than estimated (Murray 1997). Moreover, proponents point out, much to the chagrin of critics, that the Act expressly prohibits consideration of costs and benefits in adopting regulations anyway, so such criticisms are moot.

Yet, the question of costs and benefits has been asked about numerous environmental regulations and the answers are somewhat surprising in some cases. The ban on asbestos, for example, cost $111 million per premature death averted, benzene standards cost $168 million per premature death averted to name just a couple of examples (Morrall 1986).

THE IMPACTS OF C&C REGULATIONS

A second and, perhaps, more serious problem with C&C regulations is that they do not create appropriate incentives for regulated industries or for regulators. In the case of regulated industries, C&C regulations do not create incentives for polluters to reduce pollution below the standards set or reduce the social costs of pollution in the most cost-

effective manner. Limiting discharge of pollutants into the air or water does simply that and no more. Limits on discharges provide no incentives for polluters to reduce discharges *below* the regulatory limits when it could be done in a cost-effective manner.

At the same time, regulators tend to focus on setting standards that protect public health and safety regardless of where the pollution occurs, its cause, who bears the cost, and whether that cost bears any relationship to the benefits to be derived in all circumstances. Moreover, as the above example of proposed ozone and particulate regulations suggests, standards and their rationales frequently appear to be arbitrary. This perceived arbitrariness is certainly not the intent of the regulations but often results from attempting to impose national standards in a nation where environmental conditions vary widely. Frequently, standards that appear quite reasonable on their face may have unintended consequences that impose very high costs. For example, the Safe Drinking Water Act requires Montanans to pay for the cleanup of naturally occurring arsenic from the geysers in Yellowstone Park (which flow into the Madison River) from water drawn from the River for municipal drinking water to meet regulatory standards. The Act requires that arsenic levels be reduced even though "a person would have to consume two liters of untreated water from the source and eat 6.5 grams of fish every day for 70 years to increase his or her risk of cancer by 1 in 10,000" (Anderson and Hill 1996).

Such consequences of C&C regulations are not uncommon and perhaps are unintended. We say "perhaps" unintended since some environmental groups have maintained that no cost is too high to bear to improve the environment and have lobbied against Congressional efforts to require analyses of the cost-effectiveness of federal regulations. Indeed, during the 104th Congress, environmental groups lobbied against what they referred to as the "unholy trinity," which were three elements of House Republicans' "Contract with America:"

1. Federal funding for state and local governments to cover expenses incurred meeting federal mandates such as cleaning up the Madison River in Montana
2. Compensating landowners when regulations diminish the value of their property
3. Analyses of the cost-effectiveness of Congress legislation and regulations promulgated by federal agencies and a risk assessment of potential environmental harm in relation to costs

The lobbying efforts against the "unholy trinity" is illustrative of how the scope and burden of federal environmental regulations has grown. Not only does Congress not bear the costs of complying with the laws and regulations it creates in its budget, it does not necessarily even know what those costs are except when groups lobbying against extension of regulations provide the information. This creates a situation where members of Congress bear relatively small opportunity costs for supporting additional C&C regulations (i.e., do not have to give up much except perhaps the support of groups adversely impacted by extensions of regulations). Similarly, environmental groups bear no opportunity costs for lobbying for extensions of regulations or against congressional reforms that might restrain Congress and regulators.

In this situation environmental advocates and Congress bear relatively small opportunity costs for expanding regulatory authority, and federal regulatory agencies bear very few costs. Indeed, in the case of federal regulatory agencies, they may actually benefit from more regulations in the form of larger budgets and greater authority. The result is a policy-making process without constraints, without checks and balances.

Several approaches for providing some restraint on the regulatory process have been suggested in the literature. One approach involves returning of decision-making authority on environmental issues to state and local regulators. This federalist approach would allow communities or states to match regulations to local populations' preferences and their willingness to pay for improved environmental quality.

Environmental federalism is opposed by environmental groups for several reasons. Most obviously, members of environmental groups have preferences for higher environmental quality levels than the general public and, consequently, do not want to see restraints imposed on the process for raising environmental quality standards. Hence, they oppose environmental federalism for the much same reasons environmental groups oppose the "unholy trinity."

Second, environmental groups oppose environmental federalism because Congress provides a more convenient "one-stop-shop" for imposing regulations than 50 state legislatures. In contrast, the federalist approach would turn the job of raising environmental standards into a Herculean task particularly since residents in less populous Western states are generally less receptive to extensions of regulatory authority.

In addition, and perhaps with some legitimacy, it can be argued that less developed states and local communities may use lower environmental standards as a means of competing for economic development. On the other hand, many residents live in less developed rural areas because of higher environmental quality and may not be as willing to sacrifice environmental quality for economic development as environmental groups may claim. Recent concerns expressed in some Western communities over development of mining projects are indicative of these sentiments.

ALTERNATIVE APPROACHES

A second approach for providing some restraint on the regulatory process focuses on harnessing market forces to improve environmental quality. Environmental values have always been understood to be factors in market decisions. For example, home buyers will pay more or less for property depending upon the existence or lack of environmental amenities. However, since property owners do not generally have secure property rights in the environmental attributes or amenities, their value is generally discounted. Nonetheless, it is clear that consumers are willing to pay for environmental amenities and pay more when these amenities can be secured by property rights. Hence, the current attempts being made to use markets to improve environmental quality essentially involve creating property rights in environmental amenities so that they can be protected by market transactions.

The discussion below focuses on several examples of strategies to harness market forces to improve environmental quality including price incentives, tradable permit systems, and clarification of property rights. Much of the momentum behind C&C regulatory approaches has been fueled by the Pigouvian notion (Pigou 1938), that "market failure" necessitates government action to replace the market with C&C regulations. The emerging market-oriented environmental policy paradigm recognizes that markets work for good or ill in predictable ways. If markets do not produce desired outcomes, government could strengthen and modify market forces by, perhaps, clarifying property rights or creating new markets by defining new property rights. As Posner (Posner 1992), points out, "In deciding whether government intervention in the economic system is appropriate,

it is not enough to demonstrate that the market would operate imperfectly without intervention; government also operates imperfectly. What is necessary is a comparison between the actual workings of the market and of government in the particular setting."

Outcomes are the result of market structure and property rights, which shape participants' incentives. Market-oriented environmental policy seeks ways of structuring markets and property rights to achieve environmentally desired outcomes.

C&C regulations are clearly most efficient when polluters are homogeneous and regulators can readily identify the control technology that achieves desired standards at a low cost. When polluters are diverse, however, efficient pollution reduction may require that different types of polluters use different strategies to reduce pollution, and that these different polluters undertake different levels of effort. Economic theory argues that market-based implementation plans can structure incentives that will lead to efficient compliance; hence agencies are exploring mechanisms to harness market forces in pursuit of environment goals.

MARKET INCENTIVES AND ENVIRONMENTAL CONSEQUENCES

In response to these concerns, state and federal agencies began exploring the potential for increased use of market-based incentives, and implementing market-based programs to pursue environmental goals more efficiently. For example, the 1990 Clean Air Act Amendments encourage states to develop implementation plans designed to minimize the cost of public and private compliance with given standards. The EPA also encourages states to explore the potential for extension of the use of tradable permits to pursue water quality goals. On a broader scale, the Clinton administration's plan to reinvent government included the goal that government should promote the use of economic and market-based approaches to reduce water pollution.

Market-based approaches provide polluting decision makers with incentives and flexibility to meet a pollution reduction goal in the least costly manner. These approaches may seek to change household or business behavior via pricing incentives (which may be structured either as user fees or as required purchase of marketable permits), clarification of property rights to facilitate private market transactions, and better stewardship of resources.

None of these market-oriented proposals obviates the need for government action. The choice is not market-based carrot versus government stick; rather it is how best to combine the efficient incentive carrot with the mandated standard stick. Government actions in the form of structuring and protecting property rights in environmental goods are essential to market-oriented environmental policies.

Creating Incentives: Incentive Prices and Permit Systems

Two approaches have been used to give firms and households price incentives to modify their behavior: direct charges (or, less likely, subsidies) in the form of user fees or per-unit taxes on emissions, and tradable rights or permits to emit pollution where market supply and demand for these rights or permits determines the trading price. While C&C

has been the dominant approach for pursuing environmental goals, the market-based systems of user fee/tax and tradable rights or permits have been used selectively for many years. These approaches offer two important advantages over C&C regulation: market-based incentive pricing is expected to minimize the cost of achieving desired standards and it will stimulate development of cost-effective technology for pollution control.

Incentive Prices

Incentive prices, such as user fees or taxes for using environmentally sensitive products or discharging pollution, raise the costs of engaging in those activities and provide incentives for abatement. One widely known pricing incentive designed to induce households to change their behavior is the mandatory refundable deposit for beverage containers implemented in some states. King County, Washington provides another example of a monetary incentive designed to induce households to change their behavior: the trash-hauling charge for picking up a second can of household trash is significantly higher than the charge for the first weekly can. Compared with a C&C approach that might limit the total amount of trash that would be collected per household, this pricing system combines an incentive for households to reduce the amount of trash set out for pickup, with the flexibility to allow households to respond in ways that are appropriate for individual family situations. Large families may respond differently from small; families in which one member operates a home-based business (such as in-home day care) might respond differently from other households. Thus, compared with a C&C approach, the incentive pricing system reduces the need for detailed definition of desired and fair behavior by diverse households and for adjudication of complaints that specific household situations call for exemption or relaxation of the rules. At the same time, this system increases the agency's need for trash pickup information to permit accurate billing (Palmisano 1994).

Permit Systems

Under a marketable permit system, a regulatory agency determines the acceptable level of a targeted activity such as pollution emission, and requires that firms or households hold tradable permits (or rights) to emit some specified quantity of pollution. The total quantity of permits is set equal to the acceptable level and firms and households can trade these permits among themselves. A system of tradable permits could be initiated by either auctioning off the permits or giving them to current polluters. The key feature of either approach is that the rights or permits must be tradable and the price of these rights must be set through market transactions. Polluters that can reduce their emissions at a cost lower than the price of the permit will either reduce their emissions to avoid buying the permit, or reduce their emissions and sell their permits at a profit. Such a system will reduce overall pollution levels if the number of permits issued is less than the prevailing level of pollution.

The system will also reduce total abatement costs if polluters are diverse. For example, pollution from point sources such as a factory may be quite expensive or even impossible to abate while pollution from nonpoint sources may be abated relatively inex-

pensively. Under these circumstances it is cheaper for the factory to pay to abate pollution from the nonpoint source and acquire the nonpoint source's permits.

The efficiency advantages of tradable permits over C&C regulations are illustrated by the coverage permits system in effect in the Lake Tahoe basin. The goal is to limit the percentage of land area covered with buildings or pavement. The C&C regulatory approach would apply the limit uniformly to all property owners even if some owners value additional paved area more than others. A tradable permit system, in contrast, in which each property owner has permission to either cover the designated percentage of his property, or sell all or part of this permission to other property owners, allows significantly more flexibility. Property owners who place a particularly high value on coverage can buy coverage rights from property owners who value the coverage less. This system allocates the designated amount of coverage to property owners who value it most highly and allows others to receive payment in compensation for covering less than their "fair share."

FEE AND PERMIT SYSTEMS VERSUS C&C REGULATIONS

Rand Corporation (1980) compared C&C and market implementation options as strategies for reducing chlorofluorocarbon (CFC) use as a means of stopping destruction of the ozone shield in the stratosphere (Rabin 1981). Two C&C approaches were considered: banning the use of chloroflourocarbons in some or all applications or setting recovery and recycling standards for various types of users. These approaches to limiting CFC use raise daunting difficulties. CFCs have a wide range of uses, and the feasibility of substituting alternate inputs varies across these uses. Setting economically efficient production-specific standards would require detailed information that is not readily available to the agency. Further, the firms that would provide this information have strong economic incentives to limit the information they would develop and provide.

A market-based approach, in contrast, would require that companies using CFCs as a manufacturing input buy a permit for each pound of CFCs used. Rand estimated that achieving the CFC standard via recovery and recycle standards would double the resources required for compliance compared with the compliance expenditures required in a permitting system. (This cost comparison focused on resources used to comply with the regulatory system; the cost to CFC users of buying the permits was not included in the estimated cost of complying with a permit system because purchase of these permits simply transfers money from permit buyers to permit sellers.)

The greater efficiency of the market-based permit system stems from the wider array of strategies that may be implemented by the CFC users under a market system, and the incentive for each user to develop efficient alternatives. In contrast, C&C regulatory systems require the government agency to identify the best available current technology (BACT). Under this system, industries have a strong incentive to argue that the identified BACT is impractical and use political processes to thwart agency efforts. Further, the system gives industry no incentive to develop better technologies, which is a serious issue since industries will likely have a comparative advantage in achieving improvements by virtue of superior information about their own businesses.

The market system offers two additional advantages in this case. First, since CFCs are sold by a small number of producers and purchased by a wide variety of users, a system that requires sellers to purchase permits is probably easier to enforce than an

array of user-specific standards. Second, the permit system gives the agency more flexibility for reacting to new scientific information suggesting that CFC use is either more or less harmful than previously thought. Under a permit system, changing the number of permits available for sale would be a simple matter if the permits have short lives so that users must purchase permits frequently. Under the standard systems, such new information would require a more complex process of adjusting use standards in the context of best available technology for specific types of CFC users.

MARKET-INCENTIVE SYSTEMS: TWO QUESTIONS ABOUT COST

Market incentive systems give market participants incentives to achieve environmental goals efficiently. But these leave unanswered two important questions about cost:

1. Who should bear the costs and
2. Does the program's benefit exceed the cost?

Who Should Bear the Cost?

First, any regulatory or incentive system raises issues of fairness to low-income households. While incentive pricing systems reduce the total cost of reaching the trash-reduction goal as in the example above from King County, Washington, public officials must also consider the distribution of these costs. Advocates for low-income groups may argue that a large family has little choice but to pay for a second trash can each week. These advocates will compare the fee for hauling two cans with the price that family would have paid under a C&C system, and they will prefer the system with the lower price. This trade-off between an efficient system and one perceived as fair to low-income groups is not unusual. Water conservation during a drought could be achieved through either the typical C&C methods (restricting lawn watering to specified days, fining people who allow landscaping water to run off the lawn), or through a market incentive drought surcharge. This surcharge would give households and businesses a monetary incentive to conserve water efficiently; it might also be perceived as unfair. Whether the incentive price is actually a smaller or greater burden compared with C&C regulation depends on the structure of the incentive price system and on the household's flexibility and ingenuity.

System fairness is also an important issue in allocating initial permit rights. Because these permits are valuable, allocation of the permits and precise definition of the rights associated with the permits raise difficult questions. Will the permits be allocated to existing users or auctioned to the highest bidder? Allocation to existing producers or users (rather than by auction) could restrict industry competition because it confers a significant advantage on existing firms and creates a barrier for potential entrants. On the other hand, auctioning the initial rights raises average variable cost and may cause some firms to shut down. Can environmental groups (or other nonmanufacturers) buy and hold the permits, thus abating the targeted activity below the level set by government? This allows environmental groups to influence environmental policy through market mechanisms; it may also be perceived as unfair by industry since it increases demand for the permits, thereby potentially increasing permit prices.

Does the Benefit Exceed the Cost?

This issue arises in two contexts. First, an incentive price or tradable permit system provides monetary incentives for individuals and firms to find efficient methods for reaching a stated goal. This system does not, however, provide any information about the goal itself. For example, a bottle deposit system provides incentives for returning bottles. Individuals who can return bottles easily will do so, and individuals who find bottle return onerous will forfeit the deposit and allow others to earn the deposit money by collecting and returning the bottles. Bottle return is, however, an intermediate goal. The efficiency of this system may be illusory if bottle return is not the most efficient method of achieving the larger goal of reducing litter. Some bottlers have argued, for example, that a bottle deposit system is a $60 million solution to a $3 million problem. Stroh Beer Company suggests that it might be cheaper to pay minimum wage to teenagers to pick up highway litter and recycle the bottles than to induce households to return the bottles to collection points (Palmisano 1994).

The second aspect of this problem involves political incentives that accompany systems designed to provide appropriate market incentives. To induce efficient household or firm behavior, an incentive price must meet two criteria: it must be sufficiently high to influence behavior and it must reflect the external cost of the targeted activity. If an agency administering such a program succumbs to the temptation to raise fees above this level in order to fund laudable social programs, the high incentive price would induce households and firms to abate the targeted activity to inefficiently low levels.

INCENTIVE PRICES VERSUS TRADABLE PERMITS

In addition to case-specific considerations of ease of enforcement, the choice between a fee or tax and a permit depends on three considerations. The distinction between the two types of systems may appear to blur in some circumstances. Suppose, for example, an agency attempts to decrease residential wood burning by adding a pollution surcharge to the price of purchased firewood. This could be framed as a tax on firewood, i.e., an incentive pricing scheme, or as a permit system in which firewood purchasers were required to purchase a burning permit along with the firewood. However, this would be an incentive pricing system rather than a permit system since the tax or incentive price is set by the government rather than the market. A permit system for the reduction of residential wood burning and resulting pollution would involve, as an example, issuance of permits to current wood burners and then require that any future prospective wood burner buy the permit from another permit holder.

The choice between an incentive price system and a tradable permit system first hinges on whether the policy goal is more closely related to the cost or the acceptable quantity of the activity targeted for abatement. User fees or taxes make logical sense when the goal is to internalize an external cost and it is possible to set a price that reasonably approximates the external cost of the actions targeted for abatement. In contrast, if the policy goal is to reduce the quantity of a targeted activity to a specified level, a permit system is more appropriate. Thus, a tax or per-package fee makes more sense to reduce cigarette smoking and fund antismoking programs for teenagers, while permits are more logical in situations where a limited quantity of emissions is acceptable.

Second, the existing institutional structure may influence the choice. If an agency

already issues building or operating permits, an additional pollution permit is a logical extension. If the targeted activity requires purchasing a market good or paying an existing fee, taxes or fees may be more appropriate. In such cases, it may be important to explicitly set either a user fee or a tax. Differentiating between taxes and fees is important to nonprofit organizations, which must pay fees, but would be exempt from taxes and to groups opposed to tax increases. At least one court has ruled that an environmental fee is not a tax if those who pay the fee receive a service in exchange (*Lansing State Journal* 1996).

Third, revenues and monitoring costs affect the decision. Taxes and user fees will generate revenue to apply toward monitoring costs, as will permits auctioned by government. However, systems in which marketable permits are traded among users and potential users of the permits will require agency enforcement funds, without generating revenue.

IMPLEMENTING A MARKET-INCENTIVE SYSTEM

The EPA's experience in developing a system of tradable permits for air pollutants and supporting extension of this concept to water quality issues indicates that implementing such complex systems raises three issues. First, how can an agency with minimal experience with trades use appropriate caution and develop the system in phases? Second, can the trade system assure that environmental standards will be maintained at the level established under C&C regulation? Third, how will the agency adapt to the new system?

The EPA began phased implementation of an air pollution-trading program in 1976. Instead of permitting full trading of emissions permits, EPA initially authorized four specific types of trades: *bubbles* or trades within one firm, *offsets* in which a new emitter reduces pollution at an existing emission site, *netting* in which plant expansion or modernization by an existing emitter is exempt from review if the changes do not increase total emissions, and *emissions banking*, which permitted a firm to bank current reductions that exceed requirements for later use. This approach of authorizing limited types of trades to explore market mechanisms is being employed again as the attention focuses on allowing point-nonpoint trades in water pollution, with less immediate enthusiasm for allowing point-point or nonpoint-nonpoint trades. Similarly, midwestern states are gradually increasing the role of market-based programs by developing pollutant-specific trading programs for one pollutant at a time.

For pollutants such as ozone that travel after they are discharged, regional trading may be appropriate. Establishing a large trading area facilitates trading by increasing the number of potential trading partners. In the case of ozone, 12 eastern states plus the District of Columbia established a multistate emissions trading market by forming the Ozone Transport Commission. Based on this experience, analysts have noted that state and local agencies implementing local trading programs can lay groundwork for future regional trading areas by ensuring that initial local markets are set up with compatible rules and definitions. For example, defining the same life span for permits in neighboring states will facilitate future regional market cooperation (Klier and Mattoon 1995).

Some environmentalists express concern that standards for environmental quality may be allowed to slip under a new market-based system. Some of this concern may stem from a general skepticism about market incentives. For example, Simmons recounts a conversation between a New Zealand conservationist with an official at a New Zealand

endangered species unit (Simmons 1997). During a tour the official explained that the females of an endangered bird specie were kept in one aviary and males were kept in another. When asked why, the official explained that they did not want the birds to breed, which prompted the following exchange:

> Visitor: Do you mean to say that you have birds in an endangered species unit that you are deliberately not breeding?
> Official: Yes.
> Visitor: Why?
> Official: We do not know what to do with the extra young birds.
> Visitor: Have you ever thought of selling them?
> Official: Oh no! You couldn't do that!

Some of the concern stems from two issues more specific to trading systems: Does trading reduce overall pollution abatement by giving "credit" for abatement that occurred only on paper? What criteria should be used to delineate pollutants and markets for which trades are appropriate?

Are the Emissions Reductions "Real"?

Program design details, such as the method for calculating baseline pollution, play a key role in assuring that banked and traded emissions reductions represent bona fide reductions in pollution. Suppose, for example, that a state plan assumes a point discharger operates at full capacity and allows discharge of 100 tons/year. If the plant operates at only 80% of capacity this year, should it be allowed to trade the associated emissions reduction? Would the policy be different if the plant had always operated at 80% of capacity? Levin's analysis of the environmental impact of air quality bubbles, conducted in the early 1980s, indicated that the bubbles generated significant cost savings and increased flexibility, but did not increase innovation in the short term, and did occasionally give credit for reductions that occurred only on paper (Levin 1985). Despite the occurrence of paper reductions, he concluded that the cost savings were achieved with minimal environmental impact, either positive or negative.

When Are Trades Appropriate?

Criteria for identifying a potential trading market may deal with the nature of the pollutant, the nature of the discharge area, and expected market conditions. The EPA criteria for identifying areas appropriate for marketable water pollution permits provide an example.

Concern that a trading system may give credit for paper abatement, thereby allowing new emissions that would be prohibited under a C&C system, leads to concern about tradable permits for releasing bioaccumulated toxins. Developing systems for trading rights to discharge nutrients may provide a less risky venue for gaining experience with the new regulatory system. The EPA criteria for developing a permit system attempt to mitigate some of these concerns by specifying that firms must meet minimum standards to be eligible to trade.

First, a trading area must be defined in such a way that discharge by one polluter

is essentially equivalent to discharge by any other polluter. For example, the EPA specifies that all potential traders must be discharging into the same watershed.

In addition, EPA criteria for identifying situations appropriate for water pollution permit trading systems address the issue that a critical mass of potential traders is needed for a viable market system. To qualify as an area appropriate for trading, dischargers must face increased abatement requirements, dischargers must contribute a significant percentage of area pollution and the marginal cost to reduce pollution must differ significantly among potential traders. Finally, the regulatory agency must have sufficient resources to develop an enforcement program and sufficient data to estimate targets and measure emissions changes.

Can Regulators Adapt?

Transitioning to market-based strategies alters the regulatory agency's role. Instead of focusing on identifying reasonably (or best) available technology, the agency that manages market-based strategies must focus on modeling to develop sufficient understanding of cost-benefit tradeoffs to set incentive prices or determine the appropriate number of permits. For an agency transitioning gradually to market-based strategies, this implies a period of dual roles. If a significant portion of pollution or areas under an agency's jurisdiction is not well suited to market-based systems, the agency must undertake a dual role indefinitely.

CLARIFYING AND ENFORCING PROPERTY RIGHTS

The "Tragedy of the Commons"

While the United States has perhaps led the world in demanding improvements in environmental quality and in the kind of regulatory fine tuning described above, it has been a laggard internationally in dealing with environmental degradation associated with common pool resources. The problem of common pool resources was, of course, the subject of Hardin's classic article "The Tragedy of the Commons" (Hardin 1968) in which open access to resources is shown to destroy them. The "tragedy," as Hardin points out, is *not* that resources are needlessly destroyed but rather, as in classic Greek tragedies, in the remorseless and unstoppable nature of the process.

The solution to this process of resource destruction, Hardin and others have noted, lies in defining and enforcing property rights to deny open access to resources and prevent overexploitation. Many regard the denial of open access to resources such as national parks, national forests, and wilderness areas in the United States, for example, as unfair and inappropriate. Yet, as common pool resources, these resources are subject to the same processes that result in the tragedy of the commons. Below, two examples of tragedies of the commons are presented along with market-based solutions.

Artisanal Mining

Although there are many possible examples of the tragedy of the commons, the case of artisanal mining that occurs in a number of developing countries provides a good example. Artisanal mining refers to the mining of minerals by illegal miners or by miners who do not own mineral rights to the ore bodies they exploit. Cases of illegal mining in

Brazil, Ecuador, the Philippines, and other countries have received considerable international attention because of the environmental and public health problems that result.

In Ecuador, as in most countries, ownership of surface rights does not imply ownership of subsurface mineral rights. The government of Ecuador seeks to sell concessions to mining companies, which would allow these companies to explore for minerals, usually gold, and develop an ore body if they find one. Prospective concessionaires, however, find that promising areas are already being mined by illegal, artisanal miners, who are generally poverty stricken and find that their pursuits in the mines provides them with greater incomes than most of their fellow citizens (Lainé 1996). Under these circumstances, prospective concessionaires are reluctant to enter Ecuador and provide the government with concession revenues.

While environmentalists generally oppose mining companies that are the prospective concessionaires and probably would applaud the fact that poverty-stricken citizens of Ecuador and other developing nations are able to improve their economic status, the full consequences of this situation need to be considered. First, the artisanal miners use methods of processing ores that are only capable of extracting gold from the highest grade ores and are only capable of recovering about two-thirds of the minerals as more modern processes. Consequently, they leave a lot of lower-grade material that could be processed efficiently by modern mining companies to produce wealth, create jobs for the artisanal miners, and pay the government taxes. Hence, because of artisanal mining, the government and people of Ecuador must endure the environmental disturbance of mining without receiving the full potential economic benefits.

Second, the environmental impacts of artisanal mining are much worse than those that would occur if a modern mining company were given a concession and allowed to operate a mine, even without any environmental regulations. The primary reason artisanal mining is so environmentally destructive is that artisanal miners use mercury amalgamation processing techniques that were abandoned by modern mining companies over a century ago. Modern mining companies use cyanide processing techniques. While both cyanide and mercury are toxic, cyanide breaks down relatively quickly into what is essentially fertilizer when exposed to the environment, because its major ingredient is nitrogen and it is relatively unstable.

Mercury, on the other hand, is also highly toxic, but does not break down. Heaps of mercury-laced tailings are left exposed to the environment by artisanal mines. As a result, rains leach the mercury out of the mine wastes and into local water supplies exposing the miners and their families to mercury poisoning.

Compounding problems of mercury contamination caused by artisanal miners is the fact that the deposits exploited by these miners are generally in remote areas lacking in public health and sanitation facilities. Hence, along with mercury, raw sewage frequently leaches into water supplies. Needless to say, in areas where artisanal mining occurs, infant mortality rates are high and life expectancies are low.

How could the market be used to improve this situation? Property rights could either be assigned by the government to the artisanal miners or the government could enforce its property rights and evict the "squatters." In the first case, if the government simply acknowledged squatters' rights, modern mining companies could buy out the squatters and proceed to mine using modern, more environmentally friendly, techniques. In the second case, if the government enforced its property rights, concessions would have market value and could be sold by the government. Proceeds could be used for the benefit of the evicted squatters.

These choices are difficult for governments like Ecuador's, however. Giving property rights to squatters would bring criticisms from groups who advocate developing the resources and those who would benefit from the revenues raised by sales of concessions. Evicting the artisanal miners runs the risk of appearing oppressive of poverty-stricken, disadvantaged, usually indigenous, peoples. Eviction risks popular insurrection. Nonetheless, as Hardin points out, failure to define rights and end the open access system opens the road to the remorseless and unstoppable process of environmental degradation.

Saving the Vicuna

The destruction of African wildlife by hunting and, primarily, poaching has attracted worldwide attention as a number of African species such as elephants and rhinoceros have become endangered. Governments have generally been either powerless or ineffective in controlling poaching because they are unable to internalize the benefits of species protection.

However, recent trends toward protecting wild animals have turned to market forces, by acknowledging the rights of landowners to wildlife on fenced private property. Under these property arrangements, landowners manage habitat to maximize the commercial value of wildlife species, which includes hunting, tourism, and commodity production.

The case of the vicuna, a cousin of the llama that is celebrated in Peruvian literature and memorialized on Peru's national seal (Moffett 1997), is illustrative of the power of ownership of environmental resources like wildlife.

To the Maoist guerrilla group in Peru known as the Shining Path, the vicuna was the symbol of the capitalist state they sought to overthrow. Consequently, the guerrillas launched a scorched-earth policy on the vicuna and its habitat. With the Peruvian army focused on the Shining Path guerrillas and trying to protect citizens, guerrillas and poachers seeking prized vicuna wool depleted stocks to the point that in the early 1990s only an estimated 50,000 vicuna remained.

Vicuna wool was highly prized by the Incas and killing a vicuna was a capital offense. Today, vicuna wool sells for five times the value of cashmere. A man's scarf made of vicuna wool sells for $1000.

In the early 1990s two significant events converged to influence the fate of the endangered vicuna: leaders of the Shining Path were apprehended and the government of Peru gave ownership rights of the vicuna to the Andean villages in the vicuna's habitat. As a consequence, poaching and political slaughter of the vicuna has been greatly reduced as Andean villagers protect their property. In addition, Andean villagers revived the ancient Incan tradition of *Chaku* "in which peasants corral vicuna herds by forming a mile-long human chain . . . and pin down the animals and clip their wool" (Moffett 1997) and release the animals to the wild where they can breed.

Solutions to Environmental Problems

In both of the examples above, the tragedy of the commons has been or could be averted by privatizing environmental goods and allowing them to be allocated by the market. Although these examples are arguably isolated, they are illustrative of the nature of the tragedy of the commons and solutions that work. Many other examples could be provided from privatizing fisheries (Leal 1996), forests (Leal 1994), wildlife (Anderson and Hill

1996), and recreational areas (Anderson 1994), and in many cases, privatization of environmental goods can result in improving environmental quality and promoting sustainable resource use.

SUMMARY AND CONCLUSION

C&C regulations have been the general pattern of response to environmental degradation in both the United States and other countries. Economists have traditionally regarded C&C regulations as an appropriate response to "market failure" and there is little argument that the C&C approach has resulted in improvements in environmental quality. The question facing policy makers and regulators in the future, however, is how much more environmental improvement is possible using the C&C approach and what these improvements will cost.

Over time, C&C approaches have been yielding to market approaches. Initially, market approaches were limited to incentive pricing schemes. More recently, tradable permit systems have become a method of choice in a number of applications. Under certain circumstances, tradable permit systems promote the achievement of environmental goals more efficiently.

Increasingly, we find that further improvements in environmental quality and environmental management techniques can come through privatization of environmental goods. This represents a shift from centralized environmental planning and management to decentralized decision making where those whose actions most directly impact environmental improvements are empowered to meet environmental goals in the most efficient manner.

REFERENCES

Anderson, T.L. 1994. "To Fee or Not to Fee: The Economics of Below-Cost Recreation." In *Multiple Conflicts Over Multiple Uses* (T.L. Anderson, ed.), Bozeman, MT: Political Economy Research Center, p. 1.

Anderson, T.L. and P.J. Hill. 1996. "Environmental Federalism: Thinking Smaller." *PERC Policy* PS-8, December.

Hahn, R. and J. Hird. 1991. "The Costs and Benefits of Regulation: Review and Synthesis." *Yale Journal of Regulation* 8 (winter): 233.

Hardin, G. 1968. "The Tragedy of the Commons." *Science* 162: 1243–1248.

Klier, T. and R. Mattoon. 1995. "Complying with the Clean Air Act Amendments of 1990: A progress report." *Chicago Fed Letter* 89, January 1.

Lainé, R.T. 1996. "Ecuador: Illegal Mining Invasions: The Government Apathy Mining and Environment Research Network." *Bulletin* 10 (winter): 54.

Lansing State Journal, March 5, 1996.

Leal, D.R. 1994. "Making Money on Timber Sales: A Federal and State Comparison." In *Multiple Conflicts Over Multiple Uses* (T.L. Anderson, ed.), Bozeman, MT: Political Economy Research Center, p. 17.

Leal, D.R. 1996. "Community-Run Fisheries: Avoiding the Tragedy of the Commons." *PERC Policy Series*, no. PS-7, September.

Levin, M. H. 1985. "Building a Better Bubble at EPA." *Regulation* March/April, 33.

Moffett, M. 1997. "Once They Chased Guerrillas, but This Is a Different Anima." *Wall Street Journal*, June 13, A1.

Morrall, J. F. 1986. "A Review of the Record." *Regulation* 10(2).
Murray, A. 1997. *Wall Street Journal*, June 9, A1.
Palmisano, J. 1994. *The Environment Goes to Market*. Washington, DC: National Academy of Public Administration.
Pigou, A. C. 1938. *The Economics of Welfare*. London: Macmillan.
Posner, R. 1992. *Economic Analysis of Law*. Boston: Little, Brown.
Rabin, R. 1981. "Ozone Depletion Revisited." *Regulation*, March/April.
Rand Corporation. 1980. *Economic Implications of Regulating Chlorofluorocarbon Emissions from Nonaerosol Applications*.
Simmons, R.T. 1997. "Fixing the Endangered Species Act." In *Breaking the Environmental Gridlock* (T.L. Anderson, ed.), Palo Alto, CA: Hoover Press, p. 13.

5
Contingent Valuation Method

Earl R. Ekstrand
U.S. Bureau of Reclamation, Denver, Colorado

Dirk D. Draper
Balloffet and Associates, Inc., Fort Collins, Colorado

INTRODUCTION

Contingent valuation methodology (CVM) is a survey-based method of estimating how much individuals would be willing to pay for environmental or natural resource amenities, using a hypothetical market. These elicited values are contingent on the described market and quality of the good. Because these amenities are nonmarket goods, their economic value is difficult to determine. Economists call these goods "nonmarket goods" because they are not sold in the normal manner as a priced good in a market, but they still provide economic benefits to individuals. These goods can be resources that are used or consumed during activities including hunting, fishing, skiing, and other recreational activities. These nonmarket goods can also provide benefits without being used, such as knowing that the Grand Canyon is preserved, even for persons who will never visit this site. For these types of nonmarket goods, CVM is the only procedure available for estimating value. By carefully describing hypothetical conditions, CVM surveys can measure unobserved behavior and this method is the only vehicle for measuring the effect of proposed changes in quality of the resource before the changes occur.

Sound management of public resources requires knowledge and use of all economic values provided by those resources. If decisions to use or alter resources are made using market values and fail to consider nonmarket values, such decisions may result in an uninformed or incorrect allocation of resources. Traditionally, resource managers may have considered only goods and services sold in markets, such as lumber, minerals, and oil, when determining economic values. However, economists recognize that value is

---

Disclaimer: The opinions expressed here do not necessarily reflect the policy or views of the U.S. Bureau of Reclamation.

received from goods that provide benefits to the individual, even when the user does not buy those goods in a market.

WHY VALUE NONMARKET GOODS?

Capitalism is founded on a market-based economy. Individuals have goods and services to sell, and try to maximize their own well-being. They do so through transactions, trading for goods and services. Economists label this personal level of value with the term "utility." Utility is not observable or measurable, however, and most people are not familiar with the term. Although utility is not measurable or known, economic theory holds that each person instinctively understands how to increase utility for himself and attempts to maximize it. Our society assumes a goal of trying to maximize the "collective" utility of all the members rather than maximize the opportunity of a few. For market goods, this goal is accomplished through competitive markets. For nonmarket goods understanding the economic value is necessary to maximize the collective value to society.

Many people have strong feelings about the existence of natural resources, including wild rivers, old-growth forests, and salmon, even though they may never observe or use the resources. Many people have altruistic feelings and a sense of responsibility toward ensuring the future existence of these resources. They have sympathy and empathy for animals and feel some responsibility for loss of habitat due to human economic activities (Randall and Stoll 1983). Economic valuation recognizes that the continued existence of these amenities is important to many members of society (Bishop and Welsh 1992).

The national park system provides an example of nonmarket goods: When consumers visit a park unit that does not charge an entrance fee, or charges a nominal fee, they receive a benefit from this public good without directly paying for the value, compared to the price if it were a private good. The lack of entry fee does not mean the park unit provides no value to visitors. To the contrary, the amount of money they would be willing to pay if it were a private good is the value of the nonmarket benefit provided by the park unit. Public goods exist because these types of goods could not be provided efficiently in a private market. Estimating the economic value of these resources helps preserve them for use as parks.

MEASURING ECONOMIC VALUE

In a perfectly competitive market, the seller of a good prices the good at the same dollar amount for all customers even if some customers would be willing to pay more. If the seller could identify buyers who would pay more and charge a price equal to their willingness to pay for each individual sale, greater profits would be earned. However, in competitive markets, this level of market segmentation and price control is not attainable. These profits lost to the seller are a benefit to the consumer and referred to as net willingness to pay (WTP). WTP measures economic sacrifice in terms of income or other goods an individual is willing and able to forgo. Net WTP is the difference between total WTP and the consumers' actual expenditure.

Figure 1 illustrates this concept. At different prices different quantities would be

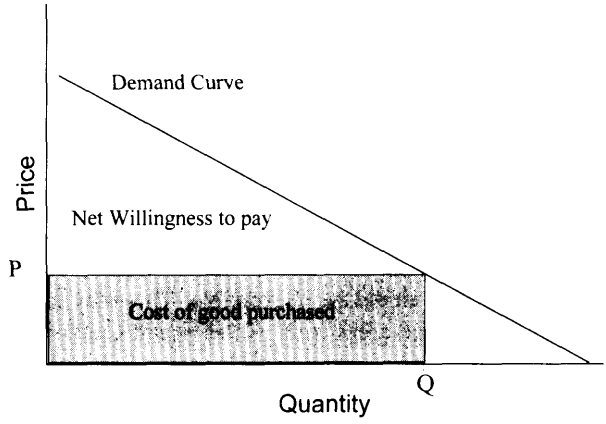

Figure 1 Measuring economic value.

purchased. At higher prices individuals would purchase less quantity, and at lower prices a greater quantity of the good would be demanded. These different combinations can be graphed by a line that economists call a demand curve, representing the quantity demanded for different price levels. Assuming that the good in question has a price (or value) P, then an amount Q is purchased. The shaded area below the price line and bounded by the line representing quantity Q represents the total cost of purchasing Q items at a price of P (this equals P^*Q). As the consumer would be willing to pay a greater price for quantities less than Q, the consumer receives extra value for the good in addition to the value equaling the cost of purchase. This extra value, or net WTP, is represented by the area above the shaded portion and below the demand curve.

Total economic value for nonmarket goods can be broken into use and nonuse values. Use values are derived from employing resources in activities such as fishing, hunting, observing wildlife, hiking, skiing, and boating. Hundreds of studies have established use values for wildlife and habitat resources used for these and many other activities. Examples of these studies can be found in Walsh et al. (1989).

Use values can be further divided into consumptive and nonconsumptive components. Consumptive use refers to activities, such as hunting and fishing, that consume the resource. Nonconsumptive uses are those in which the recreationist uses the resource without removing it from its environment. Common nonconsumptive uses include wildlife photography, bird watching, and wildlife feeding. The term "nonconsumptive" reflects the nature of the activity and should not be confused with the consumption of related goods used by the recreationist. Bird watchers, for example, who purchase (consume) binoculars, cameras, and other gear are still nonconsumptive users in regard to wildlife.

Some resources provide both consumptive and nonconsumptive uses. Many species of waterfowl, for example, could be hunted by one person and observed by a bird watcher. Endangered species, however, usually provide nonconsumptive use rather than consumptive use (if any use exists for these species) due to low population levels and because it is illegal to hunt them. Occasionally, a species that is listed as threatened, but not classified endangered, could generate some use values, such as fish species, if the

angler does not harm the catch and returns it to the water immediately. It is more usual, though, that endangered species provide only nonuse values to society.

Nonuse value recognizes that the public benefits from the preservation of the resource even when individuals do not use them. People may benefit from knowing that the amenity continues to exist, is potentially available for future use, and will be preserved for future generations. Empirical studies have established that nonuse values exist in substantial amounts (Brookshire et al. 1983; Walsh et al. 1989). In some examples, nonuse values have represented from 70 to 95% of the total value for wildlife and wilderness areas (Loomis 1991; Walsh et al. 1989). Substantial nonuse values are more likely to exist when resources are unique or when loss would be irreversible. This may apply to resources such as endangered species and unique areas such as the Grand Canyon.

REVEALED PREFERENCE TECHNIQUES FOR VALUATION

The value of a market good can be determined by observing the price at which it is sold. The price is determined by numerous interactions between buyers and sellers. If the price is too high, the seller finds that some of the good remains unsold and the seller lowers the price. If all of the good is sold quickly, the seller may recognize that the good is underpriced and adjust accordingly.

As previously indicated, nonmarket goods have no prices, but economic values can be estimated with several techniques. In addition to CVM, the most common and widely accepted methods are travel cost and hedonic pricing. Hundreds of studies have used travel cost and contingent valuation to value nonmarket goods. Hedonic pricing has been used to some extent but is restricted due to data limitations. Both travel cost and hedonic pricing methods value goods by observing preferences expressed by behavior.

The travel cost method (TCM) gathers information about the user's preferences by observing behavior. This method has been used to value resources used for activities such as fishing, boating, hiking, and other recreational activities. The TCM is limited to measuring values based only on current conditions at the site and only the economic value for participants. The method fails to consider potential users who would recreate under different conditions of amenities or lower cost.

Economic values also can be estimated using the hedonic pricing method. The hedonic technique is limited by lack of data, because it requires using observed market prices for goods, such as real estate markets, to determine resource values. This method assumes that the price of a good is influenced by many attributes. Real estate market prices are affected by features such as size of the house, its location and construction date, and school district. Other amenities such as proximity to a lake, extent and type of vegetation, and other local resources may also affect the market price. The value of each attribute is estimated by unbundling the price of the market good such as real estate using statistical procedures. The researcher then uses the resulting coefficients to identify the value of the resource in question. The hedonic method is an excellent way to value some resources, but has limited applications in valuing environmental resources because there are few market goods that can be used in this way to price environmental amenities.

CONTINGENT VALUATION METHODOLOGY

The CVM is based on stated preferences for goods, rather than observed behavior of consumers. Whereas the CVM has the limitation that it does not use revealed preferences,

it has the advantage that it can value nonmarket goods, which other methods cannot. These include changes in quality for resources, nonparticipants, and valuing nonuse goods, which the public may value highly. Many detailed references are available on this method (Cummings et al. 1986; Mitchell and Carson 1989).

Support for comparing benefits and costs for nonmarket economic values for natural resources has been provided since 1950s with *The Green Book* (Inter-Agency Committee 1958). Additional support was added by *Principles and Standards* published by the U.S. Water Resources Council (U.S. Water Resources Council 1962). The latest revision in 1983, referred to as *Principles and Guidelines*, specifically recognized the CVM, along with other techniques for valuing nonmarket goods (U.S. Water Resources Council 1983). *Principles and Guidelines* also clearly described the "willingness to pay" principle underlying national economic development benefits and the CVM.

The CVM was validated for use in conducting natural resource damage assessments in federal court with the decision of *Ohio v. U.S. Department of the Interior* (U.S. Court of Appeals 1989). During damage estimates from the oil spill of the Exxon *Valdez* in Prince William Sound, the National Oceanic and Atmospheric Administration (NOAA) asked a panel of renowned economists to review the CVM. The panel determined that this method produced estimates reliable enough for administrative and judicial determinations (Arrow et al. 1993).

The CVM has been used to value many species of animals, particularly species federally listed as threatened or endangered. Table 1 shows estimated nonuse values from studies valuing selected species (Loomis and White 1996). Because these are values for federally protected species, they represent only nonuse values, because most listed spe-

Table 1 Nonuse Values Estimated Using CVM: For 16 Threatened and Endangered Species and Habitat[a] (Converted to 1995 Dollars Consumer Price Index)

Species	Average value ($)
Atlantic salmon	7.63
Arctic graying/cutthroat trout	10.06
Bald eagle	26.01
Bighorn sheep	11.15
Blue whale	41.78
Gray wolf	71.00
Grizzly bear	35.96
Humpback whale	73.20
Monk seal	20.22
Red-cockaded woodpecker	15.56
Pacific salmon and steelhead	31.29
Sea otter	28.32
Northern spotted owl	92.65
Squawfish	8.42
Stripped shiner	6.04
Whooping crane	33.07

[a]Since some of these species (salmon) could have some use value in addition to nonuse value, these values may represent total value.
Source: Loomis and White, 1996.

cies populations are not large enough to allow use values, with a few exceptions. Values vary due to different study implementation methods, impacts to habitat proposed in the study, and impacts proposed to the species.

These values vary in magnitude because they are estimated for different goods and implement the method in different ways. More recent studies may have applied more sophisticated statistical techniques based on the experience of earlier research. Proposed impacts may vary among studies, too, including the level of restoration of the species' habitat, the level of certainty of preservation, and impact on other species. The studies' results provide insight into how society values preservation of these species.

Comparisons Between CVM and TCM Measures

Comparisons between the CVM and other techniques such as the TCM help validate CVM by showing the technique is reliable for estimating nonmarket values as the results of the two methods compare consistently. The sample of comparisons illustrated in this section is limited to studies determining use values since nonuse values can be estimated only with the CVM.

Davis' (1963) study is considered to be the first application of the CVM and estimated economic benefits of recreation in the north woods of Maine. This study estimated economic values using both the CVM and the TCM for hunters, anglers, and campers. Besides providing their travel costs, these participants were asked if their decision to recreate would be affected if the cost of the experience increased. Using a bidding process the researchers increased the hypothetical cost estimates to the level where respondents indicated that they would no longer recreate. From the survey responses, a demand schedule and total economic benefits were estimated. The $72,000 value resulting from the CVM estimates was similar to the $70,000 benefits estimated with the TCM.

Other studies also help to confirm the validity of CVM results through comparisons of methods. Sanders et al. (1991) estimated economic values for water recreation activities and compared the CVM and the TCM values for stretches of 11 rivers in the Rocky Mountains of Colorado considered for protection under the Wild and Scenic Rivers Act. These researchers mailed surveys to a sample of households in Colorado to determine their preferences and travel costs. The study estimated mean values per visitor-day ranging from $20.91 to $24.38 for both techniques, and they concluded that the estimates were sufficiently reliable to demonstrate consistent and reasonably stable recreational use values for both methods.

Carson et al. (1996) compared results from 83 studies conducted from 1966 to 1994.The studies included 616 comparisons of CVM estimates to revealed preference (RP) estimates, including travel cost, hedonic pricing, expenditure function, and household production function models. The authors compared summary statistics of the ratio of values indicated by CVM to values indicated by RP methods and found the mean ratio of CVM/RP was 0.89 with a confidence interval between 0.81 and 0.96. Most individual CVM/RP ratios ran from 0.25 to 1.25, with 80% less than 1.25. A number of CVM estimates exceeded the RP values, a few by as much as 10 times, but these represent a small portion of the sample. The review concluded that on average CVM produces values that are slightly lower than estimates made by RP techniques.

Estimating slightly lower values by the CVM compared to RP is not unexpected. CVM often is used to measure a slightly different activity, or one carried out under different conditions, than RP techniques. For example, TCM and CVM studies could be

used to estimate the value of benefits received by an angler for a weekend fishing at a favorite lake. Whereas TCM measures the economic value for the fishing trip, which may include secondary benefits such as camping, the CVM study could be estimating a value specifically for the fishing component of the trip. The activity valued by CVM is a major portion of, but not the same as, the activity valued with TCM.

Controversies Related to the CVM

There is an ongoing debate among economists over the CVM. Some CVM critics oppose the very concept of nonuse values, contend the method does not reflect values held by all of society, and suggest the results lack validity. Most of the controversy centers on the techniques used by CVM to estimate nonuse values. Opposition to using CVM as a vehicle for estimating nonuse values escalated following the Exxon *Valdez* oil spill. Environmentalists argued the oil industry used this opposition to CVM as an attempt to reduce the size of economic damages awarded following the oil spill in Prince William Sound.

Critics contend the sum of nonmarket values estimated for environmental amenities is implausibly large. They suggest nonmarket values are not accurate economic values but some highly inflated number. CVM supporters counter that this argument also could be applied to millions of market goods. While aggregate prices of market goods are substantial, individuals choose among myriad choices to allocate their limited resources (Bishop and Welsh 1992).

CVM studies of endangered species suggest there is substantial value for protecting these species. This results in significant values per individual (animal or plant) for species with small populations. These values appear large in part because consumers tend to compare the value per unit in terms of use or market values (Bishop and Welsh 1992). Consumers may think of all salmon in terms of dollars per pound when it is sold in the grocery store. However, for existence values for an endangered stock of salmon, a handful of fish may be assigned the aggregate existence value from thousands of persons.

Large values can also be thought of as indicative of the scarcity of the population and how close it is to extinction (Randall and Stoll 1983) just as scarcity elevates the price of market goods such as diamonds. As the species population recovers, the value per individual would rapidly decrease. Failure to recognize this relationship overlooks the benefits provided by the public goods portion of the species, and results in undervaluing the good.

Opponents to CVM argue questionnaires are not sensitive instruments and cannot detect small changes in availability of a resource. Desvousges et al. (1992) estimated the nonuse value of preventing the accidental death of migratory waterfowl in California. The questionnaire asked respondents to value protection of varying populations of waterfowl, ranging from 2000 to 200,000, ranging from a fraction of 1% to less than 2% of waterfowl in the United States. The study found positive values for protecting the birds, but little correlation between the waterfowl population level and value of the protection. Even when the number of birds changed by a factor of 10, the values did not vary significantly. The authors concluded that respondents had difficulty expressing values for these changes in population, a necessary condition for valuing resource damages.

Proponents of CVM contend that this and other studies used to refute CVM used surveys that were not carefully designed. This resulted in large variances, generated large

confidence intervals, and led to inconclusive findings. Proponents also suggest that one study cannot prove or disprove the reliability of CVM.

Because CVM is based on stated preferences rather than revealed preferences, some economists have expressed concern about the method's ability to reach unbiased results. Criticisms include strategic bias, hypothetical bias, implausibly large values, and bias introduced by the design of the survey vehicle. The validity of research depends on how the study is conducted and how the results are analyzed. Specific recommendations for implementing CVM studies have been made by the NOAA panel.

Strategic bias results from the respondent intentionally answering the CVM survey questions in a misleading way. Strategic bias may arise when respondents have an incentive not to reveal their true demand. For example, if the respondent recognizes that the scenarios described in the questionnaire are hypothetical, he may respond with an answer other than his true WTP. The respondent, for example, may believe that a higher value would promote a public good that is used for recreation or other purposes. On the other hand, if the respondent believes that entrance and other assessed fees in the future will depend on one's answer, the respondent may state a value that is lower than true WTP in an attempt to lower user fees. In either case, the respondent has incentive to provide biased information.

However, there is no empirical evidence supporting the concern about strategic bias. If a significant number of respondents routinely answered questions with strategic intent, CVM values would not correspond so closely to RP values. Also, analysis of CVM findings supports the belief that CVM results follow economic theory. Bids obtained from CVM studies have been shown to be statistically significant and related to income and other demographic characteristics, and affected by the availability of substitute and complementary commodities (Randall and Stoll 1983).

Hypothetical bias refers to the inability of respondents to accurately predict how they would behave if an actual market for the good was created. Opponents to using the CVM suggest that respondents may not be able to assess the values without the experience in an actual market, and that it takes repeated exposure in the marketplace to accurately price a good. Actual markets allow for repeated transactions so that the buyer can acquire information, learn about substitutes, and discuss the potential purchase with others to define actual WTP. This argument assumes that respondents, prior to receiving a CVM survey, have never considered their WTP for these goods and have problems determining these values on only one try and that this is especially true for nonuse goods such as endangered species, wetlands, and pristine wilderness areas.

Positive economic values can be identified for goods using CVM even if the respondent was not aware of the good prior to learning about it in the survey. Critics argue this is another example of the failure of CVM. Proponents of the technique counter that this exemplifies the process by which consumers determine preferences. Consumers seek information to help determine which goods and services to purchase within their budget constraints. In markets, consumers usually do not attempt to learn about goods that are unavailable. Consumers acquire additional information about the new product only after the product becomes available (Bishop and Welsh 1992).

Prior to executing the actual survey, the researcher should conduct focus groups, pretests, and pilot studies. These steps help the researcher understand how respondents will interpret the questions in the actual survey, and allow for redesign of the questionnaire. After focus groups have helped sharpen questions, and identified the need for background information, a pretest or pilot study can be administered. Providing evidence

of these helps show that public response and proper communication are being achieved (Mitchell and Carson 1989).

FUTURE DIRECTION: MEASURING RESPONDENT CERTAINTY

Uncertainty is significant to the valuation estimates because respondents are accustomed to buying goods that have predetermined prices rather than offering a price without some suggestion of value. When consumers purchase goods in real markets they are able to compare sources for the best price and consider the utility the good will provide. Similar information is not available for nonuse goods because answering a CVM survey may be the only opportunity respondents have for estimating their value for these goods. Respondents may think the nonuse good in question, whether an endangered species, wilderness area, or other environmental good, provides positive economic values, but not be certain of their response to the WTP amount they are asked to respond to without repeated opportunities to value the good. This is particularly true if survey recipients are asked to respond to a midrange value for a good. Respondents who face either extremely high or extremely low values of goods may be more certain in their responses. Incorporating the level of certainty in the estimation provides additional information for use in the valuation process and may lead to more defensible values.

To improve the reliability of survey results, researchers have begun asking how certain the respondents are to their answers to CVM questions. Researchers have found this approach reduces the estimate of WTP relative to values estimated in the more traditional approach (Li and Mattson 1995; Polasky et al. 1996). Others have found that using knowledge of the respondents' certainty reduces the variance of the estimate (Ready et al. 1995; Welsh and Bishop 1993). Incorporating this information may hold promise for developing better methods of measuring nonuse values.

DESIGNING A CONTINGENT VALUATION QUESTIONNAIRE

A well-designed CVM survey clearly identifies the resource involved in the survey, conveys to the respondent the current condition of the resource, and describes the consequences of actions proposed in the survey. The respondent must be asked clearly to state his value for causing the action to occur (or preventing the action, depending on the situation). The questionnaire must provide additional information, including describing the proposed payment method, and other background or technical information relevant to the situation.

A CVM questionnaire must convince the respondent that the project is feasible, and must sufficiently inform the respondent so he or she understands clearly the issue in question. The mechanism for payment, usually a method of taxation, payment into a special fund, or an increase in the cost of a related product purchased by the respondent, is an especially sensitive item. If the respondent does not buy into the payment mechanism, the respondent may question the validity of the study and fail to participate honestly. The study also must convey how and when the specified resource will be provided in a way that is acceptable to the respondents.

Statistical techniques should be followed when selecting the sample used in the study. The sample needs to represent the overall characteristics and demographics of the

population within the region of the study if the results are projected to the population at large. If the sample diverges from the demographic characteristics, the results may require adjustments in order to project the results to the population. Samples often are drawn from telephone directories or voting roles. Because these sources will exclude persons without listed phone numbers or are not registered voters, the resulting sample may not reflect the targeted population. The researcher must be aware of this and correct for biases in the study results.

Sample design requires choosing bid amounts such that the maximum WTP for the respondents is included in the bid amount. The bid amounts should reflect the information provided by focus groups and pretest respondents. Because of the type of data and probability distributions received from a CVM questionnaire, large sample sizes are required. The researcher often needs to be sure that the minimum number of respondents in the final analysis is large enough, a minimum being 500 observations or more, an amount necessary to keep the confidence intervals small enough so that conclusions can be reached.

The NOAA panel considered mail surveys unreliable because of low response rates, difficulties with sample frames, literacy problems with respondents, and the lack of control over the interview process with self-administered surveys. The panel preferred in-person surveys because these permit more visual materials, can help maintain respondent motivation, and can help monitor respondent performance. Telephone surveys may be satisfactory if the respondent is already informed about the resource or can be informed during the interview or with materials provided in advance.

Despite the NOAA panel recommendation, mail surveys are used frequently to administer CVM studies. Mail surveys are considerably less expensive, and allow gathering information over a much larger geographical area. Mail surveys also allow researchers to sample much larger populations than can be reached with personal or telephone interviews. However, a common problem with mail surveys may be low response rates. This may result from low respondent motivation or because of outdated mailing lists. If the respondent is informed properly, and the survey is designed well, including timely follow-up contacts, response rates often increase to acceptable levels. Following proper survey methods improves results, as does the use of focus groups and pretesting.

Mannesto and Loomis (1991) compared the effectiveness of mail-in questionnaires and in-person surveys in a CVM survey of boaters and anglers in California. They found that in-person interviews had a much higher response rate than mail-in surveys. However, for individual questions, the response rates may be higher for mail survey respondents. For sensitive (income) and CVM (complex, future-oriented) questions, the authors concluded that the mail method may be better suited as it provides the respondent the opportunity to contemplate and reduces pressure for an immediate answer. The researchers found little difference in resource values regardless of how the survey was administered.

Proper Contingent Valuation Design and Administration

The good being valued must be adequately identified for a survey to be effective. For example, if the researcher is interested in determining willingness to pay to preserve habitat for the northern spotted owl, then a summary of information about the owl and its habitat is needed. This may include information on owl population, trends related to nesting sites and other habitat, the availability of its food source, and resource management actions that will affect the viability of owl populations. This information must be

presented in a manner that the reader can easily understand within a limited time that they are likely to spend responding to the questionnaire. Text should be supplemented with maps, photographs, and charts to help the respondent visualize the material in the text.

In addition to describing current conditions, the researcher must identify hypothetical conditions in a manner realistic enough to elicit a realistic response to the WTP questions. Conveying technical information about water quality, resource management practices, or environmental degradation in a manner that all respondents will be able to comprehend can be challenging. Conveying this information is necessary, however, for the respondent to answer accurately.

Asking the Valuation Question

After the reader has reviewed the background material about the subject provided with the questionnaire, the reader is asked to estimate the dollar amount he or she is willing to pay for the good. A relevant payment mechanism, such as increased taxes, contribution to a trust fund, or increased cost for a good, must be proposed. This payment vehicle must be related to the good to be credible. For example, funding for proposed enhanced forest habitat could be collected through increased hunting license fees, if the result is increased hunting. Another example is measuring willingness to pay higher utility rates to mitigate environmental degradation caused by generating electricity.

If the resource involved in the survey is preservation of a nonuse good, then contribution to a trust fund or a tax increase may be the appropriate payment vehicle. It is important that the payment vehicle be emotionally neutral to the respondents. If respondents react to the payment vehicle rather than the good in question, their value estimate may be biased. For example, if the proposed payment vehicle is a tax increase but the respondent opposes higher taxation, this will cause a negative reaction even if it the cost is minimal compared to the value placed on the good in question. The purpose of the payment vehicle is to provide a means of creating a market without being disruptive to the respondent. A poorly chosen payment vehicle can cause the respondent to refuse to answer, in protest of the payment vehicle.

The CVM researcher must also decide how to pose the valuation question. Current alternatives include the referendum approach, a bidding process, open-ended questions, payment cards, and comparison ranking. The most popular method currently used is the referendum approach and was suggested as the method of choice by the NOAA panel for conducting natural resource damage assessments (Arrow et al. 1993).

The referendum approach is popular because it is easy to administer and the payment vehicle is similar to voting on a bond issue and therefore familiar to most survey recipients. The referendum question asks the respondents to answer YES or NO to a specific dollar amount. The value provided in questionnaires varies across the sample to allow calculating the estimate of the probability of a YES answer at each amount. Because this technique is asserted to provide accurate responses of value, it creates reasonable incentives to the respondent. A referendum question may be stated as: "Would you vote in favor of program ABC if it costs your household $X per year in higher federal taxes?"

With the referendum method, each respondent answers YES or NO to the referendum question. Because the respondent is asked a single valuation question, the survey does not directly identify the maximum WTP for an individual. The WTP for the full

sample can be estimated by analyzing all of the responses from the sample set. From this analysis a probability distribution is determined, each amount having a probability of a YES response for the respondents.

The bidding game technique was developed early in CVM research (Davis 1963) and widely used for many years. This method requires the researcher to pose questions in a context similar to markets to elicit behavioral responses. The bidding begins with the respondent being asked to pay a given amount for a given resource. If the answer is YES, the amount is raised and the question posed a second time. These iterations continue until a negative response is made. If the respondent's original answer is NO, the amount is reduced until a YES answer is made. The bidding game can be used only with personal interviews, a costly research strategy to implement. The method also carries "starting point bias," which holds that the respondent can be influenced by the starting bid amount. Respondents may alter their answers if they think that this amount is an appropriate value for the resource.

In open-ended questionnaires, the respondents are asked to determine their own maximum values with a question such as: "How much would you be willing to pay annually in higher taxes to affect this change: $_____?" Respondents fill in the amount. This method can be used with mail surveys, thereby avoiding costly personal interviews, and it eliminates the starting point bias of the bidding game. Open-ended surveys, however, typically produce lower values relative to other methods (Cummings et al. 1986). Some researchers contend values are understated because the respondent has no incentive to contemplate a maximum WTP.

A modification of the open-ended and bidding game formats is the payment card. The payment card contains values ranging from a low amount such as $0 or $1 and increasing in increments up to a predetermined maximum amount. Respondents mark the amount they are willing to pay for the resource. The researcher may provide a context for respondents, such as the amount that is already paid in taxes or the price of a related market good.

Comparison ranking is another alternative, though its application has been limited due to the time and cost of administering the survey. The respondent is asked to compare and choose between two goods. These choices can involve cash, market goods, environmental amenities, and the specific goods in question. The respondent indicates a value for goods by the choices made. By carefully choosing the pairings and placing different dollar amounts within the choices, the researcher can rank the goods to estimate a value.

Following the valuation question, the researcher should ask the respondent to answer follow-up questions to determine the legitimacy of the response, especially for very low and very high bids. Many respondents who bid zero amounts do so for reasons other than they truly do not value the good. Zero responses may be protesting the valuation process, have problems with the questionnaire, or the payment vehicle. Zero bids may be excluded from the dataset if the researcher concludes the response is a protest. Very high values also may be excluded although no standard technique has been accepted for excluding excessively high values.

In addition to the valuation question, other information about the respondent may be collected. This may include asking whether the respondent had heard or read about the resource prior to the survey. The researcher may wish to know the respondent's viewpoint on issues such as conservation of environmental resources, government ownership of lands affected by actions proposed in the survey, how the respondent views human impacts of the proposed action, and other general issues. CVM surveys typically

end with questions regarding age, gender, education level, membership in organizations, and activity preferences. These data are useful in providing insights about why the respondents answer the valuation question as they do.

CONCLUSION

Environmental and natural resource amenities have economic value even if they are not priced or exchanged in an open market. These environmental goods range from wilderness areas to endangered species to recreation activities. Valuing these nonmarket goods is a challenge facing economists and the CVM is one tool available for economists to use for overcoming this challenge. This method is based on the paradigm that economics is not just the study of markets, but the study of human preferences and behavior. Many individuals highly value the existence of natural resources, whether these resources are used for recreation or not used at all.

CVM is a survey-based technique used to establish the value of a given nonmarket good, and is the only technique available for estimating nonuse values. The researcher asks respondents to value a good or scenario by stating their willingness to pay for a good or change in conditions. The good or change in conditions that is being valued must be carefully described in information that accompanies the survey. Surveys can be administered by mail, telephone, or in person, and should follow specific design criteria established in other research, such as procedures recommended by the NOAA panel. Much of the controversy surrounding CVM, including potential introduction of different biases, can be countered with a properly designed and administered survey instrument.

The most common technique for asking respondents their willingness to pay is the referendum format. This is similar to questions voters face when considering a referendum question on a ballot. The respondent is asked to respond either YES or NO to the question containing a dollar amount. From these responses, the researcher can statistically determine an economic value for the natural resource or environmental good in question.

REFERENCES

Arrow, K., R. Solow, P. Portney, E. Leamer, R. Radner, and H. Schuman. 1993. "Report of the NOAA Panel on Contingent Valuation." *Appendix I to Natural Resource Damage Assessments Under the Oil Pollution Act of 1990.* Department of Commerce, National Oceanic and Atmospheric Administration, Federal Register, January 15: 4602–4614.

Bishop, R. and M. Welsh. 1992. "Existence Values in Benefit-Cost Analysis and Damage Assessment." *Land Economics* 68: 405.

Brookshire, D., L. Eubanks, and A. Randall. 1983. "Estimating Option Prices and Existence Values for Wildlife Resources." *Land Economics* 59: 1.

Carson, R., N. E. Flores, K. M. Martin, and J. L. Wright. 1996. "Contingent Valuation and Revealed Preference Methodologies: Comparing the Estimates for Quasi-Public Goods." *Land Economics* 72: 80.

Cummings, R., D. Brookshire, and W. Schulze. 1986. *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method.* Totowa, NJ: Rowman and Allanheld, 270.

Davis, R. 1963. "Recreation Planning as an Economic Problem." *Natural Resources Journal* 3: 239.

Desvousges, W., F. Johnson, R. Dunford, K. Boyle, S. Hudson, and K. Wilson. 1992. *Measuring*

Nonuse Damages Using Contingent Valuation: An Experimental Evaluation of Accuracy. Triangle Park, NC: Research Triangle Institute Monograph 92-1, June.

Inter-Agency Committee on Water Resources. 1958. *Proposed Practices for Economic Analysis of River Basin Projects*. Prepared by the Sub-Committee on Evaluation Standards. Washington, DC: 56.

Li, C. and L. Mattsson. 1995. "Discrete Choice Under Preference Uncertainty: An Improved Structural Model for Contingent Valuation." *Journal of Environmental Economics and Management* 28: 256.

Loomis, J. 1991. "Balancing Public Trust Resources of Mono Lake and Los Angeles Water Rights: An Economic Approach." *Water Resources Research* 23: 1449.

Loomis, J. and D. White. 1996. "Economic Benefits of Rare and Endangered Species: Summary and Meta Analysis." *Ecological Economics* 18: 197.

Mannesto, G. and J. Loomis. 1991. "Evaluation of Mail and In-Person Contingent Value Surveys: Results of a Study of Recreational Boaters." *Journal of Environmental Management* 32: 177.

Mitchell, R. and R. Carson. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*, Washington, DC: Resources for the Future, 463.

Polasky, S., O. Gainutdinova, and J. Kerkvliet. 1996. *Comparing CV Responses with Voting Behavior: Open Space Survey and Referendum in Corvallis, Oregon*. Proceedings of W-133 Benefits and Costs Transfer in Natural Resources Planning, 9th Interim Report (J. Herriges, compiler), held at Jekyll Island, Georgia, Department of Economics, Iowa State University, Ames.

Randall, A. and J. Stoll. 1983. "Existence and Sport Values in a Total Valuation Framework." *Managing Air Quality and Scenic Resources at National Parks and Wilderness Areas* (R. Rowe and L. Chestnut, eds.), Boulder, CO: Westview Press.

Ready, R., J. Whitehead, and G. Blomquist. 1995. "Contingent Valuation When Respondents Are Ambivalent." *Journal of Environmental Economics and Management* 29: 181.

Sanders, L., R. Walsh, and J. McKean. 1991. "Comparable Estimates of the Recreational Value of Rivers." *Water Resources Research* 27: 1387.

U.S. Court of Appeals. 1989. *State of Ohio v. U.S. Department of the Interior*. 880 F. 2d. 432 D.C. Cir.

U.S. Water Resources Council. 1962. *Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources* Senate Document 97, Department of the Interior, Washington, DC.

U.S. Water Resources Council. 1983. *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, Washington, DC: Department of the Interior, 137.

Walsh, R., D. Johnson, and J. McKean. 1989. "Issues in Non-market Valuation and Policy Application: A Retrospective Glance." *Western Journal of Agricultural Economics* 14: 178.

Welsh, M. and R. Bishop. 1993. "Multiple Bounded Discrete Choice Models," Proceedings of W-133 Benefits and Costs Transfers in Natural Resources Planning, 6th interim report (J. Bergstrom, compiler). Department of Agricultural Economics, University of Georgia, Athens.

6

Financing National Park Service Activities Through Entrance Fees

Benjamin M. Simon and Harvey Doerksen
Office of Policy Analysis, U.S. Department of the Interior, Washington, D.C.

INTRODUCTION

This is a time of tight budgets. While there may have been a period in government in which federal agencies could expect regular and predictable budget increases, those times have long passed. Budget cutters in Congress and in the Administration are looking for ways to make available funds go further, while at the same time seeking additional sources of revenues.

The National Park Service is not immune from these pressures. Although it has succeeded in avoiding budget cuts in recent years, the National Park Service has come under mounting pressures to increase the revenues it receives from park users. No fewer than five bills in the 104th Congress were aimed at increasing revenues collected by the National Park Service.[1] The Vice President's National Performance Review found reform in the nature, level, and collection of fees in the national parks to hold "strong potential for addressing the unmet needs of NPS," and noted that, "despite the immense challenges facing NPS and the costs they entail, public access to the national parks is virtually free of charge" (National Performance Review 1993). Others have called for more radical changes, such as decentralizing national parks into autonomous units, each self-supporting from entrance and user fees.

In the clamor for new revenues, the budget issue often masks other issues of public policy that revolve around the basic missions of the National Park Service. The Service is not just a "money machine," yet in the debate over fees and park revenues it is easy to lose sight of the fact that fee collection can potentially provide the National Park Service with management benefits that go beyond the mere issue of revenues. At least in concept, it should be the management purpose that determines the appropriate level and form of fees. Fee programs might be designed, for example, around such objectives as increasing public information, reducing congestion, or protecting natural resources.

A fee program designed simply to maximize revenues might result in a high daily

individual fee for all persons visiting all parks. A fee program designed to reduce use of a fragile resource might result in a high fee for persons visiting that particular resource, and might even involve a concurrent public information campaign to discourage or limit use of the area. A fee program based on the conception of national parks as "the peoples' parks" might result in low fees, or none at all. A fee program designed to reduce congestion and attendant demands on infrastructure might result in a complex fee system with high fees in periods of high demand (such as weekends or summers) and low fees at other times. Or there might be high fees for cars and low fees for individuals using public transportation to visit the park. A fee program designed to maximize visitor contact with park rangers might result in channeling visitors to a limited number of entrances where they will be greeted by a park employee and provided with information. Fees under such a management objective might be nominal.

PERCEIVED "POTENTIAL" REVENUES

One of the difficulties faced by the National Park Service is a growing perception that the Service is ignoring a huge, untapped source of revenue. Figure 1 illustrates the nature of that perception. The National Park Service collected approximately $50 million in entrance fees in 1994, or approximately $0.19 per visitor. At then-current entrance fee rates, this is equivalent to collecting individual entrance fees from only 10% of the visitors to the parks.

Without any further information it would be easy to conclude that the National Park Service could raise as much as $500 nonillion in entrance fee revenues by charging entrance fees to those other 90% of the visitors who do not now pay for entrance. But Figure 1 is misleading in its simplicity. The "potential" is grossly overstated. First, we should be cautious about reading the graph too literally. In the first place the maximum potential entrance fee collection assumes that 100% of the visitors tallied by the National Park Service in 1995 could be charged at the per-person rate that prevails in parks in which entrance fees are collected. Entrance fees are authorized by Section 4 of the Land and Water Conservation Act, which states:

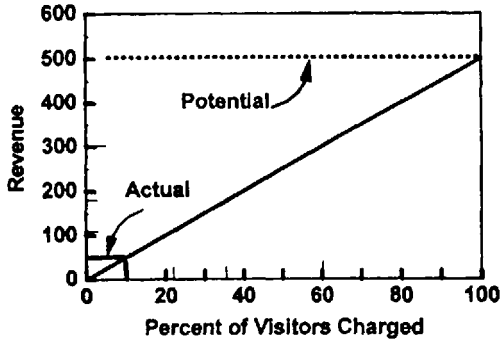

Figure 1 Theoretical maximum entrance fee revenue.

> For admission into a specific designated unit of the NPS, or into several specific units located in a particular geographic area, the Secretary is authorized to make available an annual admission permit for a reasonable fee. The fee shall not exceed $15. . . . The fee for a single-visit permit to any designated area applicable to those persons entering by private, noncommercial vehicle shall be no more than $5 per vehicle . . . the fee for a single-visit permit at any designated area applicable to the persons entering by any means other than a private non-commercial vehicle shall by no more than $3 per person (P.L. 88-578,sec. 4(a)(2)(B)).

Based on this law, most parks have a carload maximum fee that is generally less than the total that two persons would pay at individual rates. Thus, it is unlikely that every person would pay the full entrance fee. Second, the graph assumes that the same number of persons would visit the parks regardless of the magnitude of the entrance fee. Economists assure us that the straight diagonal line on the graph would actually curve downward, as persons refuse to pay increased or new fees. Exactly where the line would begin to curve, and how much, is an empirical question.

Even assuming 100% per-person fee collections, and perfect inelasticity of demand, the graph overstates the potential for revenue under current fee structures. For example, the Land and Water Conservation Fund Act prohibits the National Park Service from charging fees for urban parks, for units located in Alaska, and in several specific units including the USS *Arizona* Memorial Independence National Historic Park, any unit of the National Park System within the District of Columbia, Arlington House–Robert E. Lee National Memorial, San Juan National Historic Site, Canaveral National Seashore, and Great Smokey Mountains (except under certain circumstances).

Collectively, these units for which entrance fees are prohibited account for about 40% of visitors to the national park system. If these units are removed from Figure 1, the National Park Service could "potentially" collect about $300 million in individual entrance fees from the remaining 60% of visitors. This correction, too, overstates "potential" entrance fee revenues. for there are a number of park units in which the National Park Service is authorized to collect entrance fees, but has chosen not to do so. There are many reasons for not collecting entrance fees, such as open access, low visitation, or even local political pressure where there is a long tradition of not charging fees. About 24% of the visitors to national park units visit these units. If the National Park Service could collect individual entrance fees from the remaining 36% of visitors to units in which entrance fees are both authorized and collected, the "potential" fee collections would be about $175 million.

Even this does not reflect the reality of potential fee collections. The Land and Water Conservation Fund also prohibits the National Park Service from collecting entrance fees from persons under the age of 17, and provides that persons over 61 can obtain a lifetime pass, good for everyone in the pass-holder's vehicle, by paying a one-time administrative fee of $10. If the age distribution of national park visitors is representative of age distribution in the population as a whole, based on the U.S. Census and assuming individuals who visit national parks do so in proportion to their occurrence in the general population, this means that approximately 40% of visitors to fee-collecting units are not subject to payment of fees. This does not even take into account those persons in the car with the card holder who might otherwise be subject to entrance fees. Consequently, if the National Park Service could collect individual entrance fees from the remaining 22% of visitors who are of chargeable age and who visit parks where fees are collected, the "potential" fee collections could be as much as $100 million.

While those who look to National Park Service fees for increased revenues often see fee potentials as shown in Figure 1, without all of the necessary caveats, the amount of $100 million is a more realistic benchmark for evaluating the actual performance of the National Park Service under current fee legislation and among those units in which entrance fees are currently charged.

In a 1993 report, the Department of the Interior Inspector General found that of the parks then collecting entrance fees, an additional $51 million could have been collected during FY 1991 if entrance fees had been consistently collected. The report also found that 63 parks without established entrance fee collection activities could have collected about $54 million.[2] The Service disagreed with these estimates of potential revenues based on "the absence of specific statistical information used by the report investigators to develop the various revenue figures." The Service stated that a revised estimate of potential revenues was about $42 million but provided no methodological basis for its estimates (U.S. Department of the Interior 1993). While there may be room for disagreement concerning the magnitude of any revenue increases resulting from new or increased entrance fees, it is clear that substantial potential exists for revenue enhancement.

Data on a particular national park can provide additional guidance on why there continues to be disparity between actual and "potential" fee revenues. For example, Yellowstone National Park reported nearly three million visitors in 1995. At $10 per carload, assuming 2.7 persons per car, Yellowstone theoretically could have collected about $11 million in entrance fees, but it actually collected about a fourth of that "potential."

Figure 2, from data on actual visitation provided by Yellowstone National Park, demonstrates graphically why the potential differs so starkly from the reality. The category of visitor called "reentry" consists of people who cannot be charged an entrance fee because they have already paid through another means, such as a golden eagle pass, a golden age pass, or an annual pass for Yellowstone, any of which admits the entire carload. The "reentry" category also includes persons who paid once for the 7-day pass, and return from a trip outside the park during the 7-day period. Persons over 61 and under 17 who were not included in the "reentry" category account for 10% of the visitors to Yellowstone. Thus, Yellowstone National Park was able to charge an entrance fee to only 25% of the persons entering the gate.

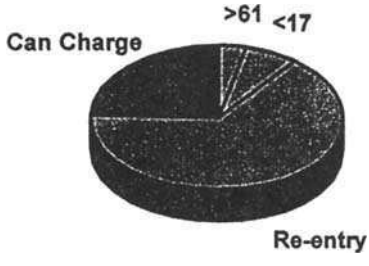

Figure 2 Summer visitors in Yellowstone. (Courtesy of Yellowstone National Park.)

THE POTENTIAL FOR REVENUE ENHANCEMENT

There are two basic approaches to increasing revenues in the national parks. Traditionally, the primary method has been to increase fees at those park units where fees are collected. Indeed, this approach has merit, particularly in those units with high visitor use, high visitor demand, and a limited number of access points through which visitors can be channeled. The second approach is to tap a greater percentage of park visitors who, under current law or practice, enter the parks without paying entrance fees.

Figure 3 illustrates the trade-offs with respect to increasing fees or broadening the base of fee payers, as means of increasing overall revenues to the national parks. The diagonal lines in the figure illustrate potential revenue enhancement strategies under two different fee schedules—an existing or "old" fee schedule, and a "new" schedule reflecting a fee increase. Increased revenues can be obtained by increasing the fee charged per individual, or by increasing the number of individuals charged—in effect, broadening the base of fee payers. For example, if the National Park Service wished to increase entrance fee revenue from $50 million to $100 million, it could either double the fees charged, moving from point "A" to point "B," or it could double the number of persons paying the old fee, moving from point "A" to point "C," assuming in either case that there is no behavioral response to fee changes.

Choosing one approach over the other might depend on political considerations, policy objectives, and implementation logistics. Of course, one might choose to do both, following a strategy used in tax reform, in which a broader set of persons must pay taxes and tax rates are lowered at the same time. Under such a scenario the chargeable base might be increased by establishing new admission charges for those groups that because of law or practice are not being charged, and by simultaneously lowering entrance fees.

There are, of course, limits on the extent to which the National Park Service could increase entrance fees at individual park units before visitation begins to decline or political pressures are brought to bear. The limit is probably higher in those few "crown jewels," or so-called "destination" parks such as Yosemite, Yellowstone, or Grand Canyon, in which we would expect demand to be relatively inelastic. The demands for the

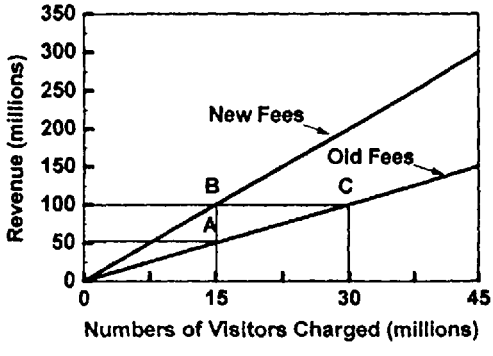

Figure 3 Alternate ways to increase entrance fee revenue.

"services" provided by many of the other park units are likely to be considerably more elastic, implying that entrance fee increases may reduce visitation in a greater than proportional manner. Should this occur, total revenues from entrance fee collections might even decrease with higher fees, at least in the short run. Since broadening the base of fee payers will be perceived as a fee increase, effects in terms of visitation changes are likely to be similar to a straightforward entrance fee increase. Therefore, visitation changes will reflect the underlying demand elasticity for the "services" provided by the particular unit.

There seems to be greater potential to broaden the base of entrance fee payers, and thereby increase entrance fee revenues without raising entrance fees, or raising them only slightly. In some cases it may even be possible to increase revenues by lowering fees concurrent with increasing the proportion of persons charged to enter the parks.

STATUS OF ENTRANCE FEE COLLECTIONS

Fees for admission into national park units fall into three general categories: entrance fees, park-specific permits, and general passports. Entrance fees typically allow individuals to visit the unit for 7 days. Park-specific permits usually allow unlimited entry during an annual period to the park unit for which it is purchased. Golden Eagle and Golden Age passports allow unlimited access to all units, for a year in the case of the Golden Eagle, and for a lifetime in the case of the Golden age passport. As shown in Table 1, the National Park Service collected in 1994 a total of about $41.7 million from entrance fees, $1.8 million from park-specific permits, and $5.9 million from passports. While these are beyond the scope of this discussion, the National Park Service also collected recreation user fees in the amount of $23.9 million for other activities, such as camping, parking, and boat launching. Total 1994 fee collections were $73.4 million, or about 12% of the total operating budgets of the park units, based on a total 1994 appropriation of $1.5 billion.

In 1994 the National Park Service collected at least some entrance fees at 135 of its 326 park units, and is authorized to collect entrance fees from all but the 50 units in which entrance fees are legislatively prohibited. There is significant variation in entrance fee revenues from unit to unit relative to each unit's 1994 operating budget, as shown in

Table 1 National Park Service Fee Revenues, 1994

Type of revenue	Amount collected ($millions)	Percent of total
Admission fees		
Entrance fees	41.7	56.8
Park-specific permits	1.8	2.5
Golden Eagle Passports	4.6	6.3
Golden Age Passports	1.3	1.8
Subtotal	49.4	67.4
User fees	23.9	32.6
Total fee collections	73.4	100.0

Table 2. The table includes only those park units that are currently authorized to collect entrance fees. Across the Service as a whole, total entrance fees accounted for about 10% of the total 1994 unit operating budgets, on average. Half of the units authorized to collect fees did not do so. Over 88% of those units authorized to collect entrance fees in 1994 brought in revenues in an amount equivalent to 20% or less of their operating budgets. At the same time, a small number of units were able to recover revenues in an amount approximately equal to or greater than their operating budgets.

Two conclusions emerge from this discussion. First, the National Park Service is a long way from where it could be in terms of revenue enhancement. Second, significant revenue increases are possible, as evidenced by the few park units that posted major earnings. This is not to say that results from these units could easily be duplicated at other units. Revenue enhancement is not without impediments, for there are many, including elastic demand in many units, congressional prohibition, age restrictions, impracticalities due to the physical arrangement of access in many units, and local political pressures.

BROADENING THE BASE OF FEE PAYERS

Given the proper set of incentives, a number of relatively straightforward steps could be taken to increase entrance fee revenues by broadening the chargeable visitor base without necessarily increasing entrance fees. There are many ways to broaden the base of fee payers. The following approaches are but a few of the more obvious examples:

Implement fee collections in all units where the service is currently legally authorized to collect entrance fees but does not currently do so. Additionally, of course, the National Park Service could seek to remove the congressional restrictions on those units where entrance fees are now prohibited.

Apply passes only to individuals. Currently, there are a number of ways in which persons legitimately may enter the park by using a pass belonging to another individual. Golden Eagle, Golden Age, and annual park passes admit all per-

Table 2 Distribution of Entrance Fee Revenues as a Percent of FY 1994 Budgets for Park Units Authorized to Collect Entrance Fees

Percent of budget collected through entrance fees	Number of units	Percent of units
0	135	50.0
0.01–5.0	45	16.7
5.01–20	59	21.9
20.01–40	15	5.6
40.01–60	5	1.9
Greater than 60	11	4.1
Totals	270	100

Five other units are excluded because there was no budget allocation data for them.

Source: Calculated from National Park Service data.

sons in a car regardless of their eligibility otherwise to be charged an entrance fee. If these passes were made to admit only the holder, other persons in the car could be charged admission. Such a proposal also would require congressional elimination of maximum fees per car, which are now priced at a level just under what two people would pay individually.

Have older persons pay the regular adult fee. The current arrangement, under which individuals aged 62 and over can, for a $10 one-time administrative fee, obtain a lifetime pass that will admit everyone in the pass-holder's vehicle, is difficult to justify. A strong case can be made for charging those individuals over the age of 61. This segment of the population holds a large proportion of the nation's wealth and can probably afford to pay entrance fees. If the law is changed to allow charging senior citizens, we assume that passes obtained under existing law would remain viable for at least some specified period of time.

Lower the age limits for youth rates. If children and youth under 17 were charged to enter national park units, revenues might be increased even if the fee for the younger ages were set at an amount lower than the adult fee, which would likely be the case. Parents might even view this lower fee as a bargain rather than as a fee increase. Politically, it would probably be necessary to retain some age cutoff for payment of entrance fees, such as age 6 or 12, rather than the current 16.

Institute multiple passes. We envision two kinds of multiple passes. One could apply to all units and be comparable to the Golden Eagle. The other might give entry into certain types of units, such as Civil War battlefields. Either pass would have an upper limit on the number of entries, measured by "punches" or electronic means of registering each entry. Furthermore the passes should be priced low enough to represent a modest discount to the card holder and high enough to provide a reasonable return to the National Park Service. This is in contrast to the 1996 price of $25 for a Golden Eagle pass, which seems unreasonably low, for it provides unlimited entry for an entire year for the card holder and everyone in the card holder's vehicle.

Establish daily entrance fees. Currently, most entrance passes are for a 7-day period. If an entrance fee was changed to provide only for daily entrance, revenues might be increased significantly in destination parks in which many visitors stay for several days, without increasing fee levels (or even by decreasing fees). In other units, in which visitation is almost exclusively limited to 1 day, substituting daily entrance fees for 7-day fees would not change revenues

Provide lifetime passes. If priced appropriately, perhaps at 5–20 times the price of an annual pass, lifetime fees might be attractive to some. Such a fee might attract a limited, if somewhat exclusive, clientele.

THE PROBLEM OF INCENTIVES

Regardless of the strategy adopted, altering the incentives facing park managers is a critical component. All attempts to either broaden the base or increase entrance fees will be subject to less than enthusiastic reception unless park managers have a stronger incen-

tive to collect such fees. If the organization's incentive to collect were stronger, it could significantly increase its fee collections. We believe that park managers would try to maximize fee revenues if all or most of the revenues could be used by the park in which they were collected, and if the revenues were treated as an addition to, not a substitute for, congressional appropriations.

Prior to 1918, fee revenues were placed in a special Treasury account and could be spent by the National Park Service with no congressional oversight. In 1918 Congress changed the legislation and required that all monies collected be deposited into the general fund (Mackintosh 1983). This gave the National Park Service little incentive to maximize its collection of fees and revenues, because its operating expenses come entirely from congressional appropriations, and because any fees generated are returned to the general treasury. Park managers saw little direct benefit from fee revenues, but considerable cost associated with fee collection. For example, a former superintendent of Yellowstone has stated that while it might be possible to increase entrance fee collections substantially he was not willing to invest his resources in increased fee collection activities because any money collected would simply go the Treasury and not benefit the park directly (Anderson 1995).

The 1993 Reconciliation Act allowed the National Park Service to retain 15% of the amount collected to finance fee collection activities. While this provides some incentive, park managers still tend to view the vast majority of fee revenues as somehow "wasted," because in their perception, the parks collect money to be used by other agencies of the government.

Public Law 104-134 authorizes 100 fee demonstration projects that can be expected to promote strong incentives to collect entrance fees. Applicable to the U.S. Forest Service, Bureau of Land Management, Bureau of Reclamation, and the National Park Service, the law allows the National Park Service considerable discretion in establishing new fee arrangements. For example, under the law, the National Park Service is not bound by the limitations imposed by the Land and Water Conservation Act and is free to establish virtually any fee in any amount.

The demonstration project provisions seem to provide the kinds of incentives to which park managers can relate, because the law allows revenues to stay in the parks and to be used for projects not covered by current appropriations. The law specifies that amounts collected at each fee demonstration area be distributed as follows; of the amount in excess of 104% of the amount collected in fiscal year 1995, and thereafter annually adjusted upward by 4%, 80% goes to a special account for further activities in the park unit from which the funds were collected, and 20% goes to the National Park Service for use on an agency-wide basis (U.S. Congress 1996). This means that, as the National Park Service increases its revenues, it can apply funds for such projects as backlogged repair and maintenance projects, interpretation, signs, habitat or facility enhancement, and other expenditures above the levels provided for in recent annual congressional appropriations.

CONCLUDING REMARKS

It is clear that there is a lot of room for improvement in the area of revenue enhancement from fee increases, particularly in those highly visible parks in which demand is relatively inelastic. However, the potential is not as great as appears at first glance. Law and

practice has limited fee collection to a relatively small number of park units, and a relatively small proportion of the visiting public. Significant revenue enhancement will require changes in legislative authority, changes in practice and attitudes within the National Park Service, and in many cases, modification to the physical access points into individual parks. Furthermore, any fee enhancement proposal should be grounded not only in fiscal concerns, but also in concerns for the central missions of the National Park System. The possibility of using fees as a management tool has not been seriously considered by the National Park Service, and offers potential opportunities to assist in achieving various mission objectives.

Broadening the base of fee payers seems to offer greater opportunities for revenue than raising the price of admission, although both should be considered in fee proposals. Whatever the National Park Service does to modify its fee and revenue structures, we believe it is best to be proactive—to determine in advance what it is that the service wants to accomplish through fees, and to design fee structures that meet those goals.

In its most basic form the argument about entrance fees ultimately comes down to a question of values and beliefs. Depending on the objective, rational analysis can be developed to support the contention that fees should be increased, or to support the view that fee increases should be limited. Behind these arguments is a basic question of values: some individuals value parks in and of themselves and see them as worthy of being totally supported by taxpayers. Others value economic efficiency, and insist that those who use the parks should have a greater share in financing visitor services.

While very different sets of values underlie the debate, there are potential policy outcomes that could accommodate both sets of values. For example, entrance fees—if set properly—could assist in addressing congestion and resource protection problems and at the same time raise revenues that could be used to fund needs within parks. This outcome might find favor from those who are concerned with increasing economic efficiency as well as those who might desire to limit visitation to protect park resources.

ENDNOTES

1. S. 1144, H.R., 2107, 2181, and companion bills S. 964 and H.R. 2025, all would amend the Land and Water Conservation Fund Act of 1965 with regard to recreation fees. They differ, among other things, in the types of fees they would provide, and in the ways in which the National Park Service could use increased fees within the parks as an addition to appropriations.

2. These units were not prohibited by law from collecting entrance fees. The Inspector General simply assumed that 65% of the visitors and/or vehicles entering a unit would pay an entrance fee. The Inspector General's report did not recognize the price-visitation relationship nor did it seriously address issues raised by the inability to control access.

REFERENCES

Anderson, T. 1995. To Fee or Not to Fee. The Economics of Below-Cost Recreation. Statement before the Subcommittee on National Parks, Forests and Lands of the House Committee on Resources, Concerning H.R. 2025, August 3.

Mackintosh, B. 1983. *Visitor Fees in the National Park System. A Legislative and Administrative History*. Washington, DC: National Park Service.

National Performance Review. 1993. *Accompanying Report of the National Performance Review*. Washington, DC, September 1993: 17–18.

U.S. Congress. 1964. Land and Water Conservation Fund Act of 1963, as amended. *Public Law* 88-578, 16 U.S.C. 4601-4 to 4601-11.

U.S. Congress. 1996. *Congressional Record*. Washington, DC. Pp. H3895-H3896, April 25.

U.S. Department of the Interior, Office of Inspector General. 1993. *Recreation Fee Charges and Collections, National Park Service*. Report No. 93-I-793, March.

This page intentionally left blank

7

The Theory and Practice of Collaborative Policy and Dispute Resolution Mechanisms

The Case of Environmental Policy

Edward P. Weber
Washington State University, Pullman, Washington

INTRODUCTION

Over the past several decades, the United States has enacted a national superstructure of environmental law for clean air, clean water, toxic cleanup, and endangered species, among other issues. Laws control pollution emitted from the largest and dirtiest point-sources of pollution, and place restrictions on the activities of extractive industries on public lands using landmark legislation like the Wilderness Act and the National Forest Management Act. Yet the defining elements of U.S. environmental politics at all levels of government are no-holds-barred conflict and unwillingness by competing interests to concede the possibility of common ground. In this respect, environmental politics fits within the larger theme of ubiquitous conflict that is generally accepted as part of the folklore of American political life. The American political system is famous for its adversarial, individualistic political culture, a fragmented interest group system, and the "openness" provided by separate institutions, checks and balances, and federalism (Badaracco 1985; Vogel 1986; Wilson 1981). In the environmental policy arena, bitter adversarial relations between stakeholders are the norm, whether in terms of business versus environmentalists, business versus government, environmentalists versus government, federal versus state interests, or congressional attitudes toward environmental and natural resource agencies (Gais et al. 1984; Gormley 1989; Hays 1989; Hoberg 1992).

The problem is that playing no-holds-barred conflict in the environmental arena is costly for all participants and is often accompanied by minimal environmental results. Legislative victories for environmentalists and their allies in Congress impose command-and-control-based, zero-sum outcomes favoring the environment *over* the economy on industrial losers. The prevalence of litigation displaces responsibility for policy decisions to the courts, a forum better suited for resolving narrow, procedural legal issues than the

substantive environmental issues driving lawsuits. Bureaucratic rule making and implementation delays regularly run 3–4 years and, on occasion, a decade or more (Kerwin 1994; Mashaw and Harfst 1990; McGarity 1992; Thomas 1987). The information government agencies need to write regulations is costly to gather and verify as affected interests artfully conceal as well as misrepresent their "true" stakes in regulatory issues. Compliance costs continue to escalate for industrial polluters as well as for states and municipalities. Beginning in the early 1980s, congressional gridlock became the rule rather than the exception.

In a limited but key number of cases, however, traditional adversaries are reacting to the high costs of conflict and choosing collaboration instead. Collaborative games, more commonly known by several acronyms, ADR (alternative dispute resolution), EDR (environmental dispute resolution), and "reg-neg" (regulatory negotiation), seek common ground and consensus, are voluntary, and are designed to "allow parties to meet face-to-face to reach a mutually acceptable resolution of the issues" (Bingham 1986). They are premised on consultation and negotiation, flexible, power-sharing arrangements that are a stark departure from the command-and-control status quo, a concerted search for better information, and the generation of "win-win" outcomes for participants and, ultimately, the environment *and* the economy. According to proponents, direct participation and the creation of credible stakes in outcomes lead participants to claim ownership of game results. Participants are, thus, more inclined to target resources in support of, rather than in opposition to, those results.

This chapter seeks to answer four questions as a way of illuminating the theory and practice of collaboration in the realm of environmental policy. What are the perceived benefits of collaboration? When is it appropriate? What are the prospects for the continued use of collaborative arrangements? What are the potential pitfalls and limits to its use? Answering these questions will take us closer to understanding why participants in environmental politics choose collaborative alternatives and why we should be careful not to overstate its value, or the proper range of its application, as a policy process mechanism. The answers will also illuminate why, despite any shortcomings, the prospects for continued use of the collaborative format in American environmental politics are quite good.

THE RELATIVE ADVANTAGES OF COLLABORATIVE ARRANGEMENTS

The earliest use of EDR is generally traced to 1973 when Governor Daniel J. Evans of the state of Washington invited Gerald Cormick and Jane McCarthy to resolve a dispute over an Army Corps of Engineers dam project proposed for the Snoqualmie River (Singer 1994). Most early uses of collaboration in the environmental arena were site-specific cases, involving the construction and placement of public and industrial projects with the potential for direct, negative impacts on environmental quality, or were employed simply to improve communication among adversaries (Bingham 1986; Leonard et al. 1977). Policy-based collaborative efforts attempting to reach a formal, binding decision were relatively rare (Bingham 1986: 79), yet provided important lessons for the growth of policy-oriented regulatory negotiations and collaboratively based civic environmentalism during the 1980s and 1990s (McFarland 1993; Harter 1982; John 1994).

Most recently, steps have been taken to institutionalize the collaborative format within federal agencies like, the Department of Interior and the Environmental Protection Agency (EPA) (e.g., Common Sense Initiative, Project XL), through a series of watershed-and ecosystem-based management arrangements in the Western United States (Jones 1996; Weber 1997), and for state- and local-level siting decisions involving hazardous wastes (Rabe 1994; Singer 1994).

The common thread linking all these collaborative efforts together is the belief on the part of participants that collaboration offers significant advantages vis-à-vis business as usual. Expected benefits include time savings for decision-making and implementation processes, the behavioral transformation stemming from the use of a hands-on, participatory bargaining process, less litigation and the removal of final policy authority from the courts, the resolution of deadlocked disputes, and customized, efficient outcomes based on better information.

Participants choosing collaboration anticipate a faster decision process, hence accelerated implementation and faster results. EPA officials have estimated the time savings of reg-negs to be as much as 6 months versus traditional APA-style notice-and-comment rule makings, while the Kerwin and Furlong (1992) study of four EPA reg-negs finds that reductions in delays total 11 months per rule (EPA 1987; Kerwin and Furlong 1992).

Of more importance than enhanced timeliness, however, is the transformative effect of the collaborative dynamic on participant behavior (Susskind and Cruickshank 1987).[1] Collaborative efforts give all participants a direct stake in the decision process and outcomes by sharing authority. The entire array of affected stakeholders (e.g., environmentalists, state, federal, and local officials, business interests, Native Americans) are invited to the bargaining table for the purpose of helping government officials write (fill in the details of) the rules governing a particular situation. By affording participants the flexibility and discretion to help decide important matters, "ownership" in outcomes is created. The dynamic becomes one where participants willingly channel their energies into making programs work instead of obfuscation, litigation, and delay. Consensus-based solutions are therefore more likely to be self-enforcing as participants find it in their self-interest to support the rules that they themselves have written.

Improved timeliness and behavioral changes promise a variety of corollary benefits to participants. Environmentalists, citizens, and regulators expect to start cleanups sooner. Government agencies encounter greater certainty they will not incur the added expense of protracted litigation and the possibility that the courts will only remand the decision back to the agency for additional scrutiny. In cases of federal regulations, state- and local-level regulators facing implementation deadlines are spared difficult decisions and costly adjustments to state implementation plans (interview with state regulator, January 12, 1994).[2]

Further, the minimization of litigation transfers decision-making authority away from the courts. Proponents of collaboration count this as a benefit given the uncertainty of judicial decisions (Wenner 1982; McGarity 1992),[3] and the concern that courts are not particularly well suited to problems of environmental protection, whether due to the generalist character of the judiciary (Melnick 1983; Rabe 1991)[4] or the tendency to focus on narrow procedural matters having more to do with law than substantive problem resolution (Horowitz 1977; Bacow and Wheeler 1984). As well, the judiciary experiences added difficulties dealing with environmental cases, which typically involve a number of

agencies and interest groups, because such cases "deviate from the [adversarial,] bi-polar pattern that is common in many . . . dispute areas and for which the courts are best suited" (Rabe 1991; Melnick 1983; Fuller 1981).[5]

Collaborative alternatives are also viewed as vehicles for resolving extremely difficult siting and policy decisions that have ground to a halt using traditional political and legal avenues of redress. Often, however, the problems are such that virtually everyone agrees they are both important enough for public action and in need of resolution. For many participants, an explicit collaborative process is a way to improve the likelihood of breaking through the "Gordian knot," whether it be congressional gridlock, as in the case of acid rain in the 1990 Clean Air Act Amendments (Weber 1998), or a NIMBY-based dispute concerning the siting of hazardous waste facilities (Rabe 1994).

Moreover, there is considerable sentiment for employing collaboration from the beginning of disputes or policymaking processes. Collaboration is considered to be better at solving problems and addressing the substantive elements of environmental problems. Dan Daggett (1995) of Arizona explains:

> [W]hen it's time for the biennial bloodletting we call elections, I won't be leafleting neighborhoods, calling voters or putting up signs. I'll be out in the world of trees and grass and bugs and streams. Sleeves rolled up, I'll be with one of a number of groups of ranchers, vegetarians, wise-users, and Earth Firsters I've been working with. . . . Together, we'll be celebrating small successes that can be measured in green meadows, healing riparian areas and increased bio-diversity. . . . I had been a soldier in the environmental wars for so long—22 years—I had forgotten how uplifting it is to be part of a group of people who don't paint the world in shades of guilt and look for someone to blame. . . . And we get better results than the politicians do when they try to solve our problems for us (1–2).

The better results appear to stem from the use of a communicative rationality "which encourages intersubjective discourse and policy dialogue" better suited to the "complex and dynamic . . . ecological problems which arise in environmental protection" (Protasel 1991; Dryzek 1987).[6] The emphasis on face-to-face interaction and iterative bargaining among stakeholders leads to a more robust information base. Thus, rather than a game where the rule is to conceal political stakes and technical information, collaboration is about revealing stakes and working together to create higher-quality scientific and implementation databases upon which program specification, compliance, and enforcement decisions are made. In turn, grounding regulatory decision making on better information creates opportunities for transforming the design of environmental policy decisions. Restrictions so typical of the broader command-and-control-based system of regulatory control fall by the wayside. Integrated pollution control, as opposed to single-media approaches, and risk assessment reviews are more of a possibility as the extensive chemical-specific databases, ecosystem profiles, and whole-facility risk profiles needed to make them work are created. One-size-fits-all rules give way to solutions customized to industrial sectors or individual facilities, or are designed with "averaging-based" pollution emission standards in place of unit-by-unit compliance requirements. Greater rigor in monitoring arrangements becomes possible, and rules focusing on real environmental results begin to replace proxy-based enforcement regimes, which tend to disconnect rules from results. The last two examples facilitate environmental protection by making it easier to track progress against environmental degradation and by increasing the probability that compliance with program rules actually has a meaningful and positive relationship to pollution reduction.

The potential for innovation directly affects and contributes to cost efficiencies—a critical reason why stakeholders in environmental politics opt for collaboration. Compliance cost savings can be dramatic for industry and state/local governments. It is not unusual for collaborative games to identify and produce compliance cost savings ranging from hundreds of thousands of dollars to hundreds of millions of dollars on an annual basis (compared to command-and-control alternatives) (Weber 1998). Initially, participants expected significant comparative financial savings from the overall decision process as well. But research shows that collaborative methods either encounter a similar, yet differently distributed, level of process costs, or actually cost some participants more (Coglianese 1997; EPA 1987; Polkinghorn 1995; Rabe 1991; Weber 1998).

Finally, there is the belief that the transparency of an inclusive collaborative process enhances overall legitimacy by allowing participants "inside" the deliberative process (Susskind and Field 1996). A transparent process allows citizens and organized groups to become more cognizant of the difficulties and trade-offs associated with virtually any public decision, while also avoiding the negative imagery of backroom, secret deals designed to favor certain "special" interests over others.

In short, the interactive, iterative style of the collaborative process combines with better information to create additional opportunities for innovative outcomes better able to satisfy individual participants' (private) preferences without sacrificing public policy objectives. In this respect, collaborative games work toward producing the kinds of "win-win" solutions necessary for building and maintaining consensus among all interests instead of settling for outcomes that impose zero-sum outcomes of benefit to only a few interests. Win-win outcomes are achieved when each player reaps greater benefits through the collaborative game format than he expects to receive under a no-holds-barred conflict scenario. Players do not have to harvest the same kinds of savings to meet the win-win criteria, rather they can experience savings in the areas of most importance to them. For an environmentalist, this might mean faster environmental results, or more stringent pollution control standards, or an overall cap on emissions. Industry, on the other hand, might benefit from lower compliance costs or greater flexibility leading to improved responsiveness to changing market conditions. Regulators might encounter savings through less litigation and improved rule making timeliness, which is likely to stem the intensity of, and costs associated with, congressional oversight activities. The important thing is that each interest is "winning," or garnering benefits simultaneously within the same transaction.

APPROPRIATENESS AND CONDITIONS FACILITATING COLLABORATION

The literature on collaboration in the environmental arena is largely theoretical and laudatory. Much of it is offered in "how to" guidebook form and assumes "that mediation, in its basic forms, [is] applicable across the spectrum of all social conflict. If you learn how to mediate . . . you [can] do it almost anywhere" (Kolb 1994). Successes and failures are recorded (Bingham 1986; Hamilton 1991; Susskind and Cruickshank 1987), yet with little effort to "place existing findings in the context of a politically oriented theoretical framework [able to] facilitate long-term analysis as the number of cases grow. Most efforts at theory construction have consisted of fairly general predictors of negotiation success; many rely primarily on highly descriptive case study accounts that lack a tightly

structured comparative case perspective" (Rabe 1991). Scholarship is also dominated by activists and practitioners with a strong normative commitment to the expanded use of collaborative methods of dispute resolution (e.g., Cormick 1980; Gamman 1994; Susskind and Cruickshank 1987; Susskind and Field 1996). The "cheerleading" style of scholarship, taken together with the lack of theory, increases the chance that collaboration is perceived as a panacea and will be applied in an indiscriminate fashion. Michael Kraft, among others, fears that collaboration has become "a magic panacea for resolving virtually any environmental dispute. It may be the new dogma that replaces the old dogma of top-down, command-and-control-based hierarchies" (Midwest Political Science Association April 19, 1996).[8]

Yet collaboration is not appropriate for many disputes, nor is it easy to engage and sustain given the complexity of environmental issues and the difficulties posed by the openness and design of the American political system (Hamilton 1991; Rabe 1988). The literature suggests that collaboration is appropriate if a particular set of transaction-specific conditions exists, and if the incentives exist to convince affected stakeholders to join the effort voluntarily. The separate issue of initiating and sustaining collaborative games to a successful conclusion focuses attention on the role of third-party intervenors (also called mediators or facilitators) and, more recently, assurance mechanisms (Weber 1998; Rabe 1994; Marcus et al. 1984).

Incentives

The potential advantages of choosing collaboration in the world of environmental politics and policy are clear. The possibility of saving time, reducing compliance costs, and providing a better match of solutions to problems offers participants across the spectrum of interests ample incentive to engage the collaborative format. But benefits are likely to vary on a case-by-case basis. The general rule is that before joining a collaborative bargaining game, participants need to assess the specific benefits likely to accrue from the particular case as well as other alternative methods of dispute resolution. Each must conclude that he will be better off with a collaborative process as opposed to other alternatives (e.g., unilateral action; conventional rule making). Fisher and Ury (1981: 97–106) call this discovering your "best alternative to a negotiated agreement," or BATNA. Susskind and Cruickshank (1987) extend it to a guiding principle for the entire process: "Know your BATNA and don't lose sight of it" (also, Bingham 1996; MacDonnell 1988).[9]

Transaction-Specific Conditions

Because stakeholders in environmental politics know that all regulatory transactions are not created equal, some transactions are necessarily more attractive than others as candidates for collaboration. Transaction-specific conditions help participants determine the attractiveness of a particular transaction by highlighting key parameters of the bargaining arena in terms of issues, players, available data, deadlines, and policy implications (Pritzker and Dalton 1990; EPA 1994; Amy 1987, 1990; Bacow and Wheeler 1984; Bingham 1986; Fiorino 1988; McFarland 1993; Susskind and Cruickshank 1987). The conditions offer information on the manageability of the game as well as whether the game is possible politically (opportunity). The more conditions met, the lower the degree of ob-

jective difficulty likely to be encountered during negotiations. They also spell out the kinds of transactions where rational, yet resource-limited and boundedly rational, stakeholders seeking transaction cost benefits are most likely to target their efforts.

- *The opportunity exists to develop creative compromises.* There should be more than one way to resolve pertinent regulatory issues. Clear, rather than ambiguous, law and detailed legislation placing restrictions on bureaucratic discretion leave limited (and, on occasion, no) opportunities for the creative compromises critical to bargaining success. "Opportunity" should also be assured in another way—through the blessing of political principals in the legislature and the executive branch at the appropriate level of government. The macropolitical level needs to either be an active participant in the game, be satisfied that constituent groups important to them are amply represented at the bargaining table, or accept the operating rules (Redford 1969) used to guide the collaborative decision-making process because they believe them able to provide sufficient protection for their primary policy concerns. Opportunity in the latter sense is the product of either direct endorsement of the game by political principals (when they play themselves) or tacit endorsement through nonintervention. One way to create opportunity is to limit games in which political principals are not directly involved to questions of "how" (implementation), rather than "what" (substance; e.g., standard setting).
- *There are a limited number of interdependent or related issues.* Limiting the scope of the problem under consideration makes the game easier to manage, not least because it serves to limit the potential pool of stakeholders.
- *The policy implications of the issues to be resolved are more or less limited either programmatically, geographically, or to common practices and rules affecting a specific industrial sector.* The problem-solving exercise will not set binding precedents beyond the scope of the pollution control program, region of the country, industrial site, or industrial sector encompassed by the negotiations. Because they violate this condition, multimedia pollution problems are likely to be extremely difficult to resolve without the prior reorganization of EPA and rationalization of the myriad federal environmental protection statutes (see Davies 1990; NAPA 1995). Ameliorating this problem somewhat are multimedia-based transactions confined to a single industrial complex or site.
- *Affected interests are identifiable, relatively few in number, and cohesive.* Interests are defined as "a grouping of parties who are likely to be affected similarly by the regulation or who appear to have similar perspectives on the subject matter of the contemplated rule" (Pritzker and Dalton 1990). Past experiences with negotiated rule making, for example, suggest that the maximum number of parties for which a collaborative game can be kept manageable is approximately 25. Once the universe of stake-holding groups has been identified, it can then be aggregated into "interests," with a single lead representative to conduct negotiations. All others within a specific interest category attend proceedings and participate, but on a more indirect basis akin to "backbenchers" in the British Parliament. Thus, "the number of negotiators actually sitting at the table is not unwieldy but all affected interests are adequately represented" (Pritzker and Dalton 1990). The interests playing the collaborative game should also be cohesive enough and designated representatives for each interest possessive of sufficient authority so that they can be reasonably expected to deliver their organizations or constituencies in support of any final consensus agreement.
- *The transaction does not involve issues of fundamental values that cannot be compromised.* If fundamental values are at stake, any common ground manufactured through

a consensus-building process is likely to envelop the marginal components of the problem under consideration. Central issues, upon which long-term collaborative success rises and falls, remain unresolved for the simple reason that no common ground is possible.

- *There is a well-developed factual database to frame the discussion and resolution of pertinent issues.* The database can exist prior to the start of the collaborative game or the gathering of data can be a fundamental precondition for initiating the game. Examples of data instrumental to regulatory problem solving in the pollution control arena are data regarding the technological performance capabilities, cost impact, or technical feasibility of a preferred solution, the relevant bureaucracy's capacity for implementation, and the distribution of compliance costs among the parties. Other examples include information regarding alternative methods of measuring policy outcomes and/or pollution emissions and a basic understanding of cause and effect between industrial processes and levels of pollution.
- *Firm deadlines exist either as statutory, judicial, or programmatic* (Bingham 1986; Weber forthcoming).[10] Deadlines force participants to think comparatively during negotiations by bringing the costs associated with alternatives into sharp relief. They remind participants that failure of the collaborative game has a clear consequence—higher costs and a greater likelihood that organizational goals will not be maximized.
- Clearly, only a small percentage of all environmental disputes, perhaps 10–20%, will qualify as candidates. Yet identifying a smaller subset of transactions conducive to the collaborative game is only the first step. While it helps clarify institutional choices for affected stakeholders and, by doing so, stacks the deck in favor of successful collaborative outcomes, it does not put the game into play. Nor does it successfully carry the game forward such that anticipated benefits are realized.

The Role of Third-Party Intervenors

It is generally agreed that the presence of a professional facilitator, or mediator, is an important factor in nurturing the collaborative effort forward to a win-win conclusion. Mediators help coordinate bargaining activities and facilitate the flow of information among parties, summarizing and organizing information into a more coherent whole, identifying and communicating prospective tradeoffs among the parties, and offering broader perspectives in terms of possible choices and alternative outcomes. Unlike adjudication or arbitration, however, mediators in collaborative processes do not have the power to make decisions for participants, rather participants "retain control over their dispute; [mediators cannot] compel them to give in to what they do not deem to be in their best interests" (Kolb 1994). Despite the near consensus on the importance of third-party intervenors, there is considerable disagreement over just what their proper role is, or should be.

Conventional wisdom argues that value neutrality is the key to success. The idea is that "parties need not fear that mediators will pursue their own agenda or favor one party over another in the process" (Kolb and Kressel 1994). Indeed, the concept of neutrality fits within the most basic assumptions underlying mediated processes and outcomes—that all parties are treated fairly and that the process is voluntary and noncoercive. But Kolb and Kressel (1994: 460) label this the "mythic" view of mediation professionals, arguing that claims of neutrality and noncoerciveness are not borne out in practice, even "at the very highest level of professional activity and commitment" (Cobb and Rifkin 1991).

In practice, many mediators employ a transformative model. Maser (1996) advocates the most extreme version of this perspective. Third-party intervenors should attempt to convince interests to modify their values, but primarily toward the proenvironmental end of the values spectrum. Other influential mediators, such as Lawrence Susskind, Linda Colburn, Joseph Elder, and ex-President Jimmy Carter, stop short of the values-modification approach, yet discuss their mediation efforts in terms of protecting the broader public interest, ensuring just and stable outcomes, guaranteeing adequate public advocacy for underrepresented groups, and, more generally, making significant changes at the institutional and/ or individual level of society (Blackburn 1988; Hamilton 1991; Kolb and Kressel 1994; Susskind 1981).

ASSURANCE MECHANISMS AND THE REDUCTION OF UNCERTAINTY

The availability of professionals trained in the facilitation of collaboration and the prospect of benefits (incentives) provided by the collaborative format imply that we should have seen a massive rush toward collaborative alternatives, but we have not. Rather, there has been a limited, albeit growing, movement toward acceptance of collaborative games and their potential for innovative, positive-sum regulatory outcomes (Amy 1990). Participants are cautiously testing the new game in a dynamic reminiscent of the early stages of an institution-building process (McFarland 1993).

The reason is that collaborative games are risky. While adhering to the prescribed set of transaction-specific conditions helps reduce risk, moving forward in such an uncertain policymaking environment also requires an element of trust among participants. Recent work in positive political economy by Miller (1992) and Kreps (1992) suggests a method for creating the trust necessary to overcome the collective action dilemma such that durable, effective institutional arrangements—those that successfully deliver benefits and help stakeholders to maximize organizational goals—can be established. According to Miller and Kreps, durable, effective arrangements are most likely to result from collaborative hierarchies. Both find that the efficiency and competitiveness of industrial organizations are enhanced to the extent that *ex ante* cooperation is induced *inside* hierarchies or among trading partners. Yet the problems of information asymmetries, ex post opportunism, and settlement of unforeseen future contingencies introduce substantial uncertainty into collaborative efforts and often prevent the level of cooperation needed to resolve the collective action problem. Without some assurance that agreements will be binding, and that their stake in decision outcomes will be protected, subordinates and trading partners alike have an incentive to act unilaterally to guard their stakes, whether through exercising control over information asymmetries in their favor, shirking after the fact, settling unforeseen contingencies to their advantage (and to the other's disadvantage), or simply refusing to engage in trades from which both sides could reap benefits. Potential trading partners, as well as leaders and subordinates inside organizations, are thus motivated to avoid the unknowns associated with collaborative hierarchies and stick with the known costs of hierarchy—and a concomitant drag on the firm's efficiency and competitiveness. Therefore, overcoming the collective action problem and establishing efficient and effective institutional arrangements requires the introduction of greater certainty into the collaborative effort, specifically an assurance mechanism, or set of rules governing the transaction, premised on credible commitment to the collaborative game

by both principals (leaders) and agents (subordinates) (Kreps 1992; Miller 1992; Weingast and Marshall 1988).

The Kreps-Miller logic of collaborative hierarchies is transferable to the environmental arena. In the uncertain, high-transaction-cost decision-making environment of environmental policymaking, participants have ample incentive to pursue collaborative arrangements. They know full well that collaboration can produce benefits important to their organizational bottom lines, whether it be faster or bigger pollution reductions, cheaper compliance, or smarter, hence more implementeable and enforceable, programs. But participants also recognize the realities of collaborating in an arena best known for its bitter adversarialism among stakeholders in Congress, federal and state regulatory agencies, environmental advocacy groups, and industry. Assuring the performance of others such that the benefits of collaboration can be realized is a highly uncertain endeavor. Will others bargain in good faith? Will adversaries defect? Will they take advantage of the American political system's openness and seek a more favorable outcome in another venue?

Weber (1998) finds that in light of these possibilities, and prior to engaging the collaborative game format, participants in environmental politics are insisting that pluralism be played by the rules. The "rules" foster the credible commitment needed to move the collaborative game forward.[11] They reduce the uncertainty and risks associated with the collaborative game by selectively promoting collaboration and by structuring participant behavior to minimize the likelihood of ex post opportunism. They also spread power among the major stakeholders of the policy network by recognizing the implicit property rights (power) that information asymmetries and complex interdependence confer on each, creating credible stakes in decision-making processes and regulatory outcomes for all. In other words, the rules are the catalytic components, which move the collaborative game from the point of active consideration (where participants perceive the benefits of collaboration) to the point where collaboration is actively engaged and sustained to a consensus agreement and beyond. Specifically, playing pluralism "by the rules" requires an assurance mechanism premised on:

- A credible commitment to collaboration by entrepreneurial political leaders
- A reputation for commitment to collaborative processes by the agency in charge of the rule
- Formal binding agreements to govern negotiations and their aftermath
- The inclusion of all stakeholders in a position to block or effectively undermine outcomes
- Participants with long-term interests in pollution control policy

Entrepreneurial Political Leadership

Miller (1992) addresses the leadership dilemma of bringing the efforts of self-interested individuals in line with the needs and interests of an organization. He argues that "a hierarchy that can induce the right kind of cooperation—defined as voluntary deviations from self-interested behavior—will have an important competitive edge over other firms" (xi, 13). Through game theoretic applications, Miller demonstrates the role of an organizational leader in building a cooperative organizational culture by establishing "mutually reinforcing expectations" among members of a hierarchy (217, 220–225; North and Weingast 1989). Implementing a cooperative culture is difficult, however, given the pres-

ence of incomplete contracts, information asymmetries, and ex post opportunism. A cooperative culture "is a form of contract that provides strong ex post incentives for reneging by hierarchical superiors. If subordinates anticipate self-interested reneging by superiors, they have every incentive to engage in actions that will ruin the effectiveness of the managerial strategy. . . . [I]t is therefore essential that hierarchical superiors find ways to commit themselves credibly to a cooperative culture" (Miller 1992). The challenge of establishing a credible commitment to collaborative strategies takes the entrepreneurial leader beyond mechanical, incentive-based solutions into the "realm of the 'organic,'" where he or she must build trust, reduce information asymmetries by forging lines of communication, and share the organizational success in a meaningful way with employees (Miller 1992; Williamson and Ouchi 1981).[12] Firm evidence of leadership's own credible commitment to the collaborative game, a function of past performance (reputation) and their willingness to use authority to promote, protect, and enforce consensus deals, is needed as well (Weber 1998; Weber and Khademian 1997).

In the environmental arena, political and bureaucratic leaders have primary responsibility for convincing the full range of affected interests to credibly commit to collaborative arrangements. For example, in cases where stakeholding interests (offices) *inside a government agency* are forced to play the collaborative game and where they have an uncertain stake (e.g., initially undefined), or a relatively small scale of expected return, or both, leaders must be skillful enough to inspire network members to transcend the sort of self-interested behavior that can result in shirking—and the unraveling of the deal. With respect to the EPA, many of the new collaborative efforts are intent on changing the rules of the overarching regulatory game. Relevant examples include the adoption of innovative regulatory mechanisms such as integrated pollution control or market-based incentives, or the wholesale rationalization of the existing regulatory structure for specific industrial sites. Each poses a radical challenge to the dominant single-media, command-and-control worldview as well as existing organizational arrangements at EPA. Subordinates within EPA who participate in such collaborative undertakings can encounter considerable risks to their careers, may be unconvinced that their expertise will be used in an appropriate manner (and hence be less than cooperative participants), or face the prospect of outcomes damaging to their organizational subunit. On this last count, for example, the rationalization process might conclude that a particular office's pollution control rules, in place for decades, are unduly expensive as opposed to possible alternatives, or ineffective at reducing pollution, or both. In every case, political leadership is a crucial component. Agency leaders must continually champion the benefits of collaboration to all participants, while simultaneously assuring them that their interests will be protected during program negotiation, specification, and implementation.

Organizational Reputation

Like Miller, Kreps (1992), examines organizational "culture" as a means to enhance the efficient operation of an organization under conditions of uncertainty. For Kreps, culture is a means to reduce the transaction costs of doing business between organizations, and of integrating work within an organization. For Miller, organizational culture is a solution to a specific leadership dilemma—getting individuals to behave in the interest of the organization. With respect to the regulatory arena, the leadership dilemma is inducing compliance with policy goals by all stakeholders, including the bureaucracy, third-party interests like environmental advocates, the regulated community, and individual citizens

(O'Toole 1994; Miller 1992).[13] For Kreps, culture is the solution for two related, but different types of leadership dilemmas: communicating a reputation to other organizations and coordinating communication within an organization by defining the way things are done to hierarchical subordinates. Organizational "culture" thus guides the behavior of firm subordinates and leaders and signals an organization's trustworthiness (reputation) to potential partners outside the organization (Kreps 1992: 93–94). Organizations that are trustworthy apply their chosen principle in a consistent fashion, even to situations where "its application might not be optimal in the short run" (93, 116).

In environmental politics, the public agency playing the game must develop a reputation for credible commitment to collaborative processes and their subsequent outcomes as well as a reputation for fairness when disposing of unforeseen contingencies as they arise (Kreps 1992). Otherwise, affected private sector entities, public interest groups, and state-level interests will be more likely to discount the possible gains from collaboration, hence less likely to join in, much less promote, a collaborative effort, even when the expected gains are substantial. Thus the leadership's task of persuading other major stakeholding organizations to work together in good faith is eased to the extent that an organization has established such a trustworthy reputation of commitment to collaboration (Selznick 1957).[14]

Formal Constitutional Rules

Both Kreps and Miller agree that collaborative strategies based on reputation and leadership are likely to be limited to smaller organizations (Miller 1992).[15] Leadership based on the informal institution of reputation is necessary, but not sufficient, in large, complex organizations (or institutional orderings) to induce subordinates to trust employers (principals) with the information that makes it possible for principals to make efficient decisions (Miller 1992: 235). Overcoming the prisoner's dilemma and improving the likelihood that participants' good faith bargaining efforts will not be wasted requires a set of "constitutional" rules placing "permanent restrictions on the ability of [principals] to pursue self-interested behavior at the expense of long-term cooperation. The most effective way to build a credible commitment to cooperation . . . is by making a permanent change in the system of property rights, a change that gives employees the confidence to invest in . . . the firm" (Miller 1992: 225; North and Weingast 1989: 1; Milgrom and Roberts 1992: 81).

Examples of permanent changes in hierarchical property rights include sharing centralized decision-making power with employee representatives (must be more than "advisory" committees), and reallocating property rights to employees either through "ownership" or autonomy of control over those aspects of the workplace deemed most important by employees (e.g., profit sharing, removal of time clocks, training programs) (Miller 1992: 226).

Within the regulatory arena, the credible restraint of hierarchy (leadership) is reinforced through formal binding rules governing the negotiation process and its aftermath. Examples include:

- Bargaining arrangements granting stakeholders a direct role in writing and crafting regulatory programs
- Agreements not to litigate or otherwise intervene once regulations have been finalized

- Explicit consideration of a stakeholder's interests in legislative language (e.g., rigorous monitoring and data reporting requirements, automatic compliance penalties, the creation of a pollution property rights regime)
- Agreements establishing the right of affected interests to choose an alternative compliance pathway upon conclusion of the collaborative effort

Inclusiveness

The theory of collaborative hierarchies suggests that all stakeholders in a position to block or effectively undermine outcomes must be included and given a credible stake in the collaborative game. Otherwise, the coalition of participants seeking more efficient outcomes encounter added uncertainty and face a greater likelihood of failure, as those left out in the cold mobilize resources or withhold critical information in defense of their stakes (Fiorino and Kirtz 1985: 40; McFarland 1993).[16] Failure to practice inclusion thus lessens the probability that implementation and the establishment of the kinds of durable, effective regulatory programs able to deliver promised benefits would occur.

Repeat Games

A final measure of credible commitment helping to reduce regulatory uncertainty is whether participants' involvement in the environmental policy arena is of a long-term, iterative nature. From this perspective, it matters whether potential participants are ongoing entities and whether they are embedded in the relevant policy network to the extent that they interact regularly on a number of issues and have an ongoing relationship with the regulatory agency in charge of the collaborative effort. As such, viable, embedded organizations are more likely to perceive the game as an iterative one rather than as a one-time opportunity to advance their self-interest.

POTENTIAL PITFALLS AND LIMITS

Collaboration may facilitate the efficient development of environmental programs and promote more effective and less costly outcomes, but there are a number of issues, which pose difficulties for its use in the American polity. Some, such as questions of accountability and representation, go to the heart of American democratic ideals, while others are added barriers or limitations on its applicability.

A general problem is the suspicious manner in which many citizens view collaboration. Collaborative deal making among erstwhile adversaries connotes the possibility of unsavory deals among a few powerful, special interests. For example, implementation of the 1990 Clean Air Act reformulated gasoline (RFG) program following a reg-neg met stiff resistance among the motoring public across the United States. The case of Milwaukee, Wisconsin is instructive. Shortly after sales of RFG began in January 1995, newspapers reported that state and federal officials were inundated with thousands of consumer complaints regarding the negative health effects of RFG. Reformulated gasoline was suspected of being the culprit for everything from general nausea, headaches, and respiratory problems to lower gas mileage and the destruction of small engines in snowmobiles, snow blowers, and chain saws. Rather than purchase RFG in the Milwaukee area, motor-

ists were driving outside the city in search of conventional gasoline. The unexpected behavior translated into more pollution as people traveled greater distances to buy fuel.

An EPA hearing into the matter resulted in the expression of tremendous anger by the consuming public against the regulation imposed by the national government. The general perception was that consumers were the victims of a rigged inside game that excluded the "small guy," leaving American motorists to foot the bill for urban smog cleanup. For the owner of the snowmobile with a ruined engine and nausea, the collaborative effort looked more like an unholy alliance that produced policy contrary to the public interest. While stakeholders could point to the low cost of pollution control associated with RFG (compared to other policy alternatives for reducing urban smog), consumers paying with their pocketbook, and in some instances their health, were hardly convinced (Eggleston 1995)[17].

The Milwaukee case also highlights the issue of public inclusion. Who will speak on the general public's behalf? How are they chosen? Can collaboration accommodate a full array of voices on any given issue? Keeping in mind the transaction-specific conditions under which collaborative endeavors are most likely to surmount the collective action dilemma, initial access may or may not be a problem. Much depends on whether stakeholders are free to select the "interest" grouping they wish to be affiliated with, or must accept classification according to some predetermined formula or government criteria. A recent example involving EPA—the Common Sense Initiative—suggests that EPA, by acceding to the demands of environmental justice groups to be treated as an interest separate from national environmentalists, is willing to entertain flexibility in this area and accept a reasonable degree of self-definition. Likewise, the level of satisfaction with the lead representative of your interest grouping may affect the perceived degree of fair representation extant for any one game. Further, to the extent that uncertainty affects the identification process, poor evaluation of the primary stakeholder base may result and increase the likelihood that the inclusivity rule will be violated. And some have expressed concern over the timing of collaborative efforts; engaging collaboration prior to a dispute being "crystallized" may inhibit development of sufficient power by weaker parties to ensure true mutuality of outcomes (Cormick 1982: 5). As Susskind and Cruickshank (1987: 94) note, how do you convince latent interests that they have an interest, much less convince them to devote precious resources to an EDR?[18] Finally, when it comes to inclusiveness and the determination of fairness and equity, on what basis do we include "all" groups? Who defines which groups should be included? Are there common groupings participants can agree are legitimate and therefore worthy of inclusion? If there are three strains of environmentalism within a community, do all have to be included to meet the fairness criteria? "Inclusion" rules drawn too broadly may lead to an administrative nightmare and present an insuperable obstacle to consensus.

Amy (1987) warns, however, that an overarching focus on initial access, and its corollary concern of inclusivity within a collaborative framework, misses the point. Amy warns that the use of collaboration can be a subtle but powerful form of political control by established economic interests that coopt public interest "voices" in the name of consensus outcomes. The process of selecting participants in collaborative forums tends to reward moderate, compliant groups with the opportunity to directly shape policy, while more radical, strident groups are excluded or marginalized (Rabe 1991: 156). The propensity of strident grass-roots groups to display steadfast allegiance to ideology at the expense of pragmatism means there is a higher threshold of what is negotiable and what is not. But placing a premium on "keeping the true faith" makes it that much less likely

such groups will conform to the informal rules and decorum governing the collaborative negotiation process. For example, in a collaborative effort to reduce air toxicity,

> [w]e had one meeting where the grass roots organization came in and said "We need a, b, c and d," and they presented "a" and explained it, and industry said "That's pretty reasonable, we can do that." They then presented "b" and received the same positive response and on down the line. The grass roots organization had their entire agenda accepted by the larger group of stakeholders during the morning session, and then they gave a speech at noon calling everybody "Fat pigs, lazy dogs, corrupt, biased, bigoted!" A whole string of names. The group walked away with zero. Nothing! Nothing! (interview, March 23, 1994).

An equally important question revolves around the matter of sustained access (Amy 1987; EPA 1987; Kerwin 1994; Stewart 1981: 1347–1350). Can environmental and consumer advocates continue active involvement in collaborative efforts over the long term? Stakeholders involved in the RFG reg-neg and the Yorktown Pollution Prevention Project were virtually unanimous in their concern over the resource intensity of the negotiation phase of the decision-making process. Senior officials from the stakeholding organizations typically have responsibility over a wide number of pollution control regulatory matters. But the collaborative game forces them to focus on a small part of their decision-making universe for the better part of several months. Unsurprisingly, staffing problems are more acute for environmental and consumer interest groups, who typically must rely on a small handful of expert staff as opposed to the battery of personnel employed by industry and government. Participants from consumer and environmental advocacy organizations also complain of the financial burden, with some suggesting that even successful regulatory negotiations are more costly for them than the litigation that typically accompanies notice-and-comment rule making (Coglianese 1997; Polkinghorn 1995; EPA 1987: 10–11).

Moreover, environmentalists and consumer advocates encounter a further potential disadvantage related to the quality of the expertise brought to bear. Given the overt reliance of collaborative endeavors on better technical information, a reasonable standard for meaningful (full) participation requires participants fluent in the arcane language of economic and scientific analysis (Eisner 1993: 130).[19] Although national environmental groups have made great strides in this regard over the past decade, it is generally recognized that scientific analysis is not one of their strengths. For example, fundamental to the Yorktown Pollution Prevention collaboration was a comparative risk analysis used to rank the health risks posed by different pollutants and different areas of an oil refinery. Yet risk analysis, even though it is becoming central to environmental policymaking, is precisely one of the areas where the environmental community's "level of sophistication is relatively low, and to the extent that it becomes central to negotiations they are going to be outgunned by industry" (interview with EPA, November 3, 1994; Baumgartner and Jones 1993: 32, 35).[20]

Collaborative games also define accountability more broadly. The traditional model of top-down accountability is melded with a controlled degree of bottom-up accountability to the stakeholders in a particular transaction. Granting bureaucratic leaders discretion under such conditions, however, may make a mockery of accountability. There are four chief areas of concern. First, the additional information, or expertise, developed through collaborative games and shared among participants may not flow upward to legislators and elected executives. Second, the close contact afforded by collaborative games creates

additional opportunities for agency leaders to cultivate clienteles. In the worst-case scenario, stakeholders will take advantage of the information asymmetry and added opportunities for discussion to conceive of win-win deals having little or nothing to do with the broader policy goals laid down by elected officials. The problematic outcomes will not trigger any alarms and Congress will not be alerted that anything is wrong, however, since the major players with the interest and resources to monitor and report on such things are beneficiaries and will necessarily refrain from such actions.

Third, by agreeing *ex ante* to be bound by any conclusions grounded in consensus, agencies necessarily give up their traditional role of authoritative, third-party decision maker with complete control over regulatory program design. Within the collaborative format, "[t]he administrative agency agrees to act as the theoretical equal of the other parties by sitting at the table to negotiate and resolve issues. A decision is not made until the affected interests . . . consent to it. The agency is not delegating decision authority to affected interests but is participating as one of them, with the same authority to block or promote consensus as any other party" (Fiorino 1988: 769). The pitfall is that once the collaborative game is in full swing, and considerable agency resources and reputation are invested, there is the possibility that a "consensus-minus-one" develops in which the agency is the lone dissenter because it views the solution as suboptimal or even illegal. Under such circumstances how likely is it that public officials will act responsibly by exercising their right to withdraw and using their legal authority to issue a different rule? Endowed with limited resources, facing the added costs of a traditional rule making process, and knowing that withdrawal virtually assures litigation and damages their reputation of commitment to collaborative games, such officials face powerful incentives to acquiesce to the near consensus, even if it means a suboptimal, perhaps illegal, outcome narrowly responsive to private groups.

Fourth, public sector leaders need to have a clear sense of agency goals—what the public interest is—and they need to articulate those goals, both short and long term, prior to engaging the collaborative format (Susskind and Cruickshank 1987, p. 80). Doing otherwise increases the exposure of public sector officials to manipulation by private interests, thereby diminishing their ability to protect some notion of a broader public interest. Industry, environmentalists, and government officials count this as one of their major concerns (or complaints) of the collaborative games conducted by environmental and natural resource agencies. In too many instances, public agencies are marching into collaborative games without stopping to consider their goals independent of other participants (Weber 1998, Chapter 8).

Collaborative efforts also face political limitations that are likely to hinder their viability over the long term and will most likely militate against their widespread application. Although the transaction-specific conditions prescribed above recognize that the likelihood of collaborative success is enhanced whenever elected officials accept, acquiesce to, or sponsor collaborative endeavors, devolving authority to an administrative-level *process* inevitably increases the uncertainty associated with outcomes *for elected officials*. Given their preference for substantive certainty—guaranteed by written procedures and strict legislative language that lock in bargains and ensure the delivery of public policy goods to key constituents (Knott and Miller 1987; Moe 1989; Scholz 1991)—the choice of collaboration is likely only to be occasional. Further, constantly changing political conditions due to elections and rapid changes in contemporary market conditions may conspire to challenge consensus conclusions in relatively short order, thereby lessening incentives to pursue common ground through collaboration, while si-

multaneously increasing incentives to lock in zero-sum policy victories for the long term (Moe 1989).

PROSPECTS FOR THE CONTINUED USE OF COLLABORATION

Despite the potential pitfalls and limits, the prospects are good for the continued use of collaborative arrangements. The incentives of the larger institutional setting, which factor so prominently in the overall push toward collaborative alternatives, still exist and are likely to remain in place for the foreseeable future. The political acceptance of collaborative processes continues apace. Actors at all levels of U.S. government are codifying and institutionalizing collaboration through laws and administrative processes, while important pressure groups are accepting collaboration as a viable dispute resolution alternative. The growth of ADR education in the nation's schools is heightening general awareness of the potential benefits of collaborative problem solving, while the growing ranks of mediation professionals provide a ready-made constituency for the promotion and use of collaborative games. Moreover, collaborative methods are not only consistent with the "next generation" of environmental and natural resource problems, but are compatible with efforts around the country to rebuild the social capital of American communities and the more general trend toward reinvented government.

INCENTIVES TO ENGAGE COLLABORATION STILL EXIST

The high-transaction-cost context within which environmental decision making occurs continues to provide participants with substantial incentives to devise alternative regulatory arrangements promising each a greater share of their organizational goals (Weber 1998). The ascendancy of the environmental lobby in national politics creates an offsetting balance of power in which both industry and environmentalists possess the power to derail or seriously compromise each others' initiatives (Baumgartner and Jones 1993: 184–189; Mitchell 1991). With congressional gridlock as the rule on virtually all environmental issues (Noah 1996),[21] the existing command-and-control superstructure stays intact, existing laws are not rationalized, and industry keeps on paying high compliance costs. Environmentalists and regulators see little further progress in the battle against environmental degradation. They are unable to address new problems of degradation as they arise much less amend the loopholes in existing statutes that make enforcement and environmental cleanup more difficult.

Oversight of EPA continues to intensify as Republican legislators hostile to EPA's basic mission seek to influence agency decisions, while Congress maintains strict scrutiny over proenvironment Clinton administration appointees such as Bruce Babbitt at the Department of Interior, Molly Beattie at U.S. Fish and Wildlife, and Mike Dombeck at the U.S. Forest Service. Further, given the prominence of federal deficit politics and the willingness of both Republicans and the Clinton administration to pursue a balanced budget, federal pollution control and natural resource agencies can expect their budgets to be cut even further during the last half of the 1990s. And greater citizen access to environmental decision making over the last several decades through open administrative

processes and liberalized rules of standing, and an activist judiciary less willing to defer to bureaucratic experts, allows more voices and values to be heard. But they also contribute to the paralysis and delay so common to bureaucratic decision making in the environmental arena (Melnick 1983; Weber 1998). Thus bureaucratic decision makers face added incentives to seek more timely and cost-effective ways of meeting agency objectives, and collaboration is a logical response.

Moreover, the increasingly important dynamic of competition between American firms and their counterparts around the world create powerful incentives for industry stakeholders to alter the traditional way that America regulates pollution (Allardice et al. 1993; Chertow and Esty 1997; Knopman 1996; U.S. Bureau of the Census 1982–83, 1995a, 1995b).[22] International competition makes its more difficult for business to "pass through" regulatory costs to consumers. Thus, industry strategies that pursue regulations as protective barriers-to-entry by domestic firms have necessarily lost much of their appeal. More importantly, accelerating rates of technological change, relatively unrestricted flows of international capital, and the growing differentiation of international product markets are redefining requirements for success (Piore and Sabel 1984). Success now requires high rates of innovation across the entire range of matters affecting firm productivity—including environmental compliance (Porter 1993). It also requires an ability to respond quickly to changing conditions. The competitive edge now goes to those firms that penetrate markets first (Allardice 1993)[23] As a result, collaborative games premised on customized outcomes, and flexible regulatory arrangements, are increasingly attractive to industry.

In addition, maintenance of the status quo places states between the proverbial rock and a hard place, thus motivating state-level officials to continue experimenting with collaboration. States continue to face hostility from industry in their attempts to implement high-cost, federally mandated environmental priorities and mandates, but with ever fewer federal dollars. The resource gap is a product of expanding environmental programs and program requirements (often through administrative initiatives), the increasing costs of administering environmental protection programs apart from added programs and added responsibilities,[24] scarce state revenues and increasing competition for available funds from other policy areas (GAO 1995: 11; NAPA 1995: 72; Taking Stock Hearings 1993: 190–200),[25] and the gradual shift in responsibility for financing pollution control programs from the federal to state and local governments, largely as the result of severe declines in federal grants and the use of nonfunded mandates (DiIulio et al. 1993; GAO 1991: 37–39; Kettl 1992; GAO 1995; Municipality of Anchorage 1992; Rees 1993; Suskind 1993).[26] Local government officials find nonfunded mandates a particularly "bitter pill" to swallow, especially when crossover sanctions are involved. Officials must either comply with the environmental mandate—and raise their constituents' taxes or use rates for utilities like water—or risk losing program funds in other, unrelated policy areas. In short, from the perspective of states, collaborative ventures are one way to leverage states' own scarce resources to maximum effect and to customize solutions to fit the particular configuration of environmental problems within individual states.

Beyond the persistence of contextual incentives, the *failure* of two major Republican efforts at national regulatory relief little more than a decade apart[27] is likely to convince more industry officials to accept the staying power of the environmental lobby and environmental values within the American electorate. It is therefore plausible to expect that the rate at which players seek out and engage the collaborative dynamic may even increase during the next century.

POLITICAL AND INSTITUTIONAL ACCEPTANCE OF COLLABORATION

The use of collaborative methods in the environmental arena, while still primarily a tool used on an ad hoc basis, is starting to become institutionalized. A key reason is that it is gaining political support across a broad spectrum of actors and levels of government (Singer 1994: 12; Gamman 1994).[28] For example, in 1987, a consensus-based, collaborative effort involving the timber industry, environmental groups, Indian tribes, and government agencies produced the landmark Timber/Fish/Wildlife Agreement governing forest management practices in Washington State. The Agreement was unanimously ratified by both houses of the Washington state legislature "without a single word being changed" (Protasel 1991: 195–196). In 1993, President Clinton sponsored the Portland Timber Summit, an attempt to use collaboration for breaking through the deadlock over Northwest forest resources. Congress gave its official blessing to reg-neg with passage of the Negotiated Rule making Act of 1990 (Public Law 101–648). In the fall of 1993, President Clinton endorsed the concept by issuing an executive order directing all government agencies to start using regulatory negotiation more often (Pritzker and Dalton 1990: 8–9).[29] Congress also passed the Administrative Dispute Resolution Act in late 1990. The Act "requires all federal agencies to develop policies on the use of ADR, appoint an ADR specialist, and provide appropriate employees with training in ADR" (Singer 1994, p. 138). For its part, EPA has employed ADR methods since the late 1980s and has taken a number of steps to institutionalize ADR through training practices, the issuance of standard operating procedures, periodic status reports, and the establishment of a computerized nationwide list of dispute resolution specialists. The "payoff" for "[t]hese proactive efforts" has been a threefold increase in agency use of ADR since 1991 (p. 139).

EPA has also developed the Common Sense Initiative (CSI) in league with corporate America, state regulators, national environmentalists, and locally based environmental justice groups. Their goal: to encourage innovation by providing flexibility and to rationalize existing regulatory rules for each industrial sector through the use of a place-based approach to standard setting (EPA 1994). EPA's Project XL (Excellence and Leadership) is a series of urban-based pilot projects that follows the lead of CSI and is modeled on the Yorktown Pollution Prevention Project, which involved EPA, state-level regulatory officials from Virginia, and Amoco Oil (see Weber 1998, Chapter 7). Project XL authorizes site-based stakeholder collaborators "to allow industrial facilities to replace the current regulatory system with alternative strategies if the result achieve [s] greater environmental benefits" (EPA Reinvention Assessment, U.S. Congress 1996: 10). Similarly, environmentalists, regulators, industry, and politicians banded together in the Great Printer's Project to create "smarter, faster and cheaper" ways of combating pollution in the Great Lakes region.

In the Western United States, more than 80 coalitions of environmentalists, ranchers, county commissioners, federal and state government officials, loggers, skiers, and off-road vehicle enthusiasts are cooperating in an attempt to improve ecosystem and public, as well as private, lands management arrangements (Johnson 1993; Jones 1996; McClellan 1996). The collaborative arrangements work within the larger framework of national laws, not in lieu of them, to prevent degradation, to provide long-term, holistic solutions to complex local problems, and to enhance the degree of local oversight and

implementation expertise. Many are intended as permanent supplements to existing governance arrangements (Johnson 1995; Alliance 1995; Weber forthcoming).

The use of collaborative methods is growing at other levels of government as well. Barry Rabe's book, *Beyond NIMBY*, examines the phenomena in the United States and Canada within the context of local hazardous waste-siting decisions (Rabe 1994).[30] Six states—Massachusetts, Wisconsin, Connecticut, Rhode Island, Texas, and Virginia—now require some degree of mediation in the siting of hazardous waste facilities prior to any litigation. Five states—New Jersey, Minnesota, Hawaii, Massachusetts, and Wisconsin—now have statewide mediation offices (Rabe 1991: 149; Singer 1994: 138–139). DeWitt John, in *Civic Environmentalism*, explores state-level collaborative games designed to resolve environmental issues associated with wetlands in the Florida Everglades, pesticides in Iowa, and energy conservation in Colorado (John 1994; Mazmanian and Morell 1992).[31] Carmen Sirianni and Lewis Friedland (forthcoming) document the growth of collaborative methods in natural resources decision making as part of a larger project focused on the emergence of a more participatory, inclusive, and deliberative form of democracy. In New York, the Department of Environmental Conservation is conducting collaboratively based, joint exploratory ventures creating integrated pollution management and prevention programs (Taking Stock Hearings 1993: 158–59).[32]

EDUCATION, TRAINING, AND THE GROWTH OF PROFESSIONALS

Support for collaborative methods is also likely to grow in the future because it is becoming entrenched within the American educational system and because of the growing ranks of professionals trained in collaborative dispute resolution methods. ADR is now a staple of law schools (95% offer a course in ADR), while the number of graduate programs in policy, public administration, business, and environmental science offering training in dispute resolution methods and the positive potential of collaborative methods, more generally, has "rapidly increase [ed.]" in recent years (Singer 1994: 9). Moreover, a growing number of high schools and junior highs are now teaching conflict resolution. "Students are applying their new knowledge to resolving other students' disputes, including the fistfights that once would have guaranteed suspension. Working in teams with newly trained teachers, they also settle differences between students and teachers. Some have mediated conflicts between teenagers and their parents" (Singer 1994: 10, 154–161).

Yet the increased probability of adoption stems as much from the heightened awareness of the possibilities offered by collaboration and the proper conditions for its application as it does from the self-interest of "collaboration/mediation" professionals. The increasing number of trained experts in both the public and private sectors complements the growth in the number of citizens familiar with collaborative methods. Historical data suggest that as the cadre of professionals with a vested interest in applying particular specialized decision frameworks to public problems grows, so too will the use of the professional method (Mosher 1982; Katzmann 1980). The increased frequency derives as much from the potential for trained incapacity (unable or unwilling to consider unfamiliar alternatives) as it does from the professional system of status and rewards that typically accompanies professional groups. In other words, much like the lawyers at the

Federal Trade Commission who prefer clear-cut, easy-to-win, and "quick" unfair trade cases (Katzmann 1980), or engineers in the Bureau of Reclamation who tend to prefer structural solutions (i.e., large dams, aqueducts, etc., as opposed to nonstructural solutions emphasizing, for example, financial institutions, land use planning initiatives, etc.), it is reasonable to expect that to the extent that collaboration/mediation professionals have the autonomy to decide how to resolve environmental disputes, it is likely that they will prefer collaboration over other possibilities. The professionalization of collaboration personnel, in effect, is likely to bias bureaucratic decisions in a particular direction and create incentives to apply collaboration even in situations where other problem-solving techniques may be more appropriate, especially when the profit considerations of private sector collaboration consultants are taken into account (Mosher 1982; Katzmann 1980; Khademian 1992).[33]

ENVIRONMENTAL PROBLEMS, THE DEVOLUTION OF POWER, AND THE REINVENTION OF GOVERNMENT

Collaborative methods are also consistent with the "next generation" of environmental and natural resource problems, correspond with the more general trend of reinvented government, and fit with efforts to rebuild the social capital of American communities.

Administrators and policymakers across the country are reorganizing and reinventing government to improve program efficiencies, to harness resources outside government in the service of public policy goals, and to better facilitate the input of affected interests and the general public. Central to this effort are innovative, decentralized, collaborative institutional arrangements, which delegate significant authority to either private citizens, program managers within existing bureaucracy, or market-based mechanisms (Barzelay and Armanjani 1992; Kettl 1993; National Performance Review 1993; NAPA 1994; Osborne and Gaebler 1993). The fields of environmental, natural resources, and public lands policy have been notably affected by the larger reinventing government movement as the limits of top-down regulatory approaches to environmental protection become increasingly clear (Mann and Plummer 1994; National Research Council 1992; Rabe 1994; NAPA 1995; Weber 1998).

Underlying the reinvention of environmental policies and programs is the realization that today's environmental problems are fundamentally different than those faced by policymakers at the dawning of the environmental age almost 30 years ago. Marian Chertow (1996) makes the case for environmental policy designed to manage the "next generation" of problems. "[H]aving addressed rather successfully the 'big dirties'—the belching smokestacks and rivers running orange—we must now turn our attention to the thousands of smaller sources of emissions including the harms that arise from the activities of every individual. This makes the set of environmental 'actors' much broader and will require new policy instruments such as economic incentives, ecolabels, and other information strategies" (p. 1).

Similarly, resolving "next generation" problems will require the active, daily support of a broad array of individuals whose first priority is not necessarily environmental protection. "[T]he range of officials who make environmental policy must be recognized to go well beyond the EPA and state departments of environmental protection. Indeed, in many respects, mayors and city managers, bankers, zoning commissioners, farmers,

highway planners, retailers, energy company managers, and route planners for overnight delivery services are the crucial environmental decision-makers" (Chertow 1996: 1). In turn, harnessing the necessary support to make policy efforts successful will require the integration of environmental goals with economic and social policy goals. The changing character of environmental problems, the multiplicity of actors, and the need for policy integration lead many to conclude that effective environmental programs now require complex, collaborative partnerships among diverse government, civic, and business actors at the state and local levels. From this perspective, collaboration is likely to be a superior vehicle for constructing solutions sensitive to the incentives facing individual participants and for developing the kinds of information needed to facilitate the many tradeoffs (Chertow 1996; John 1994; Knopman 1996; Sirianni and Friedland forthcoming).

Moreover, there is the issue of social capital. Social capital engenders norms of cooperation and trust that reduce transaction costs, facilitate development of horizontal, cooperative relationships, and contribute to an enhanced quality of life and improved performance for both the economy and policies more generally (Putnam 1993, 1995). Given the potential for community rejuvenation, a growing number of American communities are seeking to rebuild social capital through sponsorship of civic forums for problem-solving and public "issue" forums for the purpose of encouraging greater public interaction and for educating more citizens on policy matters. Others are going further and seeking to institutionalize intermediary institutions that rely on nonprofit organizations, citizen participation, and interorganizational cooperation to decide issues of importance to communities (Coleman 1988; Fukuyama 1995; Putnam 1993).[34] Although it is clearly too early to tell whether this phenomenon will take root for the long term, the core emphasis social-capital-building efforts place on cooperation provides fertile ground for sowing more rather than less collaboration for policy problems across the board, including those of environmental degradation.

CONCLUSION

Notwithstanding the very real concerns of scholars and practitioners regarding the problems of collaborative decision making for democracy, we would do well to remember the age-old maxim: "do not let the perfect be the enemy of the good." Steps can be taken to overcome certain of the shortcomings associated with collaborative arrangements. Public funding for participation costs of public interest and citizen advocacy groups and ensuring access for all participants to appropriate expertise can help level the playing field. Moreover, cost savings produced through collaboration can be shared with the environment; stakeholders might agree *ex ante* to devote 10–15% of any compliance cost savings to defraying the costs of program negotiations or any extra monitoring efforts, or to paying for additional environmental protection programs in the geographic area at issue. Further, many of the same critiques of collaboration can be, and have been, leveled at the existing system of top-down, centralized control, predicated as it is on national-level policy decisions and bureaucratic experts (Knott and Miller 1987; Light 1995).

Viewed from this perspective, the collaborative phenomenon is a pragmatic attempt by participants in environmental politics to come up with institutional arrangements that are more effective at resolving the complex regulatory dilemmas found in a traditionally

adversarial policy arena. The participants of collaborative efforts are not driven by starry-eyed romanticism; rather, they are hard-nosed realists wary of collaboration and its potential pitfalls. But relative to the high costs and inefficiencies encountered under standard ways of doing business in the environmental arena, they perceive that in some situations collaboration may be a better choice than the traditional game of no-holds-barred conflict, one that is capable of producing win-win outcomes benefiting a broad variety of interests (Weber 1998). We may not like, or we may rightfully fear, the burgeoning use of collaborative arrangements that potentially threaten cherished ideals of liberal democracy. But, whether we like it or not, policymakers and administrators are *not* waiting on scholars to decide whether such arrangements are appropriate or not. They are choosing alternative institutional arrangements that defy traditional notions of policymaking, policy administration, and democratic accountability.

The contemporary task of scholarship thus is to continue developing a better understanding of when collaborative processes are appropriate, politically feasible, and likely to improve the ability of government to achieve lasting, effective administrative solutions to pressing problems of environmental degradation. The principles of collaborative games should then be applied accordingly. To the extent that this task is achieved, it is plausible to expect that there *are* certain conditions under which collaborative games *are* the best option, not only in terms of achieving more efficient and effective policymaking processes and outcomes, but also in terms of increasing the *accountability* and *representation* of government. These conditions may be rare and extremely difficult to achieve, but rather than dismiss the innovation of collaboration out of hand, more information is needed regarding the possibilities of collaborative arrangements across all its dimensions.

ENDNOTES

1. The Wirthlin Group conducted a national survey in 1992 that discovered that not only would "over 80 percent of respondents . . . choose mediation or arbitration over litigation, . . . [but that] active participation in solving problems and the opportunity to reach a fair conclusion were even more important to disputants than savings in time and cost" (see Singer 1994: 13).

2. A regulatory process "paralyzed" by conflict and litigation can force state regulators to take the politically difficult and costly step of targeting sources of pollution *outside of the program in question* to meet federal compliance deadlines The problem is twofold. These sources may already be heavily regulated, yet failure to comply can trigger stiff monetary penalties and the wrath of Congress.

3. The history of environmentalists and regulators of court decisions in environmental law shows that courts are just as likely to favor industry as they do the interests.

4. Courts are not only burdened with cases involving a wide range of highly technical policy issues, "but few judges or clerks are trained in the scientific and related methodological skills needed to develop a basic understanding of many cases."

5. In general, these scholars argue that courts are poorly equipped to sort out the competing claims of more than two parties.

6. As opposed to an instrumental rationality, which emphasizes decision making by bureaucratic experts and which elevates scientific knowledge and technical analysis to a superior position vis-à-vis political information and knowledge provided by citizens and nonexperts.

7. Process costs are primarily allocated to several very intense bargaining periods rather than being distributed more consistently over a longer period. For data on this issue and on higher costs.

8. Public commentary before the panel on "Environment and Regulation" at the 1996 annual meeting.

9. Susskind and Cruickshank suggest that participants may want to hire an expert in BATNA assessment before proceeding. They also point out that BATNA changes over time (see pp. 80–85).

10. There is not consensus on this item. After reviewing 161 cases, Bingham concluded that successful EDR efforts were not dependent on the presence of a deadline (pp. xxiii–xxiv). My own interviews with more than 70 participants of collaborative games, however, suggest that deadlines do help facilitate the process of bargaining and the development of consensus-based outcomes.

11. The literature on EDR treats credible commitment as directly, and wholly, derivative of incentives when it comes to initiating and sustaining the process of collaboration. The matter of trust, while addressed, is associated almost entirely with the skill of the facilitator. Technically proficient facilitators can create the necessary trust. Yet the treatment of incentives and trust ignores the complexity and uncertainty inherent in the political dynamic associated with environmental policy. Participants in collaboration point out that incentives as a decision factor need to be placed in the context of uncertainty. To the extent that uncertainty is present, collection of the anticipated gain is lessened, as is the incentive to engage collaboration. Likewise, participants also make the case for trust being *politically grounded* in the institutions, leaders, and organizations involved in a particular collaborative endeavor (see the discussion below on reputation for leaders and organizations).

12. Miller notes that much of the literature in organizational economics proceeds on the premise that hierarchical organizations, like markets, move toward more efficient forms through competition If this were the case, the role of an organizational leader would be minimal; a natural progression toward efficiency requires some mechanical guidance, but not leadership. But the *political* dynamics of a hierarchy, Miller argues, differ from the dynamics of a market, and the progression toward organizational cooperation requires strong leadership to overcome (or at least alternatively direct) precisely the self-interested motivations that drive a market toward efficiency.

13. O'Toole builds from Miller's framework as well. He argues that "network managers" are critical to the development of cooperation within public policy networks. "Network manager" is synonymous with "entrepreneurial leader."

14. Reputation is enhanced to the extent that successive bureaucratic leaders pay homage to the same values. The idea of a reputation of commitment to a particular "value" is similar to Selznick's discussion of agencies "infused with value."

15. Kreps argues that "insofar as an implicit contract [derived from organizational culture] permits greater transactional efficiency, an expansion in the span of the contract will be beneficial. But weighed against this is the problem that as the span of the contract is increased, the range of contingencies that the contract must cover also must increase. Either it will then be harder for participants to determine *ex post* whether the contract was applied faithfully or the contract will be applied to contingencies for which it is not suited. . . . The focus strategy [thus] becomes a strategy of reducing the range of contingencies with which the implicit contract must deal, in order to deal better—less ambiguously—with those that are met" (pp. 129–130).

16. This is a general conclusion of the EDR and reg-neg literature.

17. The Wisconsin Department of Natural Resources conducted 130 air-sampling tests in response to concerns over possible added health risks associated with RFG. They found that the level of chemicals detected in Milwaukee's air was well below federal health standards.

18. Using an inclusive, proactive approach to environmental problems, however, may do more to protect a broader public interest by solving problems rather than letting them occur and cause harm to a particular group's interests, including those whose interests are latent by virtue of not having a "crystallized dispute" around which to mobilize.

19. Or, at a minimum, ready access to experts one can trust. This is not a new problem, nor is it exclusive to collaborative games.

20. Interview with EPA and Baumgartner and Jones discuss how institutional policy "venues" can shape final outcomes and confer advantages on some at the expense of others.

21. During the 104th Congress, only a few environmental issues passed Congress, all during the second session. In October 1996, a broad package of legislation on parks and public lands was signed into law. Agreement was also reached to significantly loosen regulatory restrictions concerning carcinogens in processed foods by scuttling the Delaney Clause, and on a revised version of the Safe Drinking Water Act, which eased regulatory requirements for small-town drinking water systems while simultaneously increasing water authorities' public disclosure requirements concerning water-borne chemicals.

22. In 1970, at the beginning of the contemporary environmental era, international transactions (exports plus imports) equaled 12.7% of the U.S. Gross National Product. By 1985 the figure almost doubled to 21.3%, while by the mid-1990s, over 25% of the American economy involved international transactions.

23. Also interviews (industry, March 10, 1994; ex-EPA, January 7, 1994); comments of Terry McManus, Director of Environmental Affairs, Intel Corporation, at the Industrial Ecology Conference, Washington State University, Pullman, WA, April 18, 1997).

24. For example, EPA estimates that simple maintenance of 1987 levels of environmental protection will require state governments to spend an extra $1.2 billion annually by the year 2000, or approximately 46% more than they did in 1986 (GAO 1995, p. 23; the estimate is from EPA's *The Cost of a Clean Environment* report [1990]. All cost estimates used in this particular EPA document are in 1986 dollars, while the level of environmental protection used in the estimate is assumed to be the level that existed in 1987. The costs are annualized at a 3% rate.).

25. Antitax and antispending initiatives in a number of states, including California, Oregon, Florida, Colorado, Minnesota, and Washington, compound these difficulties.

26. Both stem from federal deficit politics. Federal grants for environmental programs—the traditional method of encouraging states to adopt federal environmental mandates—declined by 67% in real 1988 dollars between 1979 and 1989, falling from $6.8 billion to $2.3 billion (National Governor's Association 1989; this calculation includes grants for state operating budgets and the construction of wastewater treatment plants but does not include Superfund and grants for leaking underground storage tanks). Nor have federal budgeting problems deterred Congress from passing unfunded mandates—programs or requirements imposed on states that are not accompanied by the funding needed to implement them. A Price Waterhouse report from October 1993 estimated that nonfunded federal mandates would cost localities $90 billion in the 5-year period 1994–1998.

27. The early Reagan era and GOP initiatives in the 104th Congress.

28. The use of collaboration is spreading to other countries, too, for example, in the Caribbean region.

29. Federal agencies using reg-neg include the Occupational Safety and Health Administration, the Federal Trade Commission, the Federal Aviation Administration, the Nuclear Regulatory Commission, and the Departments of Interior, Agriculture, Education, and Transportation.

30. In a study of government efforts to site hazardous waste facilities, Rabe demonstrates the effectiveness of locally based collaborative efforts. Decision-making arrangements involving in-

dustry, government, and the affected communities have produced positive results in siting such waste in the United States and Canada. The key is that these collaborative efforts are constructed at the local level, rather than imposed by a central government whose experts identify the "best" location for the waste site. Direct participation of the general public in the process has been essential to the success.

31. John argues that the real innovation and progress in environmental protection—a "new paradigm" of environmental policymaking called civic environmentalism—is centered at the state level of governance. Civic environmentalism relies on the collaborative dynamic and, much like the collaborative games described herein, emphasizes bottom-up participation and assistance in policy design, information sharing, iterative negotiations, and a willingness to choose from a broad variety of nonregulatory and noncoercive policy approaches. Cases of policymaking examining pesticides in Iowa, energy conservation in Colorado, and wetlands in Florida are used to make the point that significant future progress in the battle against environmental degradation may well require broader application of the new collaborative paradigm.

32. Testimony of Thomas Jorling, Commissioner of the New York Department of Environmental Conservation.

33. The interaction of professionals with bureaucracy and how professionals matter to policy choices and outcomes.

34. Although the bulk of the scholarly literature treats social capital as a preexisting condition, a derivative of "prior habits, traditions, and norms," which encourages individuals to engage in forms of behavior that require sociability (i.e., bowling, participating in a neighborhood watch program), Schneider et al. (1997) illustrate that the state may have a role in fostering the generation of social capital—"the design of government institutions can create incentives for individuals to engage in activities that increase social capital" (p. 82).

REFERENCES

Allardice, D.R. 1993. Preface. D.R. Allardice, R.F. Kosobud, W.A. Testa, and D.A. Hanson, eds. *Cost Effective Control of Urban Smog*. Chicago: Federal Reserve Bank of Chicago, i–xii.

Allardice, R. David, R.H. Mattoon, and W.A. Testa. 1993. "Industry Approaches to Environmental Policy in the Great Lakes Region." A Federal Reserve Bank of Chicago working paper (WP-199-8) (July), 26 pp.

Amy, D. 1987. *The Politics of Environmental Mediation*. New York: Columbia University Press.

Amy, D.J. 1990. "Environmental Dispute Resolution: The Promise and the Pitfalls." N.J. Vig and M.E. Kraft, eds. *Environmental Policy in the 1990s*. Washington, DC: Congressional Quarterly Press, 211–234.

Bacow, L.S. and M. Wheeler. 1984. *Environmental Dispute Resolution*. New York: Plenum Press.

Badaracco, J.L., Jr. 1985. *Loading the Dice: A Five-Country Study of Vinyl Chloride Regulation*. Cambridge: Harvard Business School Press.

Barzelay, M. and B.J. Armanjani. 1992. *Breaking Through Bureaucracy: A New Vision for Managing Government*. Berkeley: University of California Press.

Baumgartner, F.R. and B.D. Jones. 1993. *Agendas and Instability in American Politics*. Chicago: University of Chicago Press.

Bingham, G. 1986. *Resolving Environmental Disputes: A Decade of Experience*. Washington, DC: Conservation Foundation.

Bingham, L.B. 1996. "Negotiating for the Public Good." In James L. Perry, ed. *Handbook of Public Administration*. San Francisco: Jossey-Bass, 647–664.

Blackburn, J.W. 1988. "Environmental Mediation as an Alternative to Litigation." *Policy Studies Journal* 16: 562–574.

Chertow, M. 1996. *Environmental Reform: The Next Generation Project [summary]*. Yale Center for Environmental Law and Policy, ms.

Chertow, M. and D. Esty, eds. Forthcoming. *Environmental Reform: The Next Generation*. New Haven: Yale University Press.

Cobb, S. and J. Rifkin. 1991. "Neutrality as a Discursive Practice: The Construction and Transformation of Narrative in Community Mediation." In S. Silbey and A. Sarat, eds. *Law, Politics, and Society*. Greenwich, CT: JAI Press.

Coglianese, C. 1997. "Assessing Consensus: The Promise and Performance of Negotiated Rulemaking." *Duke University Law Journal*.

Coleman, J. 1988. "Social Capital in the Creation of Human Capital." *American Journal of Sociology* 94 (Suppl): S95–120.

Cormick, G.W. 1980. "The Theory and Practice of Environmental Mediation." *Environmental Professional* 1: 24–33.

Daggett, D. 1995. "It's Un-American, or at Best Unwestern, but Cooperation Works." *High Country News* 27 (October 16), 3 (http://www.hcn.org/pseudo/1995/oct16/dir/Opinion_It's_unAme.html).

Davies, J.C. 1990. "The United States: Experiment and fragmentation." Nigel H. and F. Irwin, eds. *Integrated Pollution Control in Europe and North America*. Washington, DC: The Conservation Foundation, 51–66.

DiIulio, J.J., Jr., G. Garvey, and D.F. Kettl. 1993. *Improving Government Performance: An Owner's Manual*. Washington, DC: Brookings Institution.

Dryzek, J.S. 1987. "Discursive Designs: Critical Theory and Political Institutions." *American Journal of Political Science* 31 (3): 656–679.

Eggleston, R. 1995. "DNR Reports Similar Air Qualities for Conventional, Reformulated Gas." *Wisconsin State Journal* (April 1), D3.

Fiorino, D.J. 1988. "Regulatory Negotiation as a Policy Process." *Public Administration Review* (July/August): 764–772.

Fiorino, D.J. and C. Kirtz. 1985. "Breaking Down Walls: Negotiated Rulemaking at EPA." *Temple Environmental Law and Technology Journal* 4: 29–40.

Fisher, R. and W. Ury. 1981. *Getting to Yes: Negotiating Agreements Without Giving In*. Boston: Houghton Mifflin.

Fukuyama, F. 1995. *Trust: Social Virtues and the Creation of Prosperity*. New York: Free Press.

Fuller, L.L. 1981. "The Forms and Limits of Adjudication." In K.L. Winsonon, ed. *The Principles of Social Order*. Durham, NC: Duke University Press.

Gais, T.L., M.A. Peterson, and J.L. Walker, Jr. 1984. "Interest Groups, Iron Triangles and Representative Institutions in American National Government." *British Journal of Political Science* 14: 161–185.

Gamman, J.K. 1994. *Overcoming Obstacles in Environmental Policymaking: Creating Partnerships Through Mediation*. Albany, NY: SUNY Press.

General Accounting Office. 1991. "Environmental Protection: Meeting Public Expectations with Limited Resources." Report to the Congress (June) (RCED-91-97).

General Accounting Office. 1995. "EPA and the States: Environmental Challenges Require a Better Working Relationship." Report to the Ranking Minority Member, Committee on Governmental Affairs, U.S. Senate (April) (RCED-95-64).

Gormley, W.T. 1989. *Taming the Bureaucracy: Muscles, Prayers, and Other Strategies*. Princeton, NJ: Princeton University Press.

Hamilton, M.S. 1991. Environmental Mediation: Requirements for Successful Institutionalization. In M. K. Mills, ed. *Alternative dispute resolution in the public sector*. Chicago: Nelson-Hall Publishers, 164–187.

Harter, P.J. 1982. "Negotiating Regulations: A Cure for Malaise." *Georgetown Law Journal* 71: 1–113.

Hays, S. 1989. *Beauty, Health, and Permanence: Environmental Politics in the United States. 1955–1985*. Cambridge: Cambridge University Press.

Hoberg, G. 1992. *Pluralism by Design: Environmental Policy and the American Regulatory State*. New York: Praeger Publishers.

Horowitz, D. L. 1977. *The Courts and Social Policy*. Washington, DC: Brookings Institution.

John, D. 1994. *Civic Environmentalism: Alternatives to Regulation in States and Communities*. Washington, DC: Congressional Quarterly Press.

Johnson, K. 1993. *Beyond Polarization: Emerging Strategies for Reconciling Community and Environment*. Seattle: Northwest Policy Center, University of Washington.

Johnson, K. 1995. "Watershed Council Helping to Rebuild Community on the Henry's Fork." *Community and the Environment* (December): 2–3.

Jones, L. 1996. "Howdy, Neighbor!: As a Last Resort, Westerners Start Talking to Each Other." *High Country News* 28 (May 13), 5 pp. (http://www.hcn.org/1996/may13/dir/Feature_Howdy,_nei.html).

Kerwin, C. and S.R. Furlong. 1992. "Time and Rulemaking: An Empirical Test of Theory." *Journal of Public Administration Research and Theory* 2: 113–136.

Kerwin, C.M. 1994. *Rulemaking: How Government Agencies Write Law and Make Policy*. Washington, DC: Congressional Quarterly Press.

Kettl, D.F. 1992. *Deficit Politics: Public Budgeting in Its Institutional and Historical Context*. New York: Macmillan.

Kettl, D.F. 1993. *Sharing Power: Public Governance and Private Markets*. Washington, DC: Brookings Institution.

Khademian, A.M. 1992. *The SEC and Capital Market Regulation: The Politics of Expertise*. Pittsburgh: University of Pittsburgh Press.

Knopman, D.S. 1996. *Second Generation: A New Strategy for Environmental Protection*. Washington, DC: Center for Innovation and the Environment, The Progressive Foundation.

Knott, J.H. and G.J. Miller 1987. *Reforming Bureaucracy*. Englewood Cliffs, NJ: Prentice-Hall.

Kolb, D.M. 1994. "Another Way to Settle Disputes: The Practice of Mediation." In D.M. Kolb, ed. *When Talk Works: Profiles of Mediators*. San Francisco: Jossey-Bass, 1–16.

Kolb, D.M. and K. Kressel. 1994. "The Realities of Making Talk Work." In D.M. Kolb, ed. *When Talk Works: Profiles of Mediators*. San Francisco: Jossey-Bass, 459–493.

Kreps, D.M. 1992. "Corporate Culture and Economic Theory." J.A. Alt and K.A. Shepsle, eds. *Perspectives on Positive Political Economy*. Cambridge: Cambridge University Press, 90–143.

Leonard, H.J., J.C. Davies III, and G. Binder, eds. 1977. *Business and the Environment: Toward Common Ground*. Washington, DC: Conservation Foundation.

Light, P. 1995. *Thickening Government: Federal Hierarchy and the Diffusion of Accountability*. Washington, DC: Brookings Institution.

MacDonnell, L.J. 1988. "Natural Resources Dispute Resolution: An Overview." *Natural Resources Journal* 28(Winter): 5–19.

Mann, C.C. and M.L. Plummer. 1994. *Noah's Choice: The Future of Endangered Species*. New York: Knopf.

Marcus, A.E., M.V. Nadel, and K. Merrikin. 1984. "The Applicability of Regulatory Negotiation in Disputes Involving the Nuclear Regulatory Commission." *Administrative Law Review* 36: 213–238.

Maser, C. 1996. *Resolving Environmental Conflict: Towards Sustainable Community Development*. Delray Beach, FL: St. Lucie Press.

Mashaw, J.L. and D.L. Harfst. 1990. *The Struggle for Auto Safety*. Cambridge, MA: Harvard University Press.

Mazmanian, D. and D. Morell. 1992. *Beyond Superfailure: America's Toxics Policy for the 1990s*. Boulder, CO: Westview Press.

McClellan, M. 1996. "A Sampling of the West's Collaborative Efforts." *High Country News* 28(May 13): 3 (http://www.hcn.org/1996/may13/dir/Feature_A_sampling.html).

McFarland, A.S. 1993. *Cooperative Pluralism: The National Coal Policy Experiment*. Lawrence: University Press of Kansas.

McGarity, T.O. 1992. "Some Thoughts on 'Deossifying' the Rulemaking Process." *Duke Law Journal* 41: 1385–1462.

Melnick, R.S. 1983. *Regulation and the Courts*. Washington, DC: Brookings Institution.

Milgrom, P. and J. Roberts. 1992. "Bargaining Costs, Influence Costs, and the Organization of Economic Activity." J.A. Alt and K.A. Shepsle, eds. *Perspectives on Positive Political Economy*. Cambridge: Cambridge University Press, 57–89.

Miller, G.J. 1992. *Managerial Dilemmas: The Political Economy of Hierarchy*. Cambridge: Cambridge University Press.

Mitchell, R.C. 1991. "From Conservation to Environmental Movement: The Development of the Modern Environmental Lobbies." M.J. Lacey, ed. *Government and Environmental Politics*. Baltimore: Johns Hopkins University Press, 81–114.

Mosher, F.C. 1982. *Democracy and the Public Service*, 2nd ed. New York: Oxford University Press.

Municipality of Anchorage. 1992. *Paying for Federal Environmental Mandates: A Looming Crisis for Cities and Counties*. Anchorage, Alaska (September).

National Academy of Public Administration. 1994. *The Environment Goes to Market: The Implementation of Economic Incentives in Pollution Control*. Washington, DC.

National Academy of Public Administration. 1995. *Setting Priorities, Getting Results: A New Direction for EPA*. Washington, DC.

National Governor's Association. 1989. *Funding Environmental Programs: An Examination of Alternatives*. Washington, DC. Natural Resources Policy Studies Unit.

National Performance Review. 1993. *From Red Tape to Results: Creating a Government that Works Better and Costs Less*. Washington, DC: U.S. Government Printing Office.

Noah, T. 1996. "Both Parties Paint Themselves Green, but Trend of Looser Environmental Rules Is Seen Continuing." *Wall Street Journal* (September 9), A20.

North, D.C. and B.R. Weingast. 1989. "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in 17th Century England." St. Louis: Washington University Political Economy Working Paper 29.

Osborne, D. and T. Gaebler. 1993. *Reinventing Government*. New York: Penguin Books.

O'Toole, L.J., Jr. 1994. "Implementing Public Innovations in Network Settings." Paper presented at the conference on Network Analysis and Innovation in Public Programs, University of Wisconsin—Madison (September 30–October 1).

Piore, M.J. and C.F. Sabel. 1984. *The Second Industrial Divide*. New York: Basic Books.

Polkinghorn, B. 1995. "The Influence of Regulatory Negotiations on the U.S. Environmental Protection Agency as an Institution." Presented at the 1995 American Political Science Association meeting, Chicago.

Porter, M.E. 1993. "The Clean Air Marketplace 1993" [keynote address]. In *The Clean Air Marketplace 1993: Conference proceedings*. Washington, DC: U.S. Environmental Protection Agency (September 8–9): 31–47.

Pritzker, D.M. and D. Dalton, eds. 1990. *Negotiated Rulemaking Sourcebook*. Administrative Conference of the United States. Washington, DC: U.S. Government Printing Office.

Protasel, G.J. 1991. "Resolving Environmental Conflicts: Neocorporatism, Negotiated Rule-making, and the Timber/Fish/Wildlife Coalition in the State of Washington." In M.K. Mills, ed. *Alternative Dispute Resolution in the Public Sector*. Chicago: Nelson-Hall, 188–204.

Putnam, R.D. 1993. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton, NJ: Princeton University Press.

Putnam, R.D. 1995. "Bowling Alone: America's Declining Social Capital." *Journal of Democracy* 6(1): 65–78.

Rabe, B.G. 1988. "The Politics of Environmental Dispute Resolution." *Policy Studies Journal* 16(Spring): 585–601.

Rabe, B.G. 1991. "Impediments to Environmental Dispute Resolution in the American Political Context." In M.K. Mills, ed. *Alternative Dispute Resolution in the Public Sector*. Chicago: Nelson-Hall, 143–163.

Rabe, B.G. 1994. *Beyond NIMBY: Hazardous Waste Siting in Canada and the United States.* Washington, DC: Brookings Institution.

Redford, E.S. 1969. *Democracy in the Administrative State.* New York: Oxford University Press.

Rees, M. 1993. "The Mandate Millstone." *Wall Street Journal* August 18, A12.

Scholz, J.T. 1991. "Cooperative Regulatory Enforcement and the Politics of Administrative Effectiveness." *American Political Science Review* 85: 115–136.

Selznick, P. 1957. *Leadership in Administration: A Sociological Interpretation.* New York: Harper & Row.

Singer, L. 1994. *Settling Disputes* 2nd ed. Boulder, CO: Westview Press.

Sirianni, C. and L. Friedland. Forthcoming. *Participatory Democracy in America.* Cambridge: Cambridge University Press.

Suskind, R. 1993. "Health-Care Reform May Seem Like a Bitter Pill to Localities Sick of Unfunded Mandates." *Wall Street Journal*, December 21, A16.

Susskind, L. 1981. "Environmental Mediation and the Accountability Problem." *Vermont Law Review* 6: 85–117.

Susskind, L. and J. Cruickshank. 1987. *Breaking the Impasse: Consensual Approaches to Resolving Public Disputes.* New York: Basic Books.

Susskind, L. and P. Field. 1996. *Dealing with an Angry Public: The Mutual Gains Approach to Resolving Disputes.* New York: Free Press.

Thomas, L.M. 1987. "The Successful Use of Regulatory Negotiation by EPA." *Administrative Law News* 13(Fall): 1–4.

U.S. Bureau of the Census. 1982–83. 71. "U.S. International Transactions: 1960 to 1981." In *Statistical Abstract of the United States*, 103rd ed. Washington, DC, 390.

U.S. Bureau of the Census. 1995a. 373. "Gross National Product, by Country: 1985 to 1993." In *Statistical Abstract of the United States*, 115th ed. Washington, DC, 855.

U.S. Bureau of the Census. 1995b. 319. "U.S. International Transactions, by Type of Transaction: 1980 to 1994." In *Statistical Abstract of the United States*, 115th ed. Washington, DC, 802.

U.S. Congress. House of Representatives. 1996. "An Assessment of EPA's Reinvention. A Report by the Majority Staff of the Committee on Transportation and Infrastructure." September.

U.S. Congress. Senate. 1993. "Taking Stock of Environmental Problems, Part I. Hearings Before the Committee on Environment and Public Works," 103rd Congress, 1st Session (March 24, 31, and July 16).

U.S. Environmental Protection Agency. 1987. "An Assessment of EPA's Negotiated Rulemaking Activities, Program Evaluation Division. Office of Management Systems and Evaluation, Office of Policy, Planning, and Evaluation," December, 13 pp.

U.S. Environmental Protection Agency. 1990. "Environmental Investments: The Cost of a Clean Environment. Office of Regulatory Management and Evaluation, Office of Policy, Planning, and Evaluation," December.

U.S. Environmental Protection Agency. 1994. "The Common Sense Initiative: A New Generation of Environmental Protection." *EPA Insight Policy Paper*, August [EPA 175-N-94-003].

Vogel, D. 1986. *National Styles of Regulation: Environmental Policy in Great Britain and the United States.* Ithaca: Cornell University Press.

Weber, E.P. 1997. "Seriously Seeking Bureaucratic Accountability Across Time and Within the Context of Contemporary Grass-Roots Ecosystem Management." Paper presented at the Midwest Political Science Association Meeting, Chicago, April 10–12.

Weber, E.P. 1998. *Pluralism by the Rules: Conflict and Cooperation in Environmental Regulation.* Washington, DC: Georgetown University Press.

Weber, E.P., and Anne M. Khademian. 1997. "From Agitation to Collaboration: 'Clearing the Air' Through Negotiation." *Public Administration Review*. 57(5): 396–410.

Weber, E.P., Forthcoming. "A New Vanguard For the Environment: Grass-Roots Ecosystem Management as a New Environmental Movement." *Society and Natural Resources.*

Weingast, B.R. and W. J. Marshall. 1988. "The Industrial Organization of Congress: Or, Why

Legislatures, Like Firms, Are Not Organized Like Markets." *Journal of Political Economy* 96: 132–163.

Wenner, L.M. 1982. *The Environmental Decade in Court*. Bloomington: University of Indiana Press.

Willapa A. 1995. *Completing the Foundation: 1995 Annual Report*. South Bend, WA: Willapa Alliance.

Williamson, O.E. and W. Ouchi. 1981. "The Markets and Hierarchies Perspective: Origins, Implications, Prospects." V. Ven and Joyce, eds. *Assessing Organization Design and Performance*. New York: Wiley.

Wilson, G.K. 1981. *Interest Groups in the United States*. Oxford: Clarendon Press.

This page intentionally left blank

8

Documenting Public Concerns

The Effects of Alternative Methods

Maureen R. McCarney
Kearney/Buffalo County Area Domestic Violence Coalition, Kearney, Nebraska

William D. Schreckhise
University of Arkansas, Fayetteville, Arkansas

Nicholas P. Lovrich
Washington State University, Pullman, Washington

INTRODUCTION

Where complex public policy issues are publicly debated, or where such issues are a source of wide and varying public concern, the argument in favor of an investigative strategy based on methodological diversity prevails. Critics of public opinion research (Bennet 1993) have argued that implicit theoretical assumptions concerning democratic polities, which are a part of public opinion research, necessarily limit the ability of researchers to capture the complexity of citizens' opinions and blind them to the contextuality of opinions people hold about public issues. Methodological diversity avoids these criticisms and supports these critics' assertions by revealing the ways in which specific publics' concerns about particular issues are located in networks of concerns and opinions about other issues. The interrelationships between a variety of issues and concerns, while complex, provide insights that should guide policymakers' decisions by offering a better picture of the preferences and opinions of diverse groups of citizens about the implementation of policy. Additionally, these criticisms are pertinent not only to the study of public opinion, per se, but also to studies whose aim is to elicit public concerns attendant to policy decisions. Moreover, taking into consideration the technological complexity inherent in matters of environmental policy formulation and implementation, such methodological diversity is especially relevant in gathering public concerns regarding matters in this policy area.

The origin of these concerns about capturing the complexity and contextuality—the breadth and depth—of the opinions of various publics lies in the increasing interest in theories concerning the impact on policy of the social construction of political reality through language (Edelman 1971, 1988; Graber 1976; Schneider and Ingram 1993).

These approaches include studies of the ramifications of postmodern critiques to the practice and teaching of policy analysis (Danziger 1995). Like the public opinion arguments concerning complexity and contextuality, postmodern and constructivist discussions are best served by a diverse methodological approach.

In place of a positivist, researcher-centric approach, postmodern scholars advocate a discourse-based, public-centric approach. They view traditional methods of gathering citizens' opinions (like surveys) or chronicling the concerns of particular groups as flawed because of their propensity for revealing opinions and concerns of importance to the researcher rather than the public (Habermas 1989; Warner 1992). For postmodern scholars, the relevance of who sets the parameters of public discourse, what power relationships exist between agencies and their relevant publics and what mechanisms or structures insure the maintenance of those relationships, and how opinions and concerns are chronicled or documented are central questions (Foucalt 1977; Lee 1992). These questions can best be elucidated and understood through the use of a diverse set of methods, especially when that set includes a discourse-based method such as focus groups.

Similarly, for constructivists, the way in which people speak about public issues and societal concerns, the symbols and language that they use, and the naïve theoretical connections they make between causes and effects can only be revealed through a discursive approach. While not as extreme in their disapproval of positivist methods, constructivists see an implicit connection between the way in which different groups construct issues in language and their policy preferences (Bennet 1993; Schneider and Ingram 1993). For example (and to step outside of the realm of environmental concerns for a moment), whether a specific public believes that welfare recipients are lazy or whether that public believes that welfare recipients lack the training necessary to enter the work force has clear implications for the specific policy they will prefer to accomplish welfare reform. Constructivists argue that it is essential that policymakers understand these implicit causal constructions of social and political issues; otherwise, even potentially good solutions to problems may be viewed as undesirable (Edelman 1988; Bennet 1993).

The aim of this chapter is to outline three methods used in studying public concerns about the environmental restoration and cleanup at the Hanford nuclear reservation in eastern Washington. These methods include legally mandated public participation mechanisms, survey research, and focus groups. We then offer a brief analysis of each method—its shortcomings and strengths—and provide a sketch of some results obtained from each. Finally, we review three specific cases, drawn from Hanford research, emphasizing the insights gained from the use of focus group methods. In each of these case studies, we demonstrate the way in which the use of focus groups, in addition to the other methods, provides insights into the complexity and contextuality of publics' opinions as well as highlighting issues relevant to environmental justice, public discourse, and the social construction of issues. Moreover, because of the multiple methods used, we were able to generate data rich in information—a richness that exceeds that of mere triangulation (Singleton et al. 1988).[1] We argue that these insights drawn from our multimethodological approach are responsive to criticisms of public opinion research and to well-considered postmodern critiques.

In 1994, the U.S. Department of Energy (DOE) was required, under Public Law 103-126, to conduct research at six nuclear weapons production facilities concerning critical waste disposal and cleanup issues. The Hanford site in the state of Washington was one of the sites covered by this national legislative directive. The aim of the research was to elicit public concerns about the facilities and cleanup efforts at the facilities

attendant to budgetary decisions. Already in place were legally mandated mechanisms for public participation.[2] The records of these proceedings were searched by researchers for concerns already voiced by the public, as were selections from the print media concerning the Hanford site. Additionally, Washington State University had conducted survey research about the Hanford cleanup (see Dalton and Lovrich 1993). Public Law 103-126 mandated that focus group methods be employed to gain deeper insight into the feelings of underrepresented and disproportionately affected populations.

These three methods, used in combination, yielded data that allowed for the effective contextualization of opinion about the management of environmental problems at Hanford. It also allowed for a more complex picture of the public's opinion to be drawn. While this research was exceptional in terms of its legislative mandate, the study's methodological implications are indicative of broader applications. Hanford is not atypical in terms of the kinds of groups involved, the level of participation (or nonparticipation) in various processes, or, even, the issues at stake. In focusing on the methodological issues raised by critics of current public opinion research, data gleaned from the Hanford site produced the basis for an argument that these three methods used together provide a deeper and broader insight into opinions about Hanford than any one of them does alone. This argument has obvious application to any situation in which a complex understanding of the public's opinions and concerns is necessary for effective policy development.

This case reviews the reasons for a multimethodological approach based on three distinct cases.[3] In the area of work with tribal organizations, focus group methodology was more consistent with the standard of government-to-government relations required by law. In the case of environmental organizations, the addition of focus group research led to a better understanding of the sources of policy preferences, of the contextualization of opinions about Hanford as well as the sources of conflict between the DOE and those groups. Finally, the focus group research did allow for the contextualization of underrepresented and disproportionately affected groups' opinions. In each of these cases, the addition of the qualitative method—focus groups—yielded important information that had not or could not be obtained in any other way.

THE SETTING

The Hanford Site produced plutonium for the U.S. nuclear weapons arsenal. The facility became operational in 1944 when the site's B-plant began producing plutonium for the bomb to be dropped at the Trinity Test site in Alamogordo, New Mexico and for the bomb to be dropped on Nagasaki (Rhodes 1986; Sanger 1989; Gerber 1992). After World War II, the site remained in operation to continue to supply weapons-grade material for the nation's growing nuclear weapons arsenal until the late 1980s, when the nation's need for plutonium for nuclear weapons waned (CERE 1995).

By the beginning of the 1990s, Hanford's official mission within DOE switched from weapons production to "environmental cleanup." Although a tremendous amount of resources have been employed in the cleanup effort, the process is moving slower than many observers had expected. Cold War plutonium production had left numerous facilities employed in the production process severely contaminated. The DOE has only completed the decommissioning and decontamination of a few of these areas within the larger site. Moreover, there are roughly 55 million gallons of highly radioactive waste at the site, stored in only temporary containers—some of which have leaked, and others

contain flammable substances (GAO 1996). Since 1989, the DOE has spent $260 million to characterize the contents of these containers, although waste characterization has reached the point where only one of the 177 storage tanks holding 240,000 metric tons of radioactive waste has been successfully remediated (Brandt 1996).

To guide the cleanup effort, in May 1989 the State of Washington Department of Ecology, the U.S. Department of Energy, and the U.S. Environmental Protection Agency signed the Tri-Party Agreement (formally known as the Hanford Federal Facilities and Consent Order), which set a timetable for the cleanup of Hanford by the year 2018 (Gerber 1992; CERE 1995; Hanford Update 1994).[4] The Tri-Party Agreement has set forth guidelines for the remediation and restoration of the site, and sets specific milestones for the Department of Energy to meet when cleaning up the site.

Previously, the Hanford site was immune from external review by regional stakeholders or interested parties; however, with the onset of the cleanup effort, numerous mechanisms have been created through which interested groups and parties can comment on the activities at Hanford and express concerns regarding the cleanup of the site, including the subsequent disposition of the land. Specifically, operations at Hanford fall under the *National Environmental Protection Act* (NEPA),[5] *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA),[6] and *Resource Conservation and Recovery Act* (RCRA),[7] all of which allow for interested parties to express concerns regarding the operations of the site (CERE 1995). Moreover, DOE has been required by Congress to create site-specific advisory boards composed of stakeholders at each of the six major DOE installations. The Hanford Advisory Board (HAB) is composed of 33 members and was established in 1993 (CERE 1995).

In addition to these legally mandated mechanisms, Congress directed the Department of Energy, under Public Law 103-126, to conduct an inventory of public concerns at each of the six major DOE installations, through an analysis of previously published documents (by independent researchers), produced during the HAB meetings, and RCRA, CERCLA, and NEPA mandated public comment periods to determine what were the most prevalent risk-related concerns at each of the sites. The six facilities include: Hanford, the Idaho Nuclear Engineering Laboratory (INEL) in southern Idaho, Rocky Flats in Colorado, Fernald in Ohio, Savannah River in North Carolina, and Oak Ridge in Tennessee. Moreover, the independent researchers were to conduct focus groups (both self-selected and randomly drawn) to supplement the information gleaned from the public comment document review and to determine the risk-related concerns of local minority residents. The document analysis and focus group results provide two of the sources for our present analysis. These results will be supplemented by survey results generated by researchers at Washington State University of local area residents regarding their risk-related concerns and other related topics.

THE METHODS OF ASSESSING PUBLIC CONCERNS

The purpose of this chapter is to articulate, in general, the types of risk-related concerns each specific method of data collection will yield. In this case, we are analyzing the results from documents generated through the legally mandated stakeholder concerns articulation processes, surveys, self-selected focus groups, and focus groups composed of naïve subjects.

Public Participation

Stakeholders, as defined by the DOE, are those private citizens affected by past environmental practices. Stakeholders are not only people who live near Hanford, but because of the enormous anticipated costs of cleanup, they are all taxpayers. This is the conceptualization of stakeholder that is used in the broadest scoping process. In the case of Hanford, this idea of stakeholder allows for the definition of a study area that includes locations remote from the Hanford site such as Portland, Oregon; Seattle, Washington; Spokane, Washington; and Lewiston, Idaho. This broadest idea of stakeholder, and its attendant scooping criteria, is incorporated into the public participation process at Hanford. This broadest of scooping definitions affects public hearings, meetings, and Environmental Impact Statements and is the reason the HAB scheduled its meetings in Portland and Seattle as well as the Tri-Cities area.

The structural context within which these public participation opportunities occur is the Hanford Federal Facility Agreement and Consent Order, commonly known as the Tri-Party Agreement. The Tri-Party Agreement was first signed in 1989 and is periodically renegotiated. The agreement integrates RCRA, CERCLA, and Washington state's *Hazardous Waste Management Act*[8] (HWMA) requirements on the site, defines relationships among the three parties, and provides a procedural framework for schedules, project management, dispute resolution—and most important for our efforts, public participation (DOE 1993; HAB n.d).[9]

In addition to the Tri-Party Agreement, the DOE at Hanford is regulated under various federal statutes and regulations, many of which require public participation and stakeholder involvement in decision making at the site. The CERCLA, and subsequent *Superfund Amendments and Reauthorization Act*[10] (SARA) amendments, provide statutory authority for the cleanup of sites not currently in operation, which allows for stakeholder involvement through community right-to-know provisions. The *Resource Conservation and Recovery Act*, which primarily focuses on the transportation, storage, and disposal of hazardous wastes, allows for stakeholder involvement and public participation by providing public access to facility investigation information. Most noteworthy, NEPA established the requirement that governmental agencies conduct reviews assessing the impacts of their actions on the environment. The DOE facilities that produced nuclear weapons materials came under the jurisdiction of NEPA in 1990 (by order of the headquarters office of DOE). The detailed Environmental Impact Statements (EISs) required under NEPA provide for stakeholder involvement at two points in the EIS drafting processing (Carter and Willard 1993). First, in the scoping process, stakeholders can voice their concerns regarding the degree to which the process must be considered.[11] Moreover, before publishing the final EIS, agencies must first publish a draft EIS on which concerned stakeholders may comment.

Even to the casual observer, the creation of public involvement mechanisms and their subsequent jurisdiction over the DOE would be a tremendous improvement over the previous mode of decision making in which there was virtually no stakeholder involvement in the past (Schreckhise 1993). Moreover, in a previous study, Kraft and Clary (1993) examined the public comment process in the high-level nuclear waste repository siting process in four states (including Hanford). They examined the content of those concerns and found, despite prevailing wisdom, that those individuals often expressed well-articulated and technically and scientifically sophisticated opinions and concerns. This is to the benefit of the participation process; it allows for a good deal of sophisticated discussion by those individuals most directly concerned.

Problems with the current public participation provisions include the systematic overrepresentation of some groups and the chronic underrepresentation of others. Because participants in the public hearing process are self-selecting, there has been some concern about the representation of the opinions and concerns documented in public hearing processes. There exists a substantial body of evidence that suggests that those individuals with higher incomes and more education are more likely to participate in conventional forms of political behavior (Schattschnieder 1960; Verba and Nie 1972; Wolfinger and Rosenstone 1980). Because participation in one of the legally mandated mechanisms for public involvement would fall into that logical category, there does exist a potential disparity in the levels of participation registered by individuals across demographic categories. Whatever biases are present generally are likely to be even greater in the case of the highly technical and scientifically complex setting of DOE nuclear weapons facility hearings.

Although we cannot determine the income or educational attainment characteristics of those individuals who have participated in the process, we can infer from the types of concerns expressed by the participants the types of individuals who have participated. The concerns most commonly expressed in the public participation process were of a fairly technical nature; commentors were distrustful of the DOE's commitment to meeting specific agreements made in the Tri-Party Agreement; there was considerable concern expressed regarding the public health impacts of long-term radiation exposure; and there was concern regarding cleanup of the carbon tetrachloride plume currently infiltrating the groundwater under the site (CERE 1995). Moreover, over 40% (41.5%) of the individuals with known affiliations who have commented in public participation documents reviewed between 1989 and 1994 were speaking on behalf of an organized interest group.[12] It is quite likely that the officials reviewing this public testimony in the DOE are cataloging concerns that are not fully representative of the overall population affected by Hanford activities. Because this potential exists with the public participation process, we will consider the strengths and weaknesses of the randomly drawn survey to compensate for this danger of unbalanced representation.

Surveys

To counter the activity of organized interests and to gain an understanding of a much broader cross-section of the citizenry, surveys have been touted as an effective means of communicating concerns and interests to government (Verba 1996). Many researchers consider the great number of surveys done by media organizations and academic researchers as a most positive development. For example, the 1996 president of the American Political Science Association considered public opinion surveys as holding "a mirror up to the nation" (Verba 1996: 3). The randomly drawn survey has the capability of accurately articulating the demands and interests of a widely dispersed population (Singleton et al. 1988).

A region-wide survey of a randomly drawn sample was conducted by researchers in the Division of Governmental Studies and Services at Washington State University in the spring of 1993 to examine the concerns expressed by area residents toward the Hanford site. The survey involved 1532 individuals contacted by mail; a response rate of 60% was attained in a three-wave survey effort following the "total design method" developed by Dillman (Dillman 1978). Samples were drawn from a city adjacent to the site (Richland, Washington), a city "downwind" from the site (Spokane, Washington),

and a special sample was drawn from a region adjacent to the site (Yakama Indian Reservation) where high concentrations of Native American and Hispanic (overwhelmingly Mexican-American) residents are located. Most prominent among the concerns expressed by survey respondents were those regarding safe storage and disposal of nuclear wastes (83.3% indicated that it was a "major" to "slight problem"); cynicism and distrust directed toward the DOE (45.5% of respondents mistrusted the agency either "mostly" or "completely"); and one-in-six respondents believed that past environmental pollution attributable to Hanford operations had adversely affected their own health or the health of their family.

Although surveys can provide a *better* means of determining the concerns of the overall population, there is still concern regarding their overall representation. According to Groves (1988), surveys suffer from four main sources of error, each of which can inhibit the generalizability of the survey findings. These are coverage error (due to use of misdesigned samples), nonresponse error, sampling error (caused by measuring a subset and not the population (subset may be different from the population), and measurement error (from interviewer effects, poor questionnaire format or unclear wording, mode of data collection). However, there are means by which each of these types of error can be minimized. Coverage error can be minimized through increasing sample size, sampling error can be minimized by ensuring the sample being measured is a representative sample of the population, and measurement error can be minimized through the use of a variety of standardized and normed attitude scales. However, despite the methods that can be employed to minimize these types of errors, nonresponse error can still be a source of trouble when wishing to accurately assess the feelings of a large population. This is especially the case with mail surveys.

Nonresponse error occurs when the individuals responding to a survey differ significantly from the nonrespondents. Because respondents and nonrespondents often differ, the results of the survey are biased to an unknown degree (O'Neil 1979; Kalton 1983). Previous research in this area has found that individuals with specific demographic characteristics tend to be less likely to participate in surveys. These include individuals under the age of 25 years (Dohrenwend and Dohrenwend 1968), individuals whose parents were born outside of the United States (Dohrenwend and Dohrenwend 1968), and residents of inner cities (Kalton 1983). Men have been found to be less likely to participate in surveys than women (Groves 1988; Smith 1979), as have individuals with less education (Dillman 1978). This observation is of particular concern because surveys are designed to target those individuals who usually do not participate in the standard public participation processes, and many of these variables of nonresponse (such as education) are correlated with the probability an individual will participate in matters of political concern. Consequently, although the survey may make great gains over the traditional forms of participation in bringing in groups usually excluded from the public meeting process, it only goes so far in accomplishing that goal (Groves 1988; Kalton 1983; Dillman 1978; O'Neil 1979).[13]

Moreover, there does exist a possibility that only those individuals with the greatest interest in the issue at hand will participate in surveys, thus hampering attempts to assess the concerns of those who do not participate in the standard mechanisms for participation. In a study utilizing mail surveys, followed up by telephone interviews for those not responding to the first mail attempt, Loomis and King (1994) found that those who had returned their mail surveys possessed differing preferences on matters of natural resource policy than did those respondents who failed to return their questionnaire and required

telephone follow-up. This difference was only slightly reduced when the demographic differences between the mail respondents and telephone respondents were controlled. The difference was most likely caused by the fact that respondents to mail surveys (as opposed to telephone or door-to-door surveys) are much more prone to "self-selection" bias—that is, those with the greatest interest in the issue-at-hand will be most likely to respond to the survey contact. The skewing of the results of the survey away from the actual population parameters is a serious danger under these circumstances. This problem is of great concern because evidence exists that suggests that participation in all forms of surveys is decreasing in recent years (Steeh 1981; Groves 1988).

Another criticism of surveys is directed toward their superficial nature. Surveys allow only a cursory examination of the issue being examined; unless the survey is designed to be so long that the likelihood a large proportion of its recipients will complete it will go down, there is little chance researchers can gain a deep understanding as to why the respondent possesses the opinion he has (Verba 1996; Zaller and Feldman 1992; Converse 1964). There are those researchers (see Converse 1964) who argue that most individuals do not possess any thought-out opinions toward many of the issues of the day and as a consequence will report their preferences on surveys in a largely random manner. Zaller and Feldman (1992) determined that respondents are often forming "semi-opinions," and although they are not reporting their preferences in an entirely random manner, they are still highly inconsistent with their opinions because they are disproportionately influenced by such things as the salience of the issue and the question-wording of the survey. In any case, these researchers have branded the survey instrument as being incapable of reaching the underlying attitudes of the respondents, occasioning the need for a much more sophisticated manner of measuring opinions concerning public affairs and their underlying attitudes. Such a method ought to allow the researcher to probe more deeply into the respondent's answers and determine the underlying logic and reasoning the individual possesses for his or her opinions. To such a method we shall now turn.

Focus Groups

While surveys aid researchers in determining what people think, they seldom succeed in getting at why individuals believe as they do. Focus groups are uniquely suited to understanding both what people think and why people think as they do. Because of their group setting, they allow the deepest possible examination of the reasons people hold the ideas they do. Because they do not seek consensus, focus groups find the differences between people's opinions about the same issues as interesting as their similarities. What the researcher surrenders in terms of control—both over the participant's responses and over the data that emerge—he or she more than regains in terms of the depth of the participant's responses. Where the major concern of the research is to glean information of the broadest possible scope that tries to free itself from past or conventional wisdom on an issue, focus group methods recommend themselves as the most participant-oriented.

Three types of focus groups were conducted as part of the Hanford DOE research under Public Law 103-126. The first type included participants randomly drawn from underrepresented or disproportionately effected groups residing in the Hanford region. These focus group sessions were facilitated by professional personnel from a private market research firm. The second type included participants from categories of persons already active in other public participation opportunities—including state regulators, local government officials, environmental groups, and site workers. A special focus group

format was created for discussions including the Native American groups. The special format of the latter group reflected a respect for the nation-to-nation status obtaining between tribal governments and the U.S. federal government. Both these types of groups were recruited and facilitated by Washington State University researchers.

Focus groups have been used primarily in marketing research, but their origins lie in the social sciences (Merton and Kendall 1946; Merton et al. 1956; Lazarsfeld 1972). In the spectrum of qualitative methods, focus group methods occupy a position between participant observation and individual interviews. Their strengths and weaknesses in comparison and contrast to these other methods reflect this intermediary position (Morgan 1988; Kreuger 1994).

The advantages of focus group discussions compared to participant observation turn mainly on the flexibility of the settings that can be arranged for focus groups (Morgan 1988). Participant observation methods require a naturalistic setting to be successful; focus group settings can vary from the most formal marketing research facilities to the least formal class or other common room environment. The focus groups conducted by Washington State University researchers took place in settings that varied from hotel conference rooms in the Richland, Washington area, to classrooms at the Washington State University Tri-Cities branch campus. Focus groups recommended themselves as preferable to participant observation because of the diverse settings from which the participants were drawn.

Focus groups' main advantage over individual interviews is that focus groups derive from a participant-oriented perspective. This means that focus groups allow for, encourage, and emphasize the interactions between and among participants rather than just the responses of a single participant. It also means that focus groups' great strength is that the locus of control for the direction of the discussion derives from the participants' responses and interactions (Morgan 1988). The facilitator of a focus group retains the latitude for pursuing topics that are important to the participants as well as those of primary research interest. What focus groups, properly conducted, add in terms of methodological diversity is an awareness of the discourse-based nature of the public's opinions. Their orientation toward discourse and discussion means that they are able to get at both what participants think, as do survey methods, and why participants think as they do. This special strength is the source of our advocacy for their inclusion for two larger theoretical reasons.

First, consistent with the preceding discussion of critiques of public opinion research, focus groups allow for the contextualization of people's opinions. In the course of discussing various nuclear waste cleanup issues, researchers at the Hanford site were able to see how these concerns were located in the broadest context of general environmental concerns, concerns about the economic future of the area surrounding the Hanford site, concerns about the future uses of the land contained within the site, and concerns about the relationship between the DOE and DOE contractors at the site and the larger community. In achieving an awareness of what participants thought about the Hanford cleanup, researchers also gained insight into the ways in which different groups constructed their aims, goals, and accomplishments related to the cleanup. Of this particular strength, more will be said in the context of the focus group case studies.

Second, consistent with the preceding discussion of the postmodern critique of the social sciences, the orientation toward participant control over the discussion reduces researcher biases and predispositions to particular responses. Postmodernism's criticism of the implicit power relationship of researcher to participant and its impact on the con-

tent of subjects of study responses is mitigated by a focus group's participant orientation. Similarly, postmodern criticism of the prevailing wisdom that too often guides research in terms of its assumptions is also mitigated by this participant-centered method. It does not accord a preference to the conceptualizations of the researcher over those of the participant. This observation conforms to Kreuger's (1994) statement that focus groups are useful especially where "there is a communication or understanding gap between groups or categories of people. This gap has a tendency to occur between groups who have power and others who do not" (Kreuger 1994: 44).

Although the use of focus groups aids researchers along these lines, two basic disadvantages occur with the selection of focus group methods. First, for groups already participating and in an oversampled population, there was some difficulty in getting participants, especially in those groups recruited and directed by the researchers. Second, focus group data are not generalizable in the same way that survey data are. There are also limitations on the quantifiability of the data received, and this, in turn, limits the types of analysis that can be done with focus group observations.

These two shortcomings, however, do not mean that focus group data are not useful in and of themselves. Focus group data are particularly useful in the contexts that have already been discussed. Where the researcher's emphasis is on discovering the nature of the discourse (what people think and why people think as they do) about a specific issue or where cognitions are of primary interest (how people construct the issue in language and how this contributes to their preferences for certain types of policies), focus groups have advantages that far outweigh their shortcomings. In addition to those advantages already mentioned, focus groups can also be used to guide methods that may be both more generalizable and more quantitative in their emphasis.

DISCUSSION

By using these three methods of collecting data, we were able to acquire information that was extremely rich in analytical possibilities. We were able to collect the complex rationale for the highly technical concerns expressed by the individuals commenting through the standard public participation process. We were able to collect data on citizen concerns that are fairly representative of the entire region of eastern Washington, and we ourselves were able to probe more deeply into the logic behind the attitudes and opinions held by our focus group members, all the while concentrating on those disadvantaged groups of citizens who were disproportionately affected by operations at Hanford.

Such a multimethodological means of data collection is important for two more reasons. First, the DOE is undertaking the monumental task of rebuilding public trust after over a decade of reports of past intentional radiation releases (GAO 1993), human radiation experiments (Conahan 1994), safety violations (D'Antonio 1993), whistle-blower harassment (D'Antonio 1993), and gross overexpense by DOE and its contractors (GAO 1996). To reestablish public trust and restore the agency's credibility, the DOE must ensure that all concerns regarding Hanford's past and present are understood in the fullest possible manner, especially those concerns regarding environmental and natural resource protection and public health.

Second, the multimethodological approach outlined here is valuable because it allows researchers and policymakers to capture the complexity and contextuality of public opinion. In all cases, the data obtained from the focus group discussions allow for a

discussion of the positioning of participants' concerns within the context of larger opinion structures. The focus group discussions also allowed researchers to map the complexity of the opinions of different identifiable publics. For example, simple reflection on the types of concerns voiced by all participants finds that there are strong similarities across groups. Surveys are especially adept at discovering this type of consensus about what is wrong or what is right with DOE operations at the Hanford site. Focus groups reflect the different locations and the different levels of complexity of the concerns existing among different groups. Environmental groups active at the site located their opinions and concerns in different opinion categories than did members of the other groups (Group A 2/1/95). The environmentalists' discussion centered on the criticism of the studies done at Hanford, citing methodological reasons. By contrast, downwinders' discussions centered on their fundamental distrust of the DOE and of any DOE report concerning safety at Hanford because of a previous pattern of misinformation and secrecy by DOE officials (Group B 1/19/95).

On a survey, these two groups' opinions about whether the studies of Hanford were reliable might be expected to be largely the same; focus group discussions revealed that this similarity was only superficial. The complex contextual nature of the location of different participants' opinions about targeted issues relative to their opinions in a more general sense is lost in survey research, although it may have a profound impact on the policy preferences that each participant advocates. In terms of environmental and downwinder groups, the responses to their concerns about Hanford are very different. Because they located their criticisms of the DOE in the context of their more general concerns about the methods used to study the environment at Hanford, the environmentalists favor more independent studies rather than those conducted and funded by the DOE. Because of their previous experience with the DOE, downwinders' preferences are for more accountability for the DOE to the local population's health and safety concerns.

The complex nature of people's opinions concerning environmental safety, preservation, or accountability is not unique to Hanford, but rather is common in all situations. Three specific cases illustrate further the importance of the interaction between the need to account for all concerns and the important depth and breadth of information gained by the use of focus groups.

Tribal Governments

Unlike other methods, the use of focus group discussions as a means for discovering concerns about the Hanford site was especially important in the discussions with the Native American tribal governments for two specific reasons. First, focus groups respected the nation-to-nation relationship between the federal government and the tribal governments. In the case of Hanford Native Americans are not considered minority groups; quite to the contrary, federal agreements regard tribal governments as having the same status as other national governments for many purposes. Our focus group participants were not drawn from the tribal population at large, nor were they drawn at random. Focus group discussions conducted by Washington State University researchers were, instead, required to draw their participants from the tribal executives of the Yakama, Nez Perce, and Umatilla reservations. Focus group methods allowed for this respect in a way that survey data or public participation forums did not.

The result of the tribal government focus group indicated clearly that the tribes expect to be accorded "special status" reflecting the trust relationship obtaining between

area tribes and the federal government. Since the Tri-Party Agreement does not specifically include the tribal governments, they have argued successfully, in annual discussions held to review the status of work undertaken under this agreement, that their involvement must be timely and extensive. Of particular concern to the tribes is the issue of *cultural values* being accorded proper attention in the prioritization of work and the assessment of risk associated with Hanford operations (past, present, and future). Tribal government participants emphasized the importance of training of federal and state officials in the obligations associated with the trust relationship, and pointed to new training programs funded by DOE in the form of grants to tribal governments as being highly constructive. The tribal representatives were quite clear, however, in their view that the historical track record of federal authorities on reservations was mixed at best—fostering more disappointments and disillusions than hopefulness—hence their current view is one of cautious optimism that current tribal-sensitive policies will persist vis-à-vis DOE-tribal dealings. The flexibility of the focus group setting allowed the creation of an environment in which tribal government participants were able to act as participants in a formal government-to-government exchange of views apart from the sessions held to solicit the concerns of "minority" citizens.

Environmental Groups

Focus group methods led, in this second case, to a deeper and broader understanding of the opinions of one of most active category of groups at Hanford—environmentalists—in two ways. First, it allowed for recognition of the different contexts of their opinions. For example, some groups located their concerns about the cleanup at Hanford in the larger context of a scientific discussion about the effects of low-dose radiation over time (Group A 2/1/95). Others located their opinions in the context of a more general concern about the condition and preservation of the Columbia River, especially the Hanford Reach—the only stretch of the Columbia River in the state of Washington that has, by virtue of its proximity to the Hanford site, remained virtually untouched by human development.

This contextualization of opinion supported the argument that recognition of the complexity of opinion is also necessary. While each participant may have been able to locate their opinion in the context of their particular interest, in general, the focus group session produced a very complicated discussion and critique of the type of research done concerning risks to the environment and public health at Hanford, as well as at other nuclear weapons production sites worldwide. The methodological concerns articulated within this group focused on three primary types of studies that were "missing" in their view. First, participants were critical of studies that did not account for possible synergistic effects between many different contaminants present on the site. Each taken independently might not exceed EPA standards for safety; taken in conjunction with one another, however, some participants believe that very different results would be obtained.

Second, focus group participants were critical of studies that ignored the possible effects of exposure to low doses of radiation experienced over long periods of time. They thought that DOE was anxious to prove that levels were acceptably low without acknowledging the possibility that exposure to these low doses both by workers and by the proximate population over long periods of time might produced dangerous outcomes.

Finally, they were dissatisfied with the temporal longitude of the studies conducted under DOE auspices. Looking at present generations was not consistent with research findings they discussed that suggested that genetic effects may increase with the passage

of generations. They referred to studies conducted at sites in the former Soviet Union and to studies conducted on the populations of Hiroshima and Nagasaki following the dropping of atom bombs on those cities to substantiate their expressions of concern. These studies revealed an increasing number of genetic difficulties in *later* generations rather than in that generation most directly affected.

These dissatisfactions could be directly tied to their policy preferences concerning DOE accountability and the progress of the DOE-managed cleanup at the site. They refused to accept what they stated was the DOE's (and the federal government's) intention to shift the emphasis at Hanford from a cleanup to a maintenance status. Their main concern was that funding for cleanup and restoration of the site would not be forthcoming from a budget-balancing-oriented Congress and that the effects that they wanted studied would continue to be ignored as a result of these budgetary concerns.

An additional by-product of the focus group research was the discovery that participants made a distinction between the types of responses they might give if asked to speak as representatives of their group or not. Consistency with their past statements was an additional variable that could not be accounted for, and was not even recognized by the other methods. When these groups participate in public forums or as subjects in a survey, their responses may yield unstable results (estimates that are too high or too low vis-à-vis the real population parameters) unless this variable is taken directly into consideration.

Underrepresented and Disproportionately Affected Groups

Public Law 106-126 required that extraordinary efforts be made to inventory the concerns of underrepresented groups and groups that had been disproportionately affected by the site. This legislative provision was due to concern that minorities might be bearing disproportionately greater health effects burdens from the nuclear weapons production sites, yet these groups would likely be less inclined to participate in the standard modes of participation at the site. This concern was due, in turn, to the fact that many studies examining the impacts of environmental pollution have found the poor and minorities to be bearing a disproportionate health burden from pollution as compared to the affluent and the European American heritage population (Baumol 1974; Asch and Seneca 1978; Mohai and Bryant 1992; Pollock and Vitas 1995; West et al. 1992). Moreover, those individuals most affected by environmental degradation have been the least active in the environmental policymaking process (Bailey and Faupel 1992; Robinson 1992). As a consequence of these considerations Public Law 103-126 featured a conscious effort to seek out the concerns of minority group members residing in the vicinity of the six principal nuclear weapons production facilities in the United States.

The focus groups for minority subjects were recruited and facilitated by a marketing research firm. The parameters for drawing participants were designed to insure that the groups finally assembled would be both representative of the population as a whole and randomly drawn from that population. In this way, the focus group discussion could more reasonably be considered to reflect that larger population than might more self-selecting recruitment patterns. While no generalizations to the larger population are possible, the focus group discussions could be expected to be useful in guiding research that might make such generalizations possible.

In these groups, participants were inclined to locate their opinions about the

cleanup effort at Hanford in the context of local concerns. These local considerations included the following:

- Concerns that publicity surrounding Hanford might affect property values or sales of agricultural products originating in the region negatively
- Concerns about the ability of the local economies to diversify
- Concerns about neighbors and family members who have experienced or who may experience health problems because of their residence in proximity to the site (Group C 2/3/95; Group E 2/28/95)
- Concerns about the general loss of jobs in the nuclear fields for which many workers have trained (Group E 2/28/95)
- Concerns about a variety of other "environmental" conditions such as the location of a storage facility for nerve gas at Umatilla, Oregon (Group C 2/3/95), the windstorms for which the area is famous (Group C 2/3/95; Group D 1/19/95), and upstream pollution of the Columbia River by paper mills in Canada (Group C 2/3/95; Group D 1/19/95)

This broader definition of "environmental" concerns was one of the most interesting findings emerging from these focus groups. Rather than focusing solely or primarily on Hanford as a source of environmental problems, the participants in these groups opted for a broader definition for environmental concerns, and in some cases evaluated the Tri-Cities as preferable to other areas with respect to environmental values. Some of the participants had previously dwelt in large metropolitan areas, such as Los Angeles, and they found air and water quality in the Tri-Cities area to be superior to those locations.

This observation serves as a very sharp indication of the potential for bias that might confound a study of opinion at Hanford. A researcher interested primarily in the average citizen's response to the Hanford cleanup might easily define the scope of their study so as to exclude these concerns. Except for the mention of wind and dust storms, which are characteristic of that part of Washington state, other sources (e.g., Sanger 1989; Gerber 1992) on Hanford omit these broader environmental concerns. In general, then, it would seem that the broader scope of this definition leads to a more complex definition of "environmental" concerns than is indicated by either surveys, which may overly focus on Hanford, or the public participation processes, which are designed only to address issues directly associated with Hanford and the site cleanup.

This necessarily cursory survey of the principal themes of the focus group discussions only highlights the rich analytical possibilities of such research. In the case of the session with tribal governments, the focus group discussions could be structured in a way that they were respectful of both the status and the traditions of the participants. It allowed for a recognition of the importance of the context of the differences of opinion between the DOE and tribal governments—this context being a perception on the part of the governments that employees of DOE were often disrespectful owing to a lack of understanding of the trust relationship obligations of the federal government and the government-to-government protocols to be followed. This type of analytical approach can only have a positive impact on the analyses drawn from such native peoples' sources. In the case of the environmental groups, the focus group discussion revealed both the complexity and contextuality of these groups' opinions. It produced evidence that the environmental groups, rather than responding solely to perceived environmental conditions at the site, took issue with the *methodology* used in studying those conditions. Finally, in the case of the specifically targeted underrepresented and disproportionately

affected minority groups, the discussion demonstrated a broader scope of environmental concerns than those just tied to the cleanup effort at Hanford. In all these cases, these analytical discoveries could not have been made under any other methodological conditions or with the use of any of the other methods of gathering evidence on public concerns.

CONCLUSIONS

The argument for the use of complementary methods in social science research is an old one. It has long been advisable, where possible, to use a multimethodological approach as a form of triangulation. But this preference for multiple methods as an enhancement has always been advisable rather than necessary. This chapter makes the argument that such methodological diversity is essential where researchers are concerned with gaining insight into differing publics' opinions about sensitive environmental issues. The abbreviated theoretical argument we have made throughout reinforces this idea about necessity. The addition of focus group methods to the investigative arsenal is advisable not only from a cost/efficiency perspective—focus groups are comparatively inexpensive and yield a wide variety of opinions and interactions—but from the theoretical perspectives concerning both public opinion and postmodern critiques of social sciences. The utility of these methods in this context cannot be overstated. They allow for the exploration of the contexts and complexity of opinions held by pertinent groups of citizens. In their participant orientation, they shift the balance of power in a study from the hands of the researcher to the hands of the participant. In this way, they help to minimize researcher bias and provide fresh and rich insights that advance inquiry into public opinion in new and exciting directions.

As we have shown and as we have argued, the addition of focus group methods does not entail the abandonment of other methods, such as sample surveys, but rather allows for an increase in overall content validity. In attempting to gain insight into differing publics' opinions about public policy issues, focus groups assist the researcher in actually measuring what she or he intends to measure.

As a method to recommend to agencies interested in increasing public trust, focus groups, because of their orientation toward the participants, are uniquely applicable, especially when agencies attempt to bridge communication gaps between agencies and the various publics they serve. While at first blush this approach to research may reflect interests that do not seem to be theoretically oriented, we have shown that in fact, this aspiration on the part of agencies is consistent with emerging theoretical perspectives, especially those concerned with the investigation of the social construction of political reality in language. By freeing themselves from unexamined conventional assumptions about the nature of publics, these emerging theoretical models are served by the inclusion of a method that specifically examines the language with which people discuss and construct issues without an implicit preference of the investigator's construction of those same issues. This may seem to be a rather obscure rationale for the selection of a particular method, but it is not. Focus groups allow for the development and testing of models that, because they accept the language of participants, yield both interesting new hypotheses to test and new ideas that inform the research designs that test them.

Finally, the addition of focus groups to research into public opinion and public policy has a normative aspect. This method itself is fundamentally discourse-based. It

encourages participants to act as respected subjects rather than being objectified by the researcher. It allows populations most adversely affected by environmental degradation to speak in their own voices about their concerns and gives relevance and importance to the language and symbols they use. This method shifts attention away from what the researcher or agency has determined should be characteristic of the concerns of various publics and refocuses attention on what these publics say are their concerns.

While we have emphasized the methodological importance of the increasingly accurate profile this multimethod approach provides of public opinion, it also is fundamentally more fair. Actively seeking participants from the poor and minority populations, societal strata that have been traditionally less active in the participation process than other, more fortunate groups, will lead to great strides in minimizing the disparity between who participates in the process and which groups share the greatest burdens. By enhancing discursive participation and through encouraging groups formerly not participating in the policymaking process, it is hoped that the burdens of environmental pollution will be shared more equally across society in the future. In the case of the Hanford site, including members of minority populations and tribal governments has, at the very least, allowed those not previously prompted to express their concerns.

ENDNOTES

1. Because of these goals of the type of research outlined above, it ought to be mentioned at this point that the overall aim of the multimethodological approach is more ambitious than the aims of more traditional methodological triangulation. When conducting triangulation, researchers employ multiple measures of the same concept, or different tests of a particular hypothesis. Our approach not only employs different measures to collect data, thus increasing the validity of our findings, but the different means of data collection (public comment, focus groups, and survey) will allow us to determine different things about what the subjects think and why they believe what they believe. Exactly how the use of these methods renders such information shall be discussed later in this chapter.

2. These requirements for public participation are included in the *Resource Conservation Recovery Act* (1976), the *Comprehensive Environmental Response, Compensation, and Liability Act* (1980), and the *National Environmental Policy Act* (1969).

3. It should be noted the participants selected for participation in each of the focus groups were selected on either the basis of being stakeholders or as members of an identifiable group.

4. The Tri-Party agreement was renegotiated and signed by the three agencies on January 25 1994. Several of the specific goals of the compact were renegotiated, granting the DOE time extensions on several of the specific provisions for cleanup and delaying the target date for site-wide cleanup by 10 years.

5. 42 U.S.C. secs. 4331–4335.

6. 42 U.S.C. sec. 9601 et seq.

7. 42 U.S.C. sec. 6901 et seq.

8. RCW 70.105.

9. The Tri-Party Agreement is occasionally renegotiated to reflect changes in technology, the priorities of the signatories, and to reschedule milestones (or deadlines) missed by the DOE (DOE 1993; HAB n.d).

10. Pub. L. No. 99-499.

11. 40 CFR sec. 1503.1(a).

12. The total number of individuals with known affiliations who commented during this period of time was 130. It ought to be noted there were an additional 334 individuals who offered comments during this time, but their affiliation—or whether they even had one at all—was impossible to determine.

13. It should be noted that there are a number of methods researchers can utilize to minimize nonresponse. For example, stratification can be used, random-digit dialing, and weighting the responses received from members of groups whose responses were lower than those of the overall population (see Dillman 1978). For an in-depth discussion of the rewards and incentives that can be employed to encourage survey participation. Moreover, there does exist evidence to suggest that non-response bias does not affect survey results to a great extent.

REFERENCES

Asch, P. and J.J. Seneca. 1978. "Some Evidence on the Distribution of Air Quality." *Land Economics* 54(3), 278–97.

Bailey, C. and C.E. Faupel. 1992. "Environmentalism and Civil Rights in Sumter County, Alabama." In B. Bryant and P. Mohai (Eds.), *Race and the Incidence of Environmental Hazards, A Time for Discourse*. Boulder, Co: Westview Press, 140–155.

Baumol, W.J. 1974. "Environmental Protection and Income Distribution." In H.H. Hochman and G.E. Peterson (Eds.), *Redistribution Through Public Choice*. New York: Columbia University Press, 93–114.

Bennet, W.L. 1993. "Constructing Publics and Their Opinions." *Political Communication* 10, 101–120.

Brandt, A.L. 1996. "Hanford Celebrates First Nuclear Waste Tank Cleanup." *Spokesman-Review* March 6, p. B3.

Carter, L.F. and W. Willard. 1993. "Issues of Restricted Scope in Social Impact Assessment: Case Study of Assumptions About Impacts of the Proposed Hanford High-Level Nuclear Waste Repository." *Research in Social Problems & Public Policy* 5, 241–266.

Conahan, F.C. 1994. "Human Experimentation, An Overview on Cold War Era Programs." Testimony before the Legislation & National Security Subcommittee, Committee on Government Operations, U.S. House of Representatives. GAO/T-NSAID-94-266.

Consortium for Environmental Risk Evaluation. 1995. *Inventory of Public Concerns at the U.S. Department of Energy's Nuclear Weapons Complex, CERE Interim Public Concerns Report.* Pullman, WA: Division of Governmental Studies and Services, Washington State University.

Converse, P.E. 1964. "The Nature of Belief Systems in Mass Publics." In D.E. Apter (Ed.), *Ideology and Discontent*. New York: Free Press, 206–261.

Dalton, R.J. and N.P. Lovrich. 1993. "Environmental Attitudes and the New Environmental Paradigm." Paper presented at the conference, Critical Masses: Public Responses to the Environmental Consequences of Nuclear Weapons Production in Russia and the United States (September), University of California, Irvine, Irvine.

D'Antonio, M. 1993. *Atomic Harvest*. New York: Crown.

Danziger, M. 1995. "Policy Analysis Post-modernized: Some Political and Pedagogical Ramifications." *Policy Studies Journal* 23(3), 435–450.

Department of Energy. 1993. *Overview of the 1993 Hanford Site Specific Plan*. Richland, WA: U.S. Department of Energy.

Dillman, D.A. 1978. *Mail and Telephone Surveys, The Ttotal Design Method*. New York: Wiley.

Dohrenwend, B.S. and B.P. Dohrenwend. 1968. "Sources of Refusals in Surveys." *Public Opinion Quarterly* 32(1), 74–83.

Edelman, M. 1971. *Politics as Symbolic Action: Mass Arousal and Quiescence*. New York: Academic Press.

Edelman, M. 1988. *Constructing the Political Spectacle*. Chicago: University of Chicago Press.

Foucalt, M. 1977. *Power/Knowledge: Selected Interviews and Other Writings*. C. Gordon (ed.), trans. C. Gordon, L. Marshall, J. Mepham, and K. Soper. New York: Pantheon Books.

Gallup, G. and S.F. Rae. 1940. *The Pulse of Democracy*. New York: Simon.

Gerber, M. 1992. *On the Home Front, The Cold War Legacy of the Hanford Nuclear Site*. Lincoln: University of Nebraska Press.

Government Accounting Office. 1993. *Nuclear Health and Safety, Examples of Post World War II Radiation Releases at U.S. Nuclear Sites*. (GAO/RCED-94-51FS). Washington, DC: U.S. Governmental Printing Office.

Government Accounting Office. 1996. *Nuclear Waste, Management and Technical Problems Continue to Delay Characterizing Hanford Tank Waste*. (GAO/RCED-96-56). Washington, DC: U.S. Governmental Printing Office.

Graber, D. 1976. *Verbal Behavior and Politics*. Urbana: University of Illinois Press.

Group A. 1995. "Public Concerns at Hanford: Environmental Group Focus Group." *Inventory of Public Concerns at Hanford*. New Orleans: Xavier University.

Group B. 1995. "Public Concerns at Hanford: Downwind Farmers Focus Group." *Inventory of Public Concerns at Hanford*. New Orleans: Xavier University.

Group C. 1995. "Public Concerns at Hanford: African Americans Focus Group." *Inventory of Public Concerns at Hanford*. New Orleans: Xavier University.

Group D. 1995. "Public Concerns at Hanford: Asian Americans Focus Group." *Inventory of Public Concerns at Hanford*. New Orleans: Xavier University.

Group E. 1995. "Public Concerns at Hanford: Hispanics Focus Group." *Inventory of Public Concerns at Hanford*. New Orleans: Xavier University.

Groves, R.M. 1988. *Survey Errors and Survey Costs*. New York: Wiley.

Hanford Advisory Board. n.d. *Hanford Environmental Restoration: Questions and Answers*. Richland, WA: U.S. Department of Energy.

Kalton, G. 1983. *Introduction to Survey Sampling*. Newbury Park, CA: Sage Publications.

Kraft, M.E. and B.B. Clary. 1993. "Public Testimony in Nuclear Waste." In R.E. Dunlap, M.E. Kraft, and E.A. Rosa (Eds.), *Public Reactions to Nuclear Waste*. Durham, NC: Duke University Press, 89–114.

Lazarsfeld, P.F. 1972. *Qualitative Analysis: Historical and Critical Essays*. Boston: Allyn & Bacon.

Lee, B. 1992. "Textuality, Mediation, and Public Discourse." In C. Calhoun (ed.), *Habermas and the Public Sphere*. Cambridge, MA: MIT Press, 402–461.

Loomis, J. and M. King. 1994. "Comparison of Mail and Telephone-Mail Contingent Valuation Surveys." *Journal of Environmental Management* 41(4), 309–324.

Merton, R.K. 1987. "The Focused Interview and Focus Groups: Continuities and Discontinuities." *Public Opinion Quarterly* 51, 550–556.

Merton, R.K., M. Fiske, and P.L. Kendall. 1956. *The Fcused Interview*. Glencoe, IL: Free Press.

Merton, R.K. and P.L. Kendall. 1946. "The Focused Interview." *American Journal of Sociology* 51, 541–557.

Mohai, P. and B. Bryant. 1992. "Environmental Racism: Reviewing the Evidence." In B. Bryant and P. Mohai (eds.), *Race and the Incidence of Environmental Hazards, A Time for Discourse*. Boulder, CO: Westview Press, 163–176.

Morgan, D.L. 1988. *Focus Groups as Qualitative Research*. Newbury Park, CA: Sage.

O'Neil, M.J. 1979. "Estimating the Non-response Bias Due to Refusals in Telephone Surveys." *Public Opinion Quarterly* 43, 218–232.

Pollock, P.H. and M.E. Vittas. 1995. "Who Bears the Burdens of Environmental Pollution? Race, Ethnicity, and Environmental Equity in Florida." *Social Science Quarterly* 76(2), 294–310.

Rhodes, R. 1986. *The Making of the Atomic Bomb*. New York: Simon & Schuster.

Robinson, W.P. 1992. "Uranium Production and Its Effects on Navajo Communities Along the Rio Puerco in Western New Mexico." In B. Bryant and P. Mohai, *Race and the Incidence of Environmental Hazards, A Time for Discourse*. Boulder, CO: Westview Press, 153–162.

Sanger, S.L. 1989. *Hanford and the Bomb: An Oral History of World War II*. Seattle: Living History.

Schattsneider, E.E. 1960. *The Semi-sovereign People: A Realist's View of Democracy in America*. New York: Holt, Rinehart & Winston.

Schneider, A. and H. Ingram. 1993. "Social Constructions of Target Populations: Implications for Politics and Policy." *American Political Science Review* 87(2), 334–347.

Schreckhise, W. 1993. "The Mobilization of Citizen Activism at Hanford." Paper presented at the conference, Critical Masses: Public Responses to the Environmental Consequences of Nuclear Weapons Production in Russia and the United States (September), University of California, Irvine, Irvine, California.

Singleton, R., Jr., B. Straits, M.M. Straits, and R. McAllister. 1988. *Approaches to Social Research*. New York: Oxford University Press.

Smith, T.W. 1979. "Sex and the GSS." *General Social Survey Report no. 17*. Chicago: National Opinion Research Center.

Steeh, C.G. 1981. "Trends in Nonresponse Rates 1952–1979." *Public Opinion Quarterly* 45, 40–57.

Verba, S. 1996. "The Citizen as Respondent: Sample Surveys and American Democracy." Presidential address, American Political Science Association 1995. *American Political Science Review* 90(1), 1–7.

Verba, S. and N. Nie. 1972. *Participation in America*. New York: Harper & Row.

Warner, M. 1992. "The Mass Public and the Mass Subject." In C. Calhoun (ed.), *Habermas and the Public Sector*. Cambridge, MA: MIT Press, 378–401.

West, P.D., J.M. Fly, F. Larkin, and R.W. Marans. 1992. "Minority Anglers and Toxic Fish Consumption: Evidence from a Statewide Survey of Michigan." In B. Bryant and P. Mohai (eds.), *Race and the Incidence of Environmental Hazards, A Time for Discourse*. Boulder, CO: Westview Press, 100–113.

Wofinger, R.E. and S.J. Rosenstone. 1980. *Who Votes?* New Haven, CT: Yale University Press.

Zaller, J. and S. Feldman. 1992. "A Simple Theory of the Survey Response: Answering Questions Versus Revealing Preferences." *American Journal of Political Science* 36(3), 579–616.

This page intentionally left blank

9

Decision Analysis Tools

Use of the Legal-Institutional Analysis Model

Berton Lee Lamb and Nina Burkardt
Midcontinent Ecological Science Center, U.S. Geological Survey, Fort Collins, Colorado

Donna Lybecker
Colorado State University, Fort Collins, Colorado

INTRODUCTION

Making decisions on how to manage natural resources is as much an exercise in policy analysis[1] as it is fishery biology, hydrology, wildlife management, or forestry. Conducting a policy analysis means engaging in a complicated modeling process to help decision makers. Helping decision makers in this way has been labeled "speaking truth to power" (Wildavsky 1979). Arriving at the truth is a matter of balancing conflicting objectives, data limitations, and available time so that recommendations help decision makers establish an appropriate course of action.

Although balancing various factors to produce recommendations can be an individual or group exercise, in environmental policy it is most often an interagency problem. In an interagency problem, behavior is conditioned by an organization's mission as expressed in authorizing statutes (Clarke and McCool 1996) and the positions that have been worked out in past interorganizational negotiations (Ingram et al. 1984). To haggle over environmental protection organizations send forth representatives who possess a knowledge of the agency's position and the positions other agencies and groups have taken in similar negotiations. Every negotiator's knowledge includes an understanding of the agency's sources of power, scope of responsibility, and authorities. Agency representatives also know the positions taken in similar cases, means commonly employed to gather and analyze data, and the official relations with other organizations (Lamb 1980). All of this knowledge works together to define an organization's behavior. Knowing what behavior to expect will provide information about the strategy and tactics likely to be employed. Knowing the likely negotiation behavior of others allows for the design of an effective bargaining strategy (Clarke and McCool 1996; Wilds 1990).

Individuals attending an interagency bargaining session represent their organization. The most common predictor of the outcome of such a negotiation is power (Lamb and Doerksen 1978). Power in interagency natural resource negotiations may have many forms, but chief among them are the powers that accrue to the organization itself (Burkardt et al. 1997). For example, a person may have a magnetic personality but work for an agency that has only a minor interest in the conflict. In such a situation individual effectiveness will be limited by the organization's position in that negotiation.

Lamb and his colleagues (1993) developed an institutional analysis model that builds on the findings of a long tradition of research in bureaucratic decision making. This model has been used by practitioners to help parties understand the policy implementation issues they face and by scholars to analyze previous implementation cases. This chapter includes an explanation of the model and provides three case histories that illustrate its use.

INSTITUTIONAL ANALYSIS METHOD

Effective negotiation requires accurate and practical analysis of an organization's likely conduct; this can be thought of as "institutional analysis" (Nierenberg 1973). Too often, such analysis is either descriptive instead of behavioral, or ideological instead of objective (Ingram et al. 1984). An analysis that is too descriptive concentrates on listing the parties, along with their official mission, authorizing statutes, and duties. An overly ideological analysis focuses on statements about how an organization's position is good or bad. Appropriate institutional analysis seeks to determine actual negotiation behavior and identify opportunities for conflict resolution.

The Legal-Institutional Analysis Model (LIAM; Lamb et al. 1993) postulates sources of agency power (e.g., legal authorities, physical control of water, constituency, and expertise) and primary decision strategies.[2] These concepts are used to predict behavior for each organizational role. Roles include "advocates," which demand change in the traditional decision processes; "guardians," which seek to protect the status quo (especially by relying on time-tried decision processes); "brokers," which seek to manage decisions through trade-offs and bargaining; and "arbitrators," which endeavor to make objective, court-like decisions. The model identifies which roles are present and weighs each role in light of various power factors. Using LIAM involves four tasks: describing context, determining roles, calculating power, and assessing strengths and weaknesses.

Tasks in LIAM: Context

There are two policymaking contexts in which the "game" of natural resources management is played. One is "distributive politics," in which success is determined by such things as "fair share," "base," and "legitimacy" (Lindblom 1959; Ingram 1972; Wildavsky 1975). In this game, winning means ensuring that all legitimate parties have some minimum base (i.e., share of the spoils). As the total potential rewards grow, each party can be assured of its fair share as a proper increased payoff over the base amount. A natural resource problem can be thought of as a game to divide the rewards from any project, regulation, or management scheme so that all legitimate players get some benefits. Distributive politics is the traditional decision pattern in natural resources management (Ingram and McCain 1977).

The other policymaking context is "regulatory politics" (Lowi 1969). Typical decisions in this arena are based on objective, reasoned analysis. The idea is not to divide resources among traditional players, but to decide who is "right or wrong." That is, choice is related to fact, equity, and precedent. Obviously, behavior of the parties is different in this arena than in distributive politics. The courtroom, with its strictly defined adversarial procedures, is a typical regulatory game.

Distributive and regulatory politics are the two most common contexts for natural resource decision making. These two contexts form opposite ends of a continuum; distributive politics on one extreme and regulatory politics on the other. All the parties to a dispute can be placed on the continuum. Parties that favor distributive politics, work with traditional allies, and ignore new players are typical of the Guardian-Broker role. Players that have been historically left out of distributive politics or believe they may be treated unfairly by traditional parties are typical of the Advocate-Arbitrator role. In distributive politics the norm is to work with traditional allies under the rules of base and fair share, to bargain out the distribution of benefits that will flow from a decision. Under regulatory politics, an Advocate overcomes its lack of a seat at the bargaining table by appealing to an ultimate decision maker. In this context, bargaining would stop and a court, or central regulatory authority, would decide who receives the benefits. Brokers tend to dominate distributive politics and Arbitrators dominate regulatory politics.

There are three key elements of success in distributive politics that advocates must master: expertise, compromise, and constituency. Some players have expertise and this is often enough for admission to the game (Ingram 1972). Beyond providing a ticket for admission, however, the game rarely allows technical expertise to play a controlling part. Results come from compromise (Ingram and McCain 1977; Benveniste 1972). Although most players have improved their bargaining skills, the skill of compromise is one Guardians have long mastered and often use. As a result, compromise is the shared language of distributive politics. It is common knowledge that constituency has a powerful effect on the shape of compromises. The skill of compromise can be learned, but constituency is an organization's principal source of strength (Clarke and McCool 1996).

Tasks in LIAM: Roles

Organizations are remarkably consistent in bargaining situations (Allison 1971). Golembiewski (1976) noted that "agencies or their units tend to develop distinctive styles, much as individuals do. These styles help determine the policies that get adopted and the decisions that are made, and both policies and decisions strengthen as well as derive from the organization style." The behavior of each organization in a conflict is likely to be consistent with the organization's traditional behavior (Wildavsky 1975). Traditional behavior is expressed through organizational roles determined by mission and support groups (Olive 1981). An important task in conducting an institutional analysis is to determine which roles are likely to be played (Lamb 1980; Wilds 1990).

Arbitrators are organizations that have statutory authority to: (1) establish management plans or regulations, (2) establish the guidelines for preparing plans, or (3) direct the implementation of plans undertaken by others. They rely on data collected by others and make authoritative allocations after hearing evidence from all sides. Brokers, on the other hand, are agencies that have the ability to facilitate bargaining. They are in a position to help or hinder the planning and implementation process. In bargaining they tend to rely on cost-benefit analysis, mechanisms for controlling resource allocation, and

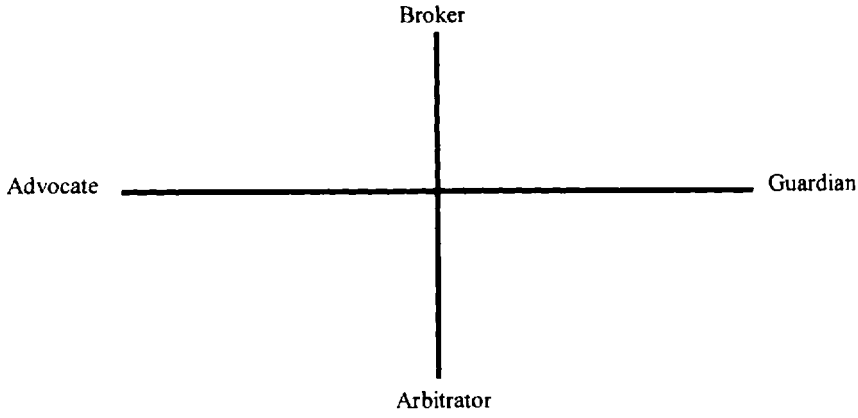

Figure 1 Typical display from the LIAM showing the two dimensions on which roles are predicted.

to some extent political considerations. The latter are important because of the nature of the agencies' support groups. The Broker strategy is to guide the decision making in order to maintain the balance-of-power (Beckett and Lamb 1976; Lamb 1976, 1980).

Advocates and Guardians are the direct competitors in negotiation. Advocates are agencies that call for a change in the status quo approach to natural resources management (Wildavsky 1975). They react to management proposals from others. They may rely on "crusading" and data analysis to advance their position. The factor that distinguishes the Advocate from the Guardian is that the former challenges any agency that seeks to impose a development- or economic-progress philosophy on a project (Lamb and Lovrich 1987).

At the other end of the continuum are Guardians, agencies that attempt to protect themselves and their constituencies from interference. Guardians are interested in preventing challenges to their routines or plans. Guardians work against change in management practice or project design (Wildavsky 1975). These agencies may prefer interest group consultation or public participation. Moreover, Guardians profit from well-established routines and bargaining processes because they have influential supporters who understand existing decision rules (Beckett and Lamb 1976; Lamb 1976, 1980).

Advocates and Guardians condition their behavior to accommodate the presence of an Arbitrator or Broker (Olive 1981). Advocate agencies often develop alliances with Arbitrators because the Arbitrators rely on Advocates for information and opportunity to act. For example, Advocates often provide the opening to initiate planning or the support around which to build a consensus. Guardians often pursue holding actions or seek to use their constituency to show injury from an Advocate's proposals.

Agency roles are typically consistent over time (Doerksen and Lamb 1979). If an agency has been a Guardian in one type of problem, that agency will usually be a Guardian when the same type of problem reappears. This holds true for all roles. But an agency may be a Guardian on one issue and an Arbitrator on another. For example, the U.S. Forest Service plays a Guardian role in decisions about its traditional land use practices. But on issues regarding rights-of-way for others, the U.S. Forest Service becomes an Arbitrator—it uses objective analysis and formal processes to decide about granting permits. The U.S. Fish and Wildlife Service (FWS), Division of Ecological Services, is an

Advocate agency regarding Corps of Engineers projects or endangered species actions, but the FWS, Division of Refuges, is a Guardian in decisions regarding changes to its refuges.

Parties do not always assume the most extreme roles. There may be several reasons for this. First, an organization may have a history of moderate behavior or a low level of interest in the conflict. Second, an organization may have a particularly charismatic leader who has a moderate view of the organization's mission. Such a leader might be able to overcome an organization's otherwise extreme tendency (Kasza 1987). Finally, a party may be so politically weak that it is unlikely to play a major part in the conflict and, therefore, assumes a moderate position.

Tasks in Institutional Analysis: Power

The way a role is played seems to be based on the power of the agency and its stake in the problem. Relative power makes a big difference in behavior (Lamb and Doerksen 1978; Clarke and McCool 1996). Agency power can be distinguished by three elements: information, resources, and constituency (Rourke 1969; Lamb and Doerksen 1978; Wilds 1986). Information refers to the ability of an organization to process information, and the ease with which an agency's expressed opinions and policies can be understood. Rourke (1969) called this the "obscurity of means" combined with the "clarity of results." In other words, an agency gains power if it represents a highly technical body of knowledge, which few understand, but can produce results easily understood by many. The power of information means an organization has special expertise, can explain its technical conclusions, and is respected for its knowledge.

Resources power refers to statutory authority, physical control of the resource, legal management responsibility, financial backing, and available personnel. Two more oblique sources of resource power are the frequency and intensity of involvement (Lamb 1976). Frequency of involvement is the idea that experience with an issue is an asset. The more experienced organization has evolved routines, attitudes, and personnel directed to the issue at hand. Intensity of involvement is a measure of how closely the issue stands in relation to agency mission. The closer to agency mission, the more intensely interested is the agency. Intense interest enhances power because an intensely interested organization is one that cannot be easily ignored.

Constituency is the power brought to an organization by its supporters. Here, constituency refers to either political support such as that received from elected officials, or public support such as that from organized interest groups (Rourke 1969; Clarke and McCool 1996). Public support is a measure of how well constituency groups are paying attention to the issue at hand, as well as cohesiveness of the groups, and their astuteness in presenting and advocating their views. The power inherent in these three elements determines the strategies and vigor of an agency. Power is a predictor of success in bargaining (Burkardt et al. 1997).

Tasks in Institutional Analysis: Strength and Weakness

The final task in LIAM is to use the elements of power to predict strengths and weaknesses. The LIAM allows the analyst to construct a strengths and weaknesses list using the elements of power. Table 1 presents a list of typical negotiation powers. Each organization's powers are compared with those of the other parties. An opportunity for action

Table 1 Elements of Resource Power in Environmental Negotiations[a]

Power element	Examples of strong power
Statutory authority	A clear legislative mandate to act
Physical control of resource	Ability to control water flow
Legal control of resource	Designation as implementing agency or land management responsibility
Constituency support	
Political	Legislators favorably disposed to organization
Public	Organized cohesive constituency
Fiscal resources	Adequate budget focused on issue
Personnel	Adequate staffing focused on issue
Frequency of involvement	Experiences with similar issues
Intensity of involvement	Issue close to organization's mission, part of organization's culture

[a]Sources of organizational power in negotiation as described in Lamb and Doerksen (1978), and illustrated for use with LIAM in Wilds (1986).

should be manifested where one party is weak and another strong. Incentive to negotiate should be strongest when power is well balanced. But pressure to concede should be apparent when there is a discrepancy of power (Burkardt et al. 1997).

HOW HAS LIAM BEEN USED?

The LIAM has been used several times to assist decision makers in planning natural resource negotiations. First, the LIAM has been used to enable parties to develop a common understanding of the nature of the conflict. In this application, the parties were asked to operate the model as a group, and the results were displayed and discussed by all. Second, the LIAM has been used by independent analysts to develop an interpretation of an ongoing negotiation for presentation to decision makers. Third, the LIAM has been used as an academic exercise to explore the institutional variables affecting a natural resource policy problem.

LIAM as an Enabling Tool: The Washington Water Power Case[3]

The Washington Water Power Company (WWP) sought to relicense two hydropower projects on the Clarks Fork River in Montana. Because WWP expected considerable opposition to their license applications, they asked researchers from the National Biological Service (NBS) to gather all the parties-at-interest and to conduct an LIAM workshop.

In September 1995, the NBS researchers met with the relicensing team from the WWP. The researchers were approached because of their experience studying Federal Energy Regulatory Commission (FERC) relicensing consultations (Coughlan et al. 1993; Burkardt et al. 1995). The team explained that they hoped to combine two relicensing applications, Cabinet Gorge and Noxon Rapids. Cabinet Gorge's license was due for renewal in the year 2001, Noxon Rapids' in 2005. Studies describing baseline conditions had been completed and WWP hoped to begin the NEPA scoping process early so that the issues would be clearly defined before parties developed firmly entrenched positions. The relicensing team understood that the endeavor was likely to be contentious, but could not be avoided. When an applicant applies for a new or renewal license for a hydroelec-

tric power project, the FERC requires consultation among applicants, federal and state fish and wildlife agencies, and other interested parties (Bearzi 1991). These parties are charged with reaching agreement to the extent possible so the utility can submit an application to the FERC reflecting these agreements. Unresolved issues are left to the FERC to decide, but there are strong incentives to reach agreement before submitting the application. With all of these factors in mind, WWP assessed the situation and the prospect of a several-year-long licensing negotiation and determined that there had to be a better way. They recruited assistance from the NBS in designing a different approach. After some discussion, it was determined that the LIAM workshop would be an effective means of opening the relicensing consultation process. The immediate goal of the workshop was to bring all parties together to share information in a neutral setting without expecting any actual negotiation to occur. The overall objective was to foster an atmosphere of trust and cooperative problem solving that might endure throughout the consultation.

To convene the parties, the NBS researchers recommended "shuttle diplomacy," whereby a designated representative of WWP contacted all identified parties-at-interest to inform them of the planned LIAM workshop and invite their participation. Initial contacts by the WWP representative were made by telephone with follow-up by mail and, occasionally, in person. Prospective attendees were told that the purpose of the meeting was to bring the parties together for a facilitated workshop with the intention of clarifying the goals and objectives of each individual or group. They were also told that researchers from the NBS would conduct the meeting using the LIAM, and the LIAM was briefly described. Each person contacted was invited to nominate other groups for inclusion in the process. Although some voiced misgivings over the process and were suspicious of the intentions of WWP, the individual designated as the shuttle diplomat was skillful in sharing information and encouraging participation. The workshop was scheduled for two days in October 1995. Approximately 30 people attended, representing a variety of interests, including state and federal fish and game agencies, tribal governments, FERC, WWP, state and federal land management agencies, local landowners, and local, state, and national conservation groups.

After introductions and a review of the workshop agenda, participants were asked to brainstorm the issues. The NBS researchers facilitated the conversation and recorded responses. Fifty-eight items were recorded. Although some discussion occurred during this session, the facilitators did not encourage participants to discuss, edit, or prioritize the issue list. The first 10 issues included:

Recreation protection on the reservoirs
Native and nonnative salmonids
Warm water sport fish
Ongoing relations between agencies, nongovernmental organizations, and WWP
Instream flows below the dams
Spawning habitat up- and downstream of the dams
Fish passage
Water quality
Wildlife habitat: terrestrial, aquatic, and avian
Rock Creek mine

The remainder of the list addressed other physical impacts of the project on resources, legal issues, and coordination among various responsible parties. The group brainstormed until they agreed that the issues listed adequately represented the concerns of those with an interest in the consultation.

The next step was to use another brainstorming session to identify and list interested parties. Sixty-six interested parties were named, representing a wide range of concerns. Using this as a starting point, the researchers asked the group to narrow the list of interested parties to a list of stakeholders. Stakeholders were defined as those individuals or groups most likely to be directly affected by the outcome, or those most likely to be actively involved in the negotiation. This exercise resulted in a set of 27 stakeholders.

Having identified issues and stakeholders, the group was nearly ready to perform the LIAM analysis. As a prelude, one of the researchers explained the theory and background of LIAM to the workshop participants. Another researcher then split the participants into three-person teams and explained how to run the LIAM software and perform an analysis. Each team was assigned three stakeholder organizations so that each organization was analyzed by more than one team. The LIAM software prompts respondents to answer a series of questions about the group being analyzed. Questions are randomly selected by the program so that the questionnaire changes each time. The software assigns scores on the Advocate-Guardian scale and the Broker-Arbitrator scale, and places the party on the LIAM role map. Strengths and weaknesses of each stakeholder are also measured as part of the questionnaire.

That evening, the researchers combined responses for the stakeholder organizations and constructed a role map showing the placement of each organization (Figure 2). A listing of the strengths and weaknesses of each stakeholder organization was also compiled. All of this information was displayed on sheets of paper on the walls so participants could review the results, with a separate sheet for each group. Thus, participants could view the Broker-Arbitrator and Advocate-Guardian scores, along with a listing of the strengths and weaknesses of each organization.

The next morning participants were asked to study the posted analysis and write comments on what they saw. This allowed all to see how each stakeholder organization was viewed and to support or question the conclusions. For example, a weakness listed for the U.S. Forest Service was lack of physical control over the resource. Several commented: "Does have physical control," "More physical control; not only the land but [through the Federal Power Act] and the number of recreational sites in project area."

The remainder of the morning was spent debriefing the workshop. Three lines of discussion were prominent. One followed up on the comments written that morning and helped the group to understand the LIAM as a tool for determining what is known and what is unknown about prospective parties to the negotiation. A second line of discussion focused on determining what kind of a negotiation was likely to follow, given parties' placement on the role map. The third explored the question of potential alliances in the negotiation, and how allies might be able to complement one another's power.

How can LIAM help parties understand what is known about others? When groups completed the LIAM questionnaires, many felt unsure of their responses. This uncertainty was translated into role map placements or power analyses that were inconsistent with or challenged by other participants during the debriefing session. Although a source of frustration when completing the questionnaire, this experience revealed an opportunity for identifying gaps in information about others. For example, during the workshop five Native American tribes were identified as stakeholders. Groups assigned to analyze tribes had little information about tribal goals or resources, and did not know if tribes were similar or dissimilar in their preferences. The lesson was that in planning for negotiation it is necessary to fill in these rather dramatic gaps in information. Participants discussed how they would gain additional information: Did a colleague have experience working with tribes? Were there ways to make contact with tribal leaders to learn more about

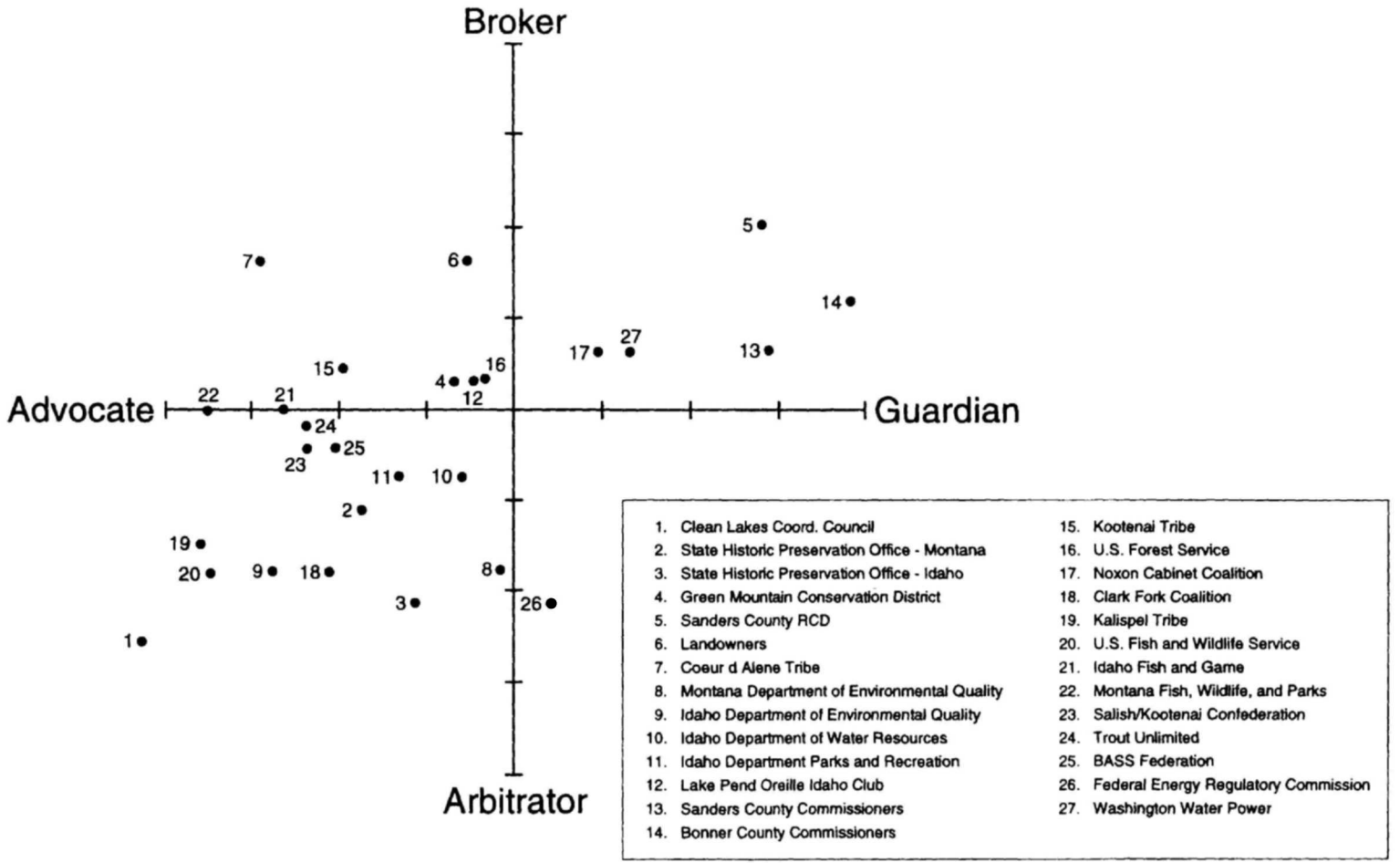

Figure 2 LIAM role map showing placement of organizations: Washington Water Power case study.

goals and preferences? A knowledge gap was evident in analyses of several stakeholder organizations.

How can the LIAM role map help parties to understand what sort of negotiation is likely? Three negotiation strategies can be identified: competitive, cooperative, and integrative (Lamb 1987; Lamb and Taylor 1990). The competitive strategy is the "winner takes all" situation. Parties try to get all that they can while giving nothing to their opponents, and the tone is often mean-spirited. In a cooperative strategy, concessions are made only to the extent that they elicit concessions from others. The tone may not be mean-spirited but it is manipulative. The emphasis is on getting all that can be gained while giving as little as possible. An integrative strategy emphasizes mutual problem solving. The negotiation is seen as a problem to be solved, with opportunities for mutual gain. Generally speaking, the farther apart are parties on the role map, the more likely the negotiation is to be competitive. When parties are far apart on the goal preference dimension, it is difficult to find opportunities for agreement, and it is common to view the negotiation as competitive (Lamb 1987). The WWP LIAM exercise revealed the potential for an integrative negotiation and subsequent to the workshop the parties agreed to use a mediator.

How can the LIAM analysis help parties to understand potential alliances? Parties situated close to one another on the LIAM role map are likely to have similar goals and preferences. Two agencies identified as Advocates are more likely to be in agreement about an acceptable negotiation outcome than are an Advocate and Guardian agency. Thus, in preparing for a negotiation it makes good sense to identify common goals and coordinate efforts with like-minded agencies. It is worth continuing with the analysis and looking at strengths and weaknesses to discern what compatible groups may have to offer one another in terms of support or resources.

More than showing opportunities for forming alliances, the LIAM allowed participants to examine the likely development of opposing alliances. All the participants could quickly make assessments about the strengths and weaknesses of each potential alliance. Discussions among the participants made clear that these calculations were very much a part of their individual deliberations.

At the conclusion of the workshop all parties were promised written documentation of the proceedings. Most parties reported that they had benefited from the session in that they had a better understanding of the absolute necessity of preparation for negotiation. Equipped with information about other parties, they felt better able to make strategic choices and more in control of the negotiation process.

LIAM as Policy Analysis: Klamath River Basin[4]

The Klamath River Fisheries Task Force is charged with developing a plan to restore salmon runs to the Klamath and Trinity Rivers. In this case, NBS researchers performed an institutional analysis of the decision-making process on the Klamath to illustrate the obstacles and opportunities for reaching a satisfactory conclusion to the question of restoring salmon runs. Researchers used the LIAM to conduct this analysis. Instead of a workshop, the NBS personnel asked several natural resource researchers who were familiar with the Klamath River issue—but not a part of the debate—to record their observations in the LIAM format. These observations were displayed as a LIAM role map to brief the Task Force. A written report discussing the LIAM findings was also submitted to the Task Force (Lamb and Klahn 1996).

The Klamath River forms a 15,600-square-mile basin in northwest California and south central Oregon. Although the Klamath basin is sparsely populated, the river is highly regulated and the basin is characterized by logging, grazing, water diversion, and habitat disturbances. This basin historically produced more salmon than any California river except the Sacramento. But salmon populations have declined by as much as 80% in recent decades (16 U.S.C. 460ss [findings], 1986). Salmon population declines have resulted in economic dislocation for the region's sport, commercial, and tribal fisheries.

As a result of these declines, Congress established the Task Force (16 U.S.C. 460ss) to restore anadromous fish runs in the Klamath basin to optimum levels within a 20-year period. As might be expected, a wide variety of agencies and organizations are involved in this restoration effort. Among these is the congressionally established Klamath Council. The Council operates by consensus to allocate and manage the harvest of salmon from the Klamath River basin. All the parties are working to build a policy that will ensure sustainable water use while meeting the conflicting interests of the human communities. This policy question can be boiled down to two ideas: fish and water rights. The parties to this conflict may be categorized in six groups.

First are non–Klamath Project irrigators in Oregon. In the upper Klamath basin, irrigated agriculture has been a common practice for more than 140 years. Water is used in the broad flat valleys of the upper Klamath mainly for flood-irrigating pastures and alfalfa crops. Irrigation water is diverted from streams tributary to the Klamath River. Irrigators vigorously oppose any change in water use as a challenge to property rights and livelihoods. A common view among irrigators is that the federal government should not intervene in the water allocation system.

Second are Bureau of Reclamation irrigators in Oregon and California. The Bureau's Klamath Project is one of the original reclamation projects, established by the act of February 9, 1905 (33 Stat. 714), which authorized the Secretary of the Interior to change the levels of several lakes in the upper Klamath basin. The project was approved by the President in 1911 (36 Stat. 835) and the last Project land was put into production in 1949. Klamath Project irrigators receive as much water as can be put to beneficial use and their views about changes in water use are similar to those of the non-Project irrigators.

Third are the Klamath, Yurok, Hoopa, and Karuk tribes. Tribal interest in sustainable water use is much different from that of irrigated agriculture. The four tribes are consistent in their desire to see changes in the use of Klamath River water. The Klamath tribe historically lived on the shores of Upper Klamath Lake and along the streams and rivers of the upper basin. The two endangered species of suckers in Upper Klamath Lake have religious and economic significance to the tribe. In the tribe's view, water use in the Klamath must change to sustain both traditional ways and modern livelihoods. The Yurok, Karuk, and Hoopa historically lived along the lower 40 miles of the Klamath River. Anadromous fish were the mainstay of these tribal economies and subsistence. Although the cause of decline in the anadromous fish populations is much debated, altered quantity, quality, and timing of flows in the river are considered primary elements. Like the Klamath tribe, downstream tribes view change in water allocation as critical to their traditions and economic stability.

Fourth are fish and wildlife interests. State and federal agencies have an interest in the Klamath basin because of their missions as resource managers and experts on the fishery. Agency perceptions about water allocation reflect their governing statutes. In this role the agencies have contributed information about the needs of the ecosystem,

indicating that some change in water allocation is important to preserve endangered species and a healthy environment (U.S. Fish and Wildlife Service 1992). These agencies include the FWS and the California Department of Fish and Game (CDFG). The FWS manages several wildlife refuges in the basin (most of which have water rights). The purpose of the refuges is to replace habitat lost to Klamath Project development. These refuges are critical to migrating waterfowl. The CDFG operates an anadromous fish hatchery on the river with the assistance of Pacificorp, a privately owned electric power utility, which operates a hydropower dam on the river. The hatchery is to mitigate for lost stocks of salmon.

Fifth are fishery-recreation interests. A number of parties are involved in this issue because their livelihoods depend on an adequate flow of water in the river for fishing and white water rafting. They are concerned about the condition of the streambed, fish spawning, salmon populations, and fish health as well as water quality and the timing and magnitude of flows. These groups include white water guide services, ocean fishers, and sport fishing groups.

Sixth are decision makers. Because it controls the dams and irrigation systems in the basin the U.S. Bureau of Reclamation is one of the primary decision makers. This agency manages the major water supply projects on the system. The Bureau must meet many obligations dictated by federal and state law as well as its contracts with irrigators. Difficulties arise because the majority of water rights in the basin are unquantified and the Bureau's mission has become one of balancing a variety of interests. These include accommodating instream flow needs, needs of the tribes, needs of threatened and endangered fish, and needs of irrigators. The Klamath River Fisheries Task Force and Klamath Council are also decision makers because of their tasks in restoring habitat and regulating the take of fish. Other decision makers include county governments of Klamath County in Oregon and Humboldt, Siskiyou, and Del Norte counties in California, Pacificorp, and two Conservation Resource Management Plan (CRMP) organizations—one for the Shasta Valley and one for the Scott Valley.

Researchers from the NBS conducted a formal review of the statutes and authorities governing water allocation in the Klamath River basin, and visited with as many of the parties as possible during the summer of 1995 (Lamb and Klahn, 1996). Four scientists from the NBS who were familiar with the Klamath basin used the LIAM to record their observations of the involved organizations. The information provided by the four respondents was averaged in the LIAM to display a combined characterization of organizations. All four respondents were able to answer questions for most organizations. However, not all respondents were able to answer for some organizations and for two organizations (Humboldt and Siskiyou Counties) only one respondent provided information. Some parties were not analyzed because the respondents were not familiar with them.

Because only four respondents participated in the LIAM study, the NBS researchers interviewed a number of other people as a means to cross-check the analysis. During January 1996, members of the Task Force's Technical Work Group were surveyed by telephone to learn their opinions on issues related to the restoration of the Klamath River anadromous fishery. Thirteen people responded to this survey. They had no advance warning of the phone calls and were asked four questions:

1. What are the three to four most important organizations involved in the Klamath River fishery issues?

2. Who are the three to four most important people involved in the Klamath River fishery issues?
3. What is the biggest obstacle to restoring the fishery?
4. What should be done to restore the fishery?

Figure 3 illustrates the relative role orientations of the various involved organizations. The 17 organizations are arrayed most prominently along the goal preference continuum, where approximately twice as much distance separates the parties compared to the process preference (Broker-Arbitrator) continuum. This configuration points toward two propensities. First, in the absence of a clear Arbitrator, the issue is likely to be decided by bargaining. Even though several parties would prefer an adjudicated decision, that is unlikely to take effect until the FERC relicensing begins. Consequently, it is expected that the parties will be inclined to look toward the FERC process even before it officially begins. As the FERC relicensing draws near, parties will more openly press for the evidence gathering required by the FERC, trusting that a true regulatory proceeding will lead to an objective decision. In the meantime, there will be interest among the parties in determining whether or not another Arbitrator is likely to take part. This may mean exploration of litigation options. Opportunities for litigation, such as the pending Oregon water rights adjudication, will be an especially attractive focus for some parties.

Without the advent of a court-like decision maker the parties are left with bargaining. In fact, the formal authorities governing the parties strongly lead toward negotiation. A bargaining process would be facilitated by a strong Broker agency, one that would receive benefits from playing the Broker role or that had a clear formal mandate to act as a Broker. The Klamath analysis does not identify such an agency, although one could be imposed on the process by such mechanisms as a congressional resolution, interstate compact, or definitive action by the Secretary of the Interior.

Bargaining is likely to be competitive because the respondents indicated that few parties see much advantage in cooperation. Parties with a stake in preserving the status quo on the Klamath River are those with a vested interest in using water for agriculture and hydropower production. Most likely, these are the reasons respondents indicated that the Bureau of Reclamation and Pacificorp are Guardian organizations. Likewise, Klamath and Siskiyou Counties may have been rated as Guardians because their constituencies are generally involved in agricultural use. These four entities are faced with a wide array of organizations characterized as Advocates by the respondents.

Advocates range from the very extreme role positions of the Indian tribes and FWS to the much less extreme role position of two counties, the CDFG, ocean fishers, and CRMPs. While the Guardians have much to gain, those in the extreme Advocate roles have much to lose from maintenance of the status quo. Both sides of this conflict have claim to legitimate rights, which the extreme Advocates are interested in submitting to an objective decision maker.

Unlike extreme Advocates, most moderate Advocate organizations are willing to pursue bargained solutions. The respondents did not characterize all organizations as holding extreme role positions. A few entities are described as almost neutral regarding goals (i.e., Shasta Valley CRMP, U.S. Forest Service) but favor a bargained solution. In other cases, coalitions might form around Indian tribes and FWS, on the one hand, and ocean fishers, Humboldt and Del Norte Counties, CDFG, and Scott Valley CRMP on the other.

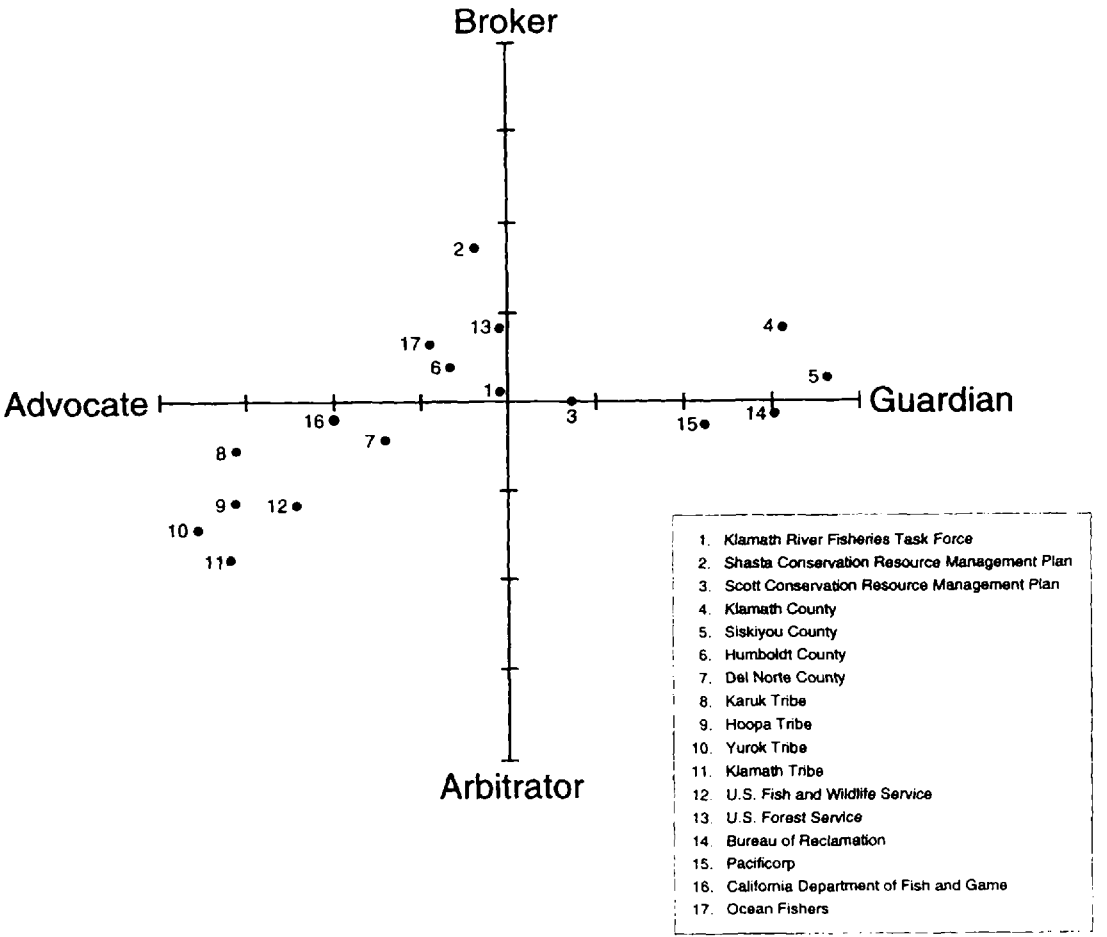

Figure 3 LIAM role map showing placement of organizations: Klamath River basin case study.

Few organizations involved in this issue have very strong physical or statutory control over resources. Exceptions would include the U.S. Bureau of Reclamation (because of its ownership and management of dams and water delivery systems), Pacificorp (because of its dam operations), the U.S. Forest Service (by virtue of its land management), and the FWS (because of its endangered species protection role). Only one organization was given very high marks for popular support (Klamath County). No organization was rated very high for personnel resources and few were seen to be financially strong (an exception would be Pacificorp). It may be relevant that along with complex, overlapping jurisdictional relationships, personnel and funding are also diffusely distributed among the parties. This may be a factor contributing to preferences for an arbitrated solution because arbitration would focus these resources.

Many organizations were rated as very high in experience with this type of issue and the centrality of the issue to their mission (e.g., U.S. Bureau of Reclamation, Hoopa Tribe, ocean fishers, Pacificorp, and CDFG). However, organizations were given very low scores for their abilities to collect, disseminate, or analyze data. While several organizations were thought to have frequently or intensely involved support groups, no one was identified as having a constituency with strong political experience or high levels of general respect.

In terms of overall correspondence between power and role, Guardian organizations were rated as more powerful in terms of resources. The number of times Guardian and Advocates were mentioned as having high power was almost equal. Guardians were noted nine times for very high resource power, while Advocates were mentioned eight times. However, Advocates were mentioned as having low information power much more frequently than Guardians. Advocates received 31 very low scores while Guardians received only five. In terms of information power, Guardians were mentioned five times as having some very high levels of influence while Advocates received no mentions. Very low information power was more evenly shared with Advocates receiving 15 very low scores and Guardians receiving 10. There were widespread high scores for interest group support, with Advocates receiving seven very high scores and Guardians 12. Guardians were mentioned once as having very low scores and Advocates received eight mentions for very low interest group support.

The results of the follow-up interviews showed that the LIAM analysis was fairly reliable as an indicator of obstacles and opportunities. Differences among the parties were pronounced in the interviews in terms of process and goals. Moreover, the differences—although manifested in technical terms—were not principally technical in nature. Rather the debate over appropriate restoration policy was associated with strongly held value differences. On the negative side, a vision had not yet been articulated that could answer the question of salmon restoration without challenging the values of powerful parties. Most interviewees seemed to believe that only win/lose solutions were possible and relied on technical studies as the main hope to cobble together a new vision for the basin. On the positive side, the parties understood the problem faced by the Task Force. Everyone interviewed could describe the major elements of the issue and all seemed to know the range of possible solutions.

LIAM as a Hypothesis: The Lerma-Chapala Water System of Mexico[5]

In Mexico, the Lerma-Chapala water system involves one of the country's major cities and largest natural freshwater lakes. Lake Chapala contains 10% of the nation's supply

of freshwater and many diverse groups rely upon the resources. Organizations and agencies directly or indirectly involved with management of the Lerma-Chapala water resource were identified and categorized. These categories included: agriculture, fishermen, industry, federal government environment division, social groups, tourism, federal government executive branch, state urban development, state rural development, and state environment division. The LIAM analysis was conducted three times for each of these groups. First it was completed by the investigator, second during an interview with representatives of each of the groups, and finally by experts working with the Lerma-Chapala system.

Findings from this LIAM application identified differences in environmental negotiation between the United States and Mexico. Three factors emerged as essential to understanding the negotiations over protection of the Lerma-Chapala water system: centralization of power, personal contacts, and past experiences. These factors enhance the findings of the LIAM analysis and suggest why the typical role pattern in Mexico may differ from that of the United States.

As with other LIAM applications, the Lerma-Chapala study clarified which organizations had similar goal and decision arena preferences. Agriculture, industry, and the executive branch were all characterized as Guardian-Arbitrators. These groups believe in promoting economic progress over environmental values and prefer a regulatory decision arena. The federal environmental division, an Advocate-Arbitrator, prefers the use of scientific and technical data in a weak regulatory environment to protect environmental and nontraditional values. On the other hand, social groups and the state environmental division (Advocate-Brokers) choose to defend the environment and pursue negotiations. This may reflect their lack of direct control over decisions. The fishing and tourism industries were classified as Broker-Advocates, with a tendency to promote the building of political coalitions to protect environmental values. State rural development and state urban development were classified as Broker-Guardian and Guardian-Broker. Each favors becoming part of a coalition to protect their economic interests.

Three conclusions can be drawn from these results. First, it is clear that the majority of the organizations prefer the distributive to the regulatory decision arena. In Mexico, the less powerful organizations increase their influence by forming coalitions for negotiation rather than deferring to arbitration. Second, despite the fact that many organizations prefer coalition building and bargaining, the diversity of Mexico's federal agencies keeps them from working well together. Only two of the five government agencies were found to be the same role type (State Urban Development and State Rural Development) and even these disagreed about their preferences for goals or process. While federal government agencies tend to defer to an arbitrator, state agencies prefer to work within a coalition. Finally, the executive branch appears more interested in development than preservation. This is important due to that branch's high level of power in environmental decision making.

From a reading of the formal statutes and regulations, environmental management in Mexico appears to be diffuse, with state government agencies exercising a measure of self-sufficiency. In fact, the federal executive branch maintains a near monopoly of control (Barragan 1994; Cothran 1994; Bennett 1995). This control is exercised through the formal apparatus of the ruling political party and the informal personal relationships of bureaucrats. These subtle mechanisms of control mean that a natural resources management context that appears distributive is actually regulatory.

The LIAM analysis did not sufficiently reflect this situation. In the Chapala case study, three weaknesses of the LIAM were identified. First, the LIAM did not display

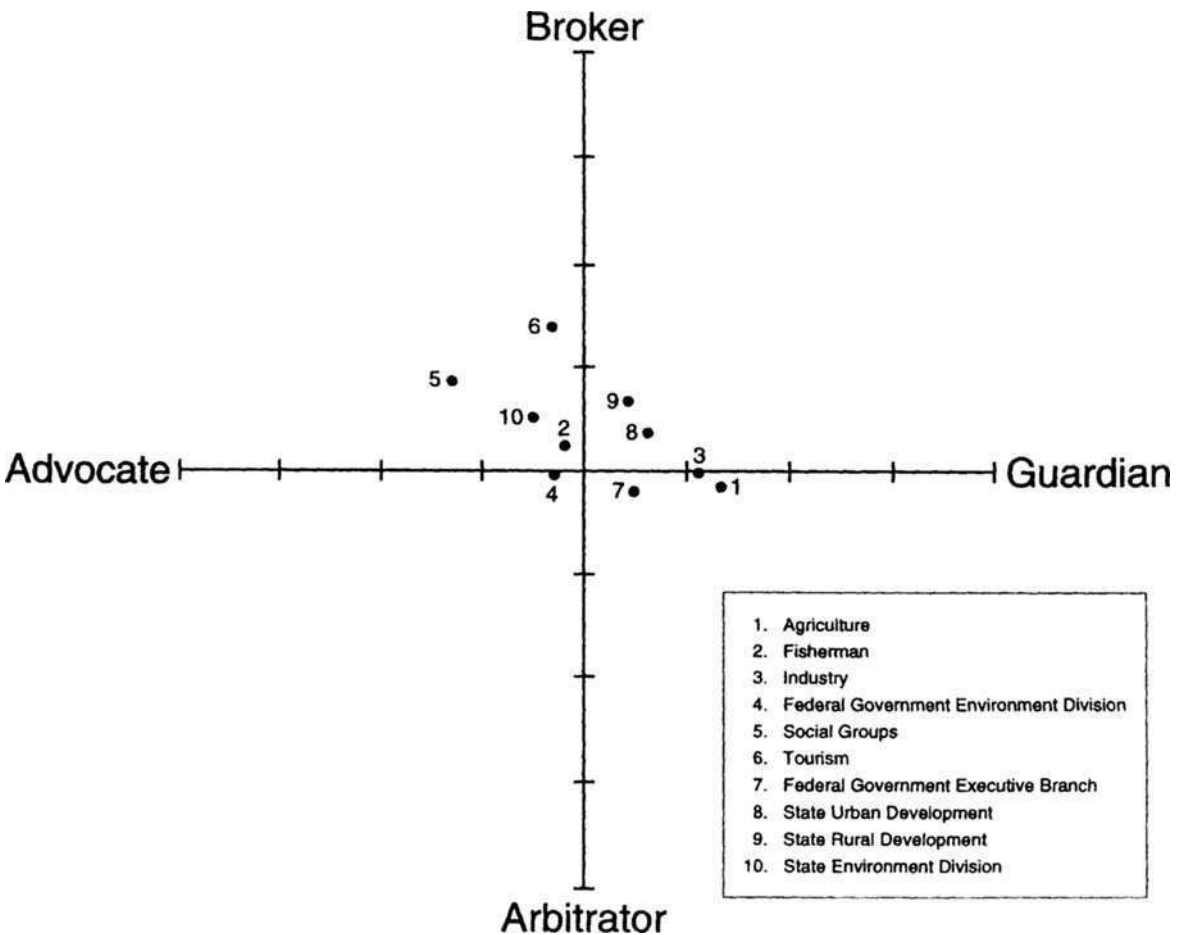

Figure 4 LIAM role map showing placement of organizations: Lerma—Chapala Water System case study.

the centralization of power in the federal government executive branch. This result may be due to the limited number of respondents used in this study. However, an important consideration for users outside the United States may be the way the LIAM calculates power. Questions in the model do not prompt respondents to observe whether or not an organization is dominant, and the LIAM does not weight measures of power. Therefore, the most salient sources of power for administrative control are not highlighted.

In Mexico, the executive branch has unilateral power to decide the outcome of conflicts (Gentlemen 1987; Barragan 1994; Cothran 1994). Because the idea of centralization of power is not incorporated in the LIAM, users may wish to consider political culture when interpreting LIAM results. Moreover, organizations with goals similar to the executive branch (e.g., agriculture and industry) gain power through association with the central power. This relationship must be inferred in the LIAM by observing the closeness of location on the role map and scrutiny of the measures of constituency support. Only one measure in the LIAM identifies similarity of an organization's mission with the dominant hierarchy as a source of power. That measure ("How closely does this organization reflect the policy objectives of current administration?") does not clearly apply to the Mexican situation and cannot be weighted to reflect centralized control.

Second, the LIAM lacks an assessment of personal contacts. This is especially important in Mexico because of the tendency toward centralization of power in the executive branch. Individuals having personal relationships with powerful actors in the executive branch will likely be able to use these relationships to their organization's advantage (Barragan 1994; Cothran 1994). This is particularly true when the executive branch has not established a formal opinion on the issue. Personal relationships help determine each organization's preferred decision arena and may increase the level of information power shown in the LIAM. The association between contacts and information power can be difficult to attribute to personal relationships in the LIAM because (1) personal contacts are not a matter of public knowledge and (2) the LIAM does not query respondents about these relationships. An open interview administered along with the LIAM can help identify when personal relationships should condition the analysis.

Finally, the LIAM lacks a mechanism for explicit evaluation of past experience. In Mexico, the high value placed on public appearances makes an organization's record of past behavior immensely important. Knowledge of earlier involvement in conflicts and their outcomes may illuminate motivations for an agency's negotiation behavior. For example, in Chapala, social groups are traditionally the "losers" in conflicts over environmental amenities. This has tended to push these groups toward more extreme Advocate positions. Although the LIAM is based on the assumption that future behavior will be consistent with past performance, it does not account for what might be termed "compensation behavior." Compensation behavior would be evident when parties strive to overcome their public stereotype. In Mexican culture negotiators are acutely aware of public perceptions of their power in negotiations. The need to save face may encourage behavior that breaks with tradition. The LIAM user might overcome this problem by examining the motivations of each party for incentives to alter traditional roles to compensate for past shortcomings.

ENDNOTES

1. Policy is purposive action taken by public authorities on behalf of or affecting the public (Hofferbert 1974). Policy analysis is an investigation of policy either to determine likely outcomes or to understand how a decision was made.

2. A similar model can be found in the work of Clarke and McCool (1996).

3. The Washington Water Power case was developed from the records of a workshop conducted for the parties by Jonathan G. Taylor, Nina Burkardt, and Berton Lee Lamb in Sandpoint, ID, October 1995.

4. Data collection and analysis of the Klamath River basin case were conducted by Berton Lee Lamb and Sarah Klahn and the full report can be found in Lamb and Klahn (1996).

5. The study of the Lake Chapala case was conducted by Donna Lybecker and is reported in Lybecker (1996).

REFERENCES

Allison, G.T. 1971. *The Essence of Decision: Explaining the Cuban Missile Crisis*. Boston: Little, Brown.

Barragan, P.M. 1994. *Mexico Dependencia y Authorismo*. Mexico, DF: Ms Editores.

Bearzi, J.A. 1991. "The Delecate Balance of Power and Non-power Interests in the Nations' Rivers." *Rivers* 2(4): 326–332.

Beckett, P.L. and B.L. Lamb. 1976. *Establishing Instream Flows: Analysis of the Policy-Making Process in the Pacific Northwest*. Pullman, WA: Washington State Water Research Center.

Bennett, V. 1995. *The Politics of Water: Urban Protest, Gender, and Power in Monterrey, Mexico*. Pittsburgh, PA: University of Pittsburgh Press.

Benveniste, G. 1972. *The Politics of Expertise*. Berkeley, CA: Glendessary Press.

Burkardt, N., B.L. Lamb, J.G. Taylor, and T. Waddle. 1995. "Technical Clarity in Inter-Agency Negotiations: Lessons from Four Hydropower Projects." *Water Resources Bulletin* 31(2): 187–198.

Burkardt, N., B.L. Lamb, and J.G. Taylor. 1997. "Power Distribution in Structured Regulatory Negotiations: Does Balance Matter?" *Journal of Public Administration Research and Theory* 7(2): 247–275.

Clarke, J.N. and D. McCool. 1996. *Staking Out the Terrain: Power and Performance Among Natural Resource Agencies*, 2nd ed. Buffalo: State University of New York Press.

Cothran, D. 1994. *Political Stability and Democracy in Mexico: The Perfect Dictatorship?* Westport, CT: Westport Press.

Coughlan, B.A.K., N. Burkardt, and D. Fulton. 1993. "Assessing the 'Need to Negotiate' in FERC Licensing Consultations: A Study of Two Hydroelectric Projects." *Environmental Impact Assessment Review* 13: 331–351.

Doerksen, H.R. and B.L. Lamb. 1979. "Managing the Rippling Stream." *Water Resources Bulletin* 15(6): 810–819.

Gentlemen, J. 1987. *Mexican Politics in Transition*. Boulder, CO: Westview Press.

Golembiewski, R.T. 1976. *Perspectives on Public Management*. Itasca, NY: F.E. Peacock Publishers.

Hofferbert, R.I. 1974. *The Study of Public Policy*. New York: Bobs-Merrill.

Ingram, H. 1972. "The Changing Decision Rules in the Politics of Water Development." *Water Resources Bulletin* 8(6): 1177–1188.

Ingram, H. and J.R. McCain. 1977. "Federal Water Resources Management: The Administrative Setting." *Public Administration Review* 37(5): 448–455.

Ingram, H., D.E. Mann, G.D. Weatherford, and H.J. Cortner. 1984. "Guidelines For Improved Institutional Analysis in Water Resources Planning." *Water Resources Research* 20(3): 323–334.

Kasza, G.J. 1987. "Bureaucratic Politics in Radical Military Regimes." *American Political Science Review* 81(3): 851–872.

Lamb, B.L. 1976. "Instream Flow Decisionmaking in the Pacific Northwest." Unpublished Ph.D. dissertation. Department of Political Science, Washington State University.

Lamb, B.L. 1980. "Agency Behavior in the Management of Section 208." In B.L. Lamb (ed.) *Water Quality Administration: A Focus on Section 208.* Ann Arbor, MI: Ann Arbor Science, pp. 209–218.

Lamb, B.L. 1987. "Software for Negotiation Planning: Experience with a New Program." *Social Science Microcomputer Review* 5(2): 137–148.

Lamb, B.L. and H.R. Doerksen. 1978. "Bureaucratic Power and Instream Flows." *Journal of Political Science* 6(1): 35–50.

Lamb, B.L. and N.P. Lovrich. 1987. "Considerations of Strategy and Use of Technical Information in Building an Urban Instream Flow Program." *Journal of Water Resources Planning and Management* 113(1): 42–52.

Lamb, B.L. and J.G. Taylor. 1990. "Negotiation Techniques to Resolve Western Water Disputes." *Water Resources Bulletin* 26(6): 967–975.

Lamb, B.L., L.J. Wilds, and J.G. Taylor. 1993. *LIAM: The Legal-Institutional Analysis Model for Microsoft Windows (tm)* Version 1. 0 (BETA). Fort Collins, CO: Midcontinent Ecological Science Center, Biological Resources Division, U.S. Geological Survey, 4512 McMurray Ave, 80525-3400.

Lamb, B.L. and S. Klahn. 1996. *Klamath River Institutional Analysis.* Draft report submitted to the Klamath River Fisheries Task Force, Available from the Midcontinent Ecological Science Center, Biological Resources Division, U.S. Geological Survey, 4512 McMurray Ave, Fort Collins, CO 80525-3400.

Lindblom, C. 1959. "The Science of Muddling Through." *Public Administration Review* 19(2): 79–88.

Lowi, T.J. 1969. *The End of Liberalism: Ideology, Policy, and the Crises of Public Authority.* New York: WW Norton.

Lybecker, D.L. 1996. "Bargaining Environmental Public Policy in Mexico: Chapala Lake." Unpublished masters thesis, Department of Political Science, Tulane University, New Orleans, LA.

Nierenberg, G.I. 1973. *Fundamentals of Negotiating.* New York: Hawthorne Books.

Olive, S.W. 1981. *Protecting Instream Flows in California: An administrative case study.* Instream Flow Information Paper 14. Western Energy and Land Use Team. U.S. Fish and Wildlife Service. FWS/OBS-82/34.

Rourke, F.E. 1969. *Bureaucracy, Politics, and Public Policy.* Boston: Little, Brown.

U.S. Fish and Wildlife Service. 1992 . Long-Term Biological Opininan for Pacific Salmon: Klamath River. Washington, DC: U.S. Fish and Wildlife Service.

Wildavsky, A. 1975. *Budgeting: A Comparative Theory of Budgetary Processes.* Boston: Little, Brown.

Wildavsky, A. 1979. *Speaking Truth to Power: The Art and Craft of Policy Analysis.* Boston: Little, Brown.

Wilds, L.J. 1986. *A New Perspective in Institutional Analysis: The Legal-Institutional Analysis Model (LIAM).* Instream Flow Information Paper No. 23, Biological Report 86(9). Washington, DC: U.S. Fish and Wildlife Service.

Wilds, L.J. 1990. *Understanding Who Wins: Organizational Behavior in Environmental Politics.* New York: Garland.

10

Rethinking Risk Assessment

Risk as Language and Solidarity

John R. Tennert
Virginia Polytechnic Institute and State University, Blacksburg, Virginia

Dennis L. Soden
University of Texas at El Paso, El Paso, Texas

INTRODUCTION

The role of environmental risk assessment in contemporary Western society has reached a level of unprecedented significance. The arrival of postindustrial society with exponential growth of technology, massive urbanization, as well as suburbanization, cultural and ethnic heterogeneity, and unprecedented economic growth, have all contributed to the advancement of environmental concerns (Inglehart 1990). Technological advancements increasingly have allowed modern society to more effectively cope with many environmental problems. Yet, it can be argued that the role of technology creates as many, if not more, problems than it can solve (Soden 1996). Furthermore, faith in technology and science is not what it used to be. Nuclear waste siting, natural resource use and management, air and water pollution, along with a host of other issues have created a significant confidence gap between the public and the experts representing various interests (Soden and Conary 1996, 1991).

Risk and risk perception are fundamental concepts for scholars of political participation. The public's *perception* of exposure to some environmental risk, particularly when that exposure is involuntary, has been found to motivate citizens to respond and partake in some aspect of the political dialogue like few other issues can, moving the public from the shadows of the policy process, shedding "rational ignorance" in favor of a stakeholder's position (Downs 1957, 1972; Steel and Soden 1989). Of critical importance to understanding the nature of risk and political participation is the distinction between risk assessments, risk perceptions, and the subsequent social impact of these distinctions, as well as risk communication and risk management. Among the many questions that arise, it is critical to ask why, in so many instances, do risks perceived by

the public fundamentally differ from those "experts" whom society charges to conduct risk assessments?

RISK AS A FUNCTION OF POSTMODERN DISCOURSE

This chapter will argue that a great deal of what passes as "expert" knowledge is suspect because it is set upon assumed privileged foundations of our society, an epoch of contemporary development referred to as *modernity*. Modernism, realism, foundationalism, and the modern project are all associated with the intellectual and cultural developments that arose out of the enlightenment period in western Europe and North America under the conceptual heading of modernity. Modernity is identified with such concepts as rationality, progress, science, and other characteristics of contemporary, industrialized capitalist economies (Rosenau 1992; Featherstone 1988: 195–196). In philosophy, modernity is identified with realism, or representationalism, which held that "meaning or truth preceded and determined the representations that communicated it" (Ryan 1988: 559).

Traditional risk analysis, and we use the term in its broadest sense, has developed from this foundationalist perspective, a perspective that is no longer applicable or particularly useful. Alternatively, it argues that an antifoundationalist perspective can help formulate a dialogue among all interested parties. Taking an antifoundationalist perspective, the analysis will demonstrate how the ground from which rational or foundationalist risk analysis is formulated is not any more, nor less, valuable than any other standpoint. Similarly, and this will be made more explicit later, the viewpoint offered here is not from a different ground from the realist, or the "reality," or "real time," from which risk analysis must take place should it wish to be successful. By foundationalist, we refer to "any attempt to ground inquiry and communication in something more firm and stable than mere belief or unexamined practice. The foundationalist strategy is first to identify that *ground* and then so to order our activities that they become anchored to it and thereby rendered objective and principled" (Fish 1989: 342) (emphasis added).

Reversely, then, an antifoundationalist perspective rejects that such grounding or anchoring is possible.

> Anti-foundationalism teaches that questions of fact, truth, correctness, validity, and clarity can neither be *posed* nor *answered* in reference to some extracontextual, ahistorical, nonsituational reality, or rule, or law, or value; rather, anti-foundationalism asserts, all of these matters are intelligible and debatable only within the precincts of the contexts or situations or paradigms or communities that give them their local and changeable shape. It is not just that anti-foundationalism replaces the components of the foundationalist world-picture with other components; instead, it denies to those components the stability and independence and even the identity that is so necessary if they are to be thought of as grounds or anchors (Fish 1989: 345) [emphasis added].

For now it is sufficient to introduce the terms and continue. More will be said of this topic later.

UNDERSTANDING RISK

A starting point would be to define risk, risk assessment, and risk perceptions. The difficulty in this task, as is already apparent, lies in a lack of consensus about the terms.

Moreover, it is precisely this ambiguity that requires social scientists to rethink the way we utilize the concept of risk in policy circles. How individuals define risk depends upon where they sit. In instances where those positions are in sharp contrast to others, particularly when a power relationship exists, conflict resolution can become a difficult task (Rothman and Lichter 1987).

To understand and make predictions about the dynamics of various social phenomena, social scientists attempt to create models of behavior to facilitate prediction and understanding. The arena of environmental activism and political participation is one such area. To what extent do various models help us to understand or predict the impact of environmental risks on the public at large? To be sure, no single answer can adequately address this question.

This section will address the various factors affecting when and how it becomes in someone's *interest* to participate, to overcome what Downs (1972) referred to as "rational ignorance." An important question must be answered to proceed effectively. When we talk about *interest*, what are we talking about? In many cases, it may seem in someone's interest to get involved, indeed it may be critical. Yet they do not. In other cases an interest may not be involved at all, yet citizens still remain active. As was noted above, when we talk about risk, we must think of it in terms of how it motivates, or does not motivate, citizens to participate.

To be sure, broad public recognition of environmental risks, primarily in the area of pollution, catapulted the environment into the political spotlight in the late 1960s and early 1970s. "While its origins are undoubtedly complex, the environmental movement had 'arrived' by 1970, as shown by the tremendous growth in the size of conservation-era organizations, the development of newer organizations, and in widespread public support" (Dunlap and Mertig 1992: 3).

This section will examine various models that have attempted to explain what causes people to perceive they are at risk and what motivates them to become active. Furthermore, it will also examine the ways in which many risk professionals go about conducting risk analysis, particularly in the realm of comparative risk analysis. Critical to understanding the complexity of the many divergent points of view is the concept of *information*. Presumably, the more you have, the better off you are. With respect to environmental risk, however, this is not always the case.

At its most basic level, risk involves a calculation of potential costs and benefits. The extent or likelihood that one will incur costs in pursuit of some basic benefit is a risk. In modern society, risks abound. When an individual lays two dollars down on a craps table with the hope of winning three, that individual accepts that losing it all is possible. Fundamentally, understanding the costs and benefits involved in making a decision, the level of information available, will determine the level of risk involved. Furthermore, the extent to which individuals understand this information will affect the overall acceptability of that risk to society.

These elements of risk create important problems for society when it attempts to address risks to the environment. It is becoming increasingly clear that society cannot know or understand the costs and benefits involved in making a decision about what the risks are from air or water pollution, deforestation, hazardous waste, or global warming, to name just a few. Similarly, the extent to which individuals agree to and accept the risks they face is also called into question when we consider the severity of externalities involved in many areas of environmental policy.

It is precisely for these reasons that government involvement is necessary, that is,

to more evenly distribute the costs and benefits with respect to the use and conservation of our natural environment. Environmental policy has become a highly contentious issue given the nature of environmental risk. Essentially, risk analysis is simply a process of agenda setting, such as that proposed by Kingdon (1984). That is, risk analysis is a process of *prioritization*. How one goes about setting priorities is critical to risk assessment in that inevitably some elements become more pressing than others. This chapter examines how traditional risk assessment has prioritized environmental risk, how it views the prioritization of the lay public, and how it explains the gap that exists.

Literature on risk falls roughly into four categories:

Risk perception
Risk analysis/assessment
Risk management
Risk communication/public outreach

It is important to note that these are rough categorizations and are by no means mutually exclusive. But they do provide a convenient starting point and useful tool for surveying the, more often than not, repetitive nature of the literature. Risk perception involves the rough beliefs and feelings that individuals hold with respect to the risks they perceive. Risk analysis and assessment involves the more "scientific" approaches to determining the more salient risks in the environment. Risk management is the application of risk assessment to the public policy arena by various policy actors. Risk communication generally involves various approaches to both understanding and educating the public about the relevant risks and perceptions that the public faces.

As noted above, the literature representing these broad categories is linked together in many complex ways. For example, risk perceptions, unlike probability estimates in hard risk assessment, incorporate a realization that fear, unfairness, and a feeling of no control exist among one or more segments of society affected by some activity. But the two are fundamentally linked to risk management because they inevitably contribute to the final outcome of a decision. Prudent risk managers will take great care to ensure sufficient input from various publics as well as the scientists and other experts involved, when making decisions about how go about addressing risks and setting priorities. Important in risk management is public outreach. Public outreach can involve either informing the public about decisions that have been made regarding risk management policies, or input from various publics to aid in making future decisions (Plough and Krimsky 1987). Unfortunately, as we will discuss below, a great deal of risk communication involves *persuasion*. This involves attempting to convince the public that many of their fears and stigmas about risks are unwarranted or incorrect, or vice versa, that these fears are indeed correct, depending on one's position on a risk-related issue (Conary et al. 1996). Moreover, as the U.S. Environmental Protection Agency has reported, perceptions between experts and the general public vary dramatically (see Table 1). Put another way, risk perceptions among the public differ significantly from risk assessments of the scientific community. As a consequence, a majority of risk communication is persuasion to change perceptions in order to move the policy process along some preordained or expertly determined track.

The Rationality of Risk

Bearing the above data in mind, risk analysis, when one takes a public policy or management perspective, attempts to take the rationality of the physical and natural sciences and

Table 1 Public and EPA Ratings of Health Risks Associated With Environmental Problems

Public ranking	Environmental problem	Expert ranking
1	Hazardous waste sites	Medium-to-low
2	Exposure to worksite chemicals	High
3	Industrial pollution of waterways	Low
4	Nuclear accident radiation	Not ranked
5	Radioactive waste	Not ranked
6	Chemical leaks from underground tanks	Medium-to-low
7	Pesticides	High
8	Pollution from industrial accidents	Medium-to-low
9	Water pollution from farm runoff	Medium
10	Tap water contamination	High
11	Industrial air pollution	High
12	Ozone layer destruction	High
13	Coastal water contamination	Low
14	Sewage-plant water pollution	Medium-to-low
15	Vehicle exhaust	High
16	Oil spills	Medium-to-low
17	Acid rain	High
18	Water pollution from urban runoff	Medium
19	Damaged wetlands	Low
20	Genetic alteration	Low
21	Nonhazardous waste sites	Medium-to-low
22	Greenhouse effect	Low
23	Indoor air pollution	High
24	X-ray radiation	Not ranked
25	Indoor radon	High
26	Microwave oven radiation	Not ranked

Source: Frederick Allen, U.S. Environmental Protection Agency, "Unfinished Business: A Comparative Assessment of Environmental Problems (1987) and national public opinion polls by the Roper Organization in December 1987 and January 1988 (see Bretthauer 1996).

apply it to a relevant public policy problem. We use the term "problem" to point out that risk analysis is directly linked to problem perception and definition. A great number of sophisticated formulas for environmental restoration and risk reduction exist, waiting to be exploited and put into practice. The key to many of these formulas is their reliance upon rational assessment and decision making, that is to say, strict adherence to scientific principles to make them work.

What can we say about the role of the rational actor when it comes to perceiving and reacting to risk? How, then, do rational individuals assess their own level of risk and willingness to accept that risk? Anthony Downs defines a rational individual in terms of goals. A rational person is one who moves toward his goals in a way which, to the best of his knowledge, uses the least possible resources through a personal cost-benefit analysis (Downs 1957: 9). Hypothetically, then, it can be argued that rational individuals, particularly and most importantly experts, will make an assessment of risks based on a similar process. Accordingly, these experts are theoretically aware of all potential risks, can rank them, and subsequently select that which is the highest or lowest risk, depending

on the desired outcome. This is done by comparing the received utility, or in the case of environmental risk, lost utility. Hence the individual will focus on those risks that cause the greatest loss first. Furthermore, following the logic above, under similar conditions, an individual will make the same choice.

An obvious objection would assert that a person does not have absolute information about all risks. In areas like environmental policy, given the breadth and scope of the problems and technical aspects involved, this process of information gathering becomes extremely arduous. However, if an individual perceives that he has all of the information available, or feels confident about the information given to him from others, this might satisfy his concern, leaving decisions to the experts. Similarly, given these calculations made by rational individuals, rational governments will attempt to mirror the collective interests of the public. Government will address those issues that the public perceives to be the greatest risk; they will match the preferences of the public. Thus, governments exist simply to carry out the will of the citizens.

Ultimately, however, strict adherence to these assumptions fails to facilitate understanding. In this respect, there are three fundamental reasons important for our discussion that must be addressed. Given our understanding of risks, the public does not have complete information to make judgments about the relevant risks they face, nor do experts, to be sure. Research conducted by Dake (1991) has found that consensus among experts is much more suspect than is at first acknowledged. Second, what the general public perceives as a risk and what government contends to be a risk are very often different things. Third, citizens do not have much faith in government's ability to protect them from risks.

The question of what "rational and scientific" risk assessment entails has thus become increasingly tenuous. This area of public policy is a particularly difficult path to follow for many reasons, precisely because there are no certain ways to determine what is rational and scientific. Ultimately, it is argued, the problems emerging from the fundamental disparities that exist between experts and the general public are a result of not enough rationality among the general public. Too often "experts" assume that the public is too bored to become "properly informed," and thus the public is inclined to make false judgments about what the risks "really are." As a consequence, an inordinate amount of time and money is spent by policymaking bodies to sift through these judgments and clarify issues for public consumption (Slovic et al. 1979).

What the public perceives as an environmental risk is far from what many experts *contrive* those risks to be. The word "contrive" is used here to make explicit the contradictions inherent within a great deal of risk analysis. As noted above, much of modern risk analysis is based upon some application of the scientific method. Whether an attempt is made to determine the parts per million of radon required to be carcinogenic, or what the cost-benefit analysis determines the risk should be, or whether the public's perception of risk is determined to be cognitively inconsistent, the effect is the same. The analysis is based on some representation of reality, and any feelings that exist among some sector of the general public that might be in conflict with these expert analyses is deemed to be irrational and/or uninformed.

The assumption here is that the methods used in determining levels of risk are not *discovered*, but created, or contrived, as used above. *This is not to suggest that these findings are irrelevant to risk management.* To the contrary, it merely suggests the possibility that scientific, expert assessments should not be held as more significant than the assessments made by the broader public, or any groups categorized as "nonexperts." To

be sure, it can be argued that to recognize and bring into concert multiple points of view can actually create more effective risk management policies.

Pollak (1996) gives a brief but applicable discussion of the process of assessing risks. Four steps are involved in risk assessment:

1. Risk identification simply delineates the subject matter that is suspected of having negative adverse consequences on individuals.
2. Dose-response assessment is the relationship between the amount of a given substance that is expected to cause a given level of harm over a given period of time.
3. Exposure assessment attempts to assess the extent to which a population is likely to be exposed to a given substance.
4. Risk characterization attempts to develop tangible assessments of the real risk, and predict the future consequences of exposure.

There are fundamental difficulties involved in these assessments however. Pollak cites Supreme Court Justice Stephen Breyer, arguing that: "[I]gnorance about these issues is matched by their importance. The choice of a dose/response extrapolation model can make an enormous difference to how risky small doses of the substance appear to be. Two scientifically plausible models for [a particular substance] may differ by a factor of 40,000" (Pollak 1996: 28). That is, two reasonable or rational assessments of risks can differ exponentially in their determination of harmful outcomes. As a result, the scientific nature of a given risk assessment is anything but conclusive. Given the stark contrast between the results of alternative assumptions chosen by risk analysts, any idea about the objectivity of such analysis must be thrown out the window. This is not to argue that assessments are not valuable, they simply leave the task incomplete.

The double-edged sword of scientific risk assessment still does not completely explain why a gap exists between experts and the general public regarding associated risks. Nor does it help us address how risk analysis can be improved. In a well-argued analysis, Freudenburg examines the dynamics of science and technology in modern society. Specifically, he makes a comparison between technology and knowledge from the 18th century and the 20th century. He argues that even though we "know more than did our great-great-grandparents . . . we actually know far less today than did our great-great-grandparents about the tools and technologies on which we depend" (Freudenburg 1996: 46). The result is that our society has become dependent upon a whole army of specialists, from auto mechanics to risk analysts. Furthermore, unlike our great-great-grandparents, we very often do not know these specialists outside of the context of their specialty.

The problem with this kind of specialization results in accountability; often "the responsible person or organization can prove almost impossible to find" (Freudenburg 1996: 47). This results in a phenomenon that Freudenburg refers to as *recreancy*: "the failure of an expert, or for that matter a specialized organization, to do the job that is required."

> How important is recreancy? Empirically, far more important than the factors that have been stressed in the many editorials about the mass media and the public. Unlike media coverage and public knowledge levels, in other words, trustworthiness and recreancy have been shown by systematic research to be key factors behind the increasingly toxic interpersonal chemistry that has been associated with an ever increasing range of technologies (Freudenburg 1996: 47).

Hence increasing mistrust combined with the declining reliability of experts has led, at least in part, to an unwillingness among the general public to blindly accept the recommendations made by scientists and government regarding acceptable or reasonable risks.

The problem then becomes: how do experts bring the public around to their way of thinking? The assumption of a great deal of risk analysis is that experts know and nonexperts do not, and that society should leave the experts to do their jobs. Many, including Slovic, argue that the lay public simply does not and cannot understand the complexities and realities of what risk really entails. Slovic et al. (1979) argued that "expert's risk perceptions correspond closely to statistical frequencies of death . . . It appears that for lay people, the concept of risk includes qualitative aspects such as dread and the likelihood of a mishap being fatal" (p. 38). This clearly illustrates the place that qualitative aspects of risk have in risk analysis.

One method for dealing with these discrepancies is to rate the risks, or *comparative risk assessment.* This involves "setting regulatory and/or budgetary priorities" among a variety of risks and risk abatement strategies (Davies 1996: 6). This process is similar to Slovic's reference in 1979 about the ways that the lay public and experts rate risks. Unfortunately, risk analysis often focuses upon the credibility of the science, and then attempts to incorporate broad societal values within the framework set by experts (Morgan et al. 1996: 118–120). This is the same kind of approach offered by Slovic et al. in 1979. Unfortunately, 17 years of research and experience has taught risk analysis very little.

Culture, Values, and Societal Responses to Risk

Thus far, a great deal has been discussed about the role of individual preferences and action on the part of assessing risks to the environment. The question then becomes: how does the public come to form judgments regarding the risks they face? Ultimately, any action on the part of a government must come from some level of consensus from the society itself. A dearth of literature exists that has attempted to model the process of perception formation among the public. Wildavsky and Dake (1990) test the assumptions of their theory against alternative methods for explaining public perceptions. "The hope for explanatory power in such approaches to risk perception is thus placed on social and demographic characteristics such as gender, age, social class, liberal-conservative ratings, and/or adherence to political parties" (p. 43).

For Wildavsky and Dake the formation of social relations occurs around three different patterns. The argument proposes that knowing an individual's cultural/social orientation as defined by these three characteristics is a more powerful predictor of risk perceptions. According to these scholars,

> *cultural theorists* have proposed that individuals choose what to fear (and how much to fear it), in order to support their way of life. In this perspective, selective attention to risk, and preferences among different types of risk taking (or avoiding), correspond to *cultural biases*—that is, to world views or ideologies entailing deeply held values and beliefs defending different patterns of social relations (Wildavsky and Dake 1990: 43).

Not surprisingly, Wildavsky and Dake find that their cultural theory is indeed a more powerful predictor of risk perceptions among individuals. Others point out that the importance of confidence or trust in existing institutions is critical to an individual's risk

calculus (Freudenburg 1996; Soden and Conary 1996). Similarly, Wildavsky and Dake find that the extent to which individuals have faith in the institutions of society, such as hierarchists who support "technological risks" that can promote a stronger society based on the status quo, or individualists who support the market system and associated risks to improve their quality of life, or egalitarians who oppose both approaches, is a strong determinant of a person's perception of risks. This helps explain why, even when presented with data or scientific evidence to the contrary, people with orientations opposed to these points can easily dismiss them as biased or incomplete.

In an interesting study that adds a comparative variable to the mix of potential determinants of risk perceptions, Steel and his colleagues (1990) find similar results as Wildavsky and Dake. A fundamental difference exists in the way they operationalize their definition of cultural/value orientations. The authors, citing Douglas and Wildavsky, assert that "perception of risk is largely a social process," whereby "different social principles that guide behavior affect the judgment of what dangers should be most feared, what risks are worth taking, and who should be allowed to take them" (Steel et al. 1990: 331). Hence, at this level, risk perceptions are inclined to be sporadic and inconclusive, whereby many citizens opt to let the experts deal with the problem until it becomes a direct concern to them, a phenomenon that is reflected in a great deal of the grass-roots responses to the environment.

RETHINKING THE LANGUAGE OF RISK

To understand how risk assessment can be viewed in an alternative light to enhance its usefulness as a tool for policymaking, we must go back and rethink the way we conceptualize communication and progress. Our perceptions of the world are fundamentally shaped by the context within which we live. And while virtually no one denies this explicitly, it is often ignored when we attempt to incorporate this context within a scientific framework or try to make policy across political domains that vary in a dramatic way. This section will explore an alternative way of thinking about human interaction and communication, and from this we can build a new approach to risk analysis.

The philosophy of Ludwig Wittgenstein offers a convenient starting point, because in many ways, Wittgenstein is perhaps one of the most useful philosophers of the 20th century. The *Philosophical Investigations* (1958b) took a very different, and ultimately more useful, approach to language and philosophy. The "basic realism" of the *Tractatus* (1922) was not rejected however, but, rather, was *inverted*. The thoughts in the *Investigations* simply flipped the logic of the *Tractatus*. An important part of Wittgenstein's early thinking relied upon the realist notion that the world was a priori fixed and thus language must be finite even before human beings came to use it. But in this passage from the *Investigations*, that concept is quickly abandoned.

> But how many kinds of sentences are there? . . . There are *countless* kinds: countless different kinds of use of what we call "symbols," "words," "sentences." And this multiplicity is *not something fixed*, given once and for all; but new types of language, new language-games, as we may say, come into existence, and others obsolete and forgotten. . . .
>
> Here the term "*language-game*" is meant to bring into prominence the fact that the *speaking* of language is part of an activity, or a form of life (p. 23) [emphasis added].

As Malcolm asserts, "[w]ith . . . words . . . their meaning is not any thing, occurrence, or process, that 'corresponds' to the word, but instead it is the *use* of the word" (Malcolm 1986: 15). What do all propositions and all languages have in common? "Instead of producing something common to all that we call language, I am saying these phenomena have no one thing in common which makes us use the same word for all—but that they are *related* to one another in many different ways. And it is because of this relationship, or these relationships, that we call them all 'language'" (p. 65).

Thus, it would appear that all language games and languages are referred to by the same word, that they would all have something in common. However, Wittgenstein asserts that there are characteristics that some language games have in common, but that others don't.

When we succumb to the urge to follow through, to uncover what is not covered, or to find the first principles of language, we create not problems, but pseudo-problems. This is so because there is not a way of speaking that is of a higher order than any other. Wittgenstein argues that *"it is our preoccupation with the method of science . . . the method of reducing the explanation of natural phenomena to the smallest possible number of primitive natural laws . . . [which] leads . . . into complete darkness"* (emphasis added) (Wittgenstein 1958b: 18). The quest for generality, for the largest common denominator is what leads to difficulty. As such, Wittgenstein concludes that "there is no one exact usage of the word 'knowledge'; but we can make up several such usages which will more or less agree with the way the word is used" (Wittgenstein 1958b: 27).

Donald Davidson, a more contemporary American philosopher, reflects an approach to language that is very similar to that proposed in the *Investigations*. For Davidson, like Wittgenstein, *truth* is simply a function of language, whereby the truth of one sentence depends *entirely on the truth of another sentence*. Thus, no outside entity, no reality determines truth. This is not because there is something special about the nature of language, but *because it is all we can utilize to talk about truth*. This point is made clear by Rorty when he argues that "there is no way to think about either the world or our purposes except by using our language . . . It is the impossible attempt to step outside our skins . . . and compare ourselves with something absolute" that leads to dogmatic adherence to universal truths (Rorty 1982: xix). Similarly, Davidson argues that "speaking a language is not a trait a [human being] can lose while retaining the power of thought. So there is no vantage point for comparing conceptual schemes by temporarily shedding [one's] own" (Davidson 1984: 185).

Return for a moment to our first definition of risk. Risk has traditionally been treated as a mathematical or statistical calculation of the probability of the occurrence of some event. This definition of risk remains prevalent in most current risk assessment strategies. A key argument of this chapter is that this fails to grasp the grammar, or the *use*, of the word risk. Experts do not have a monopoly on the meanings of words. To be sure, Douglas argues that this standard definition is no longer practical. "The risk that is a central concept for our policy debates has not got much to do with probability calculations. The original connection is only indicated by arm waving in the direction of possible science: the word *risk* now means danger; *high risk* means a lot of danger" (Douglas 1990: 3). Thus it is the constant shift and adjustment in the way we perceive and understand our environment that will influence the way that we come to make decisions about our surroundings. And this adjustment may not be very amenable to the general principles of science.

What implications does this have for modern conceptions of risk? Fundamentally it

denies any privileged interpretation of risks by anyone, be they interest groups, scientists, citizens, business, government, or the like. This by no means implies that all viewpoints are equally valid or acceptable. On the contrary, it simply eliminates de facto expertise or opinion in favor of dialogue. When one considers the range of images and symbols that play into how risks are categorized and ranked by individuals, it would be counterproductive to assume that only those who disagree with accepted views are succumbing to these images and symbols. As Wynne suggets:

> A general reason for the divergence between expert and public knowledge about risks is that expert knowledge embodies social assumptions and models framing its objectivist langauge, and that lay people have legitimate claim to debate those assumptions . . . these assumptions are much more than that—they are incipient social prescriptions, or vehicles of particular tacit forms of social order, relationships and identities (Wynne 1996: 59).

When we advocate for expanding the dialogue we have no intention of glamorizing or idealizing the public consciousness. On the contrary, there are a number of instances where public involvement and interaction hamper effective policymaking. Moreover, it is fallacious to assume that everyone *wants* to participate. When Bretthauer argues that the public "tends to overestimate risks when they have little voice in making the decision and tends to underestimate risks associated with individual choices (e.g., diet, smoking, driving)" (Bretthauer 1996: 194), the normal reaction to this statement would be to educate the public. But as Conary and Soden (1996) argue, trust in the institutions from which the information is coming is vital to accepting the conclusions or risk assessments offered. To be sure, trust in traditional policymaking actors is suspect to say the least.

This concept of language is linked directly to belief and preference formation, which is more compatible with an antifoundationalist interpretation, and helps make the expert-public confidence gap more understandable. Dennett is concerned with the way that beliefs are attributed to systems; human beings are perhaps the most complex system among an infinite number of possible systems. Specifically, Dennett outlines convincingly the way human beings come to understand each other and their surroundings. Human beings cope with their environment from three various perspectives, the physical stance, the design stance, and the *intentional stance*. For brevity's sake we will examine only the intentional stance. According to Dennett, when employing the intentional strategy,

> first you decide to treat the object whose behavior is to be predicted as a rational agent; then you figure out what beliefs that agent ought to have, given its place in the world and its purpose. Then you figure out what desires it ought to have, on the same considerations, and finally you predict that this rational agent will act to further its goals in light of its beliefs and desires. A little practical reasoning from the chosen set of beliefs and desires will in many—but not all—instances yield a decision about what the agent ought to do; that is what you predict the agent *will* do (Dennett 1987: 17).

Furthermore, an agent's beliefs are mostly true and mostly rational. Any false beliefs must be explained outside of the intentional strategy because the intentional stance is an ideal (Dennett 1987: 49).

Rationality is a very tricky concept and has engendered much bitter debate. But note that it is fundamentally different from that discussed above, which relied primarily upon sound judgment and being *true to the facts*. By rational, Dennett is referring to our

"shared intuitions" and nothing more. Moreover, Dennett, like Davidson, emphasizes consistency or *coherence*, that is, coherence with the rest of an individuals beliefs. "When considering what we *ought to do*, our reflections lead us eventually to a consideration of what we *in fact do*; this is inescapable, for a catalogue of our considered intuitive judgments on what we ought to do is both a compendium of what we do think, and a shining example . . . of how we ought to think" (Dennett 1987: 98). Thus, Dennett argues, we are measuring others belief states by "measuring against ourselves," and that measuring against ourselves "*is* measuring against an idealized standard" because, I would add, *it is the only standard we have* (Dennett 1987: 99). This is what Davidson refers to as a coherence theory of truth. "What distinguishes a coherence theory is simply the claim that nothing can count as a reason for holding a belief except another belief" (Davidson 1986: 310). The implication of this is that when the scientist asserts a belief as being justified by the facts, all this can mean is that she holds to a different set of beliefs. The argument here is that to understand how a person comes to make judgments about risks, one must understand the individual's belief *system*. When beliefs about risk do not seem to be consistent with the rest of the individual's beliefs, we must come to understand the particular story that has put that belief in its particular place. Thus, rationality is the conformance of third-party systems to predictions about what they will do under certain circumstances. This makes rationality not something an item possesses but a status conferred upon it by an outside observer. This is very important because it reduces rationality to merely the expected actions under the context of a situation as predicted by third parties. It is not a gift from God, or of the mind—it is merely accurate conformance with expectation. To say that something is rational is to say that its behavior toward data input will roughly be what we expect it to be (Weaver 1998).

At this point we should address the concern of many in policy that the public has *false beliefs*. This perception on the part of experts is based on a very rigid understanding of beliefs. This traditional, enlightenment view of consciousness invokes a "mirror of nature," or "Cartesian theater," whereby the brain receives information and sends it to some remote location in the brain to be replayed or viewed and then processed for response, leading to the formation of beliefs. Dennett (1991) offers an alternative interpretation he calls the "multiple draft" model. Essentially, the multiple draft model rejects the "mirror of nature" in the mind by advocating that information in the brain is processed at no particular place or time. Processing occurs simultaneously in different parts of the brain, using a range of stimulus, some of which is stored, currently utilized, or immediately discarded. In this regard, Dennett points out:

> While some of the contents in these drafts will make their brief contributions and fade without further effect—and some will make no contribution at all—others will persist to play a variety of roles in the further modulation of internal state and behavior and a few will even persist to the point of making their presence known through press releases issued in the form of verbal behavior (Dennett 1991: 134).

The point here is not to dwell on the neurology of the human mind, but to change the way we think about how people come to form judgments and beliefs. To be sure, it is not by some objective observance of reality, nor rational common sense. It is a complex process of input, output, retention, and revision that is fundamentally linked to language. Consider the following:

> If we see knowledge as a matter of conversation and of social practice, rather than as an attempt to mirror nature, we will not be likely to envisage a metapractice which

> will be the critique of all possible forms of social practice . . . justification is not a matter of a special relation between ideas (or words) and objects, but of conversation, of social practice (Rorty 1979: 170–171).

Linear, rational assessments of risk do not adequately take into account the way people come to form judgments about the environment and the risks they face. *Hence, for progress to be made, we must consider the social context of the beliefs, rather than the rationality of them.*

In addition, the intentional stance requires attribution of only *relevant truths*. While this strategy does not account for lost or false beliefs, it doesn't have to. Dennett asserts that beliefs are developed through a complex, continuous process, where their "attribution requires tracing out the lineage of mainly good argument or reasoning from the bulk of beliefs already attributed. An implication of the intentional strategy, then, is that true believers mainly believe truths" (Dennett 1987: 21). For Dennett, better prediction of another person's behavior arises from knowing more, or being more confident about, the beliefs that we believe a person ought to have. "[I]nterpretation . . . must inevitably depend on . . . the whole person's beliefs" because it is inconceivable that individual beliefs, like words in a language, can be discussed in isolation of other beliefs (Dennett 1987: 92).

As an example, consider the article by Slovic et al. (1979) discussed above. In their article, the authors present as evidence a frequency chart to support their conclusions that the public is ill-informed and cannot understand the complexities of risk. According to the authors, this chart demonstrates the relationship between judged and actual frequencies. Charts and graphs such as this are referred to ad infinitum (ad nauseum?) as evidence that the public simply does not understand risk. The authors conclude that "in general, rare causes of death were overestimated and common causes of death were underestimated" (Slovic et al. 1979: 15). "The perceived risk from nuclear power was disproportionately high compared to its estimated number of fatalities" (Slovic et al. 1979: 20) while risks from various personal life-style choices were underestimated (Brethauer 1996).

Slovic and his associates (1979) assert that based on "the best technical estimates" experts' judgments more closely resemble actual death rates than does the lay public. People in general overestimate high-profile risks such as nuclear power while underestimating low-profile risks such as motor vehicle deaths or tobacco-related deaths, activities involving personal choice, as illustrated in Table 1. What is striking here is the way the words *personal choice* are casually passed over or are used as justification of the irrationality of the public. But as noted above, a critical part of risk perceptions involves the extent to which the risk is *voluntary*. And while the extent to which automobiles are voluntary given our society's dependence upon them is debatable, for the most part, people who travel in automobiles or who smoke *accept those risks*. Moreover, if people do not smoke and consider themselves to be safe drivers, these activities are not considered to be a risk to them *personally*. But if they live near a proposed nuclear power plant or waste repository, they will indeed see this as a risk. Moreover, they would probably view it as an *involuntary* risk.

When we think about how the public comes to form judgments about risk, the intentional strategy is particularly useful. This is not to argue that it is more *correct*, but more practical, because Dennett's intentional stance works from within the individual, and within language, not outside of it, as science attempts to accomplish. Public perceptions may not always be rationally derived, but this does not mean that they are incorrect

(Rothman and Lichter 1987), nor does it mean they are not real policy problems that risk assessment and risk management programs can dismiss.

RETHINKING SCIENCE AS SOLIDARITY

When we apply these ideas to science, and the role of science and rationality in society, we come up with a very different definition. "It is not a question of debunking or downgrading the natural scientist, but simply of ceasing to see [the scientist] as a priest. We need to stop thinking of science as the place where the human mind confronts the world, and of the scientist as exhibiting proper humility in the face of superhuman forces" (Rorty 1991: 36). For Rorty, the greatest thing about science is the open interaction it can foster. Science is simply a forum for unforced agreement, where communities test other beliefs against their own. "Science is rational not because it has a *foundation*, but because it is a self-correcting enterprise which can put *any* claim in jeopardy, though not *all* at once" (Rorty 1979: 180). But Rorty urges that "what we cannot do is to rise above all human communities, actual and possible" (Rorty 1991: 38). Rationality for Rorty, like Dennett, becomes coherence, or "solidarity," with an accepted set of beliefs. We have not eliminated risk analysis, we have given it a new role.

Risk analysis has the potential to help society rethink or reshape how it orders, and continues to reorder, its preferences about risks. Creating and encouraging a forum for unforced agreement, where individuals have the *opportunity* to struggle with what interpretations they can accept and reject, should become an integral part of risk analysis research. When we consider issues of acceptable risk, it is no longer sufficient to simply refer to the data at hand. Moreover, as Dennett tells us, it is not practical. It is not enough to replace one belief with another. Beliefs do not exist in a vacuum, independent of every other belief. Instead, they exist in a complex web, such that to change one belief, we must change the whole system of beliefs associated with each individual belief. People often tell themselves stories about why they have the beliefs that they do, and most often they will be coherent with other beliefs that they have. As Dennett and Rorty would argue, this is a very *rational* determination of an acceptable risk. Risk assessment is not just a technical or professional endeavor, but one that deeply entails an assessment of beliefs and values. Thus, questions of acceptable levels of risk cannot be resolved by an appeal to the facts alone (Steel et al. Forthcoming).

The risks associated with nuclear waste siting, for example, are summed up very well by a Las Vegas resident. The resident asserted, in a personal interview with the authors, that "the question is not probability, but the level of catastrophe. The consequences of a nuclear-related catastrophe are so great that they outweigh any 'probability assessment' made. Any risk, regardless of how minute, is too great." It is no longer enough to calculate risks and make judgments based on these calculations. Risk management must involve *dialogue* with all parties affected in some way or another. People tell themselves stories about why they believe what they believe. To be effective, and more importantly, to be fair, risk managers must try to hear and understand what these stories are.

THE PROBLEM OF TRUST

In an era of high knowledge explosion, the efficacy of developing public input is challenged and requires an understanding of who is trusted and distrusted in a particular issue

arena (Freeman 1974; Freudenburg and Rosa 1984), even when the issue is highly symbolic and politicized (Galbraith 1967: 291–303). This is critical to understanding the belief systems that people have with respect to relevant risks. What people perceive as a risk is directly linked to who and what sources of information they trust. Hence, risk management must become more involved in rebuilding trust and relationships than it has been in assessing relevant facts.

Pierce and his associates, in a larger set of studies related to risk, describe the problems of modern environmental policy as being a part of the "technical information quandary," which itself is composed of two components (Pierce et al. 1992). The first reflects changes in mass societal values, and the second considers the development of scientific and technical information being brought to bear on the politics of democratic society. "How can the democratic ideal of public control be made consistent with the realities of a society dominated by technically complex policy questions?" (Pierce et al. 1992: 14). Trusted sources of information may act as intermediaries and should be listened to by both sides of an issue, especially when these issues are controversial and emotional (Stern and Aronson 1984; National Research Council 1989: 25).

Douglas and Wildavsky (1982: 5) assert that risk "should be seen as a joint product of *knowledge* about the future and *consent* about the most desired prospects." Very often, citizens and government, in their efforts to address problems of risk, find themselves facing circumstances of uncertainty and contest. It is important to note that this is also a situation where no immediate solution is available. How then, do we address this problem?

Risk managers can no longer view risk as a rationality or probability calculation. They must begin to frame questions of risk in terms of discourse, of social relationships between individuals, their environments, their communities, and their governments. The problem of recreancy, or of trust, is the most significant problem for risk assessments. As Wynne points out succinctly, "Public perceptions of and responses to risks are rationally based in judgements of the behaviour and trustworthiness of expert institutions, namely those that are supposed to control the risky processes involved" (Wynne 1996: 57).

If we accept the premise offered above by Rorty and Dennett, principally that truth is a constantly changing and manufactured phenomena, then the only possible solution is dialogue, conversation, *social practice*. Experts and policymakers are misinterpreting the symptom for the problem. The gap between expert analysis and public perceptions is a symptom of a much more profound and prolific problem. There is no longer a dialogue, an open, sincere dialogue, where experts and laypersons alike experiment and attempt to understand the beliefs and values that shape their response to their environment. Policymakers and risk analysts have a great deal of knowledge they can bring to the conversation. But we must recognize that knowledge does not provide answers, only tools. The only way we can develop *answers* must occur through dialogue.

CONCLUSION

It is important not to confuse the preceding analysis with something more solid than it is. Public input surely is not a panacea. Indeed, it makes the task substantially more difficult. But in a democratic society, where widespread trust of virtually all of the major

institutions is lacking, it may be essential. Moreover, it has been suggested that public participation reduces public ignorance and that the level of public participation is indicative of the degree of salience that the general public attaches to a particular issue (Gerrard 1994: 31). Risk analysis is an area where all areas of the sciences, government, interest groups, and the public can come together to work toward progress. However, we must begin to recognize that the roles that participants are required to play will continue to change, as will the dynamics of the problem.

The science of risk analysis and management, the probabilistic accounts of risky behavior cannot provide answers for us. The ideal languages of scientific "discovery" do not get at "the way the world really is," they are merely participants in different language games. And even revised environmental sciences like ecosystem management, which purport to recognize the "embeddedness" of human existence in our environment, cling to foundational notions of an ahistorical, God's-eye view of reality. But this is simply the last remnant of enlightenment nostalgia.

> Ecology, while seeming to promise a re-embedding of human choices and judgements within a framework which transcends mere human wishes, fails to do so, and always leads us back into the nihilistic condition of groundless self-assertion in a world without purpose or meaning. Ecology, after all, does *not* seem to be able to tell us what to do (Szerszynski 1996: 130).

Similarly, no matter how rigorous risk science becomes it also cannot tell us what to do. Only social processes and social interaction can attain such a goal.

Again, we must reassert the claim that this is no panacea, no quick fix. Moreover, calls for renewed attention to the benefits of dialogue are not new. Most contemporary risk analysis attempts to incorporate some form public participation, but the commitment is readily abandoned when put into practice. There are no solutions to be found here, no goals offered, no formulas or prescriptions for success. We need to stop thinking of all realms of science as providing answers, and start thinking of them as tools to be used to achieve some purpose. We need to stop looking to risk assessment for something it fundamentally cannot accomplish; that is, to *tell us what to do*. The purpose may be obscure, ill-defined, and contentious, but nevertheless, the only modicum of progress will be continued dialogue. New findings or advances in science policy do not bring us closer to reality, they simply provide us with a new set of arguments, a new set of tools with which to work and apply to those phenomena of our experience we find troublesome for some reason or another.

> We are still trying to think of ways to minimize injustice and maximize equality . . . but in trying to create both ordinary human happiness and promises of new sorts of happiness, we are not engaged in a process of emancipation or enlightenment. For there is neither a true humanity to be emancipated nor a built-in natural light (called "reason" or "conscience") by which such emancipation is made possible . . . there is no movement into to which to throw ourselves, and no historical moment whose significance we have to grasp (Rorty 1995: 59).

REFERENCES

Bretthauer, Erich. 1996. "A Historic Opportunity to Develop a More Rational Environmental Policy: The Central Role of Risk Assessment." In Dennis L. Soden, ed., *At the Nexus: Science Policy*. Commack, NY: Novas Science.

Conary, Janet S. and Dennis L. Soden. 1996. *Public Attitudes, Risk Perceptions, and the Future*

of the Nevada Test Site: Report to the Nevada Risk Assessment/Management Program. Southwestern Social Science Research Center.

Conary, Janet S., Dennis L. Soden, and Donald Carns 1996. "Science as Reflected in Public Images: Nuclear Issues and Symbolism." In Dennis L. Soden, ed., *At the Nexus: Science Policy*. Commack, NY: Novas Science.

Dake, Karl. 1991. "Orienting Dispositions in the Perception of Risk: An Analysis of Contemporary Worldviews and Cultural Biases." *Journal of Cross-Cultural Psychology*, 22(1): 61–82.

Davidson, Donald. 1985. *Inquiries into Truth and Interpretation*. Oxford: Oxford University Press.

Davidson, Donald. 1986. "A Coherence Theory of Truth and Knowledge." In Ernest Lepore, ed., *Truth and Interpretation: Perspectives on the Philosophy of Donald Davidson*. Oxford: Basil Blackwell.

Davies, J. Clarence. 1996. "Comparative Risk Analysis in the 1990s: The State of the Art." In J. Clarence Davies, ed., *Comparing Environmental Risks: Tools for Setting Government Priorities*. Washington, DC: Resources for the Future.

Dennett, Daniel C. 1987. *The Intentional Stance*. Cambridge, MA: MIT Press.

Dennett, Daniel C. 1991. *Consciousness Explained*. Boston: Little, Brown.

Douglas, Mary and Aaron Wildavsky. 1982. *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers*. Berkeley: University of California Press.

Downs, Anthony. 1957. *An Economic Theory of Democracy*. New York: Harper & Row.

Downs, Anthony. 1972. "Up and Down with Ecology: The Issue-Attention Cycle." *The Public Interest*, 29: 38–50.

Dunlap, Riley E. and Angela G. Mertig. 1992. "The Evolution of the U. S. Environmental Movement from 1970 to 1990: An Overview." In Riley E. Dunlap and Angela G. Mertig, eds., *American Environmentalism: The U.S. Environmental Movement, 1970–1990*. New York: Taylor & Francis.

Fish, Stanley. 1989. *Doing What Comes Naturally: Change, Rhetoric, and the Practice of Theory in Literature and Legal Studies*. Durham, NC: Duke University Press.

Freeman, D. 1974. *Technology and Society*. Chicago: Markham.

Freudenburg, Nicholas and Carol Steinsapir. 1992. "Not in Our Backyards: The Grassroots Environmental Movement." In Riley E. Dunlap and Angela G. Mertig, eds., *American Environmentalism: The US Environmental Movement, 1970–1990*. New York: Taylor & Francis.

Freudenburg, W.R. 1996. "Risky Thinking: Irrational Fears About Risk and Society." *The Annals*, 545 (May): 44–53.

Freudenburg, W.R. and Eugene A. Rosa, eds. 1984. *Public Reaction to Nuclear Power*. Boulder, CO: Westview Press.

Galbraith, J. 1967. *The New Industrial State*. New York: Signet.

Gerrard, Micheal B. 1994. *Whose Backyard, Whose Risk? Fear and Fairness in Toxic and Nuclear Waste Siting*. Cambridge, MA: MIT Press.

Inglehart, Ronald. 1990. *Culture Shift in Advanced Industrial Societies*. Princeton, NJ: Princeton University Press.

Kingdon, John W. 1984. *Agendas, Alternatives, and Public Policies*. New York: HarperCollins.

Lash, Scott, Bronislaw Szerszynski, and Bryan Wynne, eds. 1996. *Risk, Environment, and Modernity: Towards a New Ecology*. Sage.

Malcolm, Norman. 1986. *Wittgenstein: Nothing Is Hidden*. New York: Basil Blackwell.

Mitchell, Robert C., Angela G. Mertig, and Riley E. Dunlap. 1992. "Twenty Years of Environmental Mobilization: Trends Among National Environmental Organizations." In Riley E. Dunlap and Angela G. Mertig, eds., *American Environmentalism: The US Environmental Movement, 1970–1990*. New York: Taylor & Francis.

Morgan, M. Granger, Baruch Fischhoff, Lester Lave, and Paul Fishbeck. 1996. "A Proposal for Ranking Risk Within Federal Agencies." In J. Clarence Davies, ed., *Comparing Environmental Risks: Tools for Setting Government Priorities*. Washington, DC: Resources for the Future.

National Research Council. 1989. *Improving Risk Communication*. Washington, DC: National Academy Press.

National Research Council. 1994. *Science and Judgement in Risk Assessment*. Washington, DC: National Academy Press.

Pears, David. 1987. *The False Prison: A Study of the Development of the Philosophy of Wittgenstein*, Vol 1. New York: Oxford University Press.

Pierce, John C., Mary Ann Steger, Brent S. Steel, and Nicholas P. Lovrich. 1992. *Citizens, Political Communication, and Interest Groups: Environmental Organizations in Canada and the United States*. Praeger.

Plough, Alonzo and Sheldon Krimsky. 1987. "The Emergence of Risk Communication Studies: Social and Political Context." *Science, Technology and Human Values*, 3,4(12): 4–10.

Pollak, Robert A. 1996. "Government Risk Regulation." *The Annals*, 545(May): 25–35.

Ryan, Michael. 1988. "Postmodern Politics." *Theory, Culture, and Society*, 5: 559–576.

Rorty, Richard. 1979. *Philosophy and the Mirror of Nature*. Princeton, NJ: Princeton University Press.

Rorty, Richard. 1982. *Consequences of Pragmatism*. Minneapolis: University of Minnesota Press.

Rorty, Richard. 1989. *Contingency, Irony, and Solidarity*. Cambridge: Cambridge University Press.

Rorty, Richard. 1991. *Objectivity, Relativism, and Truth: Philosophical Papers*, Vol 1. Cambridge: Cambridge University Press.

Rorty, Richard. 1995. "Movements and Campaigns." *Dissent*, Winter: 55–60.

Rothman, Stanley and S. Robert Lichter. 1987. "Elite Ideology and Risk Perception in Nuclear Energy Policy." *American Political Science Review*, 81(2): 384–404.

Slovic, Paul. 1987. "Perception of Risk." *Science*, (236): 280–286.

Slovic, Paul, Baruch Fischhoff, and Sarah Lichtenstein. 1979. "Rating the Risks." *Environment*, 21(3): 14–39.

Soden, Dennis L., ed. 1996. *At the Nexus: Science Policy*. Commack, NY: Novas Science.

Steel, Brent S. and Dennis L. Soden. 1989. "Acid Rain Policy in Canada and the United States: Attitudes of Citizens, Environmental Activists, and Legislators." *Social Science Journal*, 26: 27–44.

Steel, Brent S., Dennis L. Soden, and Rebecca L. Warner. 1990. "The Impact of Knowledge and Values on Perceptions of Environmental Risk to the Great Lakes." *Society and Natural Resources*, 3: 331–348.

Steel, Brent S., Bruce Schindler, and Mark Brunson. Forthcoming. "Social Acceptability of Ecosystem management in the Pacific Northwest." In Dennis L. Soden, Berton Lee Lamb, and John R. Tennert, eds., *Ecosystem Management: A Social Science Perspective*. Kendall-Hunt.

Stern, P.C. and E. Aronson. 1984. *Energy Use: The Human Dimension*. New York: WH Freeman.

Szerszynski, Bronislaw. 1996. "On Knowing What to Do: Environmentalism and the Modern Problematic." In Scott Lash, Bronislaw Szerszynski, and Bryan Wynne, eds., *Risk, Environment, and Modernity: Towards a New Ecology*. Sage.

Weaver, William G. 1998. "Corporations as Intentional Systems." *Journal of Business Ethics*, 17 (January): 87–97.

Wildavsky, Aaron and Karl Dake. 1990. "Theories of Risk Perception: Who Fears What and Why?" *Deadulus*, Fall: 41–66.

Wittgenstein, Ludwig. 1922. *Tractatus Logico-Philosophicus*. Translated by C.K. Ogden. London: Routledge and Kegan Paul.

Wittgenstein, Ludwig. 1958a. *The Blue and Brown Books: Preliminary Studies for the "Philosopical Investigations."* New York: Harper & Row.

Wittgenstein, Ludwig. 1958b. *Philosophical Investigations*, 3rd ed. Translated by G. E. M. Anscombe. Englewood Cliffs, NJ: Prentice-Hall.

Wynne, Bryan. 1996. "May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide." In Scott Lash, Bronislaw Szerszynski, and Bryan Wynne, eds., *Risk, Environment, and Modernity: Towards a New Ecology*. Sage.

11

Indigenous Peoples and Environmental Policymaking

Patrick C. West
University of Michigan, Ann Arbor, Michigan

INTRODUCTION

The full topic of indigenous peoples and environmental policymaking is too large and complex to treat with any justice in one chapter. I will, therefore, deal with a critical jugular issue—the conflict between indigenous peoples and policies and programs to establish and manage national parks and other protected natural areas in the third world.

The environmental policy objective of preserving and protecting the multitude of representative ecosystems and the biodiversity of flora and fauna within them is one of the most important and challenging international environmental policy problems we face today in the global context. Natural land and forest habitats are disappearing at an alarming rate. Fisheries and fragile coral reef ecosystems are in decline in many parts of the developing world. Many species are endangered. However, our efforts to preserve and protect these ecosystems and species have been done in a highly quasi-military way that is having terrible and sometimes catastrophic impacts on indigenous peoples around the world. The IUCN category for national parks, by its very definition, precludes human use and occupancy by indigenous peoples following the U.S. national park model going back to the founding of Yellowstone National Park.

Yet such policies that may be appropriate for developed countries with "social safety nets" can be disastrous for indigenous peoples in third world countries who live at the margins of existence. In Uganda a national park in the remote wildlands led to the displacement of the Ik peoples, an isolated tribe of hunters and gatherers (Calhoun 1991; Tournbull 1972). They had lived for thousands of years in harmony with their ecosystem. But very quickly they were forcedly displaced and rapidly brought into contact with the outside world, forced to become farming peoples, and forced into other rapid changes. These rapid changes led to a total disintegration of their culture. Women often became prostitutes and the men would poach in the park, gorging on meat rather than bringing it back to feed their families or to share with their tribal group as they had done for

centuries. In such cases, we recognize that we are tinkering not only with the content of indigenous culture, but with the *functions* of culture that holds the collective social system in place and provides meaning and direction in the lives of people in that culture (West 1995).

The Gourmanche people of Northern Benin were similarly displaced from the Pendjari National Park (Agbo et al. 1993; Hough 1989). They had had contact with the outside world and had already been shifting agriculturalists in an arid region, so their culture was not as immediately threatened. However, because they are confined to a narrow strip of land between the park border and the Atacora Mountains, the rotation times of their farm fields declined markedly and malnutrition now stalks the villages during "hungry periods" before the next crop is ready to harvest.

These and many more cases from around the world present a serious ethical and social justice challenge for global environmental policy in the siting and management of protected areas. What we have here is a conflict between two good things: a conflict between good and good. Preserving ecosystems and protecting biodiversity is not a bad thing—it is a good and important objective of global environmental policy. However, human rights and social justice for indigenous people that are so often ignored are also a good thing and a very important consideration in international environmental policy-making. Such conflicts between good and good are among the most difficult to resolve for there is no clear path through which one ethic should predominate over the other. And such conflicts are not easily resolved on the ground. It is not an easy task to integrate conservation with the development and cultural preservation needs of local indigenous peoples. There are far more failure stories than success stories in efforts to resolve this thorny dilemma.

This question, however, is not just an ethical debate but also a strategic debate for those primarily interested in conservation. It has now become almost a basic conventional wisdom that to maintain security and viability of national parks and protected areas we must also deal with the legitimate needs of local indigenous people. If we do not, the protected areas we have worked so hard to establish and manage may be lost to the imperatives of nations and local peoples struggling to survive. The anthropologist Stuart Marks, in his classic work *The Imperial Lion* (1984: 5–6), was one of the first to sound the alarm:

> Many Romantic and Arcadian ideas survive, promoted in the tourist industries of today. Materialistic Northerners have sought to preserve African landscapes in the only way they could, by separating them from daily human activities and setting them aside as national parks where humans enter on holiday. . . . The creation of most national parks has incurred restrictions on the rights of local human populations without compensatory action on the part of government. . . . Wildlife protection, like other imposed policies, has always carried with it the implications of force, of quasimilitary operations, and of sanctions. It is my contention that for the West to persist in its support of preservationistic policies that hold vast acerages of land hostage to its myths is to ensure their certain destruction through African needs and perspectives (p. 6).

This recognition of the mutual fate of conservation areas and indigenous peoples was soon followed by others (McNeely and Miller 1984; West and Brechin 1991; Wells and Brandon 1991). Since that time a veritable flood of works have now appeared that have sounded this call and have firmly established that the fate of the parks and protected areas is integrally enmeshed with the fate of local indigenous people (*Colorado Journal*

of Environmental Law and Policy 1994; Kemf 1993; Pimbert and Pretty 1995; West et al. under review).

These calls of alarm have not been false cries of wolf! wolf! Research is finding that in many areas local people hold bitter attitudes toward national parks (e.g., Akama et al. 1995). Among these cases are a subset in which local indigenous people have sabotaged national parks. One of the more recent and extreme cases of this comes from Togo where only minor political disruption in political institutions in the country led to a massive uprising of local indigenous peoples that virtually destroyed the flora and fauna of the northern national parks (Lowry and Donahue 1994). Other comparative cases of such consequences are being compiled for a new book we are preparing on this subject (West et al. under review). The list of Togo-like cases is growing (Ribit 1996; Roy and Jackson 1993; Basappanavar 1993; Gupta and Nair 1990). Togo is not an isolated incident. Thus the treatment of indigenous people in the environmental policies of protected areas is both a social justice issue and a very real issue of the fate of strictly protectionist environmental policies themselves.

Highly protectionist approaches have not only set a tone of repression of indigenous peoples for supposedly legitimate conservation needs. These repressive approaches have also legitimized the efforts of elites in developing countries to suppress and oppress their own people including indigenous minority ethnic groups within the mosaic of subcultures within these societies (Peluso 1992). This has been an unintended, but very harsh consequence that most conservationists have not fully recognized and would not wish to endorse. But we need to deal with the hard reality of these repressive "side effects" of our own environmental policies. It raises fundamental and broader questions of our effects on basic human rights for indigenous peoples around the world.

INTEGRATING, CONSERVATION, DEVELOPMENT, AND CULTURAL PRESERVATION

Many in the conservation community have sincerely awakened to the need for the integration of conservation with the needs and interests of indigenous peoples. But efforts to merge and integrate conservation with the economic and cultural survival needs of indigenous peoples remain elusive. It is sometimes difficult to accommodate multiple uses of resources. But more often than not, there could be a reconciliation of resource use and conservation if only we would let go of instinctive protectionist perspectives that cloud our view of possibilities. We need both a new dream and vision and a willingness to try new strategies on the ground. It is not easy, but it is not impossible.

Coevolution

One of the first places we should look in seeking solutions is to always ask the fundamental question of coevolution. Many of the "natural environments" we wish to save have been inhabited by local indigenous peoples for hundreds and thousands of years. In this coevolution there is often a negative effect of *Homo sapiens* on creating and preserving the very diversity of species we wish to protect. In nature reserves in Israel and France, for example, the removal of human uses has led to a decline of flora that the protected areas were established to protect. In Israel, displacement of grazing and charcoal production within a protected area led to a near disappearance of rare orchids (Rabinovitch-Vin

1991). In France, park officials are begging farmers to come back and live in parks because the decline of farming has led to a decrease in biodiversity (Beede 1991).

In many swinden agricultural systems coevolution has created over aeons a greater species diversity precisely because there was a "disturbance" of raw nature. If we are interested in species diversity, then often we need to be concerned with the cultural diversity of local indigenous peoples due to coevolution.

Unnecessary Displacement

Aside from the issue of coevolution, it is too often automatically assumed that human habitation and resource use within protected areas is automatically harmful. Instead of this knee-jerk reaction within the professional culture of conservationists, we should place the burden of proof, not on the dispossessed, but rather on the conservation community. Before displacement and restriction of resource use are imposed, show us scientifically that it is indeed harmful to conservation before action is taken to remove indigenous peoples.

A case in point is from the Gir National Park in India. The Gir is the last reserve of the Asiatic lion and is thus a very important protected area from a conservation perspective. However, it was assumed that the Maldhari people were damaging the lions' habitat and they were displaced from the park. However, scientific research has shown that the cattle of the Maldhari and the ungulates that are the food for the lion are in different niches of the ecosystem (Raval 1991). Thus the presence of the Maldhari and their resource uses are not in conflict with the habitat needs of the lion. For centuries the Maldhari had been the friend and protector of the Asiatic lion. They were made into enemies only by the misguided assumptions about their incompatibility. Therefore, conservationists need to demonstrate reasonable proof before taking knee-jerk environmental policy measures of displacement and repressive measures to limit or eliminate resource uses from protected areas by indigenous peoples.

Killing the Goose that Lays the Golden Egg: The Parable of the Bori Marsh

Sometimes by being too "stingy" in restricting resource use by indigenous peoples we wind up reducing incentives for conservation that might otherwise exist. An example of this is the Bori Marsh in northern Benin (Hough 1989). When the Gourmanche people of northern Benin were displaced from the Pendjari National Park they were denied use of the Bori Marsh within the park that has had rich biodiversity in an arid savanna ecosystem. The Gourmanche used it for palm fronds for subsistence products such as sleeping mats. They also used it for fetish religious purposes. Once they were displaced, and could not use the marsh, they began to draw more and more water from the stream that feeds the Bori Marsh. Why shouldn't they? The park had severely limited their options and undermined incentives to protect the Bori Marsh. It was the only water resource left to them that flows through their village. They no longer had an incentive to balance water use from the stream with the water flow needs of the marsh. Whose fault is it that this negative effect on biodiversity is occurring? What would the harm have been of allowing a sustained yield of palm fronds? What would the harm have been of allowing them to return there for religious reasons? What has been the ecological cost of being "stingy"? Who killed the goose that laid the golden egg? Such is the parable of

the Bori Marsh. How often do we repeat this mistake in different ways in different protected areas? Remember the parable of the Bori Marsh.

Cooperation Is Better than Repression

Especially in protected areas where the region is vast and the ability to police the region is weak, cooperation with indigenous peoples is essential because forced social control simply cannot work, and efforts to make it work can only backfire creating greater resource uses by indigenous peoples. If local people are involved, if they have a sense of control and efficacy, if they are ensured survival needs—then maybe cooperative control that is viewed as legitimate will work far better than repression that is not viewed as legitimate. Those who study the phenomenon of power and social control know that the key to effective power and social control is legitimacy in the eyes of those who are affected. Legitimacy is everything.

Too often we ignore this age-old truth, and then when our efforts fail we conclude that the only solution is more repression and that conservation and development are really not compatible. In such situations I am reminded of the Pogo cartoon in which Pogo says, "We have met have met the enemy—and he is us!" Too often we blame indigenous peoples for their ignorance of conservation principles, and yet it is the way we approach them that is the problem. We can do better at this and we must.

Sometimes, the mythical images we have of local indigenous peoples is swung to the other extreme. Because they are indigenous and know their environment through "indigenous knowledge" it is often felt that their ecological wisdom should be incorporated and used in protected area management (McCorkle 1989; Thrupp 1989; Alcorn 1990; Brokensha, et al. 1980; Johannes 1993). While this indeed can be a common ground for interaction, it is, I fear, an overexaggerated myth that we hold of them. Often the real reason to include them is their legitimate claim to human rights. For an excellent discussion of this view related to marine protected areas see Polunin (1991). Also there is, quite frankly, a hypocrisy within the conservation community. As long as the indigenous knowledge claims fit what conservationists want, this is fine. But if indigenous knowledge claims that parks and people are compatible where conservationists think otherwise—well then, our hypocrisy becomes evident. When the Sierra Club finds common cause with the American Indian, indigenous knowledge and traditional Native American religious remnants are all but worshiped. But when the Havasupai Indians, the traditional indigenous stewards of the Grand Canyon, want their lands back on the south rim of the Canyon, then the Havasupai become cigar store indians manipulated by outside commercial interests (Hirst 1995). Images border on outright racism.

TRUE PARTICIPATION

If we could move beyond such mythical fog, we would see, perhaps, real participation, involving real power sharing, with real people in need, whose interests, cultures, and subsistence are threatened, and then perhaps we would be ready to meet them on their own ground with mutual respect. Solutions will only be found in the interplay of real participation that goes beyond "formal cooptation"—participation that shares power, not just images of shared responsibility (Selznick 1966). But such true participation is still a rarity with some notable exceptions (Bunting et al. 1991; Christie et al. 1994). Why is it

such a rarity when it is perhaps the single key to meaningful solutions? Perhaps it is because we are really, down deep, quite afraid of it—especially if it is more than ceremonial. And recall that there are really two power holders who feel threatened by true, power-sharing participation—the international conservation community and the local, often dictatorial regimes whose repressive measures are legitimized by our conservation agenda (Peluso 1992). In northern Benin, where we have a field project in conservation and development, the mere mention of power-sharing comanagement is totally out of the question; not to be discussed, not to be negotiated. This fear comes more from internal than external sources.

There is another barrier to true power-sharing participation. We often hear of cases where there was meaningful participation but when we examine these cases closely, participation has not meant a meaningful say in the policymaking process, but rather that local people have been offered some kind of compensation—which is then called participation. This is largely true in the ecotourism literature that extols participation, but far more often than not, just assumes that if we throw a little ecotourism at them they will be satisfied, even though we have not really asked them if they want it or not (Brandon 1993). These acts mistake imposed "benefits" for true participation about desired benefits and reserved rights.

And so when all rhetoric subsides, we come to one stark fact—true participation is very threatening. Heaven forbid! They might ask not to be displaced. Good Lord! They might ask to use resources in protected areas. Of course they will! Their subsistence and their very cultural roots often depend on this and we often don't want to give them this even though we have all come to see the importance of integrating conservation and development. At the base of it all we are afraid of what they quite naturally would want. Again we have met the enemy, and he is us. And yet meaningful, power-sharing participation is perhaps the most significant key to success.

This is the key jugular we must face and address. We have tried to integrate conservation and development and so often failed. But the problem is we have failed because we have not really tried. The problem is not that we do not understand methods of public participation such as "participatory rural appraisal" (Odour-Noah, et al. 1991; PRA Notes 1991; Widen and Levin 1991) or "participatory action research" (Fals-Borda 1987; Fals-Borda and Rahman 1991). Many have been sincere in their concern for indigenous people and many have known how to gain participation. The problem is that down deep we are afraid that what compensation they might want or demand is different from what we might be willing (within our limited vision) to offer. Again I wish to stress that there are many with sincere concern for indigenous peoples, but in reality, we simply do not want to let them live in and use the resources of parks and protected areas. How many cases can we point to where extensive resource use has been allowed even where participation has been done and concerns for local people have been sincere? Most of the cases in our book (West and Brechin 1991), most of the cases in the Wells and Brandon book (1991), and most of the cases in other compendiums do not demonstrate success in terms of integrated resource use. There are some exceptions (East 1991; Weaver 1991; Borrini-Feyerabend 1996), but such examples are few and far between.

Where success is claimed, it is usually something less than comanagement of protected area resources. Such "success stories" often document compensation of various kinds—but rarely significant use of park resources, or decisions to leave indigenous peoples in parks and protected areas. I am tired of hearing how wonderful it is that in Royal Chitwan National Park the local people are allowed once a year to come into the

park and harvest thatch grass for the roofs of their huts. We have a word for this—tokenism.

Why, then, if this is true do we claim success? The answer is quite clear and simple. We have offered "compensation" in various forms in place of residence and resource use. We do this because we feel that is the best way of meeting local needs without harming the resources of the protected area. It is a rather magical sleight of hand. Sometimes the compensation is a new school. But hungry children cannot go to school. Sometimes it is a new medical clinic. This is seductive, but if it is treating malnutrition what is the cause of this? Sometimes it is money. This a short-range compensation, not a long-term solution to the need for sustainable livelihood.

In other words, we have offered modernization and welfare if we have offered anything at all (beyond tokenism in resource use). But in so doing we have confused modernization for development. What is needed is not just modernization and basic needs provision but true "bottom-up" rural development including ongoing sustainable resource use. Sometimes fair solutions can be achieved by offering valuable replacement lands, as occurred in Swaziland for instance (Ntshalintshali and McGurk 1991). But in most cases, such an abundance of replacement resources have not been available. When the Maldhari were displaced from the Gir National Park in India, they were squeezed between the park boundary and the surrounding agricultural land uses that were already pressing at the boundaries of the park. There were not adequate replacement grazing grounds (Raval 1991). In northern Benin the indigenous peoples are squeezed between the park boundary and the Atacora Mountain chain. They were given not more or equal land, but less, and malnutrition is the result (Hough and Sherpa 1989). Their agricultural exploitation of this limited land base is not environmentally sustainable. Whose fault is this? And how long will it be before famine sets in along with a resulting crumbling of hope, culture, and a meaningful future?

THE MYTH AND PROMISE OF ECOTOURISM

The rise in the popularity of the ecotourism strategy has been nothing less than meteoric in international conservation circles (Lindberg and Hawkins 1993; Whelan 1991; Eagles et al. 1993; Ziffer 1989; Boo 1990; International Resources Group 1992; Kelsay et al. 1992). Why has this happened? It is because ecotourism promises the benefits of rural development not from the exploitation of park resources, but rather from their very preservation. It is thus seen as a park-related compensation in which local people who benefit from the park will have not only some kind of compensation, but a form of compensation that will, in theory, give indigenous peoples a stake in wanting to protect the park. They will want to protect the park because the sustained flow of ecotourism benefits will depend on the protection of the park and not on its exploitation. I believe in the potential of ecotourism. I teach a course on this topic. But I teach my students not to be myopic about its potential. Perhaps the single most naïve assumption in the ecotourism literature is that we can simply give ecotoursim benefits to local people. The inconvenient reality is that in many cases this cannot be so easily done. The reason for this is that outside tourism firms with access to markets and advertising can easily outcompete local efforts to benefit from ecotourism. With this market power also comes political power that often leads governments favoring outside interests through a combination of governmental self-interest and raw political influence and power with the agencies that regulate tourism

in developing countries (West et al. under review). While there is potential in ecotourism for integrating conservation and development, there is also a lot of myopic naïveté that needs to be recognized and addressed before its potential can be realized.

THE SHARING OF RESOURCE USE

I come now to the most fundamental point of this chapter. We must face the fact that the developing world is quite different than Yellowstone and our national park model is not appropriate there. We must come to a realization that protected areas in the third world *must involve greater residence and greater resource use than we have been willing to allow up to this point.* Conservationists are drawing up new wish lists of hundreds of new protected areas needed for ecological protection for the 21st century. Will our environmental policies undergo fundamental change with respect to indigenous peoples or will it be business as usual? Will there be a fundamental integration of conservation and *natural resource–based* rural subsistence and development? Or will participation continue to mean a new school for a village whose children cannot go to school because they must guard the remaining fields from marauding wildlife, or children who go begging chasing after the ecotourism vans where benefits do not go to local indigenous people but rather to powerful neocolonial tourism interests?

Can we really do it? Can we integrate conservation and the needs of indigenous peoples through a *sharing of a common resource base* using the principles of comanagement? One key barrier is that when push comes to shove, can the conservation culture of the major organizations such as the World Wildlife Fund truly represent the interests of indigenous peoples? A recent article by Hough (1994) shows that in Madagascar, for all the talk about conservation and development, conservation objectives dominate. He argues that there is a pervasive organizational culture of conservation first, indigenous peoples second. It is a painful article to read because it is true, and it is sad. All the rhetoric and all the sincere efforts by many well-intentioned people are constrained by a professional culture that is hard to break away from, and very hard to change. There are no easy answers or magic wands to change this. But acknowledgement of this basic organizational reality must be a first step. *There must be a change in organizational and institutional culture to the point that indigenous natural resource needs are given equal priority in international policymaking.* The first conversion to the doctrine of integrating conservation and development was easy. It was logical and rhetorical. Then came the hard part—the hard choices on the ground. Now there must be a rededication to the principles of integrating conservation policies with the legitimate resource needs of indigenous peoples. In facing these hard choices the entrenched "organizational culture" of "conservation first" must change. I understand that the Wildlands and Human Needs program that was formed within the World Wildlife Fund has been disbanded. Why is this? What will it take to get it back?

Suspending disbelief, and presuming organizational change and recommitment, how could we really integrate indigenous peoples' natural resource needs with the imperatives of conservation? We have already reviewed some of the substantive strategies—asking the question of coevolution; not displacing indigenous people if they are not harming the park; the parable of the Bori Marsh; and the appropriate role of ecotourism where local benefits can be truly guaranteed. The answer also lies partly in good science, power-sharing participatory planning, and well-balanced comanagement involving the

concepts of different protection and use zones. But this is more easily said than done. There may be no perfect answer that guards all protectionist instincts while allowing significant indigenous peoples' natural resource needs. Perhaps, just perhaps, we may need to come to terms with the reality that to meet indigenous peoples' needs we may need to trade off for something less than perfect in terms of full protectionist conservation. West and Brechin (1991) offer one potential scenario that has mainly gone unheeded:

> In some cases, perhaps in many cases, we should carefully consider the option of sacrificing selected protection objectives for the sake of a prolific yet fragile species (*homo sapiens*). . . . Preservationists, not knowing fully the critical factors for species survival, run helter skelter to try to save a species everywhere across its range, and most fervently where it is locally endangered. Conservation biologist Terry Root (personal communication) has suggested that, realistically, this is both impractical and unnecessary. Instead of focusing such efforts on regions where a species is rare, the focus should be on critical regions where there are peak populations of the species within its range, thus ensuring its conservation there (p. 399).

And what we might gain in doing this might be far more precious than what we give up. For in acknowledging local needs and allowing significant resource uses what we would gain is acceptance, legitimacy, and support, a kind and degree of support that would be far more significant than might otherwise occur.

There is another critical reason for compromise in resource use. If not for social justice needs, then at least take to heart the lessons of Togo cited above. Recall that in the case of Togo it did not take much political instability for the indigenous peoples of northern Togo to rise up and literally and totally destroy the flora and fauna of Togo's national park system. This is not a unique case. The answer is not in more guns, but in more compassion. The most important thing in attaining conservation objectives is legitimacy and acceptance within the social systems we are operating in. Social order does not rest on the points of bayonets. The critical need is not for more helicopter gunships but for more legitimacy. Legitimacy is everything; raw power is nothing.

Take the cost of one helicopter gunship and invest it in 10 villages. Develop a comanagement plan funded by forgoing one helicopter; allow significant natural resource use for key indigenous needs in a *planned and controlled way*. This will protect against "illegal use" in an *uncontrolled way*. We cannot put up brick walls and ignore indigenous people. We gain by giving, not by hoarding. It is said in a very important book to many of us—"Give and ye shall receive." In the realm of environmental policy related to the conservation of protected areas and indigenous peoples this is the most fundamental paradigm shift that is so badly needed both for the human rights of indigenous peoples and the very fate of conservation areas in the years ahead. Dr. Garrett Hardin once said, "(Social) injustice is preferable to (ecological) ruin." But in this arena it is quite the reverse—injustice will lead to ruin. Conservationists, Wake Up! Wake Up! before it is too late. We can have a more enlightened environmental policy toward indigenous peoples in the Global Village. We can and we must.

REFERENCES

Agbo, V., N. Sokpon, J. Hough, and P. West. 1993. "Population-Environment Dynamics in a Constrained Ecosystem in Northern Benin." *Population Environment Dynamics: Ideas and*

Observations, G. Ness, W. Drake, and S. Brechin, eds., Ann Arbor: University of Michigan Press, pp. 283–200.

Akama, S., C. Land, and G. Burnett. 1995. "Conflicting Attitudes Toward Wildlife Conservation Programs in Kenya." *Society and Natural Resources* 8: 133.

Alcorn, J. 1990. "Indigenous Agroforestry Strategies for Meeting Farmer's Needs." *Alternatives to Deforestation: Steps Towards Sustainable Use of the Amazon Rainforest*, A.B. Anderson, ed., New York: Columbia University Press.

Basappanavar, C.H. 1993. "Fire: The Tragedy of Nagarahole." *Sanctuary Asia* 13: 44–47.

Beede, S.F. 1991. "Le Parc National des Cevennes." *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, P. West and S. Brechin, eds. Tucson: University of Arizona Press, pp. 100–106.

Boo, E. 1990. *Ecotourism: The Potentials and Pitfalls*, Volumes I and II, Washington, DC: World Wildlife Fund.

Borrini-Feyerabend, G. 1996. *Collaborative Management of Protected Areas: Tailoring the Approach to the Context*. The World Conservation Union. IUCN.

Brandon, K. 1993. "Basic Steps Toward Encouraging Local Participation in Nature Tourism Projects." *Ecotourism: Guide for Planners and Managers*, K. Lindberg and E. Hawkins, eds. North Bennington VT: Ecotourism Society, pp. 134–151.

Brokensha, D., D. Warrem, and P. Wermer, eds. 1980. *Indigenous Systems of Knowledge and Development*. Lanham: University Press of America.

Bunting, B.W., M.N. Sherpa, and M. Wright. 1991. "Annapurna Conservation Area: Nepal's New Approach to Protected Area Management." *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, P. West and S. Brechin, eds. Tucson: University of Arizona Press, pp. 160–172.

Calhoun, J.B. 1972. "The Plight of the Ik." *Resident Peoples and National Parks: Social Dilemmas and tragedies in International Conservation*, P. West and S. Brechin, eds. Tucson: University of Arizona, pp. 55–60.

Christie, P.A., White, and D. Buhat. 1994. "Community-Based Coral Reef Management on San Salvador Island, the Philippines." *Society and Natural Resources* 7: 103–118

Colorado Journal of International Environmental Law and Policy 1994. "Endangered Peoples: Indigenous Rights and the Environment." *Colorado Journal of International Environmental Law and Policy*, Special Issue, Winter.

Eagles, P., et al. 1993. *Ecotourism: An Annotated Bibliography for Planners and Managers*. North Bennington, VT: Ecotourism Society.

East, K.M. 1991. "Joint Management of Canada's Northern National Parks." *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, P. West and S. Brechin, eds. Tucson: University of Arizona Press, pp. 333–345.

Fals-Borda, O. 1987. "The Application of Participatory Action-Research in Latin America." *International Sociology* 2: 329–347.

Fals-Borda, O. and M.A. Rahman, eds. 1991. *Action and Knowledge: Breaking the Monopoly with Participatory Research*. New York: Apex Press.

Gupta, J. and M. Nair. 1990. "Kanha: Incendiary Activity." *Sunday Observer (Bombay)* 13: 4.

Hirst, S. 1995. *Havsuw 'Baaja: People of the Blue Green Water*, Supai, AZ: Havasupai Tribe.

Hough, J. 1989. "National Parks and Local People Relationships: Case Atudies from Northern Benin West Africa, and the Grand Canyon USA." Ph.D. diss., University of Michigan, School of Natural Resources and Environment.

Hough, J. 1994. "Institutional Constraints to the Integration of Conservation and Development: A Case Study from Madagascar." *Society and Natural Resources* 7: 119–124.

Hough, J. and M.N. Sherpa. 1989. "Bottom-up Versus Basic Needs: Integrating Conservation and Development in the Annapurna and Michiru Mountain Conservation Areas of Nepal and Malawi." *Ambio* 18: 434.

International Resources Group. 1992. *Ecotourism: A Viable Alternative for Sustainable Manage-*

ment of Natural Resources in Africa. Washington, DC: Agency for International Development.

Johannes, R. 1993. "Integrating Traditional Ecological Knowledge and Management with Environmental Impact Assessment." *Traditional Ecological Knowledge: Concepts and Cases*, International Program on Traditional Ecological Knowledge and International Development Research Center.

Kelsay, D., et al. 1992. *Proceedings: The First World Congress on Tourism and the Environment*. Belize: Ministry of Tourism and the Environment.

Kemf, E., ed. 1993. "Indigenous Peoples and Protected Areas: The Law of the Mother." *Earth*. London: Earthscan.

Ledec, G. and R. Goodland. 1988. "Wildlands: Their Protection and Management." In *Economic Development*. Washington, DC: World Bank.

Lindberg, K. and D. Hawkins. 1993. *Ecotourism: A Guide for Planners and Managers*. North Bennington, VT: Ecotourism Society of America.

Lowry, A. and T. Donahue. 1994. "Parks, Politics, and Pluralism: The Demise of National Parks in Togo." *Society and Natural Resources* 7: 321.

McCorkle, C.M. 1989. "Toward a Knowledge of Local Knowledge and Its Importance for Agriculture RD&E." *Agriculture and Human Values* 6: 4–12.

McNeeley, J.A. and K.R. Miller, eds. 1984. *National Parks, Conservation and Development: The Role of Protected Areas in a Sustaining Society*. Washington DC: Smithsonian Institution Press.

Marks, S.A. 1984. *The Imperial Lion: Human Dimensions of Wildlife Management in Central Africa*. Boulder, CO: Westview Press.

Marks, S.A. 1991. "Some Reflections on Participation and Co-management from Zambia's Central Luangwa Valley." In *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, P. West and S. Brechin, eds. Tucson: University of Arizona Press, pp. 346–360.

Ntshalintshali, C. and C. McGurk. 1991. "Resident Peoples and Swaziland's Malolotja National Park: A Success Story." *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, P. West and S. Brechin, eds. Tucson: University of Arizona Press, pp. 61–67.

Odour-Noah, E., D. Ford, L. Wichhart, and L. Francis. 1991. *Implementing PRA: A Handbook to Facilitate Participatory Rural Appraisal*. Worcester, MA: USAID and Clark University Program for International Development.

Peluso, N.L. 1992. *Rich Forests, Poor People: Resource Control and Resistance in Java*. Berkeley: University of California Press.

Pimbert, M.P. and J.N. Pretty. 1995. "Parks, People and Professionals: Putting "Participation" into Protected Area Management." Unpublished paper.

Polunin, N. 1991. "Delimiting Nature: Regulated-Area Management in the Coastal Zone of Malaysia." *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, P. West and S. Brechin eds. Tucson: University of Arizona Press, pp. 107–133.

PRA Notes. 1991. "Participatory Rural Appraisal: Proceedings of the Feb. 1991 Bangalore PRA Trainers Workshop." *PRA Notes*, London: IIED.

Rabinovitch-Vin, A. 1991. "Continuous Human Use as a Tool for Species Richness in Protected Areas of Israel." In *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, P. West and S. Brechin, eds. Tucson: University of Arizona Press, pp. 95–99.

Raval, S. 1991. "The Gir National Park and the Maldharis: Beyond Setting Aside." *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, P. West and S. Brechin, eds. Tucson: University of Arizona Press, pp. 68–88.

Ribit, J.C. 1996. "Participation Without Representation: Chiefs, Councils, and Forestry Law in the West African Sahel." *Cultural Survival Quarterly* 20: 40–44.

Roy, S.D. and P. Jackson. 1993. "Mayhem in Manas: The Threats to India's Wildlife Reserves, Indigenous Peoples and Protected Areas." *The Law of Mother Earth*, E. Kemf, ed. London: Earthscan.

Selznick, P. 1966. *TVA and the Grass Roots*. New York: Holt, Rinehart, & Winston.

Thrupp, L.A. 1989. "Legitimizing Local Knowledge: From Displacement to Empowerment for Third World People." *Agriculture and Human Values* 6: 13–24.

Turnbull, C.M. 1972. *The Mountain People*. New York: Simon & Shuster.

Usher, P.J. 1995. "Comanagement of Natural Resources: Some Aspects of the Canadian Experience." *Human Ecology and Climate Chance: People and Resources in the Far North*, D. Peterson and D. Johnson, eds. Washington, DC: Taylor & Francis, pp. 197–206.

Weaver, S.M. 1991. "The Role of Aboriginals in the Management of Australia Cobourg (Gurig) and Kakadu National Parks." *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, P. West and S. Brechin, eds. Tucson: University of Arizona Press, pp. 311–332.

Wells, M. and K. Brandon. 1991. *People and Parks: Linking Protected Area Management with Local Communities*. Washington, DC: World Bank, World Wildlife Fund, and U.S. Agency for International Development.

West, P. 1995. "Global Warming, Protected Areas, and the Right to Live off the Land." *Human Ecology and Climate Chance: People and Resources in the Far North*, D. Peterson and D. Johnson, eds. Washington, DC: Taylor & Francis, pp. 281–288.

West, P. and S. Brechin, Eds. 1991. *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, Tuscon: University of Arizona Press.

West, P., S. Brechin, C. Fortwangler, and P. Wilshusen. Under review. *Protected Natural Areas and the Dispossessed.*

West, P., V. Agbo, M. Simsik, and N. Sokpon. Forthcoming. "The Political Economy of Ecotourism in Northern Benin." *Protected Natural Areas and the Dispossessed*, P. West, S. Brechin, C. Fortwangler and P. Wilshusen, eds. Albany: SUNY Press.

Whelan, T. 1991. *Nature Tourism: Managing for the Environment*. Washington, DC: Island Press.

Widen, M. and M. Levin. 1991. "Cognerative Learning Bringing Participation into Action Research." *Participatory Action Research*, W.F. Whyte, ed. Newbury Park, CA: Sage Publications.

Ziffer, K. 1989. *Ecotourism: The Uneasy Alliance*. First in Conservational International's Series of Working Papers on Ecotourism, Conservation International.

12

Environmental Justice and Equity

Mark Andrew Kelso
Queens College, Charlotte, North Carolina

ENVIRONMENTAL JUSTICE: THE CONCEPT

In recent years, observers have increasingly noticed the importance of the relationship between developed and less-developed countries in global environmental policy. The developed world is important to the global ecological picture because these countries disproportionately use the resources and produce the pollution and waste of the world. The less-developed countries are important because within their territories exist some of the world's most important ecosystems and some of the earth's most important natural resources. Clearly, a global strategy for environmental protection in the next century cannot avoid the interests of either part of the world's economic structure. The attempt to balance the interests of the developed and less-developed worlds, as well as their respective duties and responsibilities for environmental protection, underlies the concept of environmental justice. This chapter will examine the idea of "justice" in the arena of global environmental politics, focusing on some of the key issues that divide the developed and less-developed nations of the world. After establishing a framework for the discussion of the concept, the chapter will then examine how the concept has affected two major global environmental treaties: the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and the 1992 Convention on Biodiversity.

The idea of environmental justice reflects two broad areas of division between the developed and less-developed nations of the world. The first area of division deals with the question of levels of responsibility for environmental degradation and levels of obligation to help address current environmental problems. The second area of division deals with the protection of the natural resources of developing countries from the intrusion of economic or environmental interests from the industrialized world. In both instances, the interests of the industrialized countries and the developing countries conflict, leading to major disagreements on the scope of global environmental policies and the actions that need to be taken on an international scale to address perceived threats to the planetary environment.

Within the first broad area of division, the developing nations of the Southern Hemisphere make two key points regarding the responsibilities and obligations the nations of the world have regarding environmental problems. The first point is that because the industrialized nations of the Northern Hemisphere are the ones primarily responsible for most of the global threats to the environment, these nations should bear most of the costs of addressing these problems. The second point is that because the less developed nations are overwhelmed by the pressures of their own economic development, they do not have the resources necessary to address environmental problems (Jordan 1994: 19). Based on these factors, the developing nations argue not only that the industrialized world should pay the costs of their own adjustments to meet environmental challenges, but also that the North should send resources South to help the developing countries implement strategies to face the same threats. These funds should not, according to the developing countries, come from already existing aid, but should be "offered in addition to regular development funds" (Porter and Brown 1991: 46). This principle is called "additionality", as the less-developed world insists that funds to implement environmental protection policies should be in addition to any resources currently passed from the developed world to the developing (Jordan 1994: 16).

Both of the points made by the less-developed countries have validity. The industrialized nations of the North, because of their high levels of resource consumption, do contribute more to major global environmental problems than do the developing nations of the South. The industrialized nations represent just 16% of the world's population, but are responsible for 48% of greenhouse gas emissions. The annual per capita carbon dioxide emissions of the United States total 5.7 tons, while the average per capita emissions in the developing world total only 0.5 ton. The United States, with 230 million people, emitted in 1990 the same volume of greenhouse gases as the 4 billion people of the South (Hurrell and Kingsbury 1992: 39; Wells 1996: 26). The industrialized nations are also responsible for between 80 and 90% of global chlorofluorocarbons (CFC) emissions (Bidwai 1992: 854; "Green Justice" 1994: 81). These statistics demonstrate that the industrialized nations of the world do bear a large share of the responsibility for global environmental damage and support the developing world's argument that the nations of the North should bear a large share of the obligation to address these problems.

The developing nations also have a point when they say that they lack the resources to help in the global environmental protection effort. The optimism about development that some had in the 1960s has met the reality of the 1990s. In 1990, the highest-income countries in the world (the industrialized North) had an average per capita income of $20,173. In that same year, the lowest-income country has an average per capita income of $353. This translates into an absolute income gap of $19,280, compared with a gap of only $3677 in 1950. In relative terms, lower-income countries had an income equal to only 1.7% of the industrialized countries in 1990, compared to 4.3% in 1950. Thus, in the past 40 years, the relative gap between the rich and poor nations of the world has widened by 60% (Seligson 1993: 3). Clearly, the past four decades have not resulted in any major equalization of incomes among the nations of the world, and this fact strengthens the developing world's claim of poverty when asked to contribute to the global efforts at environmental protection.

Most industrialized nations, with the possible exception of the United States in recent years (Thatcher 1992: 194–195),[1] accept the basic idea behind the principle of additionality (Jordan 1994: 19). However, the industrialized nations also fear that the less-developed countries may try to use additionality as a manipulative device to extract

more development aid from them (Hurrell and Kingsbury 1992: 41). This "greenmail," as some have called it (Jordan 1994: 18), reflects the desire of some developing countries to use environmental negotiations as a way "to advance a broader agenda of change in the structure of North-South economic relationships" (Porter and Brown 1991: 129). To guard against such practices by developing nations, the industrialized North has sought to link any funds for environmental protection to the generation of global environmental benefits (Jordan 1994: 30). Such a link would also help alleviate Northern fears that any money sent South for environmental purposes would be wasted or used inefficiently. As Cooper (1994) states, "Governments of developing countries have not inspired high confidence in their abilities to use foreign capital productively during the past two decades, and the strong inclination in the donor community is to link official transfers to particular projects in the management of which the donors have some role or to make them conditional on policy changes which the donor feels are necessary for improving economic performance and growth" (60).

If one substitutes "environmental" for "economic" in the last line of the above statement, the industrialized countries' attitude toward additionality becomes clear. The nations of the North are not necessarily opposed to the concept, but they want some control over how the money is used. The nations of the South want the additional resources from the North, but they want fewer restrictions on how these resources will be used.

The disagreements between the Northern and Southern nations on additionality can perhaps be explained by their differing perceptions of the environmental crisis. While the industrialized North sees environmental protection as an independent issue, delinked from any other issue, the developing South sees "environmental protection objectives as inseparable from economic issues" (Haas et al. 1992: 8). As Switzer states, "The developing nations of the South . . . have had only limited capacity to incorporate the environment as a policy priority. Their concern for economic development overshadows longer-term issues" (1994: xvi).

While the industrialized countries argue that the resources they send to the developing world for environmental protection should be used only for that purpose, the less-developed countries often see economic development as a higher priority and would like to divert some funds to this endeavor, arguing that a higher level of economic development will allow them to put forth a stronger effort in the area of environmental protection. Many observers agree that development and environmental protection are linked, and some studies have shown that success in one area usually leads to success in the other ("Economics Brief" 1992: 79–80).

Related to the disputes over additionality and environmental protection funds are several side issues that shape the context of the debate. Developing nations argue that they would need less support from the industrialized North, for either development or environmental protection, if two steps were taken to improve their economic condition. The first is a reduction in the amount of debt that developing countries owe to industrialized countries. The debt crisis in developing nations is primarily responsible for the estimated $50 billion annual net capital drain from the South to the North (Buttel 1995: 198). This drain of resources was described by former U.S. Defense Secretary and World Bank President Robert McNamara as "like a blood transfusion from the sick to the healthy" (Gore 1992: 55). While some industrialized nations have embraced the Trinidad Terms, which call for the "writing off" of two-thirds or more of the debt of the poor countries, other developed nations, like Japan, have resisted (Jordan 1994: 27). Such

obstacles to debt reduction may also be barriers to global environmental protection, because, as Buttel states, "It is arguably the case that substantial debt forgiveness would be more efficacious in alleviating Third World environmental degradation than would the bio-diversity and forest conventions prepared for ratification at UNCED" (195).

A second step that could be taken to improve the economic condition of the developing states and thereby free up funds for environmental protection is change in international trade policies. The World Bank estimates that trade liberalization and the raising of commodity prices for the products of developing countries could generate an extra $65 billion in export earnings in the developing world by 2000. Furthermore, the World Bank and the Organisation for Economic Co-operation and Development (OECD) calculate that the world as a whole will be $213 billion richer by 2002 with the successful conclusion of the Uruguay Round of negotiations on the General Agreement on Tariffs and Trade (GATT), but that sub-Saharan Africa will be $2. 6 billion poorer (Jordan 1994: 27). Overall, the United Nations Development Program estimates that lower-income countries lose around $500 billion every year because of restrictions on access to international trade, finance, and labor markets (Jordan 1994: 32). These figures suggest that changes in trade policies could provide substantial economic benefits to the less-developed world and lessen their need for environmental protection funds from the developed.

From the perspective of the industrialized nations, there are steps that the developing world could take to improve its own lot. One of these steps is a reduction in military expenditures. In 1989, expenditures in developing world nations on imports of armaments exceeded $90 billion (Buttel: 1995). A freezing of the military expenditures of developing nations at current levels would free up billions of dollars, money that could be put toward economic and social development (Jordan 1994: 32). Another possible step is the promotion of greater energy efficiency in developing nations. Because of inefficiency, developing nations require 40% more energy than industrial states to produce the same value of goods and services (Lenssen 1994: 114). A wiser use of energy, making use of both better technology and abundant local resources, could also free up billions of dollars for development (Lenssen 1994: 114–119). These examples indicate that there are steps that can be taken by the developing countries themselves to improve their economic situation, without any assistance from the developed world.

This idea of developing countries improving their economic situation on their own leads into the second broad area of division between developed and less-developed nations. To improve their economic situation through internal means, developed nations must have the ability to control the natural resources within their own boundaries. Such control is threatened by attempts by forces in the industrialized world, for either economic gain or environmental protection, to restrict the ability of a developing nation to make key decisions about the use of its own resources.

One aspect of this conflict is the issue of forest protection. The world's forests may be the "single most important repository of bio-diversity" (Raustiala and Victor 1996: 42). Nonetheless, global efforts to protect forests have been restricted due to the efforts of certain heavily forested developing states, such as Brazil and Malaysia, to protect their sovereign domestic resources (Raustiala and Victor 1996: 42). Many developing nations resist international efforts to control logging, on grounds of national sovereignty (Switzer 1994: 292). Attempts to formulate a forest treaty prior to the 1992 Earth Summit were thwarted by a North-South disagreement on focus. Industrialized countries wanted a focus on tropical rainforests, while the developing countries wanted a broader

focus that included both temperate and boreal forests (Parson et al. 1992: 14). Similar efforts to create a forests protocol within the Convention on Biodiversity have gone nowhere, meaning that a central aspect of biodiversity in the world is not being addressed by that treaty. As one observer has put it, "Failing to address forests within the CBD is akin to failing to address coal within the convention on climate change" (Raustiala and Victor 1996: 42).

The concern of some developing countries about control over their forest resources reflects a wider concern in the developing world about control over all biological and genetic resources. Developing nations feel that they are often the financial "losers" in the process of developing useful products from genetic and biological resources because "little or none of the profits flow to the source country" (Raustiala and Victor 1996: 37). While industrialized countries reap the profits of their technological innovations in this area, the developing nations, where the resources that made these products possible exist, get almost nothing out of the process. A Malaysian delegate in a United Nations debate in 1990 complained that corporations and other institutions in the industrialized North have "exploited the rich genetic diversity of developing countries as a free resource for research and development" and then patented the results and sold them back to developing countries at "excessively high prices" (Porter and Brown 1991: 130). The developing world could gain as much as $5.4 billion annually if multinational food, seed, and pharmaceutical firms paid royalties for local knowledge and plant varieties (Raustiala and Victor 1996: 37). Industrialized nations argue for strong international intellectual property rights law, to protect their companies from the financial losses associated with the copying of innovations; but to the nations of the South, such laws are "fundamentally unjust, a means by which resources and wealth are transferred from South to North with the imprimatur of legality" (Raustiala and Victor 1996: 38). These disputes over intellectual property rights and control over biological and genetic resources were a central feature of the negotiations of the Convention on Biodiversity, as the less-developed nations sought to correct what they see as an unfair system—a system in which industrialized nations "rob" them of their resources and then use these resources for the economic gain of Northern companies and nations (Raustiala and Victor 1996: 37–39).

A third issue in the dispute between the developed and developing world over the control of resources deals with hazardous waste dumping. In the late 1980s, a series of well-publicized incidents occurred, in which the practice of industrialized nations using less-developed nations as "dumping grounds" for toxic waste was revealed to the citizens around the world. At this early stage, most of the incidents involved West European nations dumping their wastes in Africa (Gourlay 1992: 1–15). Although some African nations were willing partners in this trade, because of the great profits that could be gained from it (Anderson et al. 1988: 66–68),[2] for many in the developing world this practice was a clear example of Western callousness and insensitivity. The Organization of African Unity passed a resolution in May 1988 calling the dumping of nuclear and industrial waste a "crime against Africa" (Gourlay 1992: 9). Pope John Paul II condemned the practice in a 1993 speech (Puckett 1994: 57). The outrage over dumping the industrialized world's waste in the less-developed world led to the creation of the Basel Convention in 1989 (Puckett 1994: 54). While this international agreement established guidelines for the waste trade, it did not totally end it, and negotiations since 1989 have centered around imposing a total ban on waste trading between the developed and developing worlds (Puckett 1994: 54–57). The issue of waste dumping differs from the

issues of forest resources and biological and genetic resources in that the latter issues mainly deal with economic gains or losses, while the former issue deals with questions of morality, ethics, and simple dignity.

The question of justice in environmental issues has many dimensions for the industrialized and less-developed countries. However the question is formulated, what cannot be denied is that justice is a crucial aspect of global environmental policy (Shue 1992: 373–374). Insensitivity to the needs of the less-developed nations in formulating environmental policy will only backfire on the developed world and subvert efforts to resolve global environmental problems. As Hurrell and Kingsbury (1992) state, "The failure to promote more sustainable forms of economic development in the South may well work to undermine many forms of environmental action undertaken by the North. If Indian and Chinese per capita carbon emissions reached US levels, world emissions would treble" (39).

China alone is expected to emit more carbon dioxide by 2025 than the current combined total of the United States, Japan, and Canada. Increases of carbon levels in the developing world would cancel out any decreases in the developed world and create even greater problems in terms of global warming (Lenssen 1994: 113).

Protecting the fragile ecosystems of developing nations is also a concern of industrialized nations. While some are beginning to question the uniqueness and importance of the rainforests in the planetary system of biodiversity (Angier 1994: C-1, C-6; Buttel 1995: 193), few would argue that the destruction of these areas is a "good" thing. Furthermore, some areas of the South, which have not received the publicity of the rainforests, are important centers of diversity. One such area is Gran Chaco in South America, a 400,000-square-mile lowland plain across Paraguay, Bolivia, and Argentina. This second largest ecosystem in Latin America is disappearing at a much faster rate than the Amazon, but without the publicity (Angier 1994: C-6). Industrialized nations would gain little by preserving biodiversity in their own lands while ignoring it in the less-developed countries. Many industrialized countries, even large ones like the United States, are "not especially rich in bio-diversity" anyway (Raustiala and Victor 1996: 42).

A final reason that environmental justice must be an interest of industrialized nations is the massive problems that could be created through a combination of increasing poverty and continued environmental degradation. These problems can create large amounts of human suffering through domestic unrest, wars, and other forms of turmoil. They could also create conditions for major dislocations of people, as refugees from turmoil flood across national borders. Haiti is an excellent example of a country where environmental ruin coupled with deep poverty has created conditions of political instability (Mathews 1994: 280). Industrialized nations will inevitably be asked to intervene in such situations for humanitarian reasons. Also, if the combination of environmental destruction and poverty produce extremist, authoritarian governments, the military interests of industrialized nations might be threatened, especially if the less-developed nations in question have the opportunity to acquire weapons of mass destruction (Homer-Dixon 1994: 307). While the industrialized world has ignored such situations in the past, they have often had to intervene in the affairs of a developing nation for either humanitarian or national security reasons in the end. Recent events, such as the Persian Gulf War, the 1993 intervention in Somalia, and the proposed 1994 U.S. intervention in Haiti, come to mind as examples of interventions that might have been avoided if problems in these areas had been addressed in a more timely manner.

For all of these reasons—the possible undermining of efforts to address environ-

mental problems, the need to protect the fragile ecosystems of the developing world, and the desire to avoid political and social instability in developing countries—the industrialized nations of the North have an interest in promoting a sense of environmental justice among the nations of the South. As Gore (1992) states, "The promotion of justice and the protection of the environment must go hand in hand in any society, whether in the context of a nation's domestic policies or in the design of 'North-South' agreements between the industrialized nations and the Third World. Without such commitments, the world cannot contemplate the all-out effort urgently needed" (302).

Without justice, international efforts to protect the environment will be continuously bogged down in disputes between the North and South, the rich and poor, the developed and developing nations. While some disagreement on the "terms" of environmental justice is inevitable, the industrialized North cannot ignore this issue, or show insensitivity toward this issue, and expect the developing South to go along to "save the planet." In most cases, "saving the planet" is not as important to Southern nations as "saving themselves" from the ravages of poverty. This is a point the industrialized world must understand if global efforts at environmental protection are to succeed.

ENVIRONMENTAL JUSTICE AND INTERNATIONAL ENVIRONMENTAL AGREEMENTS

Two central questions must be answered regarding international environmental agreements. The first is: To what extent do states actually implement and comply with the principles and rules to which they have agreed? The second is: Do these agreements contribute appreciably to securing effective environmental management (Hurrell and Kingsbury 1992: 22)? To some extent, the answer to the second question is based on the first. That is, if states effectively implement and comply with the principles and rules of an environmental agreement, environmental management is likely to be enhanced. To a larger extent, the answer to the first question is that "states agree to, and commonly comply with, international environmental agreements because it is in their interests to do so" (Hurrell and Kingsbury 1992: 23). Because these interests are closely linked to environmental justice controversies, an understanding of environmental justice is necessary to understand the creation and implementation of international agreements regarding the environment.

The main approach to the creational agreements is the convention-protocol approach. This involves the creation of an international convention, or agreement, usually under the direction of the United Nations, in which signatory states agree to abide by certain principles expressed in the convention (Susskind and Ozawa 1992: 142–149). These agreements are then strengthened by later protocols, which add "teeth" to the original convention by setting down concrete objectives or technical standards consistent with the convention (Susskind and Ozawa 1992: 144). For example, on the issue of stratospheric ozone depletion, key protocols such as the 1987 Montreal Protocol, the 1990 London Protocol, and the 1992 Copenhagen Protocol set strict time tables for gradual reductions in CFCs and other substances that deplete the earth's ozone layer (Switzer 1994: 276–277). The importance of protocols in international environmental agreements is underscored by the comment of Barbara Bramble of the National Wildlife Federation regarding the Convention on Biodiversity that "anything with teeth is going to be in the protocols" (Reichhardt 1993: 577).

Many of the problems with the convention-protocol approach center round the ways in which agreements are reached. Most of the effort in international negotiations is devoted to getting a written agreement acceptable to the largest number of countries (Susskind and Ozawa 1992: 143). Such a focus can lead to a "lowest common denominator approach," in which real guarantees of change are surrendered to the goal of attracting the largest possible number of signatory states. Agreements reached tend to be vague in their language, open to numerous interpretations, and sometimes contradictory in their provisions (Susskind and Ozawa 1992: 147). With the original conventions so problematic, attention logically turns to negotiations over protocols, which can be very divisive and take years to complete. The entire process of creating a convention with significant protocols can take years, as the process is often long and drawn out (Susskind and Ozawa 1992: 146).

Complicating this process is scientific and technical ambiguity over what should be done about a given problem. A significant problem regarding international efforts to promote and protect biodiversity is the "ignorance" existing in the scientific community regarding exactly what exists in nature (Angier 1994: C-6). Scientists have identified approximately 1.7 million species on the earth, but that likely represents only a small percentage of the species existing in nature, which may total over 100 million (Raustiala and Victor 1996: 17). Furthermore, scientists are unsure of the extent of biodiversity problems (i.e., how many species are disappearing and how fast?) and exactly what kinds of guidelines should be followed in attempting to save a "species" (Raustiala and Victor 1996: 17; "So Much to Save" 1992: 94). Similar difficulties face the problem of limiting the international trade in hazardous wastes, as no clear definition exists as to what the difference is between a hazardous waste and a nonhazardous one (Hanson 1996: 22–24; MacKenzie 1995: 6–7; Laurence and Wynne 1989: 15–16). The European Union (EU), for example, has three different categories of waste—amber, red, and green—and insists that "green list" waste is not subject to the restrictions of the Basel Convention (MacKenzie 1995: 6–7). There is further controversy over nations and international organizations over what constitutes "recycling" of waste (Puckett 1994: 55–56).

The problems with international treaties identified here allow both industrialized and developing countries a great deal of maneuverability regarding international environmental agreements. International agreements and the regimes they create tend to reflect the power structure among nations (Buttel 1995: 200). This gives the industrialized world some power over the less-developed world in terms of enforcing their will on agreements. The United States and its European allies successfully imposed an "informed consent" regime on the Basel Convention, allowing wastes to be exported between states as long as there was "informed consent" by the waste importer. Such a policy was in contrast to the will of the developing nations, which wanted a total ban on waste exports (Porter and Brown 1991: 86–87). The developed world also got its way regarding how the environmental initiatives agreed to at the 1992 UNCED would be funded. The developing nations wanted a "greed fund," which would be controlled democratically by the nations who were a party to a given agreement. The industrialized nations wanted financing controlled by the Global Environment Facility (GEF), a fund set up by the World Bank over which donors had greater control. In the end, in major areas such as the Convention on Bio-diversity, funding was directed through the GEF, although there was a vague promise that this body would be "restructured" (Raustiala and Victor 1996: 20, 37; Jordan 1994: 26). The developing world also failed to get a firm commitment by the industrialized nations to increase their developmental assistance levels to 0.7% of their

GNP. Key nations, such as the United States and Switzerland, would not even agree in principle to such a commitment (Haas et al. 1992: 26–27).

The examples listed above do not mean that the developed world always gets its way. As noted earlier, heavily forested, less-developed nations like Brazil and Malaysia have successfully resisted efforts to put international restrictions on the use of forest resources (Raustiala and Victor 1996: 27). Within the Convention on Biodiversity, developing nations received a clear statement that nations have sovereign rights over genetic resources, thus ending any concept of free scientific access to biological resources (Barton 1992: 775). Through the Basel Convention and later protocols, the position of the developing nations that the international trade in hazardous wastes be totally banned has won out (MacKenzie 1995: 6; Puckett 1994: 55). The unequal position of the developing world in the world power structure is perhaps balanced out in international environmental agreements by recognition of several key points by the developed world. One is that environmental problems are global and that the South must be included in any agreement if real progress is to be made (Hurrell and Kingsbury 1992: 39). Another is that no agreement will be possible if the developing world is not a major player. Without the less-developed countries, any agreement would lack credibility, significance, and relevance. For the most part, developing nations recognize the "negative" power they have in the world of international environmental policy—the ability to undermine the efforts of the developed world to address these issues (Hurrell and Kingsbury 1992: 41). Armed with this power, the developing nations can compete on a more equal footing with the industrialized world in the formulation of international environmental policy and sometimes win the acquiescence of developed nations to their demands.

THE BASEL CONVENTION

In 1981, a group of experts met at Montevideo, Uruguay to examine the international transport, handling, and storage of hazardous waste ("Dossier" 1992: 30). In 1984 and 1985, the United Nations Environmental Program (UNEP) drew up a set of guidelines, which became known as the Cairo guidelines, to regulate the international trade in hazardous wastes. These guidelines established notification procedures, prior consent by receiving nations, and verification that the receiving nation has requirements for disposal that are as stringent as those of the exporter (Switzer 1994: 118). Many of the requirements in the Cairo guidelines would be formally codified into the later Basel Convention.

International attention to the issue of the global trade in toxic waste was limited until the late 1980s. During this time, the names of ships like the *Lynx*, the *Khian Sea*, the *Zanoobia*, and the *Karin B.* became associated in the mind of the world's public with the morally questionable practice of hazardous waste dumping (Gourlay 1992: 1–15). The *Khian Sea*'s voyage was typical, going from Philadelphia in August 1986 to the Caribbean to Haiti and back to Philadelphia before last being spotted in Yugoslavian waters off the Adriatic coast in August 1988. The ship's cargo 13,476 tons of incinerator ash, was denied entry into ports around the world. What finally happened to this cargo is unclear, but the best estimates are that the ship secretly dumped its wastes in the Bay of Bengal (Gourlay 1992: 1–3; Anderson et al. 1988: 66–67).

Such voyages, along with incidents such as the discovery of the dumping of some 3884 tons of chemical waste near the Nigerian port city of Koko, had the effect of focusing world attention on what had formerly been an obscure problem—the global

trade in toxic waste (Gourlay 1992: 5–9). World public opinion was inflamed by these incidents and the reaction from the developing world, especially Africa, was fierce. Negotiations for a new agreement on the waste trade, designed to strengthen and formalize the Cairo guidelines, were sponsored the UNEP in 1988 and 1989 (Porter and Brown 1991: 48–49). The result of these negotiations was the Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal, signed by 118 countries in Switzerland on March 22 1989 (Puckett 1994: 54). The treaty went into force on May 5 1992 after 20 countries had ratified it (Murphy 1993: 42). As of February 1996, 97 nations had ratified the treaty (Hanson 1996: 22). The only major industrialized country outside of the convention is the United States. The United States signed the agreement in 1990 and the Senate consented to ratification in 1992, but the Congress never passed the necessary implementing legislation to allow the United States to live up to its commitments under the convention (Murphy 1993: 42).

The Basel Convention sought to limit the international trade in hazardous wastes from developed to developing countries. This trade accounted for an estimated 5.3 million tons of wastes from 1989 to 1993 (Puckett 1994: 54). The major countries involved in this trade were European countries such as Germany, the Netherlands, and Italy (Porter and Brown 1991: 85). Interestingly, even though the United States played a key role in the creation of the Basel agreement, the United States is not a major player in the waste trade. Only about 1% of U.S. wastes are exported, with the bulk of those going to Canada or Mexico (Switzer 1994: 119). The essential players in this "dirty" business were: an industrialized country eager to dispose of waste at a low cost; an indebted country prepared to risk the health of its citizens for economic gain; and the entrepreneurs, adventurers, or corrupt politicians who organized the collection, shipping, importation, and ultimate disposal of the waste (Gourlay 1992: 14). One of the main concerns about this trade in wastes from a practical standpoint was that many of the developing countries importing the waste lacked the technical or administrative capacity to dispose of it safely (Porter and Brown 1991: 85).

During the negotiations leading up to the Basel agreement, the developing nations sought to gain international approval for a total ban on the international waste trade. As noted earlier, the United States and the Western European nations blocked this effort by successfully putting forth the idea of "informed consent" as the basis for the original Basel agreement (Porter and Brown 1991: 86–87). Under the original convention, states agreed:

1. To produce as little hazardous waste as possible
2. To ensure their disposal facilities for waste were adequate
3. To cut imports and exports to the "minimum consistent with environmentally sound and efficient management"
4. Not to export wastes to countries that banned them
5. Not to export wastes when they had reason to believe that the waste will not be handled in an "environmentally sound manner"
6. To give importing countries all the necessary details about the waste
7. Not to export wastes unless importing countries give written consent of acceptance to receive them (Gourlay 1992: 193–194).

If the countries involved followed these guidelines, all types of waste could continue to be traded legally under the Basel Convention.

Early criticisms of the convention focused on the agreement's vagueness, contra-

dictions, and loopholes. Key terms, like "environmentally sound manner," were not defined. In one provision, the convention bans the shipment of wastes from signatory to nonsignatory countries, while in another provision it allows them if bilateral agreements are reached (Susskind and Ozawa 147). Some questioned how "consent" could be assured in a developing nation, suggesting that this could open the door to abuse by corrupt local officials in less-developed states (Puckett, 54). Some African states opposed the agreement on the grounds that it did nothing to shift the burden of liability for the hazardous wastes from the recipient states to the generating or exporting states (Susskind and Ozawa 1992: 149).

Because of these criticisms and the perceived weakness of the convention, a number of regional and national agreements on the waste trade were created after the original Basel Convention. Partially due to pressure from their own citizens to stop the waste trade, in December 1989 the member states of the European Community agreed to ban nuclear or hazardous waste shipments to the 69 African, Caribbean, and Pacific countries in the Lome IV Convention. The ACP countries in turn agreed to prohibit hazardous and radioactive waste imports from any country. In January 1991, the members of the Organization for African Unity followed this up with an agreement, in the Bamako Convention, to ban the import of all forms of hazardous and nuclear wastes into the African continent, as well as the import of any products that have been banned for use in the country of manufacture (Puckett 1994: 54). In addition, many nations have enacted unilateral waste import bans. The number of countries enacting such bans increased from three in 1986 to 103 by 1993 (Puckett 1994: 55).

Developing nations have also used the protocol process to strengthen the Basel Convention. In December 1992, in Piriapolis, Uruguay, the developing nations sought to impose the total ban on hazardous waste exports they had supported three years earlier at Basel. A last-minute compromise by the developed nations thwarted this effort, and while the final dumping of hazardous wastes was banned at Piriapolis, exports for "recycling" could continue (Puckett 1994: 55). In March 1994, in Geneva, the recycling loophole was effectively closed. The Convention adopted the position that all waste exports from OECD to non-OECD countries would be banned by the end of 1997, including those targeted for "recycling" (MacKenzie 1995: 6). The ban was made legally binding on all parties to the Basel Convention in 1995 ("Worldwire" 1995: A-8). Extension of the ban to all non-OECD countries successfully closed another loophole in the Basel Convention, the growing waste trade between Western and Eastern Europe that had begun after the end of the Cold War in the early 1990s (Puckett 1994: 56–57).

With the original convention successfully strengthened, two major issues face the parties to the Basel Convention and other interested states. The first is the problem of defining what wastes should, or even are, banned under the Basel agreement and its subsequent protocols. As mentioned earlier, the EU has three separate lists for waste materials. On its amber and red lists are materials such as lead batteries, asbestos, and mercury. Both the EU and the Basel Convention identify these as hazardous materials that cannot be exported. On the EU's green list, however, are materials such as copper, lead, and zinc "wastes and scrap" and steel and plastic scrap. The EU says that these materials are not hazardous and can be exported under the strengthened Basel agreement. The Basel Convention lists some of these materials, such as copper, lead, and zinc compounds, as hazardous materials, but the EU says that their "wastes and scrap" are not the same thing (MacKenzie 1995: 6–7). Though not a party to Basel, the United States is interested in the outcome of this dispute, because the United States exports about 10

million tons of iron scrap annually, some of which contains metals such as zinc, cadmium, and lead, which could theoretically be banned under the Basel Convention (Hanson 1996: 23).

The second key issue facing the Convention is liability. This was a major issue facing the original agreement, but seven years later, no protocol on liability has emerged. This is an issue that clearly divides along North-South lines because there are disagreements over which handler of the waste is ultimately liable for its fate. Is the generator of the waste liable, even if he did not have control over the ultimate fate of the shipment? Is the person who takes the wastes from the generator, the handler, liable? Is the person who finally disposes of the waste liable? This is a major issue because even though legal dumping of toxic waste has been banned under the Basel Convention, illegal dumping could occur and the developing countries want a mechanism by which they can punish those responsible. In industrialized countries, chemical companies and other industrial interests are concerned that they could be held liable for waste that they have not seen, or had control over, since it left their factory (Hanson 1996: 24).

The establishment and enforcement of the Basel Convention embodies some of the key points regarding the issue of environmental justice made at the beginning of the chapter. Developing nations sought to end the practice of hazardous waste dumping because it infringed upon their ability to control their own resources. The practice exposed the citizens and the lands of less-developed countries to unnecessary and unknown dangers. The waste trade was built on the ability of governments and individuals in industrialized countries to take advantage of the developing world's poverty. As the issue gained international attention, the developing countries sought to take action to stop being "dumped on." While the original Basel Convention did little to stop the hazardous waste trade, a combination of side agreements and strengthening protocols created the desired situation for the less-developed countries—a total ban on hazardous waste exports. This issue illustrates the power developing nations can have in international environmental policymaking, especially when the question regarding environmental justice is so clear. The practice of the developed world dumping hazardous waste on the developing world was so reprehensible, morally and ethically, that the developing nations could build world public opinion in their favor. Over time, the strategy of the developing nations worked, and key loopholes in the original Basel agreement were closed, although a few do remain for future discussions.

THE CONVENTION ON BIODIVERSITY

The United Nations Environmental Program initiated the discussions for a convention on biological diversity in 1988 (Parson et al. 1992: 14). This action was in response to a perceived need, especially in industrialized nations, for a document that would create "a coherent framework for coordinated action to preserve bio-diversity worldwide" (Raustiala and Victor 1996: 18–19). Two key factors created this perceived need, and thereby the impetus for a comprehensive biodiversity agreement in the late 1980s. The first was the increased recognition of the need to preserve habitats and ecosystems in developing nations. The second was the recognition that the developing nations could not provide the necessary resources to protect these habitats and would need help from the developed world (Barton 1992: 773).

Work on the treaty was completed in May 1992 in Nairobi, and it was presented

for approval to the nations of the world at the UNCED Summit in June 1992 (Parson et al. 1992: 14). A total of 156 nations signed the treaty at UNCED. Eighteen months later, the treaty entered into force after being ratified by the necessary number of nations. As of the end of 1995, there were 127 parties to the Convention on Biodiversity (CBD) (Raustiala and Victor 1996: 19). As with the Basel Convention, the only major country outside the agreement is the United States. Although President Clinton signed the biodiversity treaty in 1993, the Senate refused to ratify it, citing a variety of reasons (Reichhardt 1994: 307).

The three main objectives of the treaty are the conservation of biological diversity, the promotion of the sustainable use of biological diversity, and the equal sharing of the benefits of genetic resources (Raustiala and Victor 1996: 20). The convention directs nations to take a number of steps to preserve biodiversity, including the establishment of a system of protected areas, the integration of genetic resource conservation into national decision making, adoption of incentives for the conservation of biological resources, and the development of assessment procedures for ensuring that impacts on biological diversity are taken into account in project design (Barton 1992: 774). The convention also establishes, in Article 15, the sovereign right of nations to control their genetic resources, with access being granted only under mutually agreed terms and conditions and subject to the "prior informed consent" of the nation involved (Barton 1992: 775).

Two of the most controversial aspects of the convention are its statements on international intellectual property rights and its financing mechanisms. In terms of property rights, Article 16 of the Convention skirts the issues by making promises to both developed and developing nations. While the developed nations commit to making technologies relevant to conserving and using genetic resources available to developing countries on "fair and most favorable terms," these terms are also supposed to be consistent with intellectual property legislation (Barton 1992: 774). What this means in terms of patents and other key issues for industrialized nations is unclear. In fact, Article 16 is one of the most blatantly ambiguous parts of the agreement (Reichhardt 1993: 577).

The financing mechanisms for the convention are addressed in several articles within the document. Article 20 states that developing countries will not be able to fulfill their commitments under the convention without financial resources and the transfer of technology from the developed nations. It also says that "economic and social development and the eradication of poverty are the first and overriding priorities of developing country Parties" (Barton 1992: 774). In terms of the mechanism for funding the implementation of the biodiversity agreement, the Global Environment Facility is identified as the "interim" mechanism, until the conference of parties creates a new mechanism. The conference on defining a funding mechanism is to be held within 1 year of the time the treaty enters into force. Procedures at this conference are to be adopted by a consensus of all participants (Barton 1992: 774). Due to the continuing fears by the donor states about the creation of a new international financing institution, the conference to define a new funding mechanism has not yet occurred, and the GEF has extended its tenure as the "interim" funding mechanism of the CBD (Raustiala and Victor 1996: 39).

Most of the criticisms of the CBD have focused on its lack of specificity and its silence on key issues. As one observer has noted, "The treaty is riddled with ambiguity and omission" (Raustiala and Victor 1996: 40). Richard Mott of the World Wildlife Fund refers to the document as an "in-artfully and ambiguously drafted" convention (Reichhardt 1993: 577). On key issues regarding biological diversity, namely the protection of intellectual property rights and technology and financial transfers from North to South,

the treaty is unclear as to what, if anything, signatory countries have committed themselves to. In fact, one of the ironies about the fact that the United States has failed to ratify the treaty is that the treaty's opponents have given the document more "teeth" than it actually has by imagining far-fetched scenarios in which the United States would be forced to do something it did not want to do. An editorial in the *New York Times* probably described the treaty accurately when it said the agreement was "a vaguely worded treaty with lots of weasel words" ("Bio-diversity Pact" 1994: A-16). In essence, it is a treaty that commits nations to little, if any, specific action.

The CBD is notable as well for the issues it avoids. As mentioned earlier, the treaty does not address forest protection, a key aspect of biodiversity (Raustiala and Victor 1996: 42). The treaty makes no effort to define what biodiversity is, creates no guidelines for prioritizing biodiversity issues, and fails to clearly establish a line of demarcation between human needs and the protection of biological diversity (Raustiala and Victor 1996: 40). These omissions in the treaty are in addition to the difficulties mentioned earlier, such as the fact that the treaty fails to spell out, in understandable terms, how much technology transfer must occur between developed and developing nations, how many financial resources must flow from North to South, and to what extent intellectual property rights will be respected in the area of genetic and biological resources (Reichhardt 1994: 307).

In other international agreements on environmental issues, such weaknesses could be addressed in subsequent protocols. Perhaps with the CBD they will be—ultimately. For the present, however, the Conference of Parties of the CBD seems to be focused on an issue that is "ultimately of tangential importance to the core goals of the treaty"—biosafety (Raustiala and Victor 1996: 41). The 1995 Conference of Parties in Jakarta endorsed the formulation of an international protocol on the regulating the transfer of genetically modified organisms (GMOs) between states. At the earliest, such a protocol would come before the signatory nations in 1999. The agreement to create this protocol was a compromise between developing nations, which wanted a comprehensive biosafety protocol, and the developed nations, which wanted less strict guidelines (Masood 1995: 326). To some, the fact that the Conference of Parties is working on biosafety, rather than an essential biodiversity issue like forest protection, is a clear sign of the warped priorities of the convention (Raustiala and Victor 1996: 41). One could also add that the focus on a minor issue like biosafety seems a bit misguided, given the fact that the convention has still not even agreed on a permanent funding mechanism.

The lack of willingness to take on crucial issues perhaps reflects the difficulty of the task facing the CBD. Unlike the Basel Convention, where one party in the dispute over environmental justice was clearly in the wrong—the waste dumpers of industrialized world—in the CBD the rights and wrongs are less clearly defined. Certainly the less-developed countries need funds for environmental implementation, yet one cannot blame the developed world for wanting to control those funds, especially given the "black holes" down which development funds seem to fall. Certainly the less-developed countries deserve some compensation for their biological resources, yet one cannot blame business interests in the industrialized world for wanting to protect their technological innovations. Issues like these, where both sides have valid positions, are much more difficult to resolve than cases where either the industrial world or the developing nations are unequivocally in the wrong.

Another factor that makes the resolution of key issues regarding the CBD difficult is the fact that the protection of diversity does not seem as pressing as it did during the

1980s, nor does it seem as pressing as certain other global environmental issues, such as ozone depletion or global warming. One reason for this lack of pressure is that a significant amount of law already exists, at both the international and national levels, to preserve biodiversity. The CBD, while being more comprehensive than these laws, is not needed to fully support the global protection of biological resources. In other words, some protection will occur no matter how weak and ineffective the CBD might be. A second reason for this lack of pressure is that the loss of biodiversity is a quiet catastrophe. It does not seize the public imagination as other problems do. Until a major event occurs, perhaps the loss of an essential plant or animal species, the public is not likely to notice what happens with the CBD (Raustiala and Victor 1996: 43).

The formulation and enforcement of the CBD illustrate the problems that occur when the path to environmental justice is not clear, and when the developed and developing nations cannot come to any kind of mutual agreement on the best course to follow to protect a given area of the environment. The CBD also illustrates, again, how international agreements tend to be vague and contradictory, and how strengthening protocols are always needed to put some bite into the goals of a treaty. Perhaps one day the parties to the CBD will agree to such protocols, but at this point the treaty seems to be sidetracked on minor issues and unwilling, or unable, to address central concerns such as forest protection, technology transfers, and funding mechanisms.

CONCLUSIONS AND IMPLICATIONS

The concept of environmental justice can be described as an attempt to balance the interests of the industrialized world and the less-developed nations in the creation of global environmental policy. Two broad areas of division underlie contemporary discussions of environmental justice. The first deals with the levels of responsibility for global environmental problems among nations and their obligation to provide resources to address these problems. Within this area of concern, a key issue is the transfer of financial resources from North to South. Under the concept of additionality, the developing nations insist that funds from the developed world to address environmental issues be in addition to current levels of funding for economic development. While industrialized nations tend to agree in principle with additionality, they do want some control over the flow of resources, feeling that aid to the developing world has been misused in the past.

The second area of concern within the concept of environmental justice is the desire of developing nations to exercise control over their own resources. On the specific issue of forest protection, and on the broader issue of genetic and biological resources, nations in the developing world have sought to protect their resources from manipulation by developed world interests, feeling that the developed world's economic gain in these areas is their economic loss. Nations in the Southern Hemisphere have also been outraged in recent years by the practice of developed nations dumping their hazardous wastes in their lands. This practice is seen by developing nations as an example of Western callousness and insensitivity, driven by a desire to take advantage of the South's poverty.

Environmental justice is a consistent feature of debates over international agreements. The nature of the treaty negotiation process creates ample opportunities for nations to put forth their interests. The normal process is for the nations of the world to agree to a vaguely worded and contradictory treaty, designed to maximize the number of signatory nations, and then attempt to strengthen this original "statement of principles"

with various protocols. Within the debates over the protocols, sometimes the developed world "wins," sometimes the developing world "wins," and sometimes there is simply a stalemate. On the treaties discussed in this chapter, the developing world won a clear victory on the Basel Convention, successfully putting forth a strengthening protocol that created a complete ban on hazardous waste shipments from the industrialized world to the developing. On the CBD, the outcome thus far has been closer to a stalemate, as key issues within the treaty, such as financing, technology transfer, and forest protection, have not been dealt with by the parties due to North-South divisions, among other factors. Future protocols within the CBD may strengthen the document, but at the present time, its importance as an international environmental treaty is lessened by its ambiguity.

Future negotiations over environmental agreements or strengthening protocols are likely to be strongly influenced by arguments over environmental justice. Some see the North-South relationship as "the single most difficult relationship" in the formulation of global environmental policy (Gore 1992: 302). This difficulty stems from the varied and contradictory interests of the industrialized world and the less-developed countries and the undeniable fact that both sides need help from the other to promote their global interests. The Northern nations want to address pressing environmental problems. To do this, they need help from the South. The Southern nations want to address their pressing economic and social problems. To do this, they need help from the North. As long as basic and fundamental inequalities exist between the industrialized world and the developing world, these nations will have conflicts of interest. As long as these nations have conflicts of interest, environmental justice will be a central feature of debates over international environmental policy.

ENDNOTES

1. Ironically, the United States was an early supporter of the additionality concept, proposing during the 1972 Stockholm Conference on the Environment that governments should "provide additional assistance to developing countries in meeting activities designed to protect and improve the environment."

2. For example, the nation of Guinea-Bissau was to receive $600 million in one agreement for 15 million tons of waste—a sum that was twice its foreign debt and more than 35 times the value of its total annual exports.

REFERENCES

Anderson, H.A., R. Marshall, C. Dickey, et al. 1988. "The Global Poison Trade." *Newsweek* 112(Nov. 7): 66–68.

Angier, N. 1994. "Redefining Diversity: Biologists Urge Look Beyond Rainforests." *New York Times* (Nov. 29): C-1, C-6.

Barton, J.H. 1992. "Biodiversity at Rio." *Bioscience* 42(Nov.): 773–776.

Bidwai, P. 1992. "North vs. South on Pollution." *The Nation* 254(June 22): 853–854.

Brown, L.F., C. Flavin, and S. Postel. 1994. "A Planet in Jeopardy." In R.M. Jackson, ed. *Annual Editions: Global Issues 94/95*. Guilford, CT: Dushkin Publishing Group: 82–84.

Buttel, F.H. 1995. "Rethinking International Environmental Policy in the Late Twentieth Century." In Bunyan Bryant, ed. *Environmental Justice*. Washington, DC: Island Press: 187–207.

Cooper, R.N. 1994. *Environment and Resource Policies for the World Economy*. Washington, DC: Brookings Institution.

"Dossier: Where Danger Roams." 1992. *UNESCO Courier* 11(Nov.): 30–31.

Dufour, J.P. and D. Corinne. 1988. "The North's Garbage Goes South." *World Press Review* 35(Nov.): 30–32.

"Economics Brief: A Greener Bank." 1992. *Economist* 323(May 23): 79–80.

Editorial. "Biodiversity Pact on the Ropes." 1994. *New York Times* Sept. 26: A-16.

"The Earth Conference: Biodivisive." 1992. *Economist* 323(June 13): 93–94.

Gore, A., Jr. 1992. *Earth in the Balance: Ecology and the Human Spirit*. Boston: Houghton Mifflin.

Gourlay, K.A. 1992. *World of Waste: Dilemmas of Industrial Development*. Atlantic Highlands, NJ: Zed Books.

"Green Justice: The Facts." 1994. R.M. Jackson, ed. *Annual Editions: Global Issues 94/95*. Guilford, CT: Dushkin Publishing Group: 80–81.

Haas, P., M. Levy, and E. Parson. 1992. "Appraising the Earth Summit." *Environment* 34(Oct.): 6–11, 26–33.

Hanson, D.J. 1996. "International Hazardous Wastes Treaty Worries U.S. Industry." *Chemical and Engineering News* 74(Feb. 26): 22–24.

Homer-Dixon, T. 1994. "Environmental Scarcity and Intergroup Conflict." In M.T. Klare and D.C. Thomas, eds. *World Security: Challenges for a New Century*, 2nd ed. New York: St. Martin's Press: 290–313.

Hurrell, A. and B. Kingsbury, eds. 1992. *The International Politics of the Environment: Actors, Interests, Institutions*. New York: Oxford University Press.

Ivker, R. 1986. "USA Still in the Cold over UN Biodiversity Aims." *Lancet* 348(Aug. 10): 398.

Jordan, A. 1994. "Financing the UNCED Agenda: The Controversy over Additionality." *Environment* 36(April): 16–20, 26–34.

Kraft, M.E. 1996. *Environmental Policy and Politics*. New York: HarperCollins.

Kumar, P. 1992. "Stop Dumping on the South." *World Press Review* 39(June): 12–13.

Laurence, D. and B. Wynne. 1989. "Transporting Waste in the EC: A Free Market?" *Environment* 31(July–August): 12–17, 34–35.

Lenssen, N. 1994. "A New Energy Path for the Third World." In R.M. Jackson, ed. *Annual Editions: Global Issues 94/95*. Guilford, CT: Dushkin Publishing Group: 113–119.

MacKenzie, D. 1995. "Europe Reluctant to Curb Toxic Trade." *New Scientist* 142(April 2): 6–7.

Masood, E. 1995. "Biosafety Rules Will Regulate International GMO Transfers." *Nature* 378(Nov. 23): 326.

Mathews, J.T. 1994. "The Environment and International Security." In M.T. Klare and D.C. Thomas, eds. *World Security: Challenges for a New Century*, 2nd ed. New York: St. Martin's Press: 274–289.

Murphy, S. 1993. "Law: The Basel Convention on Hazardous Wastes." *Environment* 35(March): 42–44.

O'Sullivan, D. 1989. "International Controls on Transport, Disposal of Wastes Agreed Upon." *Chemical and Engineering News* 67(April 3): 21–22.

Parson, E.A., P. Haas, and M. Levey. 1992. "A Summary of the Major Documents Signed at the Earth Summit and the Global Forum." *Environment* 34(Oct.): 12–15, 34–36.

Porter, G. and J. Welsh Brown. 1991. *Global Environmental Politics*. Boulder, CO: Westview Press.

Puckett, J. 1994. "Disposing of the Waste Trade: Closing the Recycling Loophole." *Ecologist* 24(March): 53–58.

Raustiala, K. and D. Victor. 1996. "Biodiversity Since Rio: The Future of the Convention on Biological Diversity." *Environment* 38(May): 16–20, 37–45.

Reichhardt, T. 1993. "Clinton Prepares to Sign Biodiversity Treaty to Celebrate Earth Day." *Nature* 362(April 15): 577.

Reichhardt, T. 1994. "Gloomy Prospects Face Biodiversity Treaty." *Nature* 372(Nov. 24): 307.

Seligson, M.A. 1993. "The Dual Gaps: An Overview of Theory and Research." In M. A. Seligson and J. Passe-Smith, eds. *Development and Underdevelopment: The Political Economy of Inequality*. Boulder, CO: Lynne Rienner Publishers: 3–8.

Shue, H. 1992. "The Unavoidability of Justice." In A. Hurrell and B. Kingsbury, eds. *The International Politics of the Environment: Actors, Interests, Institutions*. New York: Oxford University Press: 373–397.

Smith, R.J. 1991. "Support for the Convention on Control of International Hazardous Waste Movement." *US Department of State Dispatch* 2(Oct. 14): 770–772.

"So Much to Save." 1992. *Economist* 323(June 13): 94.

Susskind, L. and C. Ozawa. 1992. "Negotiating More Effective International Environmental Agreements." In A. Hurrell and B. Kingsbury, eds. *The International Politics of the Environment: Actors, Interests, Institutions*. New York: Oxford University Press: 142–165.

Switzer, J.V. 1994. *Environmental Politics: Domestic and Global Dimensions*. New York: St. Martin's Press.

Thatcher, P.S. 1992. "The Role of the United Nations." In A. Hurrell and B. Kingsbury, eds. *The International Politics of the Environment: Actors, Interests, Institutions*. New York: Oxford University Press: 183–211.

Tickell, O. 1994. "Funding Dispute Could Hold Up Biodiversity Treaty." *Nature* 363(Jan. 27): 309.

Wells, D.T. 1996. *Environmental Policy: A Global Perspective for the 21st Century*. Upper Saddle River, NJ: Prentice-Hall.

World Resources Institute. 1992. *Global Biodiversity Strategy*. New York: World Resources Institute.

"Worldwire: Toxic Export Ban Strengthened." 1995. *Wall Street Journal* Sept. 25: A–8.

13

Ethical Discourse

An Exploration of Theories in Environmental Ethics

Kara L. Lamb
Eastern Colorado Area Office, U.S. Bureau of Reclamation, Loveland, Colorado

INTRODUCTION

What is environmental ethics? Many people are asking this question. They are intrigued by the term, curious about the potential of such study, or, more simply, threatened by what looks like one more round of regulations for environmental science and the professionals in similar fields.

But is environmental ethics really a threat? The answer is a resounding "of course not." In fact, if one turns to all the recent research, which grows daily, he or she might find not regulations, but means for coping with the precarious situation in which we find ourselves and our only habitable environment, the earth, every day.

DEFINING THE FIELD

The first step in defining the field of environmental ethics is to locate the central issues, where the most research is being done, and how that research will affect the rest of the academic and nonacademic worlds. Not all academic fields transcend the university level into the professional as well as the public sector, but environmental ethics, by necessity and design, has all sectors as its ultimate goal—at least it should.

The term "should" gives the newcomer to environmental ethics a great place to start. The philosophical realm of "ethics" is traditionally broken down into three separate realms: meta-ethics, applied ethics, and normative ethics. Environmental ethics falls under normative ethics, in other words, under the realm of what should or ought to be done; and it carries over in practice to applied ethics. Therefore, environmental ethics comes as an in-depth investigation hoping to reveal exactly what society ought to do about our present environmental situation, when we should do it, how we should do it, and what exactly "doing it" will mean as we look to the future and begin practice.

As one can imagine, this sort of study permeates many areas: sociology, development, government and public policy, rights issues, health, horticulture, agriculture, forestry, biological sciences, manufacturing, corporate America, and so on. The outreach is large, because the ramifications of environmental disaster are large. Environmental ethics seeks to prevent as much environmental damage and resulting disaster as possible. It is a proactive inquiry into what has traditionally been a reactionary modus operandi.

A BRIEF HISTORY

Environmental ethics is not exactly a new idea. It is what Thoreau was talking about during the 1800s in *Walden* when he declared "in wildness is the preservation of the world." It is what Albert Schweitzer was envisioning in *The Philosophy of Civilization* in 1923. Aldo Leopold defined it in his land ethic from *The Sand County Almanac* in 1949, and much of today's environmental movement still holds ties to Aldo Leopold. "All ethics so far evolved," he wrote, "rest upon a single premise: that the individual is a member of a community of interdependent parts. . . . The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land." With the land as part of the community, Leopold's hope was that our treatment of our "newest" neighbor would change. This hope has not changed for environmentalists today.

As the environmental movement has continued, more publications and new ideas have been circulated. In 1962, Rachel Carson's *Silent Spring* spoke to a new generation concerning the dangers facing humans and wildlife in terms of toxins. In the early seventies, the famine crisis overseas sparked debates concerning human development, overpopulation, and resource management. The environment was given first priority by Arne Naess in 1973 with the introduction of deep ecology in his article "The Shallow and the Deep, Long Range Ecology Movement." Dealing with environmental disasters and epidemics overseas and at home and demanding better, more thorough methods for resolution sparked controversy. As a result, deep ecology only added to a turbulent mix after the conservative introduction of lifeboat ethics, the famine relief critique by Garret Hardin.

Controversy surrounding environmental issues intensified in the midseventies when the environmental movement collided with civil rights over environmental disasters such as Three Mile Island and Love Canal, among others. As a result, environmental justice and the debate concerning where wealthy communities dump their trash and build their chemical plants (typically in impoverished minority neighborhoods) was ignited.

The effects of adverse environmental management on people were not the only concern. In 1975, ethicist Peter Singer introduced the world to the rights of nonhumans with *Animal Liberation*, taking utilitarianism as strictly as Jeremy Bentham and John Stuart Mill intended it back during its founding: no one, including nonhumans, should be made to suffer needlessly.

Because environmental issues were sparking so much inquiry and debate, the University of Georgia responded early on in 1971 with "the first significant attempt," in establishing environmental ethics as an academic study by holding a conference that produced some of the influential papers already discussed [including Arne Naess' comment on deep ecology (Palmer 1994)]. By 1979, the "movement" was equipped with its own journal: *Environmental Ethics*, produced by Eugene Hargrove, which is now estab-

lished as "the most significant journal in the field" (Palmer 1994: 70). In the 1980s publishing of environmental ethics rose to a new high with Holmes Rolston's *Environmental Ethics* and Paul Taylor's *Respect for Nature* at the top of the required reading list.

Currently, all kinds of information regarding environmental ethics is available from periodicals to textbooks like Louis P. Pojman's *Environmental Ethics: Readings in Theory and Application*; to undergraduate and graduate degree programs at universities like Colorado State; to web sites and Internet-accessible vitaes of contemporary environmental ethicists like J. Baird Callicott. Education classes are branching out from philosophy departments into application courses designed for other departments like agriculture, environmental science, and HAZMAT programs. The popularity of agriculture ethics at state schools like the University of Illinois at Urbana has generated so much controversy that professor Jack Paxton had to change the title of the course so the word "ethics" is not used at all. Even "disguised," the availability of environmental ethics continues to grow.

The issues in environmental ethics in today's debate have focused and expanded covering a wide range of material moving from traditional philosophy with emphasis on Plato, Aristotle, Mill, and Moore to debates over axiology, i.e., value theory (Palmer 1994). But perhaps one of the most challenging questions in contemporary philosophy for the environmentalist is how to communicate a unified environmental ethic the public will be willing to adopt.

A DISCUSSION OF VALUE

The axiology debate in environmental ethics is crucial in that what it is that is taken as valuable and why is what determines the validity and eventual acceptance of an ethical theory, be it environmental or otherwise. Because how and why we reason to value teaches us what to value, an environmental ethics theory must be very clear about the value system it is trying to convey, for, in a sense, an environmental ethic introduces a new system of valuing. Value theory of this kind is also important because it acts as a guideline for how we should conduct ourselves in a nonhuman natural world: thus, the classification of environmental ethics as normative ethics, ethics that tell us what we ought to do.

Considering this new information, the environmental ethics novice might ask, "What are my value options?" It would seem that objects and individuals are either valuable or not, but the distinctions and definitions are not that simple. First, there is the debate considering how we come to value. Is value subjective or objective? If subjective, then object x is valuable only if someone (or something) values it. Subjective value is dependent on a mind. If objective, on the other hand, value is completely mind *in*dependent with object x being valuable in and of itself. Then, there is the second question regarding how many governing value principles are necessary for an environmental ethic. Before governing value principles can be decided, kinds of values and their objectivity or subjectivity must be explained.

KINDS OF VALUE

One of the most common kinds of value in environmental debates is intrinsic value. This ambiguous term has been interpreted to refer to either an objective or subjective value.

Usually, intrinsic value is defined as valuable in and of itself, and is, therefore, typically considered an objective value. In this sense, the intrinsic value is a truncated value where, for example, a tree is valued simply because it is a tree. However, this interpretation of "in and of itself" is considered by some to be "too individualistic." J. Baird Callicott argues for intrinsic value as subjective instead of objective in that value is not found in organisms autonomously. It is placed on the organism when a human encounters it. Yet, it remains intrinsic in that the human finds value in the organism regardless of the relational qualities that organism might have for the human. In other words, the subjective intrinsic value occurs just upon an encountering of an organism; the organism does not have to fulfill any need or function to be valued (Callicott 1993).

Others, however, modify the objective intrinsic value so that, while it is obviously not subjective, its objectivity is also not truncated or so individualistic. "In an ecological perspective," argues Holmes Rolston, "values no longer attach merely to individuals, at least not in absolute or unqualified ways. An organism defends and enjoys its own values, local and intrinsic to the individual" (Rolston 1986: 73). But, at the same time, he explains, an organism "plays roles instrumental to other organisms and to the systemic whole." Intrinsic value is possessed by an object or organism. Organisms come with a value distinct from any value a human mind might subjectively attach to them. Rolston argues that we should value organisms as entities that value themselves. These same organisms are instrumentally valuable to other organisms; consequently, this kind of intrinsic value, a more holistic version, needs to stay close-coupled to instrumental value.

Organisms and objects that are valuable because of their uses fall under *instrumental* value. When it comes to environmental ethics, instrumental value can be broken into three main kinds of approaches: unrestrained exploitation and expansionism, resource conservation and development, and resource preservation. Australian environmentalist Warwick Fox refers to the unrestrained exploitation and expansionism and resource conservation approaches as a "particular kind of instrumental value" where what is emphasized in both cases is the "physical transformation value of the non-human world . . . typically to economic value." In each case, the economic value is "realized by physically transforming the non-human world in some way such as damming, farming, logging, mining or slaughtering" (Fox 1996: 3). Similarly, for resource preservation, instrumental value motivates us to protect the nonhuman world. Fox explains we are preserving "not because (the non-human world) is considered to be valuable in its own right, but simply on account of its instrumental value to humans" (1996: 3). Because we enjoy hiking, camping, or simply being "out in" the nonhuman world, we value it. But in all three cases, that value is determined based on the subjective experience for the human, and that experience is through a function or use. This is not sufficient for Fox.

Of course, subjective value is not limited to intrinsic and instrumental value. It can also be found aesthetically. Aesthetic value, valuing something because it is pleasing, is predominantly in many environmental ethics, particularly those for conservation and preservation. For instance, one might argue aesthetically for the preservation of a species because "most of us believe that the world would be a poorer place for the loss of bald eagles in the same way that it would be poorer for the loss of the Grand Canyon or a great work of art" (Russow 1994: 162). Similarly, when arguing to save tigers or zebras, the aesthetic appreciator would argue that "the stripes do matter" (1994: 163).

Why aesthetic value works as a convincing argument is another matter. It is often regarded as a weak basis for an ethic because its relevance is hard to prove. As Fox described, the physical transformation of instrumental value to economic value speaks

more clearly to the contractor or developer than a tree hugger or hiker pleading for the beauty of the trees. But a point about aesthetic value can be well taken from Rolston when he writes, "We love the green, green grass of home, the trees in the meadow, the forested knobs behind the church, and the walk down by the pond" (Rolston 1986: 42). There is a satisfaction we derive from the nonhuman world that is unavailable anywhere else. Explains Callicott, "Scenery unmarred by strip mines or clear cuts and undimmed by dirty air is important to human aesthetic satisfaction" (Callicott 1995: 676).

Also worthy of consideration are the seeming opposites of some of the values already described. There is *ex*trinsic value as well as *non*instrumental value, terms surrounded by a mire of subtle distinction that sometimes makes the values sound similar to others. Rolston quotes C. I. Lewis, who argues that natural objects cannot have intrinsic value at all. While they have objective value, that value is strictly extrinsic. "All values in objects are extrinsic only. . . . The goodness of good objects consists in the possibility of their leading to some realization of directly experienced goodness" (Rolston 1986: 114). In other words, extrinsic value is an objective value based not on the object, but on facts. Rolston suggests that this usage of extrinsic be revised to refer to a contributory role objects might have, but here the mire of subtle distinction molds extrinsic value into a form of instrumental value that sounds different from what Lewis seemed to be describing.

Noninstrumental value is more typically classified as intrinsic value, and intrinsic and instrumental value, rather than extrinsic value, which is established as opposite. With intrinsic or noninstrumental value, argues Andrew Brennan, "We can be moved to act in ways that respect the welfare, needs and interests of other creatures, even when we recognize that such creatures lack defining characteristics of humans," or of uses for humans (Brennan 1988: 29).

Another kind of value often confused with intrinsic value is inherent value, or inherent worth. Inherent value deals with the values *inside* of things versus value that exists in and of itself. This, like the definition of extrinsic value, is a subtle distinction easy to misinterpret. Inherent value is typically used in discussion of teleological entities: goal-oriented entities; or entities that aspire to become a specific thing (Palmer 1994). It can be argued, however, that what "inherent value" means tends to be case-specific to the author in the text at hand. Currently, there is no universally accepted definition for inherent value.

GOVERNING PRINCIPLES

Types of values are not the only elements to be considered when developing an environmental axiology. The issue of how many ethical principles derived from these values must be employed is also important. Palmer best explains the second distinction in axiology: "One further distinction remains to be made at this point: that between ethical monism and ethical pluralism. The central question at issue here is whether it is possible . . . to arrive at a single governing ethical principle or set of consistent principles to apply to all ethical problems" (Palmer 1994: 71). Here, ethical monism, the belief that there should be only one governing ethical principle, is weighed against ethical pluralism, the belief that there should be a set of governing ethical principles. In light of the challenging question concerning public acceptance of an environmental ethic, the ethicist must care-

fully weigh the monistic versus pluralistic distinctions. Which is easier for the public to adopt: one governing principle or a set of principles?

Palmer is careful to explain that ethical monism has traditionally been the choice of environmental ethics "as indeed, ethics as a whole." Only recently have pluralistic theories been defended as the better option. The reasoning is that no one ethical principle can address the wide range of varying situations treated by environmental ethics. Writes Palmer, "One could not . . . expect an ethical principle . . . we use when dealing with a domestic cat to be suitable when dealing with the extinction of a species" (1994: 71). However, others argue that to introduce pluralism confuses the issues, makes them too cumbersome for acceptance, particularly for the finicky public. After all, says Callicott, "Animal welfare rights," such as dealing with domestic cats *or* endangered species, "and environmental ethics are by no means the same" (1995: 678). But, this depends on who is positing an ethic and what governing principle(s) he or she might use.

THE EXAMPLE OF UTILITARIANISM

Utilitarianism, as Smart and Bernard define it, is "the view that the rightness or wrongness of an action depends only on the total goodness or badness of its consequences for . . . the welfare of all . . . sentient beings" (Smart and Bernard 1963: 4). Developed out of Jeremy Bentham's concept of hedonism and refined by John Stuart Mill, utilitarianism has developed as a monistic tradition that comments on all areas of ethics. It is an ethic in itself that uses one governing principle to determine what should be done in a variety of situations. That governing principle is that "pleasure is a necessary condition for goodness," and goodness is determined by the consequences of actions. Evaluations of pleasure become the principle by which ethical actions are judged (Smart and Bernard 1963). If under utilitarian principles, then, pain is bad and pleasure is good, the utilitarian would work to promote the most amount of pleasure for the largest amount of sentient (conscious or aware) beings possible. This would follow for all realms of moral action from civil rights to medicine to environmental ethics: to maximize pleasure over pain.

This type of hedonistic utilitarianism as a monistic principle is best exemplified by Peter Singer whose argument posits that to be morally considerable or relevant, an organism must be able to feel pleasure and pain. If it can feel pleasure and pain, then it has established interests. Because utilitarianism promotes pleasure, as its measure of what is good, to inflict unjustified pain becomes immoral. Therefore, Singer's adaptation of this hedonistic utilitarianism posits that it is immoral to inflict pain on anything with established interests (Palmer 1994). As result, the same ethical theory used to help guide societal interaction also becomes relevant to the nonhuman world and, consequently, environmental ethics. A monistic tradition has been established and applied.

ANTHROPOCENTRIC THEORIES

Utilitarianism is not the only example of ethical monism. Many theories popular currently fall under this category. Many can also be classified under another heading that has been very influential throughout the history of environmental ethics: anthropocentricism.

Anthropocentricism, human-centered beliefs, has a long standing in the history of Western thought. It has been an important part of the Western tradition as it is deeply

rooted in Judaism and Christianity. This is because the origin of anthropocentricism is taken directly from the Bible, Genesis 1:26–28. It reads as follows: "Then God said, 'Let us make a man—someone like ourselves, to be the master of all life upon the earth and in the skies and in the seas.' So God made man like his Maker . . . And God blessed them and told them, 'Multiply and fill the earth and subdue it; you are its masters." From this, a strong caretaker ethic was derived and it has been taught down through the generations. What such passages mean exactly, however, is often left to interpretation. For instance: "The implication is clear," writes Singer, "to act in a way that causes fear and dread to everything that moves on the earth is not improper; it is, in fact, in accordance with a God-given plan" (Singer 1993: 266). Anthropocentric theories hold that the world exists for and is managed by human kind. They are central to its welfare.

Callicott offers this definition: "An anthropocentric ethic grants moral standing exclusively to human beings and considers non-human natural entities and nature as a whole to be only a means for human ends" (Callicott 1995: 676). Values based on the subjective human perspective, then, fall under this category. Instrumental and aesthetic values are common cornerstones of anthropocentric-based environmental ethics because in using them as evaluating tools, one is reducing nonhuman entities to means to an end, hence Fox's term: exploitation.

As the longest-standing environmental ethic in the Western tradition, anthropocentrism is also the most conservative, the most resilient under change. "Nevertheless, anthropocentric environmental ethicists have had to assume a more reactive than proactive posture and devote considerable effort to defending traditional Western moral philosophy," because many "bolder thinkers" have unleashed countless attacks against the traditional moral standing for only human beings (Callicott 1995: 676). While it has weathered the storms, it is no longer the one governing principle in regard to environment, yet it is still a very integral theory that continues to develop in a variety of forms.

Part of the reason for the continued acceptance of anthropocentric theories is the adaptability of human-centered values. Over the centuries, they have moved away from theological foundations and diversified into popular ethical territories such as act and rule utilitarianism, resource management, and aesthetic recreational satisfaction. In these areas, aspects of human well-being are emphasized: psychological, scientific, and spiritual (Callicott 1995). Goodness for the utilitarian is an adaptation of the Biblical ethic for our psyche, resource management enables a more efficient functioning of the world taught by science, and reworking anthropocentric basics to reflect aesthetic satisfactions as religious or spiritual experiences only adds lineage to the Western tradition.

These adaptations speak well for anthropocentric theories in that new environmental ethical theories can be attuned to an old standard widely accepted by most of the Western world. "Why fix what ain't broke?" as the saying goes. If environmental theories are put in terms of the anthropocentric tradition, public acceptance should not be a problem. And, as John Passmore and Kristin Shrader-Frechette have argued, it's difficult "to think of an action which would do irreparable harm to the environment or ecosystem, but which would not also threaten human well-being" (Callicott 1995: 676). In other words, by considering our own health and safety, we are, in effect, protecting the environment. The logic states that if something hurts the natural world, it will most likely also endanger us. Therefore, to consider environmental damaging actions is foolish, and already guarded against by human-centered ethics. There is no need to develop a nature-centered ethic, for example, because there is nothing that ethic will teach or require that cannot be provided by anthropocentricism.

CRITIQUING ANTHROPOCENTRICISMS

While this sounds convincing, there are some rather convincing arguments against anthropocentric theories as well. Explains Elliot, "Many of the things which [humans] do to the natural environment do affect non-humans adversely, and this, it is suggested, must be taken into account" (Elliot 1991: 286). There are some situations where the anthropocentric values, no matter how well adapted, overlook damage done to nonhumans. Callicott gives the example of the Houston toad, an animal with no aesthetic or instrumental value whatsoever for humans. There are many different kinds of toads in existence. In the case of the Houston toad, which is facing extinction due to urban development, the many different kinds of toads gloss over the loss of one particular species (Callicott 1995). Quite possibly, many years from now, a value of some sort will become associated with the toad, maybe in an ecosystem's food chain or as the sole predator of a certain kind of human-antagonizing bug, but those discoveries might not occur for years, so the loss seems minimal now.

True, there are anthropocentric theories that attempt to handle this objection. Singer's utilitarianism, typically *not* considered an anthropocentric theory, advocates no senseless and unjustifiable slaughter of Houston toads based on the fact that death is pain. However, the determination of whether or not something feels pain *is* anthropocentric in that it is still left for a human to decide. If the toad is regarded as "too tough" for sensory types of nerves, and therefore, incapable of feeling pleasure or pain as such, it becomes disregarded as a being-with-interests. While aesthetics might be helpful, any argument brought up based on the pleasing satisfaction of having *Houston* toads falls mercilessly short of developing marsh area for the economy housing of urban humans. It is not difficult to think of many extinction's such as this, which have little, if any, effect on humans. Consequently, in this light, Elliot's question is justified: who is on the side of the toad?

BIOCENTRIC THEORIES

Because of nagging questions such as these, biocentric ethics have been developed. Biocentric ethics, or "life-centered" ethics, consider all life on equal moral standing. Humans no longer reign supreme. "According to this approach, living things can be said to embody certain interests . . . in particular, living things can be said to embody an overwhelming interest in maintaining their own integrity" (Fox 1996: 11). In other words, someone besides humanity is important for reasons of its own.

Like many anthropocentric theories, many biocentric theories are easily classified as monistic in that they posit one governing principle: life matters. Just as anthropocentric models mold into one governing principle, biocentric theories preach one idea. Unlike anthropocentricism, however, biocentric theories develop out of a variety of backgrounds.

The earliest influence on biocentric theories dates back to the Greek philosopher Aristotle, born 384 B.C. (Bambrough 1963: 16). Paul Taylor, in his book *Respect for Nature*, applies Aristotelian thought to the foundation for principles of life-centered ethics. Aristotle's belief that all life harbors hidden potentiality revealed by its goal of becoming is utilized as a method for proving inherent value in organisms based on teleological grounds. Taylor argues that this teleology gives an organism inherent worth

"and this inherent worth is equally possessed by all living organisms, since all have a telos and a good of their own" that is just as vital to them as a human's good is vital to a human (Palmer 1994: 70).

Taylor's is not the only biocentric theory raised on teleological grounds. Rolston's theory is also similarly teleological. For Rolston, all organisms define their own kind of good because they are goal-seeking entities (Palmer 1994). Each aspires to become a specific member of its kind. In this sense, Rolston's ethic is very similar to Taylor's. However, there are some differences. Rolston also claims that there are additional characteristics that add value to an entity. Characteristics such as sentience, or "ability for conscious reflection," create a more "sophisticated" organism. This is his individual approach, but, like other biocentric theories to be discussed later, Rolston's ethic also branches out into ecosystems and species. Species, for example, are argued as providing the normative genetic "set" for the individual "and this genetic set is 'as evidently the property of the species as of the individual through whom it passes'" (Palmer 1994: 87).

Other origins of biocentric theory move away from Aristotelian foundations dating back only to the 1920s and the beginnings of Albert Schweitzer's environmental ethics with his book *The Philosophy of Civilization*. In this early work, Schweitzer recognized in all natural beings a "will-to-live" and for him, all wills-to-live are of equal value. For Schweitzer, "recognition of this will-to-live should engender reverence towards all living things by human beings, who experience and wish to actualize their own will-to-live" (Palmer 1994: 78). What is established by Schweitzer is that, when it comes to morality, nonhumans are no different from humans, so there is no need to treat them differently.

Schweitzer's argument for a biocentric ethics can be said to be based on the thinking of a more historical philosopher, Arthur Schopenhauer. In fact, Callicott quotes Schweitzer from one of his much later writings where he identifies Schopenhauer's voluntarism as the groundwork for his reverence-for-life ethic. The passage from Schopenhauer is as follows: "Just as in my own will-to-live there is a yearning for more life . . . so the same obtains in all the will-to-live around me, equally whether it can express itself to my comprehension or whether it remains unvoiced" (Schweitzer 1989: 32–33, as it appears in Callicott 1995: 679).

AN ANTHROPOCENTRIC CATALYST FOR BIOCENTRIC ETHICS

What Schweitzer's and Schopenhauer's reverence-for-life theory helps establish is the breakdown in a traditional philosophical diagram, which ironically is traced back to Aristotle, where a dividing line separates humans from beasts (Callicott 1995). The diagram, as it is most commonly taught, looks like this:

Humans
Primates
Mammals
Reptiles
Birds
Fish
Insects . . .

. . . and so on. The order of the beasts is basically arbitrary, left up to the valuation of the human consulting the diagram, and therefore the epitome of anthropocentricism. What establishes the line is what is traditionally considered human attributes: reason, feeling, language, and so forth. Beasts, it was argued by Aristotle and later Kant, are not rational, do not have feelings, do not engage in language. Therefore, they do not qualify for moral consideration (Callicott 1995).

Considerable work has been done to break this line down; Schopenhauer and Schweitzer's reverence for life is one example. Peter Singer's hedonistic utilitarianism is another. Although previously argued as susceptible to anthropocentric bias, Singer's hedonistic utilitarian argument for the rights of animals is biocentric in that it finds life other than human worthy of moral standing.

Singer's argument also illustrates a diversification in biocentric theories, and these must be discussed before it can be understood how they work to dismantle Aristotle's and Kant's anthropocentric line. Literally, biocentric means life-centered. However, life-centered can be argued as animal-centered. Animals range from primates to amoebas—this being a varied collection of sentient and nonsentient beings. Yet, animals, like other forms of life, have rights. In his introductory essay to environmental ethics, Elliot muses that if "biocentric" can be stretched to include nonsentient forms of animals, what prevents it from turning into an "everything ethic" where there is a question of "rights for rocks"? "The claim is," writes Elliot, "that non-living things like many living things, lack consciousness" (or "sentience"); they also "lack rudimentary biological organization," yet for some they are still "morally considerable" (Elliot 1991: 288).

Yet determining who and what is morally considerable under life-centered theories does not stop there, and this has become a criticism of the biocentric ethic because it seems strange, or "queer" as the critique is called in philosophy, that one term can foster so many different theories for what is considered "life." As Callicott interprets biocentric theories, they are not, in fact cannot be, inclusive of endangered or vulnerable elements of nature because these are not necessarily living things. And because they are not living things, they are not adequately covered by a biocentric theory. Writes Callicott, "Since species and ecosystems are not, per se, living beings, a biocentric theory would not accord them any moral standing" (Callicott 1995: 678). Because they have no moral standing, there becomes a need for something else.

But Callicott's critique is probably not in the majority. Elliot defines life-centered ethics as one that includes the very elements Callicott claims are left out. "For example," writes Elliot, "if mining goes on in [Kakadu National Park, Australia], it will involve cutting down trees and destroying other plants; it will cause the death of some animals and impair, if not destroy, wetland ecosystems" (Elliot 1991: 287). This, in essence, is actually another biocentric ethic, a "specific" ethic called ecological holism. "Ecological holism counts two things as morally considerable: the biosphere as a whole and the large ecosystems which constitute it" (Elliot 1991: 289). Such an ethic, then, includes not only animals and plants, but everything involved in the circle of life right down to the rocks, land, and molecules that makeup any ecosystem anywhere in the biosphere.

When biocentric theories turn to talk of the biosphere, another specific, and trendy-sounding ethic, comes to mind. It is that of the Gaia hypothesis. In 1975, not long after the advent of Singer's animal rights, British scientists James Lovelock and Sidney Epton reintroduced the word Gaia, the name given by the ancient Greeks to their Earth goddess. The theory is basic, with many "bypaths," and can be described as follows by Lovelock and Epton in their 1975 essay "The Quest for Gaia," reprinted in the Pojman textbook

in 1994: "This led us to the formulation of the proposition that living matter, the air, the oceans, the land surface were part of a giant system which was able to control temperature, the composition of the air and the sea, the pH of the soil and so on so as to be optimum for survival of the biosphere. The system seemed to exhibit the behaviors of a single organism, even a living creature. One having such formidable powers deserved a name to match it." Hence, the Gaia hypothesis.

DISSOLVING THE ANTHROPOCENTRIC LINE FOR BIOCENTRIC THEORIES

Once the diversity in biocentric theories such as these is explained, the implications imposed by Aristotle's and Kant's anthropocentric line take on a new perspective. By establishing such a diagram, Aristotle, Kant, and those who accept this method of determining who and what have moral standing are not just taking animals out of the equations, but whole species, ecosystems, plants, molecules, rock, viruses, the biosphere, and, if we accept the Gaia hypothesis, most of the earth as we know it. Surely in this wide world, as large and intricate as it is, all perfectly synchronized in the harmony of life, something in addition to humans has moral value.

However, this establishes a stricture difficult to maintain, and, at a certain level, unrealistic, too. Adds Elliot, "This is not to say that it is never morally permissible to fell trees, to flatten dunes, to kill animals, to modify ecosystems and so on. Whether it is permissible depends on what the outcomes are and on differences in moral significance within the class of the morally considerable" (Elliot 1991: 287). By establishing *classes* of morally considerable entities, Elliot maintains a system that denies no form of life its moral relevance, but at the same time does not jeopardize human existence by the application of an environmental ethic.

Development of "classes" of moral standing does not diminish the efforts of biocentric theories in abolishing the anthropocentric line. Instead, it can be argued they enhance the effort, giving every form of life a chance to be considered morally. No reason for the continued acceptance of this division between humans and the rest of the world really exists, particularly for Singer. To maintain it is to commit what Singer calls "speciesism," the belief that humans are morally justified in discriminating against animals. Speciesism is intended as a practice to be just as politically incorrect and offensive as racism or chauvinism. Writes Singer, "If possessing greater intelligence" or language or rationality "does not entitle one human to exploit another, why should it entitle humans to exploit non-humans?" (Singer 1995: 391). Discrimination in any form is undesirable. At least biocentric theories strive to change misconceptions so that the rest of the world can be persons, too.

ECOFEMINISM

When environmental ethics works against the background of discrimination, talk inevitably must turn to ecofeminism. "Ecofeminism is expressly committed to making visible the nature and significance of connections between the treatment of women and the treatment of nature," writes Warren in *The Encyclopedia of Bioethics* (1995). This type of philosophy can be more generally referred to as understanding "women-nature" con-

nections. The claim of ecofeminism is that until women-nature connections are better understood, not only will we not have an adequate theory for feminism, we will also not have an adequate theory of environmental ethics (Warren 1995).

The women-nature connection is important because it brings with it an argument from analogy that illustrates what is believed to be happening to women and to nature. What is believed to be happening to both groups of individuals is roughly the same thing. Therefore, by understanding one, there is understanding of the other (Warren 1995).

Ecofeminism works along the "lines" of "concentric circles." The way we perceive ourselves and the world is made up of concentric circles where unlike entities either exist together equally, exist separately but equally, or exist unequally where one entity overshadows the other (Plumwood 1993). An example of unequal coexistence is that of men and women in diverse cultures all around the globe. While it was once otherwise, the coexistence has changed so that women now make up the background to the foreground of the men. Women and their work are overshadowed and underappreciated, occasionally exploited, and in some cases unfortunately abused (Plumwood 1993).

Ecofeminism draws a clean parallel of the treatment of women to the treatment of nature. Nature and humans coexist unequally. Nature has fallen background the human foreground. The work and structure of nature are overshadowed and underappreciated, by the existence of humans. As a result it is often exploited, and more often than we care to admit, abused.

VARIETIES OF ECOFEMINISM

Ecofeminism has several varieties so that the implications of this analogous women-nature connection can be better understood and implemented into ethical theory. As a result, it breaks down into historical, conceptual, epistemological or methodological, symbolic, and political connection varieties.

The historical connection revolves around the history behind rationality. Not long ago, the anthropocentric line separating humans from other forms of life based on what were considered solely human attributes like reason not only excluded nonhuman life as previously discussed, but certain kinds of humans as well. Women, through the history of philosophy and other traditions, have been regarded as irrational, and therefore less than worthy of partial, if not full, moral consideration. Genevieve Lloyd gives a full analysis of this trend in her book *The Man of Reason: "Male" and "Female" in Western Philosophy*.

Conceptually, women and nature have been considered "inferior" to men and humanity. "Many ecofeminists claim that the twin dominations of women and nature grow out of and reflect oppressive ways of thinking" (Warren 1995: 691). When discussing conceptual women-nature connections, ecofeminism concentrates on the popular and traditional concepts of women and nature as objects. "On this view," explains Warren, "oppressive patriarchal conceptual frameworks sanction behaviors that maintain the domination of women and nature" (1995: 691).

The study of how we learn or the exploration of knowledge, known in philosophy as epistemology, teaches traditional methodologies for thinking and knowing. The women-nature connection under epistemology and methodology examines the different sorts of knowledge women have than men—and vice versa. As a result, not only should the question "what is known?" be asked, but it should be followed by "who has the

requisite knowledge?" or "from where does it come?" (Warren 1995). For example, it has been argued by Jodi Jacobson for the World Watch Institute that "careful management of the local resource base to provide for continued human sustenance is something women have been doing for a long time . . . [and is] what is required of the whole human community to achieve sustainable development at the planetary level" (Jacobson in World Watch Paper #110 1992). In other words, as caretakers, and as the majority of the farmers in agrarian societies like many in Africa, women have a knowledge that men do not simply because their duties and responsibilities down through generations have been separate, and at one time equal. By accessing that knowledge, we might be able to resolve many of the problems facing humanity and the environment today; Jacobson is commenting on sustainable development, the new era of what was once the famine relief debate.

Similarly ecofeminism argues that there is knowledge nature has that if we accessed, or respected enough to consider, might help us turn the tide of our environmental crisis (Warren 1995). The best example of this is the current "newsflash" that wetlands make excellent septic system additions for country home builders who wish to be environmentally safe.

Symbolically, also, the women-nature connection has something to offer. One needs only to turn to literature, religion, art, and philosophy to glean symbolic representation of how women and nature should be subdued, subverted, subject. Warren's clearest example of symbolic oppression of the women-nature connection is in language. Women and nature are frequently linked derogatorily by the adjective-nouns we use to describe them. "Women are characterized frequently as cows, sows, foxes, chicks, bitches, beavers, dogs, mares, dingbats, old bats, pussycats, birdbrains, harebrains, and serpents . . . they are 'domesticated creatures,' manageable just like nature (Warren 1995: 691).

Political women-nature connections are a positive connection in the way ecofeminism was founded. The term "ecofeminism" has always "referred to grassroots activism by local women interested in bringing together feminist environmental concerns." Whether by the first actual tree hugging instigated by the Chipko women in India or by Native American women in North America who are becoming environmental justice activists, fighting the dumping of uranium residue on their lands, the political connection between women and nature is at the heart of ecofeminism (Warren 1995: 692).

Something very specific about ecofeminism is that it is not classified as anthropocentric or biocentric. By its very definition, it is trying to avoid any types of "centricisms" whatsoever. So it has become an ethical entity in and of itself, valuable in its own right, just as women and nature are striving to be.

DEEP ECOLOGY

Ecofeminism is not the only environmental ethical theory that stands out on its own. Deep ecology, also considered somewhat revolutionary, also does not claim any ties to either anthropocentricisms or biocentricisms. Instead, deep ecology is its own theory, developed in the early 1970s by Arne Naess.

What deep ecology is, exactly, is a meshing of many different influences to reach a deeper, "more spiritual approach" to an environmental ethic (Devall and George 1985). In this sense, this discussion has come almost full circle from where it began with Aldo Leopold and his "deeper" consideration of community in the land ethic. Naess harks

back to the writings of Leopold to reach this deeper sense he believed was missing from traditional consideration of the world around us.

"The essence of deep ecology is to keep asking more searching questions about human life, society and Nature as in Western philosophical tradition of Socrates. As examples of this deep questioning, Naess points out 'that we ask why and how, where others do not'" (Devall and George 1985: 65). Many of these questions are of a philosophical nature, but others delve into religion and concepts of self. Deep ecology looks to establish a whole new perspective of consciousness about the world around us.

BASIC PRINCIPLES OF DEEP ECOLOGY

There are eight basic principles of deep ecology (Devall and Sessions 1985). They are as follows:

> The well being and flourishing of human and non-human Life have intrinsic value.
> Richness and diversity of life forms as contributors to the realization of this intrinsic value.
> Humans have no right to reduce this richness and diversity except to satisfy vital needs.
> The flourishing of human life and cultures is compatible with a substantial decrease of the human population. The flourishing of non-human life requires such a decrease.
> Present human interference with the non-human world is excessive and rapidly worsening.
> Policies must therefore be changed. The resulting state of affairs will be different from the present.
> The ideological change is mainly that of appreciating life quality rather than adhering to an increasingly higher standard of living.
> Those who subscribe to the foregoing points have an obligation directly or indirectly to try to implement the necessary changes.

Clearly, deep ecology is establishing one ethic that offers a guideline for all arenas of human behavior and living, with ethics in regard to the environment as the governing principle. This is, perhaps, the most complete example of a monistic ethic yet discussed. But not unlike anthropocentric, biocentric, and ecofeministic environmental ethics, deep ecology makes claims difficult for the public, and often even a theorist or ethicist, to accept full time, in all the different areas of human and nonhuman life.

PLURALISTIC APPROACHES

The last types of environmental ethical theories to be considered are those of a pluralistic structure. Moral pluralism has been defined by Peter Wenz as "an approach which contains a variety of principles which cannot be reduced to, or derived from, a single master principle" (Palmer 1994: 95). Palmer goes on to explain that the common language of moral pluralists is that of "frameworks or matrices" so that the different situations, earlier outlined by Palmer's example of a domestic cat and an endangered species, can be equally addressed by one ethic governed by different principles.

"We can observe, then, that the general frameworks of ideas within which we can

think of, diagnose and propose solutions for problems need not be of one kind," writes Brennan. His argument for pluralism is that within one tradition of thought, there are many different frameworks for different sorts of situations that might arise. We have frameworks of thought to guide us through issues, and, in philosophy, we have frameworks to guide us through frameworks (Brennan 1988).

Palmer offers this situation: an area of forest is to be felled for house building. How might the ethical questions in such a venture be resolved? An anthropocentric ethic might justify the situation because humans are the primary moral consideration. A holistic, biocentric ethics for ecology would, in direct contrast, deny any sort of action because the nonhuman world is equal in moral weight to human consideration. Peter Singer's utilitarianism would argue along the lines of how much pain would be caused, and to whom, and is it justifiable in the light of what pleasure it would bring, if any? The deep ecologist might cite basic principle #7 and say it is in areas like this that our ways of thinking about our world need to change.

The moral pluralist, on the other hand, Palmer explains, would allow "a large range of factors to be taken into account when making ethical decisions about the environment" (Palmer 1994: 96). In this sense, moral pluralism is another kind of holism. Brennan considers his theory an ecohumanism one with an account for a "humanistic approach to our situation." This is important, he concludes, because "lives that are worth living will all be lived in nature and the worth that we accord to our natural context cannot ultimately be separated from the worth of such lives" (Brennan 1988: 221).

In other words, seeking to develop a series of frameworks for resolution of the ethical problems we face in terms of the environment offers the advantage of "context sensitive, open-ended" possibilities for engaging in such complex decision making (Palmer 1994). While moral pluralism acknowledges that there are no easy answers, and sometimes an impossibility to find clear ones, it does avoid a certain dogmatism typically associated with more monistic approaches.

SUMMATION OF THEORY·

While pluralistic theories seem to hold some answers the monistic theories do not, there are some drawbacks. Primarily, there is no one set of values or even valuing system that helps guide such an ethic. While this is also one of the strengths of moral pluralism, it is also its weakness if one accepts the premise that before the public will adopt an ethic, it must have something to value. True, there is not one, but a variety of values, available through pluralism, but when we apply the principle of Occam's razor, i.e., keep it simple, pluralism looks a little more confusing than its monistic counterparts.

However, the dogmatism of monistic theories is a problem. Further, the ambiguities involved in the terms used to define and promote value such as intrinsic, inherent, and instrumental, to name just a few, suffer the same fate as pluralism when applied to Occam's razor. That is why the newcomer to environmental ethics is best suited to learn as much as possible about the ethics available and continue examining them to reach the higher understanding ecofeminism and deep ecology claim is so crucial for any kind of ethic.

Such an examination is, naturally, a philosophy in itself, and popularly known: that of the Socratic method. Like the ancient Greek philosopher, the father of Western tradition, perhaps we are best served to continue asking questions and questioning answers.

ENVIRONMENTAL EDUCATION

Such a summation amounts to an argument for an ongoing environmental education. When the reasons for adoption of an environmental ethic are outlined: world overpopulation (by humans); global warming; loss of biological diversity through endangered and extinct species; soil, rainforest, and other resource conservation; sustainable development (where people and the environment coexist without acting as each other's parasites); the throwaway society and environmental justice—to name just a few—a need for a new education as well as a new environmental ethic seems firmly established. Clearly, writes Orr, in *Conservation and Environmentalism: An Encyclopedia* (1995), "No generation has ever faced a more daunting agenda." The generation he is referring to is "the present generation of students," which, depending on one's definition, could include any one human on the planet who continually engages in the process of learning.

Orr, however, states the present practice of environmental education is flawed. "For the most part," he writes, "we are still educating the young as if there were no planetary emergency. It is widely assumed that environmental problems will be solved by one technology or another. Better technology can certainly help, but the crisis is not primarily one of technology." And education is an essential place to start, particularly with the younger generations whose mindsets are still not solidified. Surmises Orr, "Resolution to the great ecological quandaries of the next century," a mere year away, "will require us to reconsider the substance, process, and purposes of education at all levels." This includes the children as well as the adults, from elementary to ethical education.

CONCLUSION

In short, as inhabitants of Gaia, the one world all human and nonhuman life forms share, we owe it to ourselves to know something about the predicament the earth is in. The good news is, there is something students of all ages can do about it: learn the possibilities for solution. The best range of possibilities currently exists in the philosophical study of environmental ethics where a variety of monistic and pluralistic choices are offered for the Gaia inhabitant to consider.

Returning to the challenging question of establishing an ethic the public will wish to take home, perhaps the best answer is a converging of monistic theories into a pluralistic framework of options, in short, a holistic approach that begins with a grass-roots movement in elementary education for the younger set, and direct ethical appeals to the older. After all, the larger the ethical arsenal of appeal, the more individualized an environmental ethic might appear tailor-made to the public sector.

Most importantly, by appealing to value and value systems, a variety of solution possibilities, and a newly directed education, instead of harping on the impending crisis and doom statistics, perhaps the environmental ethic an be made more marketable for all generations. That is my hope and it remains to be seen.

REFERENCES

Bambrough, R. 1963. *The Philosophy of Aristotle*. New York: Signet.

Brennan, A. 1988. *Thinking About Nature: An Investigation of Nature, Value and Ecology*. Athens: The University of Georgia Press.

Callicott, B.J. 1993. "The Search for an Environmental Ethic." In *Matters of Life and Death: New Introductory Essays in Moral Philosophy, Third Edition*. T. Regan, ed. New York: McGraw-Hill: 322–381.

Callicott, B.J. 1995. "Environmental Ethics: Overview and 'Land Ethic.'" In *Encyclopedia of Bioethics*, rev. ed. W.T. Reich, ed. New York: Simon & Schuster, Vol. 2: 676–686, 688–690.

Devall, B. and S. George. 1985. *Deep Ecology*. Salt Lake City, UT: Bivvs M. Smith.

Elliot, R. 1991. "Environmental Ethics." In *A Companion to Ethics*, P. Singer, ed. Oxford: Blackwell: 284.

Fox, W. 1996. "Overview of Environmental Ethics." *World Futures* 46: 1–21.

Leopold, A. 1949. *The Sand County Almanac*. Oxford: Oxford University Press.

Orr, D.W. 1995. *Conservation and Environmentalism: An Encyclopedia*. New York: Garland.

Palmer, C. 1994. "A Bibliographical Essay on Environmental Ethics." *Studies in Christian Ethics* 7: 68–79.

Plumwood, V. 1993. *Feminism and the Mastery of Nature*. London: Routledge.

Rolston, H. III. 1986. *Philosophy Gone Wild: Essays in Environmental Ethics*. Buffalo, NY: Prometheus Books.

Rolston, H. III. 1991. "Environmental Ethics: Values in and Duties to the Natural World." In *The Broken Circle: Ecology, Economics, Ethics*. New Haven: Yale University Press: 73–96.

Russow, L.M. 1994. "Why Do Species Matter?" In *Environmental Ethics: Readings in Theory and Application*. L.P. Pojman, ed. London: Jones and Bartlett: 158–163.

Singer, P. 1993. "The Environment." In *Practical Ethics*, 2nd ed. Cambridge: Cambridge University Press: 264.

Singer, P. 1995. "Animal Rights." In *Ethics for Modern Life*, 5th ed. A. Raziel and F. M. Louise, eds. New York: St. Martin's Press: 390–401.

Smart, J.J.C. and W. Bernard. 1993. *Utilitarianism, For and Against*. Cambridge: Cambridge University Press.

Warren, K.J. 1995. "Ecofeminism." In *The Encyclopedia of Bioethics*, rev. ed. W.T. Reich, ed. New York: Simon & Schuster, Vol. 2: 690–693.

This page intentionally left blank

II

Environmental Policy and Administration in the Developing and Industrializing World

Environmental issues must compete with many other public policy issues for the attention of political leaders. In advanced industrial countries such as the United States, environmental issues are increasingly at the center of political debate and a majority of the public is sympathetic to environmental issues. The salience of these issues to the public, however, is often less than other issues such as unemployment, inflation, and taxes. While the overwhelming majority of Americans call themselves an "environmentalist," only a small percentage are willing to identify environmental issues as the most important problems facing the nation (see Chapter 1). If the salience of such issues is low in affluent, advanced industrial nations, how much importance would they be given in less economically developed nations, which face a myriad of economic, social, and political problems?

One major issue that will impact future environmental policy in developing countries is population growth, which is increasing much faster than in the advanced industrial countries (Sadik 1993). India and China alone added 34 million people just in 1995 (Porter and Brown 1996: 4). Population growth along with increasing levels of consumption will have dire global environmental consequences (Bryner 1997). For example, the loss of cropland in China coupled with increasing disposable income due to industrialization will lead to a need to import grain for 1.2 billion potential consumers (Brown 1995: 63–71). Therefore, China's land and water scarcity may very well become a scarcity for the rest of the world, which will need to export grain to meet this enormous demand.

Perhaps the greatest danger to the environment in less-developed countries is poverty. Poverty leads countries to engage in behaviors that drive ecological deterioration. For example, billions of tons of fertile soil are lost annually due to deforestation and cultivation of steep lands. And as soil fertility declines, there is increased deforestation for new croplands and even the use of chemical fertilizers in some locations, which then contaminate drinking water supplies (Bryner 1997: 271–272). What many countries are doing is overexploiting resources to provide for current needs while sacrificing future generations.

There is no shortage of research on the increasing pressure imposed on the environment in developing nations, and on the close relationship between humans and ecosystems (see Bryner 1997; Caldwell 1996; Porter and Brown 1996; Worldwatch Institute 1997). It is also true that rural populations of less-developed countries are closely con-

nected with the use and management of natural resources because most of the population is rural and involved in subsistence agriculture (Sachs 1996). Droughts, floods, and other natural calamities can be life-threatening events. At the same time human-caused disturbances—such as rapid population growth, resource depletion, pollution, and general ecological degradation—pose additional hardships and threaten the very foundation of the human–natural environment relationship and thus socioeconomic sustainability. The chapters in Part II provide some insight into the possibilities of environmentally sustainable development.

Rebecca Warner's chapter, "Gender, Development, and the Environment," examines the critical role of women in sustainable development and environmental policies for the developing world. Reflecting on theories of gender relationships, she explains how the division of labor and social hierarchy in developing nations must be considered to achieve a sustainable balance. Warner concludes that because of women's substantial interaction with and knowledge of ecosystems, it is imperative that environmental policy and management in the developing world incorporate gender from a grass-roots perspective.

Following the theoretical discussion presented by Warner, Hillary Egna's chapter presents an African case study that sought to balance economic development with environmental concerns. The case study presented by Egna concerns an attempt to introduce aquaculture (fish farming) in Rwanda to preserve fragile ecosystems from conversion to farmland and to support food for a rapidly expanding population. While the implementation of aquaculture was wrought with bureaucratic mismanagement, Egna found an "unplanned success" with women playing a critical role in the adoption of these new technologies. Similar to Warner's discussion, Egna argues that women must be involved in the planning and implementation of sustainable development and environmental policies in the developing world.

Ecotourism has often been touted as a policy that seeks to balance development needs with sustainable environmental policy. In his examination of the literature on ecotourism, Steven Parker finds that while it has the capacity to protect fragile ecosystems and attract foreign capital in developing countries, it often has not led to either job creation or protection of ecosystems. Similar to the two previous chapters, Parker suggests that the implementation of ecotourism may be most successful through the use of grass-roots coalitions and collaborative alliances between tourism providers, government agencies, and indigenous peoples.

While the first three chapters of Part II focus on environmental policy from a grass-roots perspective, the next two chapters examine environmental policy from the perspective of elite decision makers in the Asian context. Brent Steel and Sushil Pandey's chapter examines environmental and development policy preferences from the perspective of political elites in Nepal. Utilizing survey data and interviews of legislators and other political elites immediately after the first democratic election in Nepal, Steel and Pandey find that environmental issues are not considered very important when compared to the needs of economic development. As suggested in the three previous chapters, sustainable environmental policy in developing countries must be pursued in conjunction with development objectives. One area of hope identified by the study, however, is the so-called "greening" of younger and more highly educated political elites who see environmental protection as part of a sound development policy.

While Korea is much more industrialized than Nepal, Chun-Oh Park and Sung-Chul Kim illustrate in their chapter that environmental protection is often sacrificed for

development objectives by government decision makers. The government of Korea passed an Environmental Protection Act in 1979 and also established a Ministry of the Environment to oversee and promote environmental policy. According to Park and Kim, the establishment of the act and ministry was due to growing citizen and environmental group expectations for a clean environment. However, these expectations have yet to be realized due to minimal influence and financial support of environmental agencies and legislation. Therefore, environmental policy in Korea tends to be "symbolic" while economic and financial interests tend to dominate the political agenda. With the Asian economic crisis of 1998 looming, including slower economic growth, collapsing stock markets, and the devaluing of Asian currencies, it would not be surprising to see governments in Asia place even greater emphasis on economic affairs while environmental issues remain less salient.

The next three chapters focus on changing environmental policies in former or transitional communist countries. Edward Chiu-yeng Tseng's chapter on the People's Republic of China suggests that new political leadership has brought positive trends in environmental policy after decades of neglect. A National Environmental Protection Agency has been established to monitor and regulate pollution, there are new pollution fines being used to discourage harmful activities, natural reserves have been established to protect rare ecosystems and species (e.g., the Giant Panda), and the increasing desertification of the country started under Mao has been curtailed. Tseng still identifies many negative trends due to development and industrialization pressures (e.g., water shortage and contaminated water), but identifies changes in the political structure from Mao's time as leading to better environmental practices.

Political and economic changes have been more radical in the former Soviet Union when compared to China. Cathleen Rineer-Garber explores issues in the Russian far east that exemplify the vast environmental and social problems confronting the region with the transition to a free market economy. Before the collapse of communism, environmental problems in the Soviet Union had reached disastrous levels, from radioactive contamination at Chernobyl to the desertification of the Aral Sea. While many observers had hoped the transition to democracy, political decentralization, and a free market economy might lead to positive environmental policies, Rineer-Garber argues that the regional governments of the Russian far east have encouraged unsustainable rates of natural resource extraction to compensate for a spiraling economy. While the new political situation allows for the legal and open participation of environmental and citizen groups in the policy process, economic circumstances are dictating a short-run approach to environmental issues.

Curtis Durrant and Laszlo Perneczky investigate the emergence of environmental groups in the former communist nations of central and eastern Europe reinforcing Rineer-Garber's observations on the limited abilities of such organizations in these transitional countries. Using survey data from the first comprehensive study of such organizations in the formerly communist eastern and central Europe, Durrant and Perneczky found that the vast majority were financially unstable, poor, and had tense relationships with government. With the economic difficulties many of these countries face in the transition to democratic capitalist societies, many of these organizations will have difficult times ahead. Regardless of financial and staffing limitations, however, Durrant and Perneczky found that about two-thirds of these organizations believe they have been successful bringing about positive environmental change in their respective counties.

The last chapter in Part II makes comparisons between Russia and the United

States concerning environmental policy. This chapter is of particular interest in that it compares Russia, a country undergoing vast socioeconomic and political change, with the United States, which has a long democratic tradition and has been confronting controversial environmental issues for some time now. John Pierce, Nicholas Lovrich, and Russell Dalton compare citizen trust of environmental information sources in Russia and the United States in areas where the populace has been exposed to radiation, the Hanford Reservation in central Washington State and Mayak in Russia. Pierce and his associates argue that the free flow of information is essential to sound environmental policy and therefore finding out which information sources are trusted in these two diverse political and managerial settings is of great interest to policymakers and academics alike. In both settings, the study found high levels of trust for the media and environmental groups among citizens who live in cities downwind from the nuclear sites (Spokane, Washington in the United States and Chelyabinsk in Russia). Interestingly, when examining which factors were most important in predicting policy orientations among residents, these authors found that age was the most important variable in the U.S. context while gender was the most important variable in Russia. This finding in Russia underscores the importance of including gender considerations in formulating and implementing environmental policies in developing and industrializing nations, as was argued in the chapters by Rebecca Warner and Hillary Egna.

The chapters in Part II help illustrate the difficulties and complexities lesser developed and industrializing nations face in the environmental policy arena. The need for economic development to combat poverty and to provide for a growing population is the most important policy issue on the domestic agenda. Many chapters argue that sound environmental policy in lesser developed and industrializing countries must incorporate economic development objectives. And these policies must involve those individuals who are directly involved in economic development activities; environmental policy cannot be designed and imposed by elites without grass-roots participation. In addition, gender must be a central consideration in the design of sustainable development and environmental policy.

REFERENCES

Brown, Lester. 1995. *Who Will Feed China?* New York: Norton.

Bryner, Gary. 1997. *From Promises to Performance: Achieving Global Environmental Goals.* New York: Norton.

Caldwell, Lynton K. 1996. *International Environmental Policy: From the Twentieth to the Twenty-First Century.* Durham, NC: Duke University Press.

Porter, Gareth and Janet W. Brown. 1996. *Global Environmental Politics.* Boulder, CO: Westview Press.

Sachs, Carloyn. 1996. *Gendered Fields: Rural Women, Agriculture, and Environment.* Boulder, CO: Westview Press.

Sadik, Nafis. 1993. *The State of World Population.* New York: United Nations Population Fund.

Worldwatch Institute. 1997. *State of the World.* New York: Norton.

14

Gender, Development, and the Environment

Rebecca L. Warner
Oregon State University, Corvallis, Oregon

INTRODUCTION

Developing countries, like others, are facing the erosion of their natural resources. Deforestation, desertification, global warming, and ozone depletion are among the major issues. Causes for such degradation include both internal and external forces. On the one hand, many argue that local practices of managing natural resources are destructive and need to be modernized with technology from developed countries. Others counter that local practices are actually sustainable, and the cause of destruction comes from external pressure to shift modes of production to meet the demands of an international market. It is also the case in some parts of the world that natural ecological shifts are reducing productive land (Tinker 1994).

Recent discussion on the environment dovetails with that on "sustainable development." What does *sustainability* mean? Very often writers equate the term with *reproduction*. That is, if a system is sustainable, it is able to reproduce itself. A sustainable environment is one in which natural resources are available for day-to-day living, but also can be counted on for future generations. Thompson (1995), in his book *The Spirit of the Soil*, argues that there are two broad paradigms used to define sustainability: a resource availability approach and a functional integrity approach. The former is an accounting model that requires the assessment of how much of some resource there is, the rate at which it is consumed, and a plan for consumption over a certain number of years that will ensure that it is not depleted. The latter is an approach that plans for the reproduction of systems by recognizing which systems are involved (biological, economic, and sociocultural) in reproducing resources, and how those systems interact.

The use of the concept of "reproduction" and the call to include sociocultural dimensions of environmental systems (ecosystems) opens the door for feminist scholarship on gender and development to be integrated into theories of sustainable development (Collins 1991). From the early work of Boserup (1970) on women's contribution to agricultural production, to Dankelman and Davidson's (1988) important summary of women's connection to the environment, writers have argued that gender is central to

any discussion of sustainability, especially environmental sustainability. In many parts of the developing world women interact more directly with natural resources than do men because women are usually assigned the time-consuming tasks of collecting water, fuel, and fodder. Their work is also seen as integrative; that is, the work they do is not independent of other systems of production but rather it helps bring them together (Venkateswaran 1995).

This chapter will explore the ways in which the discourse about sustainability and environments has shifted over time and how current thinking does not include a clear understanding of gender. We start with a discussion of the importance of the concept of sustainability in research, theory, and policy, and then explore the work on gender and development that makes the case for rethinking our current knowledge about sustainability. The goal of this chapter is, by integrating these different approaches, to work toward a definition of sustainability that can be used to enhance the quality of life for all groups of people (including women) without destroying the natural environment.

SHIFTING THE ENVIRONMENTAL DISCOURSE TO SUSTAINABILITY

The issue of sustainability has recently emerged throughout the literature on development. However, the history of developmental discourse has not always had "sustainability" as its primary concern. Over the last five decades, the way in which development has been defined has gradually moved from one with emphasis on economic production to one of participatory self-reliance (Young 1993). In the 1950s and 1960s, most countries gave primacy to economic growth, usually measured by GNP and GDP. "Trickle-down" philosophy suggested that the well-being of human populations would automatically follow national-level economic success. However, while most agree that economic growth is *necessary* for development (providing the means to build schools, hospitals, etc.), it is not *sufficient* for successful development. Major international economic crises following earlier decades of development policy resulted in economic restructuring policies that were insensitive to the "human face" of development. Examples include the exploitation of workers in export-processing zones, separation of families due to outmigration of adults seeking waged work, and increased poverty (see, e.g., Mosse 1993 and Wallace and March 1991 for examples and reviews). The result is that most people no longer equate *development* with only *economic growth*.

Considerable research since the 1970s has demonstrated that narrow policies of economic growth can be disastrous for both humans and their natural environments (Dankelson and Davidson 1988; Momsen 1991). One frequently cited example is that of Brazil (Bradshaw and Wallace 1996). Using an approach referred to as "develop now, distribute later," Brazil's growth rate in the 1970s climbed as high as 14%. At the same time, Brazil's people and environment have been negatively affected. The majority of the population lives at or below the poverty line. Hundreds of thousands of square miles of the rain forest have been destroyed and levels of air and water pollution are on the rise. Bradshaw and Wallace suggest that the "tension between *development* and *environment* looms as perhaps the most polarizing inequality between the rich countries of the industrialized North . . . and the poor countries of the developing South" (1996: 158).

A second example from research in African herding communities suggests that one of the reasons why development policies have been so ineffectual is the ignorance of

how people interact with their environments. Kettel (1995) reviews a strategy of introducing meat production that was designed both to enhance economic develop and to slow desertification. Financial donors focused primarily on men and men's interests (the production of meat), ignoring the fact that women depend on cattle for the production of milk. With fewer animals for milk production, families' nutritional levels declined, women lost access to an important resource, and as a result lost an avenue of power. Moreover, because the production of animals for meat is more pasture-intensive, environmental degradation has increased even more rapidly. Kettel suggests that "overt crises" such as the destruction of the rain forest or desertification have attracted some international attention and led to significant investments in policies to guard against them. But there are also "hidden crises" that are partly a result of the strategies to manage the overt crises. These hidden crises include women and children, their health and well-being. As Kettel (1995:253) argues, "Donors who ignore women's landscapes and environmental interests cannot hope to develop adequate policies and programs to halt and reverse accelerating environmental degradation in Africa or elsewhere."

These are just a few examples from a number of major research efforts that document the interconnections of humans and their environments, the lack of understanding of these connections, and the negative effects these have had. The result of this work can be seen in a rhetorical shift from top-down to bottom-up approaches, a movement away from grand economic schemes toward policies and practices that emerge from the lived experiences of women, men, elderly, and youth who reside in communities (Harcourt 1994; Braidotti et al. 1994; Thomas-Slayter and Rocheleau 1995). Even development organizations such as the United Nations now call for "human development" as a prerequisite for sustained economic development (World Bank 1995). And increasing attention is focused on the environment with a call for policies and practices that include the sustainable management of natural resources.

Discussion at the international level began to move in this direction as early as 1992 when the United Nations Conference on Environment and Development, known as the Rio Earth Summit, made the issue of sustainability central to future planning. The World Bank followed suit by redesigning operations and appointing a new Vice President for Environmentally Sustainable Development and targeting over 10 million dollars by 1996 to lend to 65 countries to improve their environment (World Bank 1995). The stated justification for this shift was the recognition that past economic and management policies had not been very effective and were actually a major cause of environmental degradation—certainly not news to those working in developing countries that have been the recipients of these past policies (Dankelman and Davidson 1988).

The World Bank now refers to environmental management as an "unfinished agenda" and makes explicit that they will support only those plans that meet new criteria for success: identifying priority problems, defining priority actions, and ensuring effective implementation. Effective management policy is that which is informed by broader political, economic, and social concerns, and effective implementation requires the participation of those affected by the plans. These are strong statements, but it is not clear just how important gender will be in the "broader concerns" identified by the World Bank. But it is clear that past policies have been flawed in many ways. Among the most significant of these flaws has been the tendency to conceptualize families as one unit with a single function. In spite of the recognition that intervention strategies affect individual family members, all members are assumed to agree and cooperate in a rational manner to maximize their returns to investment. This neoclassical view of families in

development policies ignores conflict and power differences that occur along gender and age lines (Blumberg 1995). When data are desegregated by gender, research shows that women in developing countries interact with the environment more often than men, and when they engage in income-earning activities, they are more likely to share that income with their children (Blumberg 1988; Engle 1995). Without paying attention to the varying ways people interact with their environments, policies and programs designed for sustainability will not be successful.

It is also clear that uncovering the complex ways in which people create and maintain their environments will require a new methodology. We can't simply identify the stakeholders (as the World Bank refers to those affected by development projects) and study them; stakeholders themselves must be part of the vision and policy design.

To this end, new methodologies have been developed that are specifically designed to "put people first" (Chambers 1983). Early development research was seen as problematic in that it focused more on "things" (roads, buildings, dams, etc.) than people; and when people were included in the research, they were more likely to be the more powerful (those with money, men, political or community leaders). With the attention given to sustainability came the recognition that to be effective, policies must be compatible with people's lives (Abramovitz 1994; Wacker 1994). Development literature is now replete with references to using participatory research, participatory action research, participatory agricultural research, and participatory rural appraisal.

To summarize, the past three decades have seen a dramatic shift in the way in which development researchers and policymakers view development and the relationship of development to environments. The most recent thinking falls into the approach Thompson (1995) referred to as "functional integrity." From this perspective, development cannot be effective unless it is designed to be sustainable. And to be sustainable, development must include both the people and the things, as well as an understanding of how environments are socially constructed and maintained by those who use them. The way to understand these environmental systems is to include people who interact with the environment in the design and implementation of development strategies and policies (Rocheleau et al. 1996).

What has not been very clear in the mainstream literature is the importance of gender in sustainable development. Part of the reason for the invisibility of women in the discussion has been the relative invisibility of women's contribution to production. Because women's work is often not remunerated, it is neither counted nor noticed. And in those cases where it is noticed, the work is often taken for granted and not valued. Another reason that women are not central to development is that both the theories and methods employed in development strategies have tended to be "masculinist" (Scott 1995). For example, both modernization and dependency theories place primary emphasis on market relations, leaving the domestic sphere unproblematized. And the methods used to measure activity (labor) have also been blind to labor done in the domestic sphere.

We now turn to a detailed discussion of just these issues. We begin with a review of literature on gender and development that documents the value of women's labor and their interconnections with local ecosystems. After that we will turn to a discussion of theory and methods to see how conceptual and empirical models need to be deconstructed to uncover the biases that exclude women.

GENDER AND DEVELOPMENT

Both the terms "gender" and "development" have undergone dramatic redefinition over the last several decades. Above we made reference to how development has shifted from one of strictly economic output to include other dimensions of social life and an emphasis on sustainability. The meaning of gender has also been deconstructed and retheorized. During the 1960s and 1970s sociologists provided a critique of the term "sex roles," based on the argument that biological sex is neither a necessary nor a sufficient cause of social behavior. Preference was then given to the term "gender roles," suggesting that the expectations for behavior for men and women were the critical issue. By the 1980s writers had become uncomfortable with the term "roles" as the research began to demonstrate how expectations for behaviors are not the same for all women or all men (Stacy and Thorne 1985). Currently, gender is generally conceptualized more as an ongoing activity, or "practice" (West and Zimmerman 1987). This conceptual shift is based on the notion that we construct who we are as men and women, and that this construction is constantly changing and shifting over time and across situations. Some theorists suggest that it is theoretically and empirically problematic to even think of women as a group. A "group" as defined by sociologists has a particular meaning, and this includes an identification of the members of a group as being part of it. Feminist critics, including a good number from developing countries, recognize that women do not often acknowledge their membership in a group with all other women. Women from different races, classes, castes or ethnic identities do not experience the same social realities or find themselves faced with similar problems. However, this most recent critique of the use of "gender" is more than just a recognition of divisions among women along class and/or ethnic lines. Women within social classes and those sharing similar ethnic identity don't always connect *as women*. Young (1994) suggests replacing the term "women as a group" to "women as a series." The meaning of "women," then, should be situated in specific locations. We should not assume anything about women (or men), but by exploring particular sites of activity we can obtain partial glimpses of gender. We will continue this discussion later in the section devoted specifically to theories about gender and the environment, but for now it is important to summarize that the focus has shifted from looking at what women and men are expected to do, to one that explores how definitions of masculinity and femininity are constructed through what we do in everyday life. This conceptual shift parallels the shift from top-down to bottom-up theories and methods in development research.

WHY IS GENDER IMPORTANT IN DEVELOPMENT?

The conceptualization of gender in development research has followed a similar transition to the one outlined above. Early writing dichotomized work, contrasting that done by men and women, while more recent work looks at how women and men are situated in particular environments. Reviews of this work usually start with the important work of Boserup in her 1970 publication *Woman's Role in Economic Development*. In that work, she documented quite clearly how women's contribution to agriculture had been uncounted in calculating measures of economic development. Since that time, there has been an abundance of research from around the globe that finds women's contribution

to production is greater than expected, and certainly greater than the official statistics at the time could measure.

MEASURING WOMEN'S CONTRIBUTION

Making women's work visible, however, has been a challenge for a number of reasons (methodologically as well as politically). One problem is that many measures have neglected work in the informal and domestic sectors of the economy (Young 1993). This work is often done at home and out of sight of others. And when attempts are made to explore such work, cultural biases keep researchers from understanding the input of women. This work is seen as "natural" and not worthy of attention (Mosse 1993). Still another issue is the evaluation of simultaneous activities and how to count them. Research suggests that because women often perform multiple tasks at one time, traditional time use estimates hide the complexity of women's work. And finally (although these are just a few examples), measurements taken of work are usually cross-sectional and do not consider significant seasonal variations in the work performed. This may result in biased estimates of work performed. These problems require a little more elaborate discussion, and examples will help make them clear.

Attempting to measure the amount of work performed depends on what is "valued as work." Economists conceptualize work as an input into production. Because work in the formal sector is paid, it is visible and easy to measure. Unpaid work, also an input into production, is more difficult to measure. Very often the debate over what is to be counted is centered on the distinction between "productive" activities and "personal" activities. Goldschmidt-Clermont (1994) suggests that we can distinguish between these two by a concept she refers to as the "third person" criterion. By this criterion, "an activity is deemed productive if it might be performed by someone other than the person benefiting from it; or, in other words, if its performance can be delegated to someone else while achieving the desired result" (69). Thus, for example, another person can make our meals (productive), but only we can eat them (personal activity).

Goldschmidt-Clermont goes on to show that there are two basic methods that can be employed for valuation of unpaid labor-output-based and wage-based methods—and that these will produce different kinds of outcomes. Regardless of specific technique, the ability to measure work is beneficial. For example, she argues that monetary valuations could be used to determine the contribution of unpaid work to an "extended GDP" to get a fuller picture of production. They can also be used for policy formulations. As a particular example, we could estimate the costs of caring for children, the elderly, or infirm. Decisions about what types of programs or initiatives are constructed for development, and when they are offered, could then be more informed. For example, programs that provide opportunities for training for women (e.g., literacy programs or maternal and child health programs) may make assumptions about the availability of "free time" (when women are not working for wages) when actually women are engaged in productive activity (child care or domestic work) (Tinker 1990).

Another methodological issue has to do with timing of research and the problems it can create for counting women's involvement in production. This problem can be seen in a study done in rural Sri Lanka (Wicramasinghe 1993). This research, carried out in villages in the dry zone of Sri Lanka over the course of a year show that what you count and when you count it will produce very different estimates of men's and women's

contributions to overall production. First, she notes that both women and men are involved in agriculture, although overall men invest more time and energy in agricultural labor than women, who are responsible for domestic activities as well. Still, the relative comparison of time spent between men and women changes over the year. During the peak season (October through January), women spend more similar amounts of time in agricultural production to men (both about 300 hr a month on average). During the slack season, the differences are greater (men average 245 hr a month to women's 235 hr). Without longitudinal research, different pictures of agricultural activity would emerge depending on when data were collected.

Maybe more important is the overall finding concerning time spent in productive labor. Data were also collected in rural Sri Lanka on time spent in production activities (subsistence, waged, or for exchange), housework (cooking, cleaning), collecting water and firewood, social and religious activities, and leisure/sleep activities. Combining all work-related activity (not leisure or sleep), the contribution of women to a family unit is at least 32% greater than that of men. During the peak season women's proportion of the total working hours performed is 57%. During slack time, women's proportion is 60%. The difference is that women's domestic activities continue year-around, increasing during slack periods. Men are more likely to increase their sleep/leisure time when agricultural activity is not required.

Variations in time spent across seasons can also be seen in data from Nepal (Shtrii Shakti 1995). Using observation and recall methods in 15 sites across the country, researchers measured time allocation in three categories of economic activities: *conventional economic activities* (animal husbandry, agriculture, manufacturing, and other outside income-earning activities), *expanded economic activities* (water and fuel wood collection, food processing, and household construction), and *domestic activities* (household chores and child care). They found variations by season, type of activity, age, and gender, as shown in Table 1.

These data show that women and men allocate their work time in different areas, but that overall, women have longer workdays. Even among children aged 14 and under,

Table 1 Time Spent in Productive Activities During Two Seasons in Nepal

Average hours spent per day	Busy Season		Ratio women/ men	Slack Season		Ratio women/ men
	Men	Women		Men	Women	
Conventional	5.77	4.78		4.15	3.57	
Expanded	0.85	1.69		1.17	1.79	
Domestic	1.22	4.47		0.99	4.00	
Total	7.84	10.94	1.40	6.31	9.46	1.50
	Boys	Girls		Boys	Girls	
Conventional	1.9	1.9		2.79	2.21	
Expanded	na	na		0.31	0.59	
Domestic	na	na		0.73	2.55	
Total	3.17	4.72	1.50	3.83	5.35	1.40

na = not available.
Source: Shtrii Shakti 1995.

girls put in longer days than boys. An interesting comparison is that workdays are longer for children during slack season than the busy season. This is due to school closures during winter vacation when children are used for herding cattle and harvesting crops. Although the research did not give exact figures for the other categories during the busy season, we can see that the increased time in conventional activities accounts for most of the added time. Findings regarding time allocation in urban areas suggest that although gender segregation of time across categories of activity is greater, women and girls still work longer days than their male counterparts. Nor does this gender difference in total labor seem to have changed much over time. A seven-village study conducted in Nepal (comparable villages) a decade earlier found that women's average day was 10.81 hr to men's 7.51 (Center for Economic Development and Administration 1981).

A final methodological note is that collecting time use data can become problematic when many of the activities are done simultaneously. When women collect fuel or firewood, they are also taking care of children. Women in urban areas who are doing informal sector work at home may be producing something that will be used for consumption, as well as for sale. To make sure that time estimates do not exceed the hours in a day, time that is spent engaging in more than one activity is usually divided across the number of activities being performed. Estimates are then not really accurate, and if used for estimating value (as Goldschmidt-Clermont suggests) will not capture value completely.

Almost two decades of research have shown quite clearly that when all productive labor is explored, women's level of production equals or exceeds that of men in many developing countries around the world. Much of this work involves the management of natural resources. Alarmingly, recent findings suggest that environmental degradation may be increasing these gender differences in total labor time. For example, in the Orisa area in India, women spent an average of 1.7 hr a day collecting firewood 20 years ago, but today the distance needed to travel to find usable firewood has increased such that the average time spent is approximately 6 hr/day collecting firewood (Venkateswaran 1995). This finding is not unique to India (Dankelman and Davidson 1988).

MANAGEMENT OF NATURAL RESOURCES

Environmental issues are increasingly a concern within developing countries. Women's labor is particularly important in this regard because of women's extensive day-to-day involvement with the management of natural resources. Since the gender segregation of labor produces differential involvement with the local natural resource base, resource degradation has differential effects on women and men. The results include differential access to resources as well as differential health consequences. Examining how women and men interact differently with the environment (although certainly it is not exclusive to developing countries) suggests that policy designed to manage natural resources should be sensitive to gender. Past neglect of gender issues not only has resulted in a decline in natural resources (Kettel 1995), but it has also resulted in the disappearance of local knowledge about the environment (Abramovitz 1994; Rocheleau 1991; Sachs 1992). As we will see, much of this knowledge was held by women.

We have already been introduced to data that documents women's extensive time in productive activities. In this section we explore how, in addition to being time consuming and productive, women's work also serves to integrate productive systems. An exam-

ple of this comes from a number of studies conducted in India (Shiva 1988; Venkateswaran 1995) and shows how women play critical roles in both agriculture and forestry, and it is their traditional role to integrate forests with food production and animal husbandry. As the primary gatherers of fodder and other forest products, women provide inputs to agriculture directly, as fertilizer to the soil, or indirectly, as fodder for the cattle, which then produce fertilizer for the soil. Women are also responsible for collection of firewood, for use and for sale, and for collection of forest products used for food, building materials, and other household items, and for medicinal purposes. In many areas around the world, we are just coming to understand the important role women play in understanding how to use natural resources such as plants for food and medicine (Abramovitz 1994; Kettel 1995; Rocheleau 1991; Sachs 1992).

With the increased deforestation around the world, the effect on women has been significant, as it has reduced both the quantity and quality of forest products. Deforestation affects the availability of products, the time required to access these products, and the nutrition level of households (Momsen 1991). In several parts of India, for example, many women depend on minor forest products as their main source of livelihood (Venkateswaran 1995). Deforestation has eliminated the availability of a type of grass used by women in the area of Orissa, who depend on the availability of this grass for weaving baskets. As a result, these women have been forced to shift from self-employment to wage labor in agriculture to maintain their families.

The evidence about effects of deforestation also suggests that decreased availability of wood for energy results in lower levels of health and nutrition for families, but especially for women. Without fuel, fewer meals may be cooked, lowering intake of calories for all in the household. In addition, food may be cooked for less time, leading to illness. In some areas women have replaced wood with agricultural products such as cassava stalks or dried dung for cooking fuel, which then lowers agricultural production as well (Momsen 1991). While decreased nutrition affects everyone in the family, the effects on women may be particularly serious due to cultural norms that result in women receiving smaller shares of food. Consequently, when women's expenditure of energy meets or exceeds that of men (longer working day or pregnancy), their health is at greater risk (Venkateswaran 1995).

It is important to note that increased risk in terms of health and nutrition adds to what is already believed to be a disproportionate exposure to environmental health risks for women in rural areas due to the existing division of labor. With the responsibility for most cooking, and the use of wood as energy for cooking in households with poor ventilation systems, women are chronically exposed to more air pollution than men.

WOMEN'S KNOWLEDGE

Women's involvement with natural resources is more than just an issue of labor inputs. For women to gather food for their families' use and welfare, they must also have knowledge of the nutritional and medical value of plants, roots, and trees. Development strategies focused on commercially oriented agricultural practices do not take advantage of this specific knowledge and therefore have had negative consequences for sustainable development (Abramovitz 1994; Rocheleau et al. 1996). Because women's knowledge of natural resources has largely been neglected by development strategies, environmental degradation frequently results. Just as serious, as the natural resource base has been

depleted, so too has the knowledge base of women. Indigenous knowledge of biodiversity has been significantly undermined as a result of programs of crop specialization (Abramovitz 1994; Mehta 1996; Sachs 1992).

Several decades of research on women's and men's interaction with, and knowledge of, the natural environment have resulted in an appreciation of just how important are women in development. Time estimates show women are often working long after men have completed their labor, and when the value of the work is estimated, women's contributions are not supplemental, but critical to family survival. Research also indicates that women's work is integrative, in that it involves managing the natural resources (such as water, wood, and fodder) that fuse forest and agricultural production systems. Moreover, because of the extensive work that women do with natural resources, their knowledge of the value of the resources is important to consider if sustainability is the issue.

At the same time, this documentation of women's work does not allow us to compare all women to all men. All women are not the same. We've seen that there are significant variations in men's and women's involvement in production between countries. However, variations among women within countries is also important. For example, the extent and type of interaction with the environment varies greatly from rural to urban areas and from plains to mountain regions (Byers and Sainju 1994; Tinker 1994). One of the consequences of this diversity is that the effects of environmental problems vary by location. In many rural areas the division of labor is such that women are exposed to more air pollution because of their role in cooking. In urban areas, air pollution is caused by multiple sources (automobile emissions, industrial waste) and may affect women and men in similar ways. This suggests that analyses of gender and the environment may not always produce differences between women and men but between people who are living in certain regions. We cannot assume, then, that all women will always share in their experiences and reaction to environmental stresses.

Even in rural areas there is considerable diversity. For example, the way in which men and women engage their environments in Nepal depends on whether they live in the low-lying terrain or the mountain regions. A review by Byers and Sainju (1994) suggests that the division of labor by sex in mountain regions is much less rigid than in the plains. This is a combination of factors related to culture and caste. While a detailed discussion of Nepal's caste system is beyond the scope of this chapter, research suggests that social placement based on caste connects one to the community through expectations for employment or occupation. And although caste hierarchies appear among most communities of Nepal, those communities in the valley (terrain and foothills) more closely resemble the Indian Hindu caste system, which prescribes more rigid segregation by sex. Caste divisions among Tibeto-Burmese, who are represented in greater numbers in the mountain region, appear to be less restrictive such that all members of the community interact with the environment in more similar ways. For example, a case study from Nepal on women's participation in forestry practices suggests that the success of a project in the mountain village of Akrang was due in part to the homogeneity of households with respect to ethnicity (Gurungs, a Tibeto-Burman group) (Gurung 1987).

Class differences further complicate our understanding of how people interact with the environment. Poorer households in developing countries are often much more dependent on access to communal resources. And these communal resources are often the first to be negatively affected by change (Burra 1993; Venkateswaran 1995).

Nevertheless, even though considerable variation exists among women of different

castes, classes, or ethnic groups, we should not forget that among the poor as well as the privileged, there are often gender variations with respect to access to resources.

THEORIES ABOUT GENDER AND THE ENVIRONMENT

The accumulation of research over the past several decades has been critical for understanding the complexity of natural resource issues as they relate to the creation of sustainable communities. It provides us with evidence of the centrality of women not only in providing labor to collect materials and sustain families, but also in serving to integrate production systems through their activities as well. Connections to nature and knowledge of local ecosystems may in fact put them in a privileged position, one that is unique from that of men. This approach that sees women's experiences and knowledge as unique has been referred to as "standpoint theory" (see Sachs 1992 for a review). From this perspective, women's lived experiences and ways of knowing, being more strongly connected to the management of natural resources, ought to put them at the center of policies designed for sustainability.

There are a number of variations of standpoint perspectives that include socialist feminist perspectives, radical feminist perspectives, and a more recent perspective known as ecofeminism. Socialist feminists, working from a traditional Marxist perspective, see women's oppressed status in societies as giving them the critical "view from the bottom." As an oppressed group, women's ways of knowing are less distorted by the elite and the ones who should be directing the overthrow of oppressive systems. Their stronger dependence on the natural resources gives them a stake in decision making.

Radical feminists focus on women's oppression as their shared experience, but instead of focusing on the material conditions of their oppression, a radical feminist perspective places primary emphasis on sexual exploitation of women. As long as men have power over women *as women*, there cannot be a successful movement toward sustainability.

Ecofeminists share the perspective that women's experiences are unique and different from those of men, and that this uniqueness ought to be celebrated and provide a source of guidance for social change. The term "ecofeminism" emerged in the 1970s and is used to point out the strong connections between feminist and ecological concerns. The central argument is that the domination of nature and the domination of women are related. As suggested earlier, development theories are "masculinist" or androcentric (Scott 1995), focusing on the control over, or mastery of, nature. As much as female/feminine has been aligned with nature, development has also been the control over, or mastery of, women. Ecofeminists do not reject women's alignment with nature, but actually use it as a source of empowerment. Because of their stronger connection to nature, women come together in ways that sustain environments, rather than destroy them (Mies and Shiva 1993; Shiva 1988, 1994).

There is considerable diversity among ecofeminists (see Braidotti et al. 1994; Diamond and Orenstein 1990; Warren 1994) but most include statements suggesting women have a stronger connection to nature than men, and this has been interpreted as essentialist. The critique suggests that not all women share this closer connection to nature, and that their knowledge is not necessarily "privileged" compared to men's as experiences are very much situated within the localities in which we live. Like the "doing gender"

approach in sociology (West and Zimmerman 1987), connections to nature/environments can be seen as constructed (or practiced) across time and space, and in relation to others. There will be considerable variations among both women and men; and these variations may be of greater magnitude than the variation between women and men. As we pointed out in the previous section, relationships with the environment can vary across class, caste, ethnic, and regional situations.

Agarwal (1992), in her summary and critique of ecofeminism, suggests an alternative perspective she refers to as "feminist environmentalism." She argues that traditional models of development have privileged some over others, and been ineffective because they have not taken advantage of specific knowledge of local ecosystems held by the indigenous populations, including women. Alternative models must be based on an understanding of the material relations of local populations with their environment. People whose lives are dependent on their day-to-day interaction with the environment are the first to feel the effects of environmental degradation. These are very often the rural poor. But even among the poor, effects of environmental change vary. Because of cultural norms and practices, women and children may be the most severely affected. But the major point of Agarwal (1992) is that this should be understood on the basis of practice (how daily life and work is arranged) and not on the more ideological and symbolic connections of people to nature often used by ecofeminists.

SUMMARY

The goal of this chapter has been to explore the literature on gender and development (related to the environment) with the hope of making the term "sustainability" more inclusive. As pointed out, more recent thinking on what sustainability means includes the recognition that ecosystems contain people and that the relationships people have with their environment are structured in ways that relate to cultural norms and practices. Because gender has not been given serious attention in relating culture to the environment, policies have not been very effective in overcoming inequities in development (the poor seem to be getting poorer) nor have they halted environmental destruction. It is our intent to argue that including an understanding of gender will further the goal of policymakers to insure that the "stakeholders" of communities are central to development, which is something believed to enhance the likelihood of sustainability.

Our discussion of gender included several points. First, the meaning of gender has changed over time, from looking at different expectations for the behavior of men and women to looking at the ongoing construction of what it means to be a woman or man through everyday activities. It is important to explore people's everyday life because very often we will discover that what we expect people to do does not match their sense of reality. For example, as we saw in the summary of research on women's and men's productive work, women's level of production equals or exceeds that of men in many developing countries. This is not an image that was often included in the development policies in prior decades.

We also saw that much of the productive work that women do in developing countries is done in direct interaction with the local environment. We argued that women's work provided valuable support for the family. Women's work can provide direct input through the provision of food, by gathering plants and herbs for medicines, or by the

selling of collected forest products. Women's gathering of firewood, water, and fodder is also integrative; it provides inputs for agriculture that enhances production.

Because of the evidence of women's substantial interaction with, and use of, the environment, we then argued that their knowledge is worth pursuing and using in alternative development strategies. Feminist theories, such as the variations or extensions of ecofeminism, map out these relationships and make arguments for how to proceed. This work suggests that it is not simply a comparison of women's and men's work. There are important variations among women and among men to consider. Differences among people based on class, caste, ethnicity, and geographic location will be important to how daily lives are constructed. This is sometimes frustrating for those interested in political action. If we deny the "essentialist" argument and focus on difference, what will we have to hang on to for designing policies for social change? Haraway (1991) argues that what we are left with are partial perspectives based on situated knowledge. But this is superior to knowledge claims that are not based on lived experience. Development agencies have recognized that top-down policies based on Western theories and epistemologies have not been as effective as originally hoped for.

Recently nations got together to assess international progress toward meeting the goals outlined at the Earth Summit. Data suggest that progress is slow, or in some cases things have gotten worse. This chapter includes information suggesting that with continued environmental degradation we may begin to see even bigger differences between the well-being of women and men.

REFERENCES

Abramovitz, J.N. 1994. "Biodiversity and Gender Issues: Recognizing Common Ground." In W. Harcourt, ed., *Feminist Perspectives on Sustainable Development*. London: Zed Books: 198–212.

Agarwal, B. 1992. "The Gender and Environment Debate: Lessons from India." *Feminist Studies* 18(Spring): 119–158.

Blumberg, R.L. 1988. "Income Under Female Versus Male Control: Hypotheses from a Theory and Data from the Third World." *Journal of Family Issues* 9(1): 51–84.

Blumberg, R.L. 1995. "Engendering Wealth and Well-Being in an Era of Economic Transformation." In R.L. Blumberg, C.A. Rakowski, I. Tinker, and M. Monteon, eds., *EnGENDERing Wealth and Well-Being: Empowerment for Global Change*. Boulder, CO: Westview Press: 1–14.

Boserup, E. 1970. *Woman's Role in Economic Development*. New York: St. Martin's Press.

Bradshaw, Y.W. and M. Wallace. 1996. *Global Inequalities*. Thousand Oaks, CA: Pine Forge Press.

Braidotti, R., E. Charkiewicz, S. Hausler, and S. Wieringa. 1994. *Women, the Environment and Sustainable Development: Towards a Theoretical Synthesis*. London: Zed Books.

Burra, N. 1993. "Caste, Class, Tribe and Gender: Factors Affecting Women's Participation in Wasteland Development." In A.M. Singh and N. Burra, eds., *Women and Wasteland Development in India*. Newbury Park, CA: Sage Publications: 245–285.

Byers, Elizabeth and Meeta Sainju. 1994. "Mountain Ecosystems and Women: Opportunities for Sustainable Development and Conservation." *Mountain Research and Development* 14(3): 213–228.

Center for Economic Development and Administration. 1981. "The Rural Women of Nepal: An Aggregate Analysis; Summary of Eight Village Studies," Vol. II, Part 9. USAID/Nepal. Kathmandu.

Chambers, R. 1983. *Rural Development: Putting the Last First*. London: Longman.

Collins, J. 1991. "Women and the Environment: Social Reproduction and Sustainable Development." In R.S. Gallin and A. Ferguson, eds., *The Women and International Development Annual*, Vol. 2. Boulder, CO: Westview Press: 33–58.

Dankelman, Irene and J. Davidson. 1988. *Women and Environment in the World: Alliance for the Future*. London: Earthscan Publications.

Diamond, Irene and G.F. Orenstein, eds. 1990. *Reweaving the World: The Emergence of Ecofeminism*. San Francisco: Sierra Club Books.

Engle, P.L. 1995. "Father's Money, Mother's Money, and Parental Commitment: Guatemala and Nicaragua." In R.L. Blumberg, C.A. Rakowski, I. Tinker, and M. Monteon, eds., *EnGENDERRing Wealth and Well-being: Empowerment for Global Change*. Boulder, CO: Westview Press: 155–180.

Goldschmidt-Clermont, Luisella. 1994. "Monetary Valuation of Unpaid Work." In *International Conference on the Measurement and Valuation of Unpaid Work: Proceedings*. Ottawa, Ontario, Canada: Statistics Canada, Labour and Household Surveys Analysis Division: 69–77.

Gurung, Durga Kumari. 1987. "Women's Participation in Foresry: A Case Study of Akrang Village." Forestry Research Paper Series, No. 10. USAID Library, Kalimati, Kathmandu, Nepal.

Harcourt, Wendy. 1994. "Negotiating Positions in the Sustainable Development Debate: Situating the Feminist Perspective." In Wendy Harcourt, ed., *Feminist Perspectives on Sustainable Development*. London: Zed Books: 11–25.

Haraway, Donna. 1991. *Simians, Cyborgs, and Women: The Reinvention of Nature*. New York: Routledge.

Kettel, Bonnie. 1995. "Gender and Environments: Lessons from WEDNET." In Rae Lesser Blumberg, Cathy A. Rakowski, Irene Tinker, and Michael Monteon, eds., *EnGENDERing Wealth and Well-Being: Empowerment for Global Change*. Boulder, CO: Westview Press: 239–259.

Mehta, Manjari. 1996. "'Our Lives Are No Different from That of Our Buffaloes': Agricultural Change and Gendered Spaces in a Central Himalayan Valley." In Dianne Rocheleau, Barbara Thomas-Slayter, and Ester Wangari, eds., *Feminist Political Ecology: Global Issues and Local Experiences*. New York: Routledge: 180–208.

Mies, Maria and Vandana Shiva. 1993. *Ecofeminism*. London: Zed Books.

Momsen, Janet H. 1991. *Women and Development in the Third World*. New York: Routledge.

Mosse, Julie Cleves. 1993. *Half the World, Half a Chance: An Introduction to Gender and Development*. Oxford: Oxfam.

Rocheleau, Dianne E. 1991. "Gender, Ecology, and the Science of Survival: Stories and Lessons from Kenya." *Agriculture and Human Values* (Winter-Spring): 156–165.

Rocheleau, Dianne, Barbara Thomas-Slayter, and Ester Wangari. 1996. "Gender and Environment: A Feminist Political Ecology Perspective." In Dianne Rocheleau, Barbara Thomas-Slayter, and Ester Wangari, eds., *Feminist Political Ecology: Global Issues and Local Experiences*. New York: Routledge: 3–23.

Sachs, Carolyn. 1992. "Reconsidering Diversity in Agriculture and Food Systems: An Ecofeminist Approach." *Agriculture and Human Values* (Summer): 4–10.

Scott, Catherine V. 1995. *Gender and Development: Rethinking Modernization and Dependency Theory*. Boulder, CO: Lynne Rienner Publishers.

Shiva, Vandana. 1988. *Staying Alive: Women, Ecology and Survival in India*. New Delhi: Kali for Women.

Shiva, Vandana, ed. 1994. *Close to Home: Women Reconnect Ecology, Health and Development Worldwide*. Philadelphia: New Society Publishers.

Shtrii Shakti. 1995. *Women Development Democracy: A Study of the Socio-economic Changes in the Profile of Women in Nepal*. Typeset by Shruti Designs and printed at Raj Press, New Delhi.

Stacy, Judith and Barrie Thorne. 1985. "The Missing Feminist Revolution in Sociology." *Social Problems* 32: 301–316.

Thomas-Slayter, Barbara P., and Dianne E. Rocheleau. 1995. "Research Frontiers at the Nexus of Gender, Environment, and Development: Linking Household, Community, and Ecosystem." In Rita S. Gallin, Anne Ferguson, and Janice Harper, eds. *The Women and International Development Annual*, Vol. 4. Boulder, CO: Westview Press: 79–116.

Thompson, Paul B. 1995. *The Spirit of the Soil*. New York: Routledge.

Tinker, Irene. 1990. "The Making of a Field: Advocates, Practitioners, and Scholars." In Irene Tinker, ed., *Persistent Inequalities: Women and World Development*. New York: Oxford University Press.

Tinker, Irene. 1994. "Women and Community Forestry in Nepal: Expectations and Realities." *Society and Natural Resources* 7(4): 367–381.

Venkateswaran, Sandhya. 1995. *Environment, Development and the Gender Gap*. Thousand Oaks, CA: Sage Publications.

Wacker, Corinne. 1994. "Sustainable Development Through Women's Groups: A Cultural Approach to Sustainable Development." In Wendy Harcourt, ed., *Feminist Perspectives on Sustainable Development*. London: Zed Books: 128–142.

Wallace, Tina with Candida March, eds. 1991. *Changing Perceptions: Writing on Gender and Development*. Oxford: Oxfam.

Warren, Karen J., ed. 1994. *Ecological Feminism*. London: Routledge.

West, Candace and Don H. Zimmerman. 1987. "Doing Gender." *Gender and Society* 1(2): 125–151.

Wickramasinghe, Anoja. 1993. "Women's Roles in Rural Sri Lanka." In Janet H. Momsen and Vivian Kinnaird, eds., *Different Places, Different Voices: Gender and Development in Africa, Asia and Latin America*. London: Routledge: 159–175.

World Bank. 1995. *Mainstreaming the Environment*. Washington, DC: World Bank.

Young, Iris Marion. 1994. "Gender as Seriality: Thinking About Women as a Social Collective." *Signs: Journal of Women and Culture* 19(3): 713–738.

Young, Kate. 1993. *Planning Development with Women: Making a World of Difference*. New York: St. Martin's Press.

This page intentionally left blank

15

Environment, Aquaculture, and Food Policy Nexus

Case Study of Two USAID Aquaculture Projects in Rwanda

Hillary Egna
Oregon State University, Corvallis, Oregon

INTRODUCTION

This chapter explores institutional networks created by international donor organizations and the Government of Rwandan (GOR) for developing aquatic food resources in Rwanda. These networks involved two U.S. Agency for International Development (USAID) aquaculture development projects (one research and one extension project) that employed U.S. university technical specialists from 1982 to 1994. The scope and time frame of the research project [Pond Dynamics/Aquaculture Collaborative Research Support Program (CRSP) Rwanda project] and the extension project (Projet Pisciculture Nationale, PPN) differed, but together they accounted for the lion's share of aquaculture activity in Rwanda throughout the 1980s.[1] The changes brought about by these USAID aquaculture projects were not on a grand scale—that is, great improvements in Rwanda's fish supply did not result—but rather were of the type that would eventually be absorbed into Rwanda's cultural, economic, and political structures.

Rwanda, before its recent tragic upheaval in 1994, was considered a darling among donor agencies. Rwanda was referred to geographically as the "land of a thousand hills," and politically as "the land of a thousand projects."[2] Since achieving independence in 1962, Rwanda's thirst for foreign capital opened the door for donors to become ever more powerful and able to influence internal policy decisions. By the mid-1980s, foreign aid accounted for 60% of the Government of Rwanda's funds, with France, Belgium, Germany (West), and the United States being the largest donors (Pottier 1993: 5).

Donor-driven interventions associated with aquaculture since the 1980s in large part dovetailed with food policy reforms promoted by the Rwandan government. In a classic systems loop, food policy reforms promoted by the government were also par-

tially motivated by donor agendas. However, reasons other than food policy reforms were probably key motivating factors for the government's disproportionate interest in this sector. The fisheries and aquaculture sector in Rwanda was comparatively small in relation to the donor activity it generated. As Rwanda is a landlocked country, fish played a minor role in the diets of most Rwandans. Those living near bodies of water where there was a natural fishery were among the main consumers of fish in Rwanda. Even so, fishing was a marginal activity in Rwanda with fewer than 4000 fishers participating as of the early 1990s (FAO 1991a,b: 2). Poorly developed transportation and marketing pathways to remote areas where most of the population lived relegated fish to a rare feature of the Rwanda diet. Yet aquaculture projects were promoted and sponsored. No doubt that in addition to the goal of raising rural incomes, the GOR wished to appease the donor community to keep aid dollars flowing in.

With burgeoning population growth in the 1980s, food security became a major concern in Rwanda. A challenge to the GOR and the development community was to find ways to improve nutrition without causing a commensurate decrease in environmental quality. Rwanda had one of the largest rural population densities in the world. Nearly 94% of the population lived outside Rwanda's major urban areas and tended to be dispersed in small farms (USAID 1992: 5; Clay and Johnson 1992: 495). In addition, Rwanda was slow to intensify agricultural production and instead expanded its farming into ever more fragile ecosystems.

Aquaculture was envisioned by donors as an "appropriate" intervention, but in the early 1980s, when these two projects began, little attention was paid to aquaculture's effects on the environment. Most donors were geared toward food production solutions, and in the 1980s there was a heavy emphasis on agricultural research (Christensen 1994: 7). Then, in what amounted to a pendulum swing around 1990, donors began sponsoring environmental projects and discontinuing agricultural production projects. Existing aquaculture projects were made to reexamine their research objectives in this new light. An example of this change could be found in USAID's Rwanda projects. In their Rwanda Strategic Plan, the USAID Mission noted that its "natural resources" portfolio in the mid-1980s consisted of fish culture and wetlands projects (USAID 1992:36). Before then, aquaculture was typically part of the agricultural portfolio. Partially because it was understood as both agriculture and artificial fishing (a natural resources connotation), aquaculture survived the cuts in the USAID agriculture portfolio. And in a surprising turn of events, it became an element of the Natural Resources Management Project, which was the USAID Mission's first "earnest" attempt to include natural resources in their portfolio of projects. This chapter speculates on some of the environmental effects of the two aquaculture projects, and illustrates how the research and donor agendas shifted to meet the new challenges.

During the 12-year period in which the two USAID projects operated, aquaculture had become a fast-growing enterprise in Asia, Latin America, and the United States (FAO 1995a). Donors thus had high expectations for aquaculture at the start of the projects, but by the 1990s, aquaculture in Africa still had not blossomed. Although aquaculture had yet to deliver on its big promises in Africa, some unplanned successes were achieved. Unanticipated spin-offs from these two aquaculture projects in Rwanda included the creation of a first-rate water quality laboratory, formulation of a national strategy on aquaculture development, and new opportunities for women. This case study provides a look into how these achievements came about.

In particular, this chapter explores the evolution of women's participation in aqua-

culture and some of the barriers they had to overcome. As an introduced technology, aquaculture was envisioned differently by different stakeholders. The donor community regarded aquaculture as a means to mitigate against losses in the natural fishery and a means to increase the availability of protein. Neither the donor community nor the GOR envisioned aquaculture as a métier for women, who by the late 1980s became the fastest growing segment of the population adopting aquaculture. Fish farmers, some of whom were "landless" women, challenged government policies as they sought control over their earnings and fish harvests.

HISTORICAL CONTEXT FOR THE DEVELOPMENT OF AQUACULTURE IN RWANDA

Aquaculture's seeds in Rwanda were sown through colonial intervention. Fish culture was introduced by the Belgians in the 1920s, and grew to assume some national importance as it was eventually factored into national plans and strategies developed by the Rwandan government in the early 1990s (Table 1). Civil laws on fishing date back to at least 1893, but no mention was made of legislation regarding fish culture until relatively recently (Coche 1994: 256).

A report published by the Belgian Congo administration in 1960 reflected Western perspectives on the role of fish in the Rwandan diet. Through education, "the population grew accustomed to a more balanced diet and food interdicts have been greatly reduced. In former times, the cow was eaten only during old age or when suffering from some disease; fish was practically unknown" (Belgian Congo 1960: 11–12). The report went on to state that "fish is appreciated only by those living on the shores of Lakes Tanganyika and Kivu and the interior lakes where the administration has introduced telapia [sic]" (Belgian Congo 1960: 12).

Before 1960, fish were caught regularly in interior lakes such as Lakes Muhazi, Mugesera, and Ruhondo principally under the auspices of "interchieftaincy bodies." As of 1960, Rwandans reportedly were "seeking an ever-growing source of income from fishing" (Belgian Congo 1960: 54). To this end, the Belgian administration and Rwanda's Agricultural Service supplied fishermen with fishing equipment.

Given the growing interest in fish as a source of income (from the perspective of the Rwandans) and as a source of protein (from the perspective of the Belgians), the Belgian Congo administration stocked new lakes in 1956. They continued to sponsor research already underway at Kigembe, which later was to become the site of the National Fish Culture Service Station (Figure 1). Much of the research undertaken at that point was on "rational stocking and natural productivity of the lakes, nutrition tests and the profitability of pisciculture" Aquaculture centers in Ruhengeri, Kibuye, Astrida (Butaré), and other locations carried on "development and propaganda activities" to promote fish culture (Belgian Congo 1960: 54).

By 1958, Rwanda and Burundi together had 1246 ponds, or nearly 410 acres under water. The Belgian administration for consistencyrecommended artificial feeding, a technology intervention that was later countered by the technologies promoted by the CRSP. The CRSP leaned toward green manure and composts, as feeding was expensive and not a practical technology in remote areas of Rwanda. CRSP technologies developed for Rwanda aimed at fostering self-reliance within the production system, so that farmers would not need to depend on externally supplied inputs.

Table 1 Time Line of Selected Aquaculture Events in Rwanda, 1923–1994

1923 Belgians brought fish culture with them from the Congo to Rwanda, and sent fish culture pioneers such as Professor Huet to survey the potential for fish culture.

1952 A fingerling production center was constructed at l'École des Assistants Agricoles in (Astrida) Butaré. This center later became the site of the CRSP research station.

1954 A fingerling production center was constructed in Kigembe. Kigembe later became the site of the Rwanda Fish Culture Project (PPN).

1959 Over 2000 ponds (1112 acres) were producing an average of 356 lb/acre/year in Rwanda.

1960–66 Fish culture was at a standstill and many ponds were abandoned. In 1966, only 448 ponds existed.

1967–70 FAO conducted a project to evaluate inland fisheries and aquaculture potential. More than 7 fish species were being cultured, including 3 tilapias (*Oreochromis rendalli*, *O. macrochir*, and *O. niloticus*).

1970 An agreement was signed between MINAGRI (Ministère de l'Agriculture et de l'Elevage) and CRDI (Centre de Récherches pour le Developpement International) of Ottawa, Canada for implementation of the ELADEP project (see 1978).

1972–75 An FAO project evaluated capture fisheries and aquaculture as a secondary activity.

1975 Another FAO project evaluated inland fisheries and fishfarming and found that smallholder fish culture was poorly developed and yields were low.

1977 Dissatisfaction with FAO efforts was noted by Mahy, who was associated with FAO and Canadian development assistance.

1978 The Government of Rwanda (GOR) reported that there were 2662 fishponds in Rwanda and that it was interested in reinvigorating aquaculture in Rwanda. At that time fish yields were very low. Through the loan of U.S. Peace Corps volunteers from Zaire, GOR assessed its aquaculture potential. Also, a team from North Korea helped GOR develop a grass carp seed production system. NGOs began small projects to develop smallholder communal fish farming at various sites throughout Rwanda.

1978–80 IDRC (International Development Research Centre of Canada) funded ELADEP (Empoissonment des Lacs du Pays et Développement de la Peche), which focused on lake fisheries but also included aquaculture studies on fingerling production and fish nutrition. Although an aquaculture extension program was not yet created, some fisheries staff received training in fish culture through this project. ELADEP was headquartered at the Ruganwa Fish Station in Kigali, and had projects at Rusumo Fish Station in Kibungo. According to Schmidt and Vincke (1981: 9), "All the people from Rwanda who have so far been trained in fish farming and fisheries at the 'Centre de Formation' in Bouake, Ivory Coast, have been assigned to this project." Administrative problems resulted in ELADEP's termination a year before schedule.

1979 North Korea introduced Chinese carps in December at the Ruganwa Fish Station in Kigali. Also in 1979, an Aquaculture Development Program was proposed by MINAGRI for each prefecture and commune in Rwanda. The proposal called for 10 fish hatcheries comprising 16 ponds in all 10 prefectures, and 100 smaller hatcheries in 100 communities.

1980 FAO, with funding from USAID and in collaboration with GOR, reviewed, once again, the feasibility of small-scale rural fish culture. Although no biotechnical impediments were found, FAO noted that fish culture in Rwanda had not been successful and that extension services and appropriate technologies needed to be developed. However, farmers continued to be interested in fish culture. By 1980, only two species were commonly cultured (*O. rendalli* and *O. macrochir*). *O. niloticus* was cultured only in Kigali; clarias and carp were grown occasionally.

1983 Inception of the USAID-sponsored CRSP Rwanda Project at Rwasave Station, at the National University of Rwanda in Butaré. Inception of PPN at the National Fish Culture Extension Service Station in Kigembe. PPN was sponsored by USAID with technical assistance from Auburn University and MINAGRI. Planning documents for both of these projects had been accepted by USAID and the GOR in 1981.

Table 1 Continued

1988 PPN ends and the station in Kigembe became known as the National Fish Culture Service (SPN).

1989 The Natural Resources Management Project (NRMP) was funded by USAID through Development Alternatives Inc., which contracted with Auburn University to conduct a component on aquaculture assessment and planning.

1990–91 A series of FAO planning missions were undertaken and pointed out the weak links between technical and extension efforts. They recommended that a consultative commission be created to plan for fisheries and aquaculture development.

1992 A Women in Fishfarming project was funded through USAID, the CRSP, and Oregon State University.

1994 War. All project activities cease.

Sources: Veverica 1997: 11, 12; Moehl 1993: 13–15; Hishamunda and Moehl 1989: 14; Miller 1988: 2; Schmidt and Vincke 1981: 4, 9, 10.

Although the literature notes that aquaculture in Rwanda languished for many years following independence, the number of ponds in 1984, just after the USAID aquaculture projects started, was 1436 (Jolly 1992: 1).[3] A series of fisheries and aquaculture evaluations were conducted by the United Nations Food and Agriculture Organization (FAO) in the 1970s, paving the way for increased donor interest in aquaculture in the 1980s. As of 1990, the number of ponds registered by the Fish Culture Extension Service had increased to 2897 (Moehl 1992: 39). Jolly (1992: 1) reports that for the same year the number of ponds was 3511. In 1992, estimates were as high as 4000 ponds.

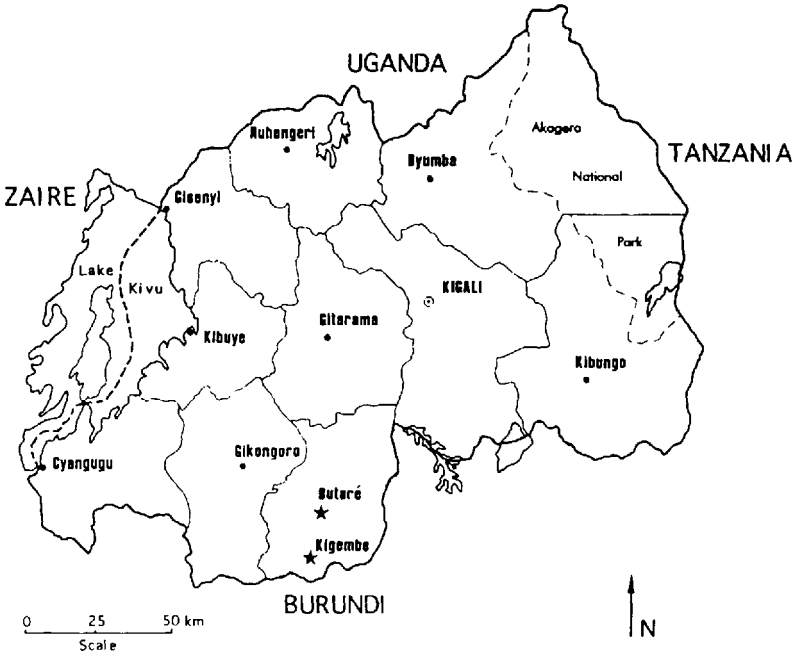

Figure 1 Map of Rwanda.

The Belgians originally constructed large ponds of about 0.52 acre in size, but with time and encouragement from development projects, the pond size decreased. As of the late 1980s, the average pond was 0.10 acre, and accounted for a substantial portion of the family farm, which was about 1.2 acres. Jolly (1992: 1) notes that in the 5 years after 1984, fish production from aquaculture and fisheries grew 7% annually, and that most of the increase was due to improvements in fishing techniques and in food processing. Thus, these USAID-sponsored aquaculture projects operated during a time in Rwanda when fish yields were increasing, but a link between the projects and the increase should be viewed as speculative rather than causal.

PROJECT LINKAGES BETWEEN AQUACULTURE AND THE NATURAL ENVIRONMENT

In Rwanda, where land and population pressures were enormous, deleterious effects of agriculture on the environment became pronounced. Soil fertility, erosion, and water quality concerned almost all stakeholders as Rwanda's agricultural base became increasingly threatened. Aquaculture was viewed as part of the solution, but it could just as easily have added to the problems. Furthermore, governmental aid, such as that provided through USAID, is known to have contributed in the past to bolstering inefficient, bloated bureaucracies, with their attendant environmental and social ills.

The potential for negative environmental effects of these aquaculture projects was therefore real. One problem was limited awareness of aquaculture's potential impacts. Aquaculture, until very recently, was considered by many in the development community as a panacea to the world's food problems. With zeal and great conviction, Peace Corps volunteers and other U.S. development workers helped to spread aquaculture throughout Africa (Egna 1997; Cross 1991). Little attention was paid to aquaculture's effects on the environment. Then, the runaway growth of the aquaculture industry beginning in the mid-1980s in Asia and Latin America brought about heightened concern over aquaculture's negative effects. The literature now contains ample references to the nexus between aquaculture and the environment (Holmes 1996; Pullin et al. 1993; Weeks 1992).

As a backlash to the protected status aquaculture enjoyed for so long, the literature is increasingly portraying it as a "bad" farming activity, without paying attention to the type of aquaculture practiced. Aquaculture, however, covers a broad range of farming activities from the backyard pond (akin to a home garden) to an energy-intensive, commercial, export-oriented transnational operation (akin to an agricultural conglomerate).[4] It involves many levels of intensity and complexity, from gravity-fed ponds with little or no inputs, to intensive systems that use aeration, supplemental feeds, antibiotics, and genetically altered species. In addition to the type of practices and systems is the sensitivity of the site in which aquaculture occurs; this depends on societal and technological conditions as well as environmental resilience. In Africa, most freshwater aquaculture is technologically unsophisticated—ponds rely on natural pond productivity and low levels of inputs. Rwanda's aquaculture ponds were no exception—they were small, earthen, hand-dug ponds that relied primarily on local inputs, ranging from kitchen table scraps to more complex compost formulations.

An environmental assessment was not completed in advance of the projects. After all, in 1982, few if any USAID projects in international agriculture were reviewed under the U.S. National Environmental Protection Act (NEPA). An end-of-project assessment also did not occur due to the war. However, some ex-post observations of the environmental effects of the projects are offered below.

The USAID projects in Rwanda had been managed to limit negative environmental effects. This was by circumstance rather than design. In the CRSP research project, the initial motivation of the U.S. university scientists tended to be on performing studies that would be accepted by their peers and that would advance the state of aquaculture. These studies originally were designed for sophisticated inputs and equipment, and required trained staff and adequate infrastructure. Given the state of the research network in Rwanda, it became obvious in a short time that the original design would require revision to be appropriate.

One example of a revision in the research agenda concerned the use of inorganic fertilizers. In Asia and Central America, the CRSP sponsored research that tested inorganic fertilizers in aquaculture systems. In Rwanda, access to inorganic fertilizers was limited. The fertilizer industry, which was developed by European donor organizations, and operated through parastatals in Rwanda, was not well equipped to supply smallholder fishfarmers (Baydas et al. 1995). Thus, a shift in project focus to available local inputs was made. Aquaculture research emphasized composts, green grass, and other local by-products to drive the nutrient cycle occurring naturally in the ponds.

This example demonstrates that the aquaculture projects contained the flexibility to respond to local conditions, which favored more environmentally sound solutions than the ones originally envisioned. The original research agenda reflected its times in not containing provisions for mitigating against negative environmental effects. When faced with the realities of carrying out a largely U.S.-based research agenda in Rwanda, the projects responded by making decisions that in the long run were appropriate to local conditions and introduced far fewer possibilities for negative environmental impacts. However, this change in the research agenda was also not without its problems. Surplus by-products did not exist in Rwanda. CRSP experiments requiring loads of over 1000 kg/ha/week of manures and green grasses, for example, competed with other uses of those materials. Under such acute scarcity, materials that Westerners took for granted became enmeshed in a sequence of trade-offs for the farmer. Indeed, an opposite viewpoint has been taken by some who criticize the unintensive aquaculture systems promoted by the development projects as being "a type of ecological socialism . . . that is being imposed on African Communities" (see Costa-Pierce et al. 1992).

Another concern about aquaculture is the potential for negative interactions with native flora and fauna. As aquaculture replaces wild habitat, changes to the ecosystem inevitably occur. In Rwanda, most ponds were located in the marais (wetlands). Thus, the conversion of marsh to pond area probably resulted in changes to habitat, and affected indigenous flora and fauna. However, comprehensive studies were not undertaken to assess the extent of the effects, so it is not known whether changes were negative or whether they were primarily due to increasing agricultural pressure on the marais. Anecdotal evidence suggests that ponds may have acted to increase bird populations as a large variety and number of birds were seen around ponds (fish-eating, and insect-eating birds in particular), but this evidence should be viewed cautiously, as a broader view of the changes occurring to bird populations was not undertaken.

Other evidence suggested that ponds served as breeding grounds for vectors of animal and human disease (i.e., snails and mosquitoes). Managed ponds are not likely to spread disease, but in Rwanda, not every pond was managed well. Deutsch and Colette (1992: 15, 17) found snail hosts for waterborne diseases at all three fish culture sites sampled (Kigembe, Runyinya, Gikongoro) in one of the few surveys undertaken on the connections between fish culture and disease. *Biomphalaria*, the snail host for human intestinal bilharzia, was abundant at all sites; *Lymnaea*, the host for sheep and cattle liver

fluke, was moderately abundant; and *Bulinus*, the host for human urinary tract bilharzia, was found only at Kigembe. Intestinal bilharzia was fairly common throughout Rwanda but particularly near the lakes, near Cyangugu and Ruhengeri, and the Rusizi River. Although mosquitoes (subfamily Culicinae) were abundant, they were not anopheline mosquitoes, which are hosts for malaria.

Exotic species, when introduced into new environments, can "outcompete" native species, causing unwanted changes to a habitat or even an entire ecosystem. These aquaculture projects did not introduce a new species into Rwanda. *Oreochromis niloticus*, commonly called the Nile tilapia, was already present throughout Rwanda. However, the Belgians, and possibly the Germans before them, were probably responsible for introducing other fish species, as well as for spreading Nile tilapia to new areas within Rwanda (De Vos et al. 1990; Dumont 1986). Trewavas (1982: 10) noted that the natural distribution of the *Oreochromis* subgenera included the Rift Lakes (e.g., Lake Kivu in Rwanda) and much of East Africa. Philippart and Ruwet (1982: 17) noted that while *O. zilli* and *O. rendalli* were introduced to Rwanda, *O. niloticus* (*S. nilotica*) probably was indigenous. *O. niloticus* likely originated in the upper Nile (Uganda) and spread south through the Rift lakes to Lake Tanganyika. The projects, in promoting the spread of aquaculture, provided an opportunity for Nile tilapia to enter smaller lakes and riverine systems where they may not previously have been present.[5] Again, no baseline data or comprehensive fish censuses were available for most of the aquatic resources of Rwanda, so it is unknown whether tilapias had already spread from the Rift Lakes and what the impact actually was.

Additionally, as of 1991, the GOR, USAID, and FAO did not have a clear directive against exotics, and there was still some leniency in the importation of species into Rwanda if enhancement of food security would result. For example, in their preliminary planning sessions in 1990–1991, FAO and the Rwandan ministry of agriculture recommended that research be conducted on introducing new species that can be integrated into the lacustrine system and would be marketable (FAO 1991b: 5).[6] However, after the projects had ended, both USAID and FAO began articulating concerns:

> The construction of aquaculture fish ponds can have profound negative effects on the maintenance of natural aquatic ecosystems. . . . Improperly sited aquacultural projects can damage freshwater ecosystems and result in the release of cultured fish stocks into natural freshwater ecosystems. Cultured fish stocks can affect the gene pools of native fish and spread disease among them. . . . Conflicts occur between fisheries and environmental conservation when wetlands are cleared for aquaculture (Knausenberger et al. 1996: 31–32).

> [E]fforts should be undertaken to minimize the harmful effects of introducing non-native species or genetically altered stocks used for aquaculture including culture-based fisheries into waters, especially where there is significant potential for the spread of such non-native species or genetically altered stocks. . . . States should, whenever possible, minimize adverse genetic, disease and other effects of escaped farmed fish on wild stocks (FAO 1995b: Article 9.3.1, p. 9).

Discharges from aquaculture ponds also have the potential to degrade the environment. Effluents from aquaculture can be a source of pollution. However, the impacts of effluent and other material transport depend largely on the type of aquaculture practiced. If ponds are managed properly, discharges (soil and water) can be used in animal husbandry and plant production. Nutrient-rich pond soils can be dredged for crop production, thereby reducing the need for soil amendments such as inorganic fertilizers. Rwandan ponds typically had nontoxic inputs and highly degradable effluents. The large quantity

of inputs required in the CRSP ponds for driving primary productivity—even if those inputs were composts and manures—could have been a source of effluent problems if ponds were not maintained. However, most evidence with Rwandan aquaculture pointed to few serious effluent problems.

On an institutional level, some project impacts could be considered to have had a positive effect on the environment sector. Both aquaculture projects encouraged systematic techniques in observation and record keeping, important elements of any monitoring system. Without the generation of baseline data, detecting changes in the environment is exceedingly difficult. Researchers, farmers, and extension agents were trained in these techniques through project efforts. Unfortunately, the ineffective bureaucracy governing fisheries and aquaculture in Rwanda relegated the potential of these techniques to an administrative morass, rather than to a natural resources database. Even as of 1991, when the FAO convened a conference on fisheries and aquaculture planning, data were still reported to be of insufficient quality and quantity.

Also in 1991, Rwanda's ministry of planning (Ministère du Plan) officially adopted the National Environmental Strategy Action Plan (SNER/PAE). Deutsch and Colette (1992: 25), who were familiar with the training efforts of the two aquaculture projects, recommended that a biomonitoring program be included in the implementation of the Plan. The Plan contained several objectives related to aquaculture, which points to the government's increasing awareness of aquaculture's potential effects on the environment. Among these objectives were to reduce negative environmental impacts of activities in the marais; to practice pollution abatement, especially with reference to pesticide use; to site aquaculture ponds to optimize resource use; to ensure that ponds do not spread waterborne diseases; and "to introduce exotic fish species only in cases of proven need" (Moehl 1992: 14).

Another institutional outcome of these projects benefited environmental monitoring. The creation of the premier water quality laboratory in East Africa was conceived and supported through USAID project funding, with some support from other donors, including the European Economic Community. Rwandans received training to perform water chemistry analyses under strict quality control standards. The agriculture and environment sector, including Rwanda's ministry of agriculture and NGOs, such as the World Wildlife Fund, paid Rwasave Station to analyze samples for them. Rwasave was jointly managed by CRSP and Rwandan scientists from the National University of Rwanda, and became largely self-sustaining as a result of the financial resources it was generating through its water quality laboratory. In this way, the aquaculture project provided a service to the Rwandan government and to NGOs in helping to monitor source water and water quality.

In sum, aquaculture and environment were inextricably linked in Rwanda. The nexus between the two was also evident in the policy arena. An increasing person-land ratio put enormous pressure on the landscape. Aquaculture in Rwanda was not originally envisioned by USAID as a natural resources activity. However, toward the end of the projects, USAID wrote:

> While there were research programs through the mid-1980's in fish culture and wetlands development, the USAID intervention in natural resources began in earnest only in the late 1980's when the Natural Resources Management Project [NRMP] began. It is too early to be able to measure the full impact of the program but we have done a preliminary assessment. The program has attracted significant interest from interest groups in the United States and the several biodiversity projects which have been financed appear to be proceeding well (USAID 1992: 36).

This statement acknowledged the USAID Mission's perception of aquaculture as a natural resources intervention. It also indicated that in promoting environment projects, USAID was not responding to GOR concerns but to the U.S. environmental community.

By 1992, USAID had become so discouraged with its "lack of success in the agricultural sector" that it dropped agriculture from its portfolio in Rwanda (USAID 1992: 36). Aquaculture, as a hybrid activity, was repackaged to fit into other natural resources efforts. The NRMP had a significant aquaculture component, largely directed at assessment and planning. In addition, existing aquaculture efforts in Rwanda such as the CRSP were repackaged with an "environmental spin." They then counted in USAIDs country strategy in the environment line item and were not as easily categorized as part of the unsuccessful efforts in agriculture. In this way, aquaculture shifted in the development portfolio from agriculture to environment for a brief time in the early 1990s.

An examination of institutional networks for these aquaculture projects reveals certain actors who reappear at different times in different points of the network. In a closed-circuit system such as international aquaculture development, it is not surprising to find that the same people recycle through the network. One example is provided in a key study sponsored by the NRMP. A former PPN expatriate, an Auburn University technical specialist, was commissioned to perform an evaluation of aquaculture. Most of his findings related to the development of the aquaculture sector. Very little emphasis was placed on evaluating the environmental effects of aquaculture, although a recommendation for using a study on "environmental soundness" as the basis for the development of a National Aquaculture Development Plan was made (Moehl 1992: 33). The study on environmental soundness consisted of another U.S. university scientist's short-term visit to Rwanda. Recommendations emphasized the need for comprehensive studies and biomonitoring to evaluate impacts of aquaculture on the environment. It is uncertain whether any additional studies were undertaken before the war caused an evacuation of expatriate project personnel in April 1994.

REASONS FOR DEVELOPING AQUACULTURE: PERSPECTIVES OF PROMOTERS AND ADOPTERS

The four principal actors in this case study—donor organizations, the Government of Rwanda, U.S. project expatriates, and Rwandan researchers and farmers—shared reasons for supporting the development of aquaculture. Although the rationales of these actors changed over time and with new information, at the start of the USAID projects in 1982, different elements of the aquaculture "solution" attracted each actor. In sweeping generalizations, the donor community, including expatriates, were attracted to aquaculture as a means of increasing the availability of protein and providing relief to the overfished natural fisheries. Rwandan farmers were attracted to aquaculture as a means to increase their incomes and improve their diets. The government focused on aquaculture as a way to appease the donor community and as a means to diversify farming activities. And expatriates, who largely saw themselves as development entrepreneurs responsible for spreading an enthusiasm for aquaculture, also had vested interests in appeasing the donors.

THE PROTEIN RATIONALE

In the donor and scientific communities of the early 1980s, protein was thought to be more critical in "alleviating hunger" than other dietary inputs, such as carbohydrates.

This assumption formed the basis for USAIDs support of the aquaculture projects in Rwanda. While current thinking has questioned the validity of this assumption, the debate surrounding the 'hunger controversy' does not entirely refute it. Bioavailability of micronutrients, an aspect of food quality, has emerged as an important factor in determining nutritional status. As it turns out, fish contain many of the micronutrients (especially iodine and zinc) considered to be important for early child nutrition and growth. Thus, the debate now centers on defining "hunger" as a complex condition that may involve either or both food shortages and food quality.

Regardless of prevailing opinion in the early 1980s about the main factors of malnutrition, it is evident that the connection between fish and protein intake was made in Rwanda long before USAID or other donor projects came on the scene. Data sources spanning nearly 50 years show that available animal protein was not sufficient to meet the needs of the growing population in Rwanda (Jolly 1992: 1; Laure 1980: 111; Belgian Congo 1960: 26). Indeed, in 1960 Belgian authorities were "aware that a greater consumption of fish would add protein to the [Rwandan] diet," and thus, the administration was in favor of encouraging the development of aquaculture in Rwanda (Belgian Congo 1960: 54). Also, the GOR's Second Five-Year Plan (1977–1981) had as a top priority "food equilibrium . . . in addition to an insufficient quantitative nutrition, the nutritive quality of the food is alarming. The shortage of (animal) protein and lipides [sic] (oil, fats) is very clear" (see Univ. of Antwerp nd: 30).

With this Second Five-Year Plan, GOR was likely responding to donor concern over protein malnutrition; in other words, this was not a problem that the government first noticed without the development community's assistance. In an address at a CRSP-sponsored women's event in Kigembe (site of the National Fish Culture Station), Rwanda's Director General of the ministry of agriculture—which oversaw the Directorate of Fisheries and Aquaculture—stated:

> [I]t would not be a surprise to you if I said that our nutrition is poor in animal protein. Meat and dairy products are insufficient compared to the population size. The available production does not get to consumers due to transportation and distribution constraints. Considering the sole example of meat, there is no need to use statistical data to prove a shortage in our markets. Additional causes of that shortage relate to the war that has been threatening our country since 1990 and that caused the loss of about 1/10th of our livestock or about 50,000 cows. That war also stopped the exchange of goods between regions. Another cause of meat shortage is that the raising of small animals has not been supported for long so that the consumption of the meat from these animals was not widespread. Considering the size of our land now and in the future, small animals such as goats, chickens, pigs, sheep, and rabbits, which produce rapidly and don't require a lot of land should be given appropriate attention. The role of fish from lakes and ponds also should not be neglected, especially for their protein content to our bodies . . . (CRSP Kigembe Focus Group March 1992).

With the potential for aquaculture to satisfy nutritional requirements, donors and GOR invested heavily in aquaculture, disproportional to its potential to fulfill expectations. If fish were to be part of the solution, they would need to be affordable for most of the population. At the start of the projects, fresh tilapia were among the most expensive sources of protein for the money (Laure 1980: 110). In a study undertaken in 1991 by the former Director of the Rwanda Fish Culture Project, fish were found to be a very expensive source of protein (Hishamunda et al. nd). Although the study did not differentiate between the value of animal and plant proteins, it was found that fish protein was six times costlier than maize, which was the least expensive source of protein. Thus, it is

not surprising that by 1991, fish were still a novelty. Fresh fish were consumed primarily in urban areas, and not in the rural areas the projects had originally envisioned.

Given the small role fish played in the traditional diet, aquaculture seemed hardly worth investing in as a means to increase the availability of protein. However, donors, especially FAO, recommended the development of aquaculture in Rwanda at least partly because they realized the importance of fish in the diet in other regions of Africa (see ALCOM 1990). In the early 1980s when the two aquaculture projects were initiated, data on dietary intake and food consumption were generally not available for Rwanda. In retrospect, we now know that Rwanda did not match the average for fish consumption in Africa, where 21.1% of animal protein consumed came from fish (FAO 1992: 163). FAO statistics for 1987–1989 showed that the per capita consumption of fish in Rwanda was low, especially compared to some other "fish farming" nations in the region (Table 2).

FAMINE PREVENTION

The location and severity of famines have policy implications for fisheries and aquaculture programs. Rwanda experienced periodic famines throughout its history. From 1856 to 1944, thirteen distinct famines were recorded.[8] One study showed that famines occurred almost every 5 years from 1890 through 1990, with recent famines in 1979, 1984, 1989/90, and one predicted for 1994 (Uwizeyimana 1990: 44, 80). For the most part, these famines were localized and did not spread throughout the country unless they became cumulative and when agricultural regions in the north and central regions were affected (Lugan 1985: 171). Consequently, it was thought that fish farms, if located in remote and famine prone areas, could increase food security in those regions. This was part of the tenet of the original Belgian aquaculture program, and became part of the long-term goals for the USAID projects as well.[9]

The USAID strategy for combating nutritional problems in Rwanda in the 1980s was to pursue programs for educational awareness rather than food aid. Rwanda in the 1980s was better off than many African countries, and was considered a "poor country that was still relatively food secure in the 1980s thanks to its diversified agricultural

Table 2 Comparison of the Importance of Fish in the Diets of Rwandans and Other Sub-Saharan Africans

Country	Fish products as % of the total daily protein supply[a]	Fish consumption (g/person/day)[b]
Chad	9.65	5.1
Congo	21.95	11.3
Malawi	4.70	3.2
Tanzania	7.05	4.2
Rwanda	0.02	2.2[c]
Uganda	7.40	3.9
Zambia	4.65	2.3

[a]Data were averaged from 1980 and 1990 (World Bank 1994: 168).
[b]Data were averaged from 1987 to 1989 (FAO 1992: 163).
[c]Data from FAO 1992: 2.

base" (Pottier 1993: 5). That said, the amount of food aid supplied throughout the 1980s decreased, following similar patterns observed in other poor sub-Saharan African countries.

The amount of food available for human consumption decreased steadily from 1979 through 1990, and did not keep pace with population growth. In addition, the amount of protein and calories available to the rural population also decreased during the period when these two aquaculture projects were operating. Clearly there were breaks in the links necessary for improved nutrition: improved availability must be connected to access, consumption, and nutrition (Diskin 1994). Most Rwandans in rural areas consumed far less than 100% of the recommended calorie intake, and in some regions over 80% of the population had caloric deficiencies (Hishamunda et al. nd; Gotanegre 1988: 190).

Imports of fish to Rwanda throughout the 1980s were erratic, climbing to their highest levels in the mid-1980s and then dropping to zero in 1991. Rwanda, however, had a lower overall capacity than many other sub-Saharan African countries to finance food imports (FAO 1992: 11). According to one measure of well-being by IFAD, Rwanda in 1991 ranked 18th among the nations with the lowest food security in the world, and was the second most impoverished nation (Haralambous 1993: 62, 64).[10]

DECLINE IN THE NATURAL FISHERY

The decline in the natural fishery was a key reason for the colonial introduction of aquaculture in Rwanda. Overfishing, especially by European industrial fisheries in nearby Lake Tanganyika in the 1950s, was so extensive that the Belgian Congo Administration set policies to protect native fisherman by limiting industrial access to the fisheries through permit restrictions. They also trained fishermen in new harvest techniques (Belgian Congo 1960: 52). In Rwanda's lakes, a similar situation probably occurred, and with time and more efficient harvest techniques, further stock depletion likely resulted (Mukankomeje et al. 1993). In the 1990–1991 FAO planning mission for fisheries and aquaculture development, which involved GOR representatives, recommendations to set quotas and fishing limitations were made in response to continuing declines in the natural fisheries (FAO 1991a,b).

AN INCOME MOTIVE

Rwandans engaged in fish farming primarily for profit. Although U.S. development workers originally envisioned the reason for participation to be non-cash related ("from pond to table"), later studies have shown this not to be a main reason according to the farmers. Early donor assumptions that fish farmers would consume the fish they produced thereby directly improving their nutritional status, were not found to be correct. Rather fish farming provided the means to choice of foodstuffs and was propelled by a profit motive (Molnar et al. 1996: 33; Engle et al. 1993: 161; Hishamunda et al. nd: 230).

Expatriates also had an income-related motive in promoting aquaculture. Although many were true believers in the potential for aquaculture to bring about beneficial changes, they also were technical specialists whose future employment depended on aquaculture's success in the development sector. Thus, it benefited the expatriates—and the university projects—to show that their projects were successful and that aquaculture

was realizing its potential in Rwanda. That way, funds would continue to flow into the system, allowing the continuation of their projects and also the initiation of new aquaculture projects. Searing accounts of development project excesses have been written for Rwanda. In terms of income-related motivations, expatriates have been noted to have significantly higher incomes than their Rwandan colleagues and were able to "command the lower levels of Rwandan society" (Univ. of Antwerp nd: 48). In discussing the evolution of the aquaculture expatriate, Cross (1991: 73) notes that the self-reinforcing loop between technical specialists and new development projects resulted in over 200 "aquaculture consultants" registering at FAO every week.

While the two aquaculture development projects were no different from most projects in retaining over half their funding for costs associated with donor country involvement (e.g., expatriate salaries, travel of U.S. scientists), the technical specialists employed by the U.S. universities were not highly paid consultants, as has been the criticism in some other cases.[11] Furthermore, the expatriates and U.S.-based project administrators believed that these projects would never have been realized without the day-to-day efforts of the expatriates. To a great extent the institutional network analysis provided in this case study supports that belief. As this chapter attempts to show, the success of the projects could not have been achieved without enrolling actors with vested interests. There is no doubt that other outcomes might have been achieved without expatriates.

An income motive was also evident in the government's support for aquaculture. Aquaculture itself was probably not the magnet; the promise of project funding was. More projects were thought to bring in more money. Again, this was the land of a thousand projects. In addition, there may also have been some high-level personal interest in aquaculture—the President of Rwanda had ponds on his property in northeastern Rwanda. After the CRSP project had begun at the Rwasave station, the President paid a visit in keeping with his recent decision to visit each development project in the country. He indicated an interest in seeing the project succeed and pledged greater coordination with the ministry of agriculture (Rwasave Station was part of the National University of Rwanda and was under the ministry of higher education and scientific research, MINESUPRES). The aquaculture development projects also included the President's ponds in their on-farm studies.

IMPROVING CHILDREN'S NUTRITION

Women, in addition to the profit motive, were more likely than men to engage in fish farming for the opportunity to enhance their children's diets by increasing their intake of animal protein (Balakrishnan et al. 1993). The latter rationale was probably learned at nutrition centers or through another channel.[12] Balakrishnan et al. (1993: 30) also stated that women fish farmers "prefer to produce fish themselves rather than buying it so often."

AN UNPLANNED SUCCESS: WOMEN AS NEW TECHNOLOGY ADOPTERS

A decade ago, few if any fish farmers in Rwanda were women. By 1992, women fishfarmers comprised 25% of the total and were said to be the fastest adopters of new aquaculture technologies (Mpawenimana and Karamaga 1997: 14). Women do much of the farming in Africa so it is not unusual for them to be engaged in a farming activity like

fish production. However, in Rwanda their involvement in fish culture was a relatively recent phenomenon and has been attributed principally to the efforts of the two aquaculture development projects.

As of 1991, women played a more active role in the aquaculture industry than the capture fisheries industry, as they partook in almost all aspects of the farming operation. In capture fisheries, women were chiefly involved in fish processing and marketing activities, whereas men were almost exclusively responsible for fishing and harvesting (Service d'Appui 1991: 51). Although fish farming was dominated by men in Rwanda, the percentage of women farmers was increasing every year through the late 1980s and early 1990s. Overall, men tended to be associated more with fish production (both farmed and capture) and women with the commercialization and marketing of fish, especially in urban areas (Jolly 1992: 2; Service d'Appui 1991: 51). Although Rwandan women were intermediaries in fish marketing, on the whole they spent most of their time in noncash agriculture (growing legumes, tubers, cereals) whereas men tended to work in the production of cash crops (Ford 1990: 50).[13]

Rwandan women were responsible for ensuring that basic household food needs were met. They exerted influence over whether a new technology such as aquaculture would be adopted, and whether fish would be placed on the table or sold for profit. But this potential was not appreciated in the early 1980s. In a glaring example provided by a flagship 1980 FAO study commissioned to rejuvenate aquaculture development in the coming decades, the authors wrote, "In the absence of detailed studies on the present decision-making process, it may be assumed, therefore, that the farmer decides on farm affairs, other than day-to-day food crop production, but that his wife is likely to influence his decisions" (Schmidt and Vincke 1981: 43). In so stating they assumed the "wife" not to be the farmer, although she was "autonomous in the spheres dominated by her" such as the household and in food crop production. Insofar as statements such as these are indicative of the prevailing attitudes of the time, it is no small wonder that women farmers were not targeted by these development projects.

Reasons for the increase of women in fish farming can be traced to two different, although interactive, "environments": one governed by internal forces in Rwanda and one by external forces. Internally, Rwandan women were becoming increasingly involved in aquaculture as aquaculture itself was becoming more popular as a smallholder farming activity. In Rwanda during the 1980s, more women (97.9%) than men (87.6%) were involved in agriculture (Service d'Appui 1991: 47). Women farmers were of course engaged in some pecuniary activities that allowed for exchange and barter (Ndiaye and Sofranko 1994: 45; Clay and Johnson 1992; Randolph and Sanders 1992). Indeed, in stating why they were interested in fish farming, Rwandan women noted that it gave them the opportunity to improve well-being, income, and nutrition (Service d'Appui 1991: 51). Approximately 16% of Rwandan households were headed by women (Ndiaye and Sofranko 1994: 40).

The participation of Rwandan women in aquaculture resembled patterns observed for subsistence agriculture in other African countries.[14] It also resembled similar gender patterns for adoption of fish farming as in other countries (Harrison 1991; Nash et al. 1987). Thus, with the emphasis on fish farming by development projects, it logically followed that a likely adopter would be women, given their already established role in the family farm. That they weren't included in the USAID project plans or government policies related to aquaculture was less a reflection on women's willingness to participate than on the role the government and the donors envisioned for them.

Aquaculture was not a traditional activity in Rwanda, therefore few farmers—men or women—could take the initial risks involved with transferring scarce family resources to a new farming activity. Risks are especially implicit in new farming activities. As is well documented in the literature, farmers are not by nature necessarily risk averse, but are constantly balancing trade-offs to determine which risks are worth taking. Myths of the irrational farmer who can not adopt new technologies or change with a changing environment were not borne out by the experience of women fish farmers in Rwanda. Indeed, the Rwandan farmer has been noted to behave "more naturally than ruling classes and official aid agencies tend sometimes to believe" (Univ. of Antwerp nd: 31). Women were no different than men in having to face risks—and balance trade-offs—associated with adopting aquaculture. However, due to their more precarious socioeconomic position in Rwanda, women could be said to have had less economic ability to cope with these risks, and by adopting aquaculture—as they did—they could be viewed as taking a greater risk than men who had more access to information, land, labor, and capital.

Additionally, women may have been attracted to fish farming because traditional gender barriers were not as well established as for other farming or fishing practices. Although animal husbandry was practiced in Rwanda mostly by men (fish farming can be considered a form of animal husbandry), it was not well entrenched. Evidence of this inexperience revealed itself in reports that farmers did not routinely feed their animals; thus, instances where animals starved to death were common (Schmidt and Vincke 1981). In a 1980 survey of fish farmers, they did not see the point of feeding their fish because they thought the fish subsisted on soil and water (Schmidt and Vincke 1981: 43). While not feeding penned animals could prove detrimental for most land animals, with fish, this may not have been the case. Serendipitously, but possibly through trial and error, these farmers were practicing general prescriptions for "extensive" pond management (low technology using local inputs or natural pond production) later suggested by the CRSP through its investigations on pond dynamics. But aquaculture—as originally introduced by Europeans—did not build on "traditional" animal husbandry practices; rather it presented a new type of farming activity that relied on external inputs such as feeds. Thus, the nontraditional techniques promoted by the Belgians, and to some extent by the two USAID projects, may have been particularly attractive to women as fish farming may not have been perceived as an entrenched male activity but one that departed from known niches and was therefore "open."

The adoption of fish farming by women had an external component as well. The aquaculture development projects, through several dedicated women "ambassadors" of the new aquaculture technologies, actively enrolled women farmers. A key individual in the education of women and their subsequent conversion to fish farming was Pelagie Nyirahabimana. USAID, through Auburn University, had enabled both Pelagie Nyirahabimana and her husband, Nathanael Hishamunda, then Director of the Rwanda Fish Culture Project, to receive aquaculture training. A New York Times article written in 1989 touts her efforts:

> Mrs. Nyirahabimana, the university-trained daughter of a traditional Rwandan farmer, is a major promoter of fish farming as a way of solving the looming food shortage in this tiny central African country. . . . As the trainer of extension workers who travel from farm to farm helping with fish techniques and marketing, Mrs. Nyirahabimana encourages the workers to involve women, traditionally the hardest-working in the fields of Africa but usually the least rewarded, in the new fish enterprises . . . "[Women] are the most productive," she said proudly (Perlez 1989).

In the case of these two projects, external agents of change also came from the U.S. university community. Auburn University scientists on the project were open to training both men and women, unlike many agricultural development projects of the early 1980s in which men were the sole recipients of the development assistance. The Auburn scientists were not necessarily responding to equity concerns as stated by the donor—USAID now encourages that projects give equal attention and support to men and women—but to the observations they themselves had made regarding the role of the woman farmer in Rwanda (Veverica 1988). Therefore, women, although not specifically targeted in the original project documents, ended up receiving attention not by design, but by default.

BARRIERS TO ADOPTION: WOMEN'S ACCESS TO LAND, CREDIT, AND INFORMATION

In a number of studies sponsored under the umbrella of these development projects, barriers to adoption of new technologies by women were evaluated. No substantial policy changes resulted from the findings. Major constraints facing women fish farmers were access to capital, land and water, and technical knowledge. While some taboos and concerns about eating fish were no doubt present in Rwanda, they represented a minor concern in spreading this new technology (Bryant 1994). The Belgian Congo administration (1960: 54) noted that "fish, formerly taboo, is being eaten more and more by [Rwandans]." Taboos arising from prior bad experiences may have prevented some Rwandans from eating fish. Some taboos were related to actual cases of food poisoning by spoiled fish. Other taboos have a less direct history. For example, a local story recounted how a dam was constructed over the river that ran through the Tutsi king's court so that the king would have fish (probably *Oreochromis macrochir*). One day he choked on a bone, giving fish a bad reputation.

Lack of access to capital and credit caused problems for women fish farmers.[15] Some studies showed that male extension agents who recommended farmers for financial assistance were not aware of or open to women's needs (Molnar et al. 1994; Randolph and Sanders 1992). In Rwanda, women had little access to bank credit (5% of all types of credit went to women in 1990; men received 95%) (Service d'Appui 1991: 65). Issues of credit to women farmers were complicated because overall credit to farmers in Rwanda declined considerably from 1989, or around the same time that an expansion in the number of women fish farmers was taking place (Baydas et al. 1995: 9). Also, aquaculture mostly relied on informal financing, which is extremely difficult to trace.

Other studies revealed that the complexities relating to women's limited access to land were a main barrier (Molnar et al. 1996; Balakrishnan et al. 1993; Harrison 1991). In Rwanda, men own land.[16] Women's land rights were by association with men: through her father, husband, or son a woman had access to land (Clay and Johnson 1992; Randolph and Sanders 1992).[17] Only a small percentage of Rwandans needed to rent all the land they farmed; approximately half had sufficient land and less than half needed to rent to augment their holdings (Clay and Johnson 1992; Migot-Adholla et al. 1991). Women had usufruct rights to land if they had young children (Randolph and Sanders 1992: 87). Most Rwandans retained strong connections to the traditional farming unit, *rugo* (*ingo*), which is the typical dwelling of most rural Rwandans. *Rugo*, or homestead, is an enclosure around the home, and the *umusozi*, or hill, is the next larger living unit after the *rugo* for the Banyarwanda (Prunier 1995).[18]

Also during the period in which these aquaculture projects were functioning, massive changes to the Rwandan landscape were occurring. Increasing population pressure (3.7% in the mid-1980s) and a continuation of land transfers and inheritance patterns resulted in an increased fragmentation of land holdings (Ndiaye and Sofranko 1994). Ndiaye and Sofranko (1994: 42) reported that farmers were especially keen on land reform, which meant an opening up of the government-owned marais for farming. Agricultural development of the marais (*bas-fond*, marshes, riparian areas, valley bottoms) occurred in response to the increasing demand for land, especially for new technologies such as aquaculture (Skladany and Engle 1990: 7).[19] An indication of the extreme pressure on the land was that by the mid-1980s, the rich valley bottoms were already double and triple cropped (Robins and Ndoreyaho 1988: 271).

The *marais* were the principal areas of fish farming in Rwanda. Water rights in the *marais* rested with the State, under Rwanda's ministry of agriculture, in a form of communal ownership administered by the top local official (usually the *bourgmestre*) and a local council. Fish farmers were allowed to lease marais land although typically they did not pay rent."Subletting" marais land—that is renting out land that was leased—was illegal, although it was common for farmers to exchange plots for labor or other items (Molnar et al. 1994: 8). As of 1992, Molnar et al. (1996: 26) reported that the leases were "relatively secure" but that houses were not permitted, thus ponds were usually located some distance from the *rugo* and in many cases had to be watched at night to prevent theft. In at least several cases in the late 1980s, highly valued marais land was leased ostensibly for fish production, but once the farmer had access to the land, she or he also had access to better garden plots. Long-term leases that ran along family lines also depended on the land being actively used. If a farmer was unable to use the marais, the lease might be revoked by the local government. In turn, some marais were put into fish production as a place holder—a way to demonstrate that the land was being used productively. Since fish farming on the scale practiced throughout Rwanda required moderate labor inputs except during stocking and harvesting, this type of activity was beneficial to the farmer in generating income and food, and in preserving access to land. Thus, while gender was an important factor in determining land tenure, it was not the only one. In Rwanda, a complex social system resulted in barriers to land and water access based on lineage, ethnic group, class, and scarcity.

Although there is only anecdotal information on women's water rights in fish farming, the fact that women increasingly took up fish farming through the late 1980s and early 1990s points to their relative sense of security. Why would anyone take up fish farming if she could not be assured that she could reap the benefits of her labor? Rwandan women probably felt a modicum of stability in leasing land for aquaculture, otherwise they would not have continued adopting the new technologies. They would have opted out of fish farming. This is not to say that they were offered equal terms with male tenants or that they did not fear repossession by a government official. But on whole they saw possibilities of economic gain in the undertaking. Indeed, Pottier (1989: 475) notes that with tightening government controls over agriculture in Rwanda, women were often more successful than men because women were the "invisible farmers" who had "ways of outwitting policy intervention"—especially bad policies.

However, women did encounter real problems with "officials" on issues of land tenure. Gender-driven jealousies and ignorance were frequent motives deterring the appropriation of unclaimed lands to women for aquaculture. In response to an unfair charge that their women's collective ponds were spreading malaria, the following statement by

one woman noted that her collective could "turn around" an unproductive pond: "[I]n our region, the population begged the sector councilor and *bourgmestre* to destroy our ponds pretending they are the ones [that] brought malaria. Our point was that empty ponds with stagnant water are the ones that cause malaria, and if nobody could take care of them, they should be given to us because we are capable of exploiting those decorative [sic] ponds" (CRSP Kigembe Focus Group March 1992).

Other possible motivations (e.g., gender stratification and stereotyping) may also have prevented women from owning ponds and thereby owning land. Indeed, in assigning a reason for Rwanda's land ownership patterns, USAID (1992: 3) states that:

> Rwanda has neither villages, nor their corresponding organizational structures, as are commonly found in Africa. Rwandans do not have the tradition of marketing and commerce as is seen throughout West Africa. Nearly all rural families live in self-contained farm compounds. The relentlessly hilly terrain has been a noted factor which induced this decentralized and self-reliant pattern. Isolationist tendencies encouraged families to be self-sufficient, and served to slow the integration of rural Rwandans into the monetized market economy. Not surprisingly, Rwandan social structures are based on the dominance of the family as a governing unit. Within the family unit, the precedence is patrilineal. Thus, if a farm's land is to be divided, it is allocated among the family's males.

Women tended to farm in collectives or groups rather than individually. This was partly due the difficulty of obtaining land and the preference given to collective farms rather than individual farms. As of 1992, Rwandan local governments favored leasing land to groups rather than to individual farmers, hence the growth of fish farming collectives (Molnar et al. 1996: 24).[20] Interestingly, farmer perceptions did not coincide with this information as many fish farmers did not necessarily think that group farming conferred easier access to land or credit (Molnar et al. 1994: 12). Due to the land tenure relationships described above, few women were individual farmers; those who were, were likely exercising their usufruct rights.

Women did not receive as much attention as did men from agronomists or extension agents, but nevertheless some felt that they were still very capable fish farmers (Randolph and Sanders 1992: 64; Molnar et al. 1991: 53).[21] Indeed, some women aggressively sought out information, in the face of resistance from the "authorities," to help them in their fish-farming enterprises. A women farmer from Bwakira commune told the group gathered at the 1992 CRSP Kigembe workshop:

> These authorities [local authorities including the *bourgmestre* to the more powerful administrative divisions] failed to support women, they even discouraged them. One women was forbidden to participate in a financial management training. Still she managed to go and when she came back she had an argument with a local authority who took her to trial for disobedience. The women had to seek help from her brother to get reconciliation with the authority. The woman had to remain submissive to all of the authority's orders. Another male member of an association [fish-farming collective] and inspector refused to record the fish production and preferred to go and drink with peasants in a tavern and make fun of the women members in his association. Those women had to take him to trial and he lost. The *bourgmestre* of Bwakira Commune does not care, he does not organize meetings of different associations, and those associations don't get help from projects which are supposed to assist them. Those associations are then isolated. Women in Bwakira Commune have not however given up. Even though they have to count on themselves they continue to fight.

The PPN, much more so than the CRSP, actively encouraged extension agents to visit women's ponds. A PPN expatriate researcher stated that "project extension agents (all male) were encouraged during their November 1985 review course to try to augment the number of women-owned fish ponds" (Veverica 1988: 18). The rationale was that since women fish farmers were more receptive to advice than were men, the agent would be more favorably evaluated by his supervisors as his rural pond "productivity" would be higher.

In addition, the PPN offered suggestions for improving outreach to women fish farmers, including holding meetings where women conventionally gathered at nutrition centers and health centers, and training more women extension agents (Veverica 1988: 18). It is unclear whether these suggestions were followed, as the PPN project ended soon after the recommendations were made, and the CRSP project was slow to pick up the thread. However, given that by 1994, there were more women extension agents and fish farmers than when the projects started, it is likely that the suggestions were heeded.

Besides the obvious problems that arose when women fish farmers were denied access to information through their extension agents, in Rwanda the extension service also played a role in whether women had access to land. Balakrishnan et al. (1993: 25) found that male extension agents, in their advisory capacities to the local authorities, could influence the parceling out of land and site selection in the marais. Indeed, in a review of the fish culture extension service, one of the chief impediments to the proper allocation of land was said to be "local jealousies" (Mpawenimana 1997: 25).

In Rwanda, the extension service was evolving at the same time that women were rapidly adopting fish culture and that fish-farming technologies were being produced with relevance to Rwanda's unique needs. Extension services in fish culture are rare everywhere in the world. That women were included at all in Rwanda's extension program was possibly afforded through the "opening" that occurred when extension underwent some transformations. In 1980, as a result of a review by FAO, Rwanda began to place some emphasis on training fish culture extension agents. The largest and purportedly the most successful step undertaken in this regard was the creation of the PPN. Thus, by the end of the PPN, and the inauguration of the fully nationalized (i.e., run by Rwandans) Service Pisciculture Nationale (SPN), Rwanda could be said to be one of the few countries with a fish culture extension service. However, by 1992 the fish culture extension service was again thought to be in serious trouble and new interventions (projects such as the Rwanda Natural Resources Management Project) began addressing ways to improve it (Molnar et al. 1994; Moehl 1992).

INSTITUTIONAL NETWORKS

The lack of overlap in the agendas of the many actors became a practical barrier to the development of sustainable institutional networks and to the creation of legislation on aquaculture. There was insufficient opportunity to enroll new actors and secure allies for change. Networks are typically reinforced by people's actions—through the action of translating knowledge, information, and capital, a network becomes strengthened (Latour 1987). At the highest levels of the institutional network of which these projects were part, there was mostly lip service paid to forging connections. For example, aquaculture's semantic shift in the USAID portfolio from agriculture to environment revealed a willingness to accept an old wine in a new bottle but not to make the systemic changes necessary for integrating aquaculture into the revised USAID agenda for economic development. To donor organizations and the GOR, the networks consisted mostly of linkages on

paper—as contracts and line items on budgets—and consequently did not attract the actions of self-interested individuals to keep the connections viable (Callon 1986). Thus, it was not surprising that few policy changes occurred at the level of the government or donor as a result of these projects.

The donor community was well entrenched and was in the position of offering the dominant view on development. Donors pointed to a specific, primarily Western agenda aimed at improving food security. Being highly dependent on foreign aid, the GOR acquiesced to donor objectives so that inputs of capital, food aid, and other goods kept flowing into Rwanda. In turn, donors perceived they were spending money on a country that appreciated them and their view of development; thus, a mutually reinforcing loop was created. However, no matter how much money was deployed or how many structural adjustments made, a significant barrier facing the country was that it had a poorly functioning economic and political system. And it was heavily dependent on foreign aid.

On the project level, expatriates and Rwandans interacted through their respective universities and ministries to weave together a network for aquaculture research and development. The expatriates and some Rwandans also had direct access to the donor, which in this case study was USAID. In turn, USAID operated from two principal activity centers: one in Rwanda at its Field Mission in Kigali, and the other in Washington, D.C.[22] Rwandans generally had indirect access to USAID Washington.[23] Core CRSP funding originated from USAID Washington, but the USAID Mission maintained in-country control over logistics required for carrying out the research. For example, denials of simple travel clearances by the USAID Mission would result in delays in the research schedule. Funding for the CRSP involved a number of constituencies beyond those listed here, but expatriates, and to a lesser extent Rwandan researcher counterparts, had some connection to USAID Washington primarily through the larger CRSP organization, of which the Rwanda Project was one part.

Funding for the PPN and NRMP was bilateral in that it was issued through the USAID Mission. The Mission tended to be more favorably disposed toward projects it had funded versus those funded by Washington. The tension between the two USAID activity centers also sometimes caused confusion in interpretation of the donor's agenda. Was aquaculture in or out? Did Washington's vision apply to the USAID Mission in Rwanda? Throughout the 1980s to the early 1990s, the dynamism between USAID Washington and its missions brought about confusion not only in goals, but in implementation and evaluation. Many USAID Missions in Africa were closed in the mid-1990s as decision making tended toward centralization in Washington, or to a regional office.

The following three examples of institutional networks pull together information from the previous sections of this chapter. In analyzing a network, the real actions occur in the details, where motivations are revealed, and adjustments and translations occur. Even seemingly simple networks, such as those the aquaculture projects were nested in, can be deceptively complex. Therefore, without first evaluating the motivations of the actors, and the actual state of aquaculture in Rwanda, understanding the networks would have been difficult.

WOMEN FISH FARMERS

The first network highlights an unanticipated by-product of the two development projects. Wherever individuals are engaged in a project with carefully stated objectives (such as the CRSP or PPN projects), it is not unusual for spin-off activities to become more

successful than the planned activities (see Veverica and Molnar 1997). What is key is that the individuals recognize the potential of the unanticipated activities and take steps toward their actualization. This is what happened with enrolling Rwandan women in aquaculture.

Largely through the efforts of two individuals—a Rwandan extension agent and her expatriate colleague—women became fast adopters of fish-farming technologies, and the external development community began to take notice. Studies were eventually sponsored by USAID to evaluate the distinct needs and barriers women faced in adopting new technologies. The expatriate researcher, working first with the PPN and then in 1987 with the CRSP, became an advocate for women fish farmers. The media, including *The New York Times*, fed into the network, thereby increasing the momentum already begun. The Rwandan fish culture extension agent, Pelagie Nyirahabimana, who was identified in these media articles as practically single-handedly bringing about a women's revolution in fish culture, later cycled into the U.S. university system to receive advanced degree training (Bryant 1994; Perlez 1989). Her degree was sponsored by USAID and would be taken at Auburn University, where the expatriate came from and where key U.S. project personnel were located. This cycling of people through familiar and trusted institutions is a cornerstone of many university development projects. What makes this case special was that a concept promoted by two project people in their "spare time" was able to enroll so many allies, including U.S. university administrators, the media, USAID, Rwanda's newly created Fish Culture Extension Service, and Rwandan women farmers.

The immediate implications of this revolution seemed positive by all accounts (Veverica 1997; Bryant 1994; Molnar et al. 1994; Perlez 1989). However, the true test of long-term success is whether any of these changes took root in Rwandan society. The stability of a network can in small measure be used to predict whether changes would be long-lasting. Early indications were that the network was growing, but that barriers and obstacles still threatened. It could not be said that women's social and economic position improved substantially as a result of their participation in fish farming. Rather, fish farming showed promise as one of a number of means for improving women's status over the long run. Consequences of changing women's roles in the household and community were not addressed, but, as was illustrated in the previous section on barriers to adoption, there was some evidence that conflicts were occurring. Unfortunately, with the war, an evaluation could not be made. There remains only anecdotal information that women as well as men were again attempting to grow fish in ponds after the initial massacres in 1994 had abated.

Although the network may not have survived intact in Rwanda, key actors, including the two women "ambassadors" of fish culture, are maintaining the network in a new form. Many development specialists note that women and men's behavior differs when it comes to allocating scarce household resources. In the few studies undertaken by these USAID projects, the allocation of fish harvested from ponds was found to differ less between men and women, and more among individual farmers (albeit mostly men) and collective farmers. However, men and women's farming practices did differ and thus advice and technologies needed to be tailored to be of value. Thus, one change that resulted from the firsthand experience with women farmers in the project network is that the overall research agenda for the CRSP (which continues to function in countries other than Rwanda) is now more aware of women's needs and responsive to their inclusion in the research agenda.

NATIONAL AQUACULTURE STRATEGY

The second network demonstrates how expatriate viewpoints became inserted into national policies for development. The U.S. project expatriates, along with consultants from FAO, catalyzed discussions on a national aquaculture plan. Although the plan was never officially implemented—it was still in the negotiation phases when the war broke out—donors and expatriates played a prominent role in shaping and promoting it to the GOR. While it is beyond the scope of this chapter to review the history and detail of the plan, this example provides a glimpse of how project networks played a fundamental role in policy formulation.

As early as 1983, U.S. expatriates of the PPN project attempted to increase awareness of the need for an aquaculture strategy.[24] FAO consultants and Auburn University faculty reviewed the PPN between 1984 and 1988 (see Miller 1988; Molnar and Nerrie 1987; Moss 1984). The reviewers reinforced the expatriates' viewpoints by recommending that the GOR look toward developing a comprehensive aquaculture plan. Institutional constraints were found to be as much as or more of an impediment to successful aquaculture development than the technological constraints the projects originally targeted.

The expatriates' initial motivation for the plan—to streamline governmental organizations responsible for aquaculture—came in response to frustrations they faced upon project implementation. Later their motivations became crystallized as a means to "avoid inefficient use of limited human, economic, and natural resources" (Moehl 1992: 28). Challenges facing aquaculture development were identified. Policy-oriented challenges were that extension and research efforts in Rwanda were poorly coordinated; the ministries and directorates responsible for aquaculture had ineffectual policies that restricted the development of "good" aquaculture practices; there was competition between aquaculture and other agricultural and fisheries practices; and there was interest in privatizing some parts of the government's aquaculture operations.

The plan remained in a conceptual phase for years, in spite of the number and strength of the external actors pushing for its approval. Then, beginning around 1990 the impetus for a national aquaculture policy gained momentum. Consultants hired by the NRMP (under contract with Auburn University) and FAO added new vigor to the effort. A frenzy of evaluative activity took place with many U.S. faculty and FAO consultants making short-term visits to Rwanda in 1991 and 1992. The FAO visits culminated in a series of reports and in a tentative outline for a plan. However, the FAO vision was not entirely shared by the NRMP aquaculture consultants, who preferred a partitioning of aquaculture from fisheries (Moehl 1992).

One area of the plan called for a prioritization of research needs in aquaculture. As of 1992, the CRSP expatriate researcher was already participating in a national aquaculture research committee to identify research constraints. The recently formed committee came about as a result of the externally driven discussions by FAO, NRMP, and CRSP on mechanisms to improve linkages between research and extension. The president of the research committee was the head of the Rwasave station, and expatriates were invited to participate as temporary members. With few highly trained Rwandan aquaculture researchers, there remained a perceived role for the expatriates. Not surprisingly, the process for identification of constraints shared characteristics of the process the CRSP was using for developing research work plans. Thus, although the committee's agenda could appear to be driven primarily by Rwandans, this was clearly not the case as there was obvious external input.

The available literature contains few references on GOR's viewpoints on the plans for aquaculture, so it appears as if they were in general agreement with what was being proposed by the donors. However, this may not have been what was actually occurring—and it may be why there was some reluctance to move quickly on approving a national aquaculture plan. The attempts of external actors to formalize legislation were probably stymied more by the Government's apathy than by direct resistance. As was previously shown, aquaculture was a relatively insignificant part of Rwanda's rural sector and contributed hardly at all to GDP.[25] In addition, civil unrest and border skirmishes were increasing problems from 1990 on. Thus, it is not surprising that GOR had more pressing matters on its agenda. The GOR was probably more concerned about not disappointing the donors—who were pushing for a strategy—than in the strategy itself. This was manifested in some examples of how the government gave "lip service" to the development of a plan.

In the early 1990s, Rwanda's various ministries involved in aquaculture included some references to the development of a fisheries and aquaculture plan.[26] One former project expatriate noted that "[a]dministration of aquaculture is complicated by its identification with capture fisheries, the latter often dominating policy and regulation" (Moehl 1992: 16). An example of this confusion resided in the very ministry that regulated most aquaculture activities in Rwanda. The 1991 work plan of the Rwandan ministry of agriculture provided mostly for fisheries policy development under the ministry's division of fish and aquaculture, but there was also provision for the "finalization of the fisheries/aquaculture development plan in collaboration with FAO" (Moehl 1992: 13). In response to the apparent lack of emphasis on aquaculture, one of the former PPN expatriates noted that the ministry was still not promoting the type of structural changes required to coordinate the present "ambiguous position" of aquaculture (Moehl 1992: 13). Another ministry (Ministère du Plan) did, however, begin to implement some aquaculture-related activities in its 20-year environmental strategy (SNER). The first 5-year action plan of SNER—previously discussed in the environment section of this chapter—had an objective of finalizing fisheries and aquaculture legislation. Once again, fisheries and aquaculture policies were combined. In yet another example, a presidentially appointed commission (Commission Nationale de l'Agriculture) recommended that low-technology ("classic") aquaculture be abandoned in favor of more economically viable practices. At the heart of this recommendation was the GORs interest in the best use of the valuable marais. In response to the recommendations in the commission's report entitled *Developpement des Ressources Halieutiques*, the former PPN expatriate who was acting as an NRMP consultant to USAID (under the Auburn University subcontract with DAI) noted that the Commission failed to consult SPN (fish culture extension) or University researchers (CRSP and others affiliated with Rwasave Station).

Thus, additional discussions were required before a national policy could be adopted. Perhaps the lack of attention to an aquaculture policy by the government reflected its apathy with the sector. When it came to project funding, however, GOR continued to show considerable interest in aquaculture. Thus, the dynamic was set up whereby the expatriates and donors had to make a direct connection between continued project funding and approval of a national plan. While there was no written evidence of tacit coercion, the impetus for the aquaculture policy was externally driven. As would be expected, the fisheries and aquaculture plans did not survive the war, and there is no indication that the new regime (government) has resumed any interest in them. However, the institutional network that was generating knowledge and information on the need for

an aquaculture policy remained fairly intact, as the key expatriates moved onto other aquaculture projects in East Africa and the key Rwandan Fish Culture Extension Service personnel went to Auburn University to receive advanced-degree training.

WATER QUALITY LABORATORY

The third network came about as a offshoot of the research efforts at the Rwasave Station. The CRSP set up a water chemistry laboratory to perform the standardized analyses required in the experimental protocols. However, the network that developed in response to the creation of this laboratory was wider than the project had originally envisioned. When the CRSP began, existing infrastructure was insufficient to perform the required water quality analyses, so funding and effort was put into an existing facility at Rwasave Station. What resulted was a fully operational water chemistry laboratory, which was lauded by FAO as one of the best in East Africa. The expatriate researchers engaged Rwandans in building a laboratory to specification and in training Rwandans in water chemistry analyses. Over time, a number of technicians were able to perform quality-controlled analyses with little or no supervision from the expatriate researcher.

Interest in the laboratory grew as environmental concerns continued to mount. Rwasave aquaculture technicians began to be contacted by groups outside the University to perform water analyses. The Rwandan ministry of agriculture and nongovernmental groups, such as World Wildlife Fund, were willing to pay to have water samples analyzed. By 1992, the laboratory was self-financing and even generated enough earnings for the technicians to be paid extra (as a second job or incentive pay after their CRSP work was completed). Financial success attracted the attention of the University. The University, and to some extent USAID, became more interested in Rwasave as a revenue center, not only for the income it was bringing in for water quality analyses, but because its reputation had begun to attract other donors who were interested in "leasing" the facilities for aquaculture research. With the increasing momentum, researchers and administrators began envisioning Rwasave's potential as a self-supporting research center for aquaculture in East Africa.

With the war, the ponds were again abandoned. However, there was some indication that the surviving technicians were trying to revive the station and grow fish. Equipment losses rendered the laboratory unusable, but in 1995, the University contacted the CRSP to inquire whether it was interested in renewing its connection at Rwasave. Thus, the network created around Rwasave had some lasting vestiges that survived even one of the most debilitating wars.

CONCLUSION

This case study transcended labels that might be affixed to such a political and economic system as was operating in Rwanda (i.e., dependency and core-periphery theories). The essence of this case study centered on some of the institutional networks that evolved in Rwanda around aquatic food resources and how these networks acted as microcosms of the larger system being played out on a national level. Also, occasionally the smaller institutional networks would bubble into national level networks where broad-based policies on aquaculture and fisheries were being formulated.

The changes these project networks brought about were not sweeping. Rather they were of the type that became narrowly embedded in Rwanda's cultural, economic, and

political structures. Through nearly 15 years of promotion by donors and expatriates, aquaculture, as a nontraditional farming technology, began to gain a fragile foothold in Rwanda. Women were offered new farming opportunities, water quality technicians were employed in a new, semiprivatized enterprise, and government agencies were beginning to mention aquaculture in their plans for national policy formulation (albeit if only to satisfy donor concerns). Rwandans even became more receptive to including fish in their diets as fish became more available (Egna 1993). These changes were small but not insignificant. If war had not erupted, there was ample indication that aquaculture was gaining the momentum it needed to enter mainstream Rwanda, after so many failed attempts over the years. The entry points were through informal channels—where people worked and were active in aquaculture networks (Veverica and Molnar 1997: 400).

This case study showed that institutional networks were not created through careful organizational preplanning, but arose organically. No single agent had control over the networks, as actors exerted influence on their particular levels of interaction. Some actors were able to move through several networks and "recreate" themselves at different times and at different points in any given network. What resulted was development by default rather than by design. In fact, few of the planned objectives of these projects were as successful as the unanticipated outcomes that were generated through the institutional networks.

In the networks from which these technology changes emerged, many dead ends were traveled before successful paths were found. The process whereby women became new technology adopters was complex and nonlinear, and involved trials and errors not immediately obvious to the casual observer (see Bella 1987). Actors were enrolled who lost interest, and new actors were enrolled whose interests were sustained. Often in development project evaluations, outcomes are presented in the framework of a dedicated process of development. Even in "lessons-learned" exposés, the complexity of the system is usually suppressed and a linear process of development emerges. A network analysis—with all its complexity—allows a more synoptic view of how technological changes come about.

A historical retracing of how changes became embedded in Rwanda's social organization provided only a partial view of what was occurring at any given time. Another perspective was evident by the actions of the individuals as they were moving through the networks (through participant observation). The networks in which the unanticipated project outcomes were incubating were fed by many actors, but key among them were the U.S. project expatriates. By following the expatriates through the networks, we can see a number of connections. The expatriates needed to be responsive to their "employers" (USAID and U.S. university project administrators) by attempting to carry out a planned research agenda. They faced a different reality in the field, where aquaculture was actually being practiced and had to be responsive to the needs of the people they met everyday. The needs and interests of these groups overlapped superficially, but the expatriates were able to act through a number of institutional networks to carry out their planned work and their "real" work.

The system that was created became self-perpetuating. Actors enrolled primarily through self-interest and through circumstantial interactions with key project personnel such as the expatriates. The expatriates promoted aquaculture actively by inviting farmers and government staff to workshops at the stations, by selling fish from the station, by participating in demonstration events (markets and fairs), by granting interviews to the media, and by participating in national strategy discussions. Aquaculture was also pro-

moted passively through farmer emulation (many farmers copied what they saw their neighbors doing), through the reputation of the water quality laboratory, and through nonproject publications and other public relations materials. Feedback loops from other promoters and adopters of aquaculture helped to reinforce the networks.

The expatriates, as noted previously, saw themselves at the crux of the networks. This case study reinforces that idea. One expatriate in particular appears in a pivotal role in all three institutional networks described in this case study. But the work involved in generating these outcomes was much more than one or even two individuals could do. In science, a "personality" often is credited with the development of a technology, even though the technology actually required the enrollment of many additional people and "things." In the case of aquaculture in Rwanda, normative questions emerge from the network analysis. Should one or two expatriates have been so influential in setting up aquaculture development in Rwanda? Should so much power have been concentrated in so few people? This case study did not expose the expatriates as having done anything wrong—in fact, the record shows that many of the recommendations of these well-meaning expatriates were effective. However, it does show how external actors can accumulate power and influence over development agendas.

ACKNOWLEDGMENTS

I am grateful to Candace Buzzard, Danielle Clair, and Marty Fitzpatrick for their critical review of the manuscript; to Ingvar Elle for mapmaking assistance; to Bijou for typing assistance; to Mary Lee Nolan for a review of an earlier draft of the manuscript; to Revathi Balakrishnan for sharing data from the Kigembe focus group; to Jean-Damascène Bucyanayandi, Anaclet Gatera, Nathanael Hishamunda, Joe Molnar, Joyce Newman, Eugene Rurangwa, Felicien Rwangano, Wayne Seim, Mike Skladany, Karen Veverica, and many others for their personal perspectives on aquaculture development issues in Rwanda; to the Management Office staff and friends of the Pond Dynamics/Aquaculture Collaborative Research Support Program; and last but not least, to the editors, Dennis Soden and Brent Steel. I dedicate this chapter to my Rwandan colleagues at the National University of Rwanda and the Fish Culture Extension Service who lost their lives during the war. This chapter presents views of the author and does not represent an official position of the PD/A CRSP or USAID.

ENDNOTES

1. For background information on the CRSP and PPN see Egna 1997, and Hishamunda and Moehl 1989, respectively.

2. Demographic, economic, and other statistics are mentioned in the past tense in this chapter because of the drastic upheavals that occurred in the past few years. The war in Rwanda that began in 1994 with the killing of Rwandan President Juvenal Habyarimana, and took nearly a million lives, created a very different Rwanda from the one described in this case study. Thus, the case study should be read as a slice of time before the outbreak of the devastating war. The fieldwork for these case studies was undertaken during a time of increasing political instability in Rwanda, from 1990 to 1994.

3. The literature could be somewhat self-serving on this point, as most reports were written by U.S. university researchers who were involved in these USAID aquaculture projects. Their state-

ments that fish culture was not well run before 1983 could be viewed as establishing a low baseline against which their project results could later be measured. Although this probably was not the case, little independent information exists to corroborate this point one way or another. Indeed, one problem with all the data reported on the status of aquaculture is subjective bias. Estimates were made by researchers and field workers with a stake in the results—and these vested interests may have resulted in unintentional errors.

4. The social environment, while not a focus of the present discussion, is of paramount importance in evaluating the overall impacts of aquaculture. The relations of production and distribution also affect the natural environment, as people in their social settings interact with the natural environment. Aquaculture systems can therefore be described not only in terms of biological or technological efficiencies, but in terms of equity. The remainder of the chapter focuses on social relationships in describing the organization of work carried out by these aquaculture projects.

5. Also, there was some evidence of interspecific breeding in fish ponds as researchers in Rwanda began to question the purity of the tilapia strain they were using in their experiments. *O. niloticus* and *O. macrochir* were thought to be producing a hybrid strain (Moehl 1992: 27).

6. Rwanda's "ministry of agriculture" refers to the Ministère de l'Agriculture et de l'Elevage (MINAGRI). Most fish culture activities, including the PPN, fell under the jurisdiction of MINAGRI. The exception was the area of scientific research, which encompassed the CRSP project at Rwasave as it was part of the National University of Rwanda. Research at Rwasave station fell under the Ministère de l'Enseignement Supérieur et de la Recherche Scientifique (MINESUPRES).

7. In 1983, which marks the year that these USAID projects initiated activities in Rwanda, the European Economic Commission was reconsidering its investments in agricultural development in Africa. Lipton (1983: 22) states that "it is increasingly agreed that food shortage (scarce calories), not food structure (e.g., too few proteins) [sic], is the main medium by which poverty causes malnutrition." That said, the subject of food quality versus quantity is still debated, as is evident in recent reports by the International Food Policy Research Institute (IFPRI), but the debate has extended to include a broader perspective of "hunger" (see Kates nd; Chen and Kates 1994; Barrett and Csete 1994; Levinson 1994). Another complicating factor is that hunger has been known to be both over- and underestimated for a number of reasons including the lack of transferability of standards developed for Western populations, the reliance on national and local statistics, and data synthesis errors. Also, caloric deficiencies are seen by some nutritionists as the first need that must be filled, for the body to be able to utilize or metabolize proteins. A final point in this debate is that protein deficiencies do not affect all people equally or to the same extent. Lactating women, children, pregnant women, and the elderly are especially vulnerable.

8. Rwandan vocabulary reflects an abundance of words (more than 25) that describe crises associated with lack of food (Gotanegre 1988: 195); thus, food shortages have been part of the cultural landscape for some time.

9. In 1983, when these USAID projects began work in Southern Rwanda, the prefecture of Butaré had high malnutrition among children especially from densely populated areas (350–870 inhabitants/km^2 in 1978) (Gotanegre 1988: 188).

10. The International Fund for Agricultural Development (IFAD) measure for food security took into account per capita daily calorie supply as a percentage of requirements, annual growth rate of per capita energy supply, food production index, self-sufficiency ratio, production variability, and consumption variability. The poverty index took into account per capita GNP, income gap ratio, per capita GNP annual growth rate, per capita GNP growth factor, percentage of rural population below the poverty line, and life expectancy at birth. Both indices are more relevant for rural areas and are a national average rather than an indication of well-being at the individual or household level.

11. Nevertheless, the expatriates were still paid more than their Rwandan counterparts, but substantially less than the "going rate" for aquaculture consultants. The salary level had to be sufficient to attract knowledgeable people, and provide for their families who relocated to Rwanda during the course of the projects.

12. Nutrition centers were promoted by the Government of Rwanda, possibly with some support from the donor community, to improve the nutritional status of Rwandans, but especially of women and children. In 1976 there were 62 units and in 1989 there were 214 units (Service d'Appui 1991: 36). An earlier version of the nutrition center quite possibly was the "homemaking center" concept, promulgated by the Belgians. The first of these homemaking centers was established in 1948 in Usumbura, Burundi, and the second in Butaré in 1949, with four Belgian social workers and a number of local monitors. The goals were to teach basic home economics skills, including food preparation, to women who had moved from rural traditional households to more urbanized ones. The Belgian administration noted that the success of the program was testimony to "the confidence of the women and their will to improve their status" (Belgian Congo 1960 v3: 48).

13. The literature frequently refers to "cash crops"—crops for the export market—as being desirable from a development point of view. Little and Horowitz (1987: 255) refute this assumption in the case of Rwanda, where farmers' income may have benefited more by producing for local markets rather than export markets.

14. Another relatively new farming activity for women was apiculture (beekeeping), which until very recently was considered men's work (Service d'Appui 1991: 51). As with aquaculture, groups of women began expressing interest in apiculture in the mid-1980s and 1990s. Whether this interest was due primarily to broad-based demographic and environmental changes occurring in the country or to the encouragement of donor projects is unknown.

15. Some reasons for women's lack of capital and credit: (1) The justice system was patrimonial and thus women were excluded from certain rights; (2) there were limits to rights of inheritance and thus women could not acquire more land and had little independence; (3) the perception that women did not have an entrepreneurial spirit; (4) insufficient technical knowledge; (5) because of the division of labor, women tended to be interested in things that the banks were not; (6) most needs were in the rural sector where most heads of family are men (Service d'Appui 1991: 64).

16. The GOR maintained the right of eminent domain, but in practice most land holdings were governed by a combination of traditional law and modern regulations (USAID 1992: 12).

17. A few aristocratic women—probably Tutsi before independence and well-connected Hutus afterward—may have had special privileges and greater independence in land ownership. The land tenure system in Rwanda is complex. In brief, *ubukonde* were pieces of land traditionally belonging to certain Northern Hutu lineages. The original land holders, usually powerful men (*abakonde*), leased land to clients/tenants (males), who would be known as *umugereerwa* (*abagererwa*), in a fashion similar to the *shabuja/umugaragu* relationship in the *ubuhake* contract, which mainly concerned cattle under Tutsi clientship (Prunier 1995: 371). Pottier (1993: 9) writes that the *ubukonde* custom, unlike *ubuhake*, was not abolished after independence and continued in the North, where many of the leaders in the struggle for independence came from. This land tenure system eventually led to fragmented land holdings, such that two-thirds of the population were excluded from agricultural development projects possibly because many development projects require a certain minimum land holding (Pottier 1993: 10). Little and Horowitz (1987: 255) note that a land settlement scheme called *paysannat*, which was promoted by Belgians, created a land use pattern whereby farmers would cultivate crops for export on their small farms and would be dependent on the government for inputs.

18. Prunier (1995: 3–4) notes: "The physical layout of the land, where most people live on *musozi* (hills), has determined a very precise and peculiar form of human occupation. First of all, the Rwandan peasant is a [man] of the *rugo*. The word has several meanings. In day-to-day affairs, it simply means the family enclosure or compound around which all life evolves. In a polygamous household each wife has her own *rugo*. But *rugo* is also, at a humbler level than *inzu* (lineage), the basic unit of life in Rwandans society. *Rugo* is the family. Every hill is dotted with dozens of *ingo*."

19. The marais were thought to be one of the last underutilized areas for farming in Rwanda. In 1987, the GOR reviewed land tenure arrangements and existing marais use. The review culminated in proposed legislation for promoting the best use of the valuable marais, to be administered under the ministry of agriculture. Adoption of the bill was pending when war broke out in 1994.

20. Fish farm tenancy as recorded in 1991 in the marais was 32% individual farms; 67% group farms; 1% institutional (e.g., prisons, schools) farms (Mpawenimana and Karamaga 1997: 14). In 1991, 978 individuals leased 1152 ponds; 1950 groups (composed of 12,933 individuals) leased the rest.

21. Rwandan women head-of-households (*chef de ménage*) received less attention than men head-of-households from extension agents and agronomists (Molnar et al. 1994). Women head-of-households were less educated (88% illiterate—men were 47% illiterate), older, and had smaller farm parcels than men head-of-households and were in generally a less favorable situation for taking risks (Service d'Appui 1991: 48). As of 1994, Rwanda had several women extension agents familiar with aquaculture.

22. The USAID organization involved in funding and logistics for these projects was more complex than the simple description of a Washington "core" and a Field Mission "periphery." The projects directly interacted with the USAID Mission in Kigali, and with the Office of Agriculture and Food Security in the Global Bureau's Division of Economic Growth in Washington, D.C. (note that restructuring of USAID over the years resulted in many name changes). Other levels of organization were also less directly involved (the Bureau for Africa in Washington, D.C., regional offices such as REDSO, and fiscal entities such as the Development Fund for Africa, and others).

23. On a national level, Rwanda's president, ambassador, and others had access to Washington, but these individuals were not active members of the network. The projects had attenuated familial connections to the President and the Ambassador, through one Rwandan CRSP researcher who later became a graduate student at Oregon State University.

24. In addition, in a separate network dominated by FAO, other aquaculture consultants continued to push for comprehensive fisheries and aquaculture development, an idea FAO had pursued since 1967 (Table 1). Also in the late 1980s donors began developing a strategy—Study for International Fisheries Research (SIFR)—to coordinate donor assistance in the fisheries and aquaculture sector (see World Bank 1992).

25. There was some evidence that Rwandan farmers in Butaré looked at fish culture as a reward the government could bestow upon them for following new agricultural policies on export crops (Pottier and Nkundabashaka 1992). During the 1980s and 1990s, the GOR was busy issuing and enforcing policies on its more important crops, such as bananas—and on export crops including coffee.

26. A number of ministries were involved in aquaculture. Among them were MINAGRI (Ministère de l'Agriculture et de l'Elevage), MINESUPRES (Ministère de l'Enseignement Supérieur et de la Recherche Scientifique), Ministère de Fonction Publique, and Ministère du Plan. Within each ministry there were a number of divisions and directorates that were responsible for certain aquaculture activities. This uncoordinated national bureaucracy governing aquaculture was really no different from the one in the United States, where three departments and a number of agencies have some responsibility over aquaculture (Egna 1997).

REFERENCES

Aquaculture for Local Community Development Programme (ALCOM). 1990. "Methods to Promote Acquaculture [sic] in Rural Development, Workshop in Chipata, Zambia, 10–14 July 1989." Harare, Zimbabwe: Swedish International Development Authority and FAO. 21 pp.

Balakrishnan, R., K.L. Veverica, and P. Nyirahabimana. 1993. "Rwanda Women in Aquaculture: Context, Contributions and Constraints." Corvallis: Office of Women in International Development, Oregon State University, 39 pp.

Barrett C.B. and J. Csete. 1994. "Conceptualizing Hunger in Contemporary African Policymaking: From Technical to Community-Based Approaches." *Agriculture and Human Values* 11(4): 38–46.

Baydas, M.M., D.H. Graham, and J. Bicamumpaka. 1995. "Input and Output Distribution Networks in the Agribusiness Sector in Rwanda: Markets or Pre-markets?" Washington, DC: Office of Sustainable Development, Bureau for Africa, USAID, 56 pp.

Belgian Congo and Ruanda-Urundi Information and Public Relations Office. 1960. *Ruanda-Urundi*, Vols. 1, 2, 3. Brussels, Belgium.

Bella, D.A. 1987. "Organizations and the Systemic Distortion of Information." *Journal of Professional Issues in Engineering* 113: 360–370.

Bryant, E. 1994. "Farming Fish." *African Farmer* July: 42–43.

Callon, M. 1986. "Some Elements of a Sociology of Translation: Domestication of Scallops and the Fishermen of St Brrieuc Bay." Pages 196–233 in J. Law, ed. *Power, Action, and Belief: A New Sociology of Knowledge?* Sociological Review Monograph 32. The Sociological Review. Boston: Routledge and Kegan Paul.

Chen, R.S. and R.W. Kates. 1994. "World Food Security: Prospects and Trends." *Food Policy* 19: 192–208.

Christensen, C. 1994. "Agricultural Research in Africa: A Review of USAID Strategies and Experience," SD Publication Series, Technical Paper No. 3. Washington, DC: Office of Sustainable Development, Bureau for Africa, US Agency for International Development, 55 pp.

Clay, D.C. and N.E. Johnson. 1992. "Size of Farm or Size of Family: Which Comes First?" *Population Studies* 46: 491–505.

Coche, A.G., ed. 1994. *Aquaculture Development and Research in Sub-Saharan Africa: National Reviews*. CIFA Technical Paper no. 23, Suppl. Rome: FAO, 397 pp.

Costa-Pierce, B.A., A.A. van Dam, O.V. Msiska, D.M. Jamu, R.P. Noble, and R.S.V. Pullin. 1992. "Aquaculture's Role in Africa." Letter to the Editor, International File, *Fish Farmer International*.

Cross, D. 1991. "FAO and Aquaculture: Ponds and Politics in Africa." *Ecologist* 21: 73–76.

CRSP Kigembe Focus Group. March 1992. Transcript. Unpublished.

Deutsch, W. G. and Mukakarera Colette. 1992. "Environmental Studies Related to Integrated Aquaculture and Water Quality in Rwanda, Central Africa." Report of research supported by a contract between Auburn University ICA and DAI, Inc., 48 pp.

De Vos, L., J. Snoeks, and D.T. van den Audenaerde. 1990. "The Effects of Tilapia Introductions in Lake Luhondo, Rwanda." *Environmental Biology of Fishes* 27: 303–308.

Diskin, P. 1994. "Understanding Linkages Among Food Availability, Access, Consumption, and Nutrition in Africa: Empirical Findings and Issues from the Literature." Department of Agricultural Economics and the Department of Economics, Michigan State University, East Lansing, Michigan (also published as a USAID Technical Paper by the Office of Analysis, Research and Technical Support, Bureau for Africa). 47 pp.

Dumont, H.J. 1986. "The Tanganyika Sardine in Lake Kivu: Another Ecodisaster for Africa?" *Environmental Conservation* 13(2): 143–148.

Egna, H.S. 1993. *Introduced Technologies and Changes in Food Consumption in Rwanda*. Proceedings of the Oregon Academy of Sciences, Vol. XXIX.

Egna, H.S. 1997. "History of the Pond Dynamics/Aquaculture Collaborative Research Support Program." Pp. 19–52 in H.S. Egna and C.E. Boyd, eds., *Dynamics of Pond Aquaculture*. Boca Raton, FL: CRC Press.

Engle, C.R., M. Brewster, and F. Hitayezu. 1993. "An Economic Analysis of Fish Production in a Subsistence Agricultural Economy: The Case of Rwanda." *Journal of Aquaculture in the Tropics* 8: 151–165.

Food and Agriculture Organization (FAO), United Nations. 1991a. "Programme de Cooperation Technique. Plan Directeur de developpement des Peches et de l'Aquaculture. Rwanda.

Peche et Aquaculture au Rwanda: Revue Sectorielle." TCP/RWA/0052, Document Technique No. 1 (prepared by MN Luginbuhl and JC Micha). 85 pp.

Food and Agriculture Organization (FAO), United Nations. 1991b. "Programme de Cooperation Technique. Plan Directeur de developpement des Peches et de l'Aquaculture. Rwanda. Contribution au Plan de Developpement des Peches et de l'Aquaculture." TCP/RWA/0052, Document Technique No. 2 (prepared by MN Luginbuhl and JC Micha). 63 pp.

Food and Agriculture Organization (FAO), United Nations. 1992. *The State of Food and Agriculture 1992*. Rome: FAO, 262 pp.

Food and Agriculture Organization (FAO), United Nations. 1995a. *Review of State of the World Fishery Resources: Aquaculture*. Inland Water Resources and Aquaculture Service, Fishery Resources Division. Fisheries Circular no. 886. Rome: FAO, 127 pp.

Food and Agriculture Organization (FAO), United Nations. 1995b. "Code of Conduct for Responsible Fisheries." Rome: FAO, 14 pp.

Ford, R.E. 1990. "The Dynamics of Human-Environment Interactions in the Tropical Montane Agrosystems of Rwanda: Implications for Economic Development and Environmental Stability." *Mountain Research and Development* 10(1): 43–63.

Gotanegre, J-F. 1988. "Contribution a la connaissance de la malnutrition au Rwanda." *Cahiers d'Outre-Mer* 41(162): 179–196.

Haralambous, S., ed. 1993. "The State of World Rural Poverty." Rome: International Fund for Agricultural Development (IFAD), 86 pp.

Harrison, E. 1991. "Aquaculture in Africa: Socioeconomic Dimensions. A Review of the Literature." School of African and Asian Studies, University of Sussex, England.

Hishamunda, N. and J. Moehl. 1989. "Rwanda National Fish Culture Project," International Center for Aquaculture Research and Development Series no. 34, Dept. of Fisheries and Allied Aquacultures, Auburn University, 19 pp.

Hishamunda, N., M. Thomas, D. Brown, C. Engle, and C. Jolly. nd. "Small-Scale Fish Farming in Rwanda: Economic Characteristics." Alabama: Auburn University, 57 pp.

Holmes, B. 1996. "The 'Blue' Revolution: Fish Farmers Drive Out Fishermen." *World Press Review* June: 18–19.

Jolly, C.M. 1992. "Fish Marketing in Rwanda." Report of Consultancy to Projet d'Amenagement des Ressources Naturelles Service Pisciculture Nationale of (sic) Rwanda, March 10–27, 1992. 87 pp.

Kates, R.W. nd. "Ending Hunger: Current Status and Future Prospects." Washington, DC: International Food Policy Research Institute, 12 pp.

Knausenberger, W.I., G.A. Booth, C.S. Bingham, and J.J. Gaudet, eds. 1996. "Environmental Guidelines for Small-Scale Activities in Africa: Environmentally Sound Design for Planning and Implementing Humanitarian and Development Activities." SD Publication Series. Technical Paper No. 18. Washington, DC: Office of Sustainable Development, Bureau for Africa, U.S. Agency for International Development, 202 pp.

Latour, B. 1987. *Science in Action: How to Follow Scientists and Engineers Through Society*. Cambridge, MA: Harvard University Press, 274 pp.

Laure, J. 1980. "Evolution des prix de detail des principaux aliments a Kigali (Rwanda) entre 1964 et 1978." *Cahiers ORSTOM*, XVII (1–2): 85–115.

Levinson, F.J. 1994. "Conceptualizing Hunger in Contemporary African Policymaking: A Response." *Agriculture and Human Values* 11(4): 47–49.

Lipton, M. 1983. "African Agricultural Development: The EEC's New Role." Bulletin 14(3), Institute of Development Studies, Sussex, England, pp. 21–31.

Little, P.D. and M.M. Horowitz. 1987. "Subsistence Crops Are Cash Crops: Some Comments with Reference to Eastern Africa." *Human Organization* 46(3): 254–258.

Lugan, B. 1985. "Famines et disettes au Rwanda." *Cahiers d'Outre-Mer* 38: 151–174.

Migot-Adholla, S., P. Hazell, B. Blarel, and F. Place. 1991. "Indigenous Land Rights Systems in Sub-Saharan Africa: A Constraint on Productivity?" *World Bank Economic Review* 5(1): 155–175.

Miller, J.W. 1988. "Technical Evaluation of the Rwanda/USAID National Fish Culture Project." USAID/Kigali, 58 pp.

Moehl, J.F. 1992. "Aquacultural Assessment and Planning in Rwanda." International Center for Aquaculture and Aquatic Environments, Department of Fisheries and Allied Aquacultures, Auburn University, Alabama, 50 pp.

Moehl, J.F. 1993. "Aquacultural Development in Rwanda: A Case Study of Resources, Institutions, and Technology." Auburn University Ph.D. Dissertation, Alabama, 321 pp.

Molnar, J.J. and B.L. Nerrie. 1987. "Rwanda Fish Culture Project: Technical, Social, and Institutional Issues Affecting Delivery of Fish Farming Extension Services." ICA Technical Paper, ICA, Auburn University, 33 pp.

Molnar, J.J., A. Rubagumya, and V. Adjavon. 1991. "The Sustainability of Aquaculture as a Farm Enterprise in Rwanda." *Journal of Applied Aquaculture* 1(2): 37–62.

Molnar, J.J., C.L. Cox, P. Nyirahabimana, and A. Rubagumya. 1994. "Socioeconomic Factors Affecting the Transfer and Sustainability of Aquacultural Technology in Rwanda." Research and Development Series No. 38, International Center for Aquaculture and Aquatic Environments, Alabama Agricultural Experiment Station, Auburn University, 16 pp.

Molnar, J.J., T.R. Hanson, L.L. Lovshin, and A.V. Circa. 1996. "A Global Experiment on Tilapia Aquaculture: Impacts of The Pond Dynamics/Aquaculture CRSP in Rwanda, Honduras, The Philippines, and Thailand." *NAGA* April: 12–17.

Moss, D.D. 1984. "Review of Rwanda Fish Culture Project." Report to the International Center for Aquaculture, Auburn University, Alabama, 21 pp.

Mpawenimana, P. 1997. Rwanda's Extension Service. Page 25 in K. Veverica, ed. *The Pond Dynamics/Aquaculture CRSP-Sponsored Proceedings of the Third Conference on the Culture of Tilapias at High Elevations in Africa.* Research and Development Series No. 41, International Center for Aquaculture and Aquatic Environments, Alabama Agricultural Experiment Station, Auburn University, 26 pp.

Mpawenimana, P. and C. Karamaga. 1997. "Rwanda Country Report: Historical Perspective and Start of the National Fish Culture Service." Pp. 11–14 in K. Veverica, ed. *The Pond Dynamics/Aquaculture CRSP-Sponsored Proceedings of the Third Conference on the Culture of Tilapias at High Elevations in Africa.* Research and Development Series No. 41, International Center for Aquaculture and Aquatic Environments, Alabama Agricultural Experiment Station, Auburn University, 26 pp.

Mukankomeje, R., P-D. Plisnier, J-P. Descy, and L. Massaut. 1993. "Lake Muzahi, Rwanda: Limnological Features and Phytoplankon Production." *Hydrobiologia* 257: 107–120.

Nash, C.E., C.R. Engle, and D. Crosetti, eds. 1987. *Women in Aquaculture.* Proceedings of the ADCP/NORAD Workshop, 13–16 April 1987. Rome: FAO.

Ndiaye, S.M. and A.J. Sofranko. 1994. "Farmers' Perceptions of Resource Problems and Adoption of Conservation Practices in a Densely Populated Area." *Agriculture, Ecosystems, and Environment* 48: 35–47.

Perlez, J. 1989. "Kigeme [sic] Journal: Why Worry About Crops When Fishing's Better!" *New York Times*, International Section, December 14, 1989.

Philippart, J-C. and J-C. Ruwet. 1982. "Ecology and Distribution of Tilapias." Pages 15–60 in R.S.V. Pullin and R.H. Lowe-McConnell, eds., *The Biology and Culture of Tilapias.* Manila: International Center for Living Aquatic Resources Management (ICLARM), 430 pp.

Pottier, J. 1989. "'Three's a crowd': Knowledge, Ignorance, and Power in the Context of Urban Agriculture in Rwanda." *Africa* 59(4): 461–477.

Pottier, J. 1993. "Taking Stock: Food Marketing Reform in Rwanda, 1982–1989." *African Affairs* 92: 5–30.

Pottier, J. and A. Nkundabashaka. 1992. "Intolerable Environments: Towards a Cultural Reading of Agrarian Practice and Policy in Rwanda." Pp. 146–168 in E. Croll and D. Parkin, eds. *Bush Base: Forest Farm.* New York: Routledge.

Prunier, G. 1995. *The Rwanda Crisis: History of a Genocide.* New York: Columbia University Press, 389 pp.

Pullin, R.S.V., H. Rosenthal, and J.L. Maclean. 1993. *Environment and Aquaculture in Developing Countries*. Manila: International Center for Living Aquatic Resources Management, 359 pp.

Randolph, S.L. and R. Sanders. 1992. "Female Farmers in the Rwandan Farming System: A Study of the Ruhengeri Prefecture." *Agriculture and Human Values* 9(1): 59–66.

Robins, E. and V. Ndoreyaho. 1988. "Agricultural Policy and Practice in Rwanda: A Response to Little and Horowitz." *Human Organization* 47(3): 270–273.

Schmidt, U.W. and M.M.J. Vincke. 1981. "Aquaculture Development in Rwanda." United Nations Development Programme ADCP/MR/81/12, Food and Agriculture Organization of the United Nations, 69 pp.

Service d'Appui a la Cooperation Canadienne. 1991. "Profil Socio-Economique de la Femme Rwandaise," final version. Kigali: Reseau des Femmes Oeuvrant pour le Developpement Rural, 102 pp.

Skladany, M. and C. Engle. 1990. "An Initial Study of the Socio-economic Impact of CRSP Aquaculture Technologies in Rwanda and Thailand." Report to the Pond Dynamics/Aquaculture CRSP, 33 pp.

Trewavas, E. 1982. "Tilapias: Taxonomy and Speciation." Pages 3–13 in R.S.V. Pullin and R.H. Lowe-McConnell, eds., *The Biology and Culture of Tilapias*. Manila: International Center for Living Aquatic Resources Management (ICLARM), 430 pp.

United States Agency for International Development (USAID). 1992. "Country Program Strategic Plan for Rwanda: Demographic, Political, and Economic Transformation to the 21st Century." Kigali, Rwanda, 57 pp.

United States Agency for International Development (USAID). 1996. "Making a Difference in Africa: A Report on USAID Assistance to Africa." Washington, DC: Office of Development Planning, Bureau for Africa, USAID, 23 pp.

University of Antwerp. nd. "Basic Needs, Income Distribution, and the Political Economy of Rwanda." University Faculties St. Ignatius, Center for Development Studies Paper v82/55, 51 pp.

Uwizeyimana, L. 1990. "Periodicite des crises alimentaires au Rwanda: Essai d'interpretation." Dept. of Geographie, Universite Nationale du Rwanda, Ruhengeri, 98 pp.

Veverica, K. 1988. "Rwanda Women in Aquaculture." *Women in Natural Resources* 10(2): 18.

Veverica K., ed. 1997. *The Pond Dynamics/Aquaculture CRSP-Sponsored Proceedings of the Third Conference on the Culture of Tilapias at High Elevations in Africa*. Research and Development Series No. 41, International Center for Aquaculture and Aquatic Environments, Alabama Agricultural Experiment Station, Auburn University, 26 pp.

Veverica, K.L. and J.J. Molnar. 1997. "Developing and Extending Aquaculture Technology for Producers." Pages 397–413 in H.S. Egna and C.E. Boyd, eds., *Dynamics of Pond Aquaculture*. Boca Raton, FL: CRC Press.

Weeks, P. 1992. "Fish and People: Aquaculture and the Social Sciences." *Society and Natural Resources* 5: 345–357.

World Bank. 1992. "A Study of International Fisheries Research." World Bank report No. 19, Policy and Research Series, Washington, DC, 103 pp.

World Bank. 1994. "Population and Development: Implications for the World Bank, the International Bank for Reconstruction and Development." Washington, DC: World Bank, 134 pp.

16

Ecotourism, Environmental Policy, and Development

Steven Parker
University of Nevada, Las Vegas, Las Vegas, Nevada

INTRODUCTION

The focus of this chapter will be an examination of tourism and ecotourism, as they are affected and directed by public policy. It will deal mostly with ecotourism, providing an overview of the ways in which governments attempt to guide (or in some cases merely react to) its development. The assessment of these governmental strategies will proceed by first examining four different types of tourism policy and then analyzing the nature of the political processes that create them.

The concept of ecotourism itself is scarcely a decade old but already enjoys a substantial consensus as to its nature. Ceballos-Lascurain (1996) defines it as "environmentally responsible travel and visitation to relatively undisturbed natural areas in order to enjoy and appreciate nature that promotes conservation, has low visitor impact and provides for beneficially active socio-economic involvement of local populations." From a public-policy perspective it is the last part of this definition that is the most important for it draws attention to the fact that increasingly governments and other public organizations are actively taking steps to create alternative economic value through conservation practices.

One example may suffice. Until the Monarch Butterfly Reserve was established in Mexico, the trees there could have economic value only when they were harvested. Creating the Reserve created a tourist destination and because of this change the trees were given an economic value only if they were not harvested (Boo 1990). In this way, economic and public policy innovation fosters conservation, as does the construction of ancillary facilities such as lodges (Bernstein 1995). Most writers in this field agree on the essential elements contained in this example. Thus, Chalker (1994) refers to ecotourism as using tourism to generate nature conservation through education, community development, and altered priorities. She also emphasizes the provision of employment and business opportunities for local residents.

As Hall (1994a) observes, the practice does not simply refer to visits to national parks and other scenic areas, but to a form of income and employment generation whose goal is conservation. Here lies the public-policy connection, since governments can use economic and regulatory tools to maintain biodiversity (Goodwin 1996). Valentine (1993) adds that ecotourism is tourism that is based in natural areas, ecologically sustainable, protective of the natural areas used, and subject to ongoing management. Of course, this management is usually provided by some governmental entity. Hall and Weiler (1992) also differentiate ecotourism from purely adventure tourism since (for the traveler) the former involves discovery, contact with nature, and a downplaying of thrill seeking and competition. Because of the nature-contact dimension, some scholars (Laarman and Perdue 1989a) also include science tourism as a subtype of ecotourism. Finally, Pearce (1992) distinguishes ecotourism from conventional mass tourism by asking several questions about it, such as: What is being developed? Where? Who are the developers? Who are the tourists and how are the impacts generated?

Numerous scholars have attempted to quantify and measure the ecotourism impact of such travel and we will now examine work done by several of them. Using a cost-benefit technique, Thresher (1981) calculated the value of a maned, male lion in Kenya's Amboseli National Park. Over the course of its life, its value for the three uses studied was as follows: as a tourist viewing resource it was worth $515,000 in foreign exchange receipts; as a resource for hunting its value was estimated at $8500, and as a commercial resource its skin would retail for approximately $1200. Similarly, McNeely (1988) estimated elephant value at $610,000 per year and a 1970's World Bank investment in Amboseli was expected to generate tourist revenues of $40 per hectare, while the same land would yield a mere 80 cents per hectare if it were turned over to agricultural use (Western and Wesley 1979). Of course, all of these financial returns are framed by public-policy choices. Navrud and Mungatana (1994) calculated the annual recreational value of wildlife viewing in Kenya's Lake Nakuru National Park to be worth somewhere between $7.5 and $15 million (USD). Analyses done in Costa Rica (Tobias and Mendelsohn 1991) indicate that the value per acre of the Monteverde Cloud Forest Reserve is approximately double the cost of buying adjacent land to make additions to it. In a related study, Laarman and Perdue (1989b) found that science tourism conducted through the Organization for Tropical Studies (a consortium of universities) generates 2–3% of Costa Rica's tourist income. Clearly ecotourism creates income for both the public and private sectors, and it is income that is dependent on conserving rather than depleting natural resources.

Two Canadian studies have also assessed these returns. In a study of the economic value of killer whales, Duffus and Dearden (1993) found that 10,000 whale watchers brought $4 million to the Vancouver economy, while Hvenegaard et al. (1989) calculated that bird watchers generated $3.2 million per year for businesses located near Point Pelee National Park. Similarly, Wearing and Pearson (1991) reported on the results of their study of the regional economic impact of Australia's New England/Dorrigo National Park: rain forest visitors spend $3.35 million annually. Of course, the "World Heritage Area" designation is of great importance and thus it came as no real surprise when Driml and Common (1995) reported on their economic analysis of the financial value of tourism at five such sites in Australia: the Great Barrier Reef, Wet Tropics, Kakadu, Ulum, and the Tasmanian Wilderness. Specifically, they concluded that in 1991 $1.37 billion was spent on visits to these five sites—not counting the cost of transportation. More than half of this sum was spent on accommodations and services purchased in adjacent regions.

They also observe that tourism supports hundreds of tour operators, with over 800 permits being issued to operations in these five areas. Interestingly, their management (government) budgets totaled only $48.7 million, or 3.5% of the total tourist-expenditure estimate.

Other treatments of economic impact may also be useful to the reader. Mathieson and Wall (1982) provide an excellent discussion of how to calculate multiplier effects when doing analyses like those reported above. Inskeep (1991) is also very helpful in this area. For a treatment of valuation methods for parks, in particular, see Cummings et al. (1986), while an excellent presentation of economic techniques for assessing biodiversity, in general, can be found in Pearce and Morgan (1994). Finally, the reader in search of information on business practices for ecotourism (what might be termed microlevel analysis) is referred to the annual sets of proceedings published by the Adventure Travel Society (1991, 1993). These volumes present papers and summaries of talks delivered at symposiums of industry representatives. Their emphasis is on ecotourism business planning, marketing, operations, and finance.

By this time a question should have occurred to the reader concerning the environmental impact of all of this economic activity. How much is too much and when does the resource that everyone is so anxious to see start to become endangered by overuse? This concern is frequently referred to as the "sustainability" or "carrying capacity" issue. It will be treated comprehensively below, but for now several examples will highlight the problem. Jacobson and Figueroa-Lopez (1994) studied Tortuguero National Park in Costa Rica and concluded that an inverse correlation existed between ecotourist numbers and green turtle nesting behavior. Similarly, in Madagascar ecotourist activity has interfered with both the activity and the habitat of the large primate they all come to see, the Indri (Stephenson 1993). In Ecuador's Galapagos Islands bird behavior changes as tourists approach (Burger and Gochfeld 1993) and in the St. Lawrence Beluga whales stay underwater longer and vary their groupings as a result of the pressure of ecotourism boats. Authorities in all of these countries have responded with attempts at regulation—a type of public policy.

REGULATORY POLICY

Typologies of public policy have been offered by numerous political scientists, with those of Lowi (1964), and Salisbury (1968) being perhaps the classic formulations. For our purposes a very comprehensive model of public policy was provided by Anderson (1994), who distinguished between distributive, regulatory, self-regulatory, and redistributive types. We will proceed by *examining* government tourism and ecotourism policy in each of these four areas.

Regulatory policy is undoubtedly the most easily understood of all government outputs since it involves the placement of restrictions and limits on the actions of individuals, groups, and businesses. For the tourism industry in general, governments play an important regulatory role, but it is even more significant in the case of ecotourism. Preserving the environment at the same time that you are inviting millions of people to visit your country requires the use of some very direct and forceful guidelines.

Some of these guidelines focus on host businesses while others target visitor behavior. Starting with the former, licensing is one of the most powerful controls available to governments. Virtually all tour operators from hoteliers to transport companies depend

upon government for licensure. Kenchington (1989) describes how the system for licensing naturalist guides works in Ecuador's Galapagos National Park and how it assists park rangers with the task of controlling and monitoring visitor movement. Wallace (1993b) has shown, however, how the granting of licenses has led to a politicized split between the islands' "naturalist" guides (who are frequently from the mainland and who are better educated and paid) and the "auxiliary guides." In terms of political tension, the same author also discusses the pressure on park authorities to grant more licenses and permits to boat operators to generate additional revenues for the Park. Nearly all applicants are successful and therein lies the problem of too many tourists in the Galapagos (Honey 1994).

Technically such boat operators are park concessionaires and Ceballos-Lascurain (1996) points out that governments can, and often do, impose conditions on such licensees in order to pursue other objectives such as increasing local employment or the sale of locally produced goods. Illustrating this approach, Pieters and Gevers (1995) point out that the government of Bonaire grants licenses and leases only to operators who already possess a demonstrated planning, investment, and delivery capability.

However, while the licensing mechanism is available, it is frequently difficult to utilize because destinations compete with one another for visitors and thus tourism firms seek to keep prices down by relying on externalities (Cater 1992). And because these firms generate revenues for the government, public officials are frequently unwilling to utilize their licensing powers to their fullest. Paraphrasing Ashton and Ashton (1995), we might thus say that licensing regulations can find themselves being sacrificed to the cause of economic development.

A second type of regulatory policy concerns land use; see Levy (1997) for an excellent discussion of the tool. The imposition of conditions guiding how real estate is developed can channel private investment decisions toward traditional mass tourism or toward ecotourism; the choice is up to government. Inskeep (1987) assesses how this type of policy affects development at three different levels: land-use planning, site planning, and architectural/engineering design. Regarding the type of microplanning involved in the second and third of these levels, Selengut (1995) discusses how the government of the Maldives has sought to keep the scale of development in check by requiring that no tourist building exceed treetop height and that 80% of any site must be left with natural vegetation. Andersen (1993) seconds this approach, suggesting that government controls can guide site planning, building design, and waste management as well as energy consumption. All such decisions can either help or hinder the ecotourism industry. Policy is not neutral.

The most extreme land-use policy, of course, would be no development/building at all. Kenchington (1989) shows how the application of this policy regarding accommodations for Galapagos visitors has limited tourist impact by restricting most people to boats. Until recently, these small-floating hotels kept the annual tourist numbers at a manageable level. Lest we forget about the political dimensions of such a policy, however, Getz and Jamal (1994) remind us that tourism land-use decisions depend on factors such as the relevant strength of the actors, the economic prospects of the project, the state of public opinion, and the power of the various stakeholders.

Finally, Shaw and Williams (1990) present the cautionary observation that it is in the area of local land-use planning and regulation that there is often the greatest potential for conflict between public policy and demands for tourist development. This is so because it is usually local councils and administrators who are responsible for dealing with

growth in this industry. This growth has frequently been too rapid (Finney and Watson 1975) and these are the officials who need to deal with the consequent environmental and social problems.

Closely related to the subject of accommodations for tourists is the subject of housing for employees of the tourism industry. According to Tong (1975), legal mechanisms exist in Hawaii by which government can require that employee housing be constructed before a hotel occupancy permit is issued. The state also requires that certain sites be subject to an historical survey before development can begin.

Thus far our treatment of regulatory policy has been confined to its application to ecotourism service providers, but there is also a whole second focus: the behavior of the visitors themselves. One subject given a great deal of attention in the literature of alternative tourism is that of the management of protected areas—preserves that can be visited but not disturbed (Ceballos-Lascurain 1991). Barborak (1995) provides an overview of the different types of institutional arrangements that may be used to manage such areas and government, of course, is a major player.

It is perhaps obvious that a great deal of tourist-focused regulation centers here and marine reserves provide a good example. White et al. (1994) compare the centralized enforcement of a total ban on fishing in non-traditional-use areas in Bali (by the Directorate of Nature Conservation) with the community-control approach used in the Solomon Islands. In the latter, it is the traditional chief and his village who are given responsibility for access and fishing decisions. Similarly, in the Sian Ka'an Biosphere Reserve on Mexico's Yucatan Peninsula it is a Council of Representatives (made up of people living in the Reserve) that makes the key management and regulatory decisions.

In any case, no matter how sophisticated or how simple each of these bodies may be, they are all governments and they all make decisions regulating what tourists can do when they are in these areas. Furthermore, Blangy and Todd (1993) and Blangy and Wood (1993) demonstrate how sets of guidelines jointly developed by public-land managers and others (environmental groups, ecotour operators, local communities, etc.) can augment, or in many cases actually exceed, government regulations.

Other prohibitions focus on specimen collection (Inskeep 1991), on illegal trade in historical objects and crafts, on unofficial archaeological research and the despoilation of sacred sites (Ceballos-Lascurain 1996), and on poaching. With regard to the latter, Larson (1993) has shown how Zimbabwe's Campfire Program (Communal Areas Management Program for Indigenous Resources) has given elephants an economic value. Economically dispossessed natives in the countryside are in charge of protecting the animals so that trophy fees can be returned to the villages. Because of this approach, poachers are shunned and punished because they deprive the tribe of income. In a similar vein, Sindiyo and Pertet (1984) have written that rhino sanctuaries in Kenya have returned fee monies to local inhabitants. They, in turn, set up antipoaching patrols to protect the economic resource (the rhino) that tourists come and pay money to see. As a result, breeding adults that were once poached nearly to extinction can now find one another.

As the number of ecotourists increases, however, carrying capacity limits may be reached and discussion regarding further regulation required. This was what occurred, as Coburn (1984) has shown, in the case of uncontrolled mountain trekking in Nepal. There the hordes of hikers generated a massive deforestation problem as they harvested firewood for cooking and warmth. However, once the area became a World Heritage Site in 1980, Sagarmatha was subjected to a governmental ban on firewood collection and a

requirement that expeditions carry kerosene. So effective has the recovery plan been that officials are now considering allowing the natives to resume firewood use by reinstating the *shinga naua*, a local institution by which villagers manage the firewood harvest themselves.

A third, and final, type of regulatory policy concerns neither the provider nor the tourist in isolation, but the whole society. Here we are referring, of course, to system-wide resource protection laws. An effective treatment of such statutes is provided by Miezkowski (1990) in his discussion of the U.S. Coastal Zone Management Act, which regulates land in fragile coastal areas and provides funds for the acquisition of endangered lands. Similarly, Romeril (1985b) assesses tourism in England's Channel Islands and how it is shaped by Britain's Planning Law—with its requirement that coasts must be kept in their natural state.

DISTRIBUTIVE POLICY

The second general type of public policy identified by Anderson (1994) is termed "distributive." By this he means those policies that involve the distribution of benefits to particular groups. Distributive policy is thus fundamentally promotional in nature and governments rely heavily upon it to stimulate the tourism and ecotounsm industries. As Hall (1994b) has shown, they do so because these industries are frequently controlled by local elites eager to better their own situations and also because a prospering tourism industry generates more government revenue and foreign exchange (de Kadt 1976; Inskeep 1991). For example, Milne (1992) has demonstrated that all Micronesian governments generate at least 7% of their resources from tourism, while in the Cook Islands the figure is as high as 25%.

According to Wilkinson (1989), government involvement also occurs because of a need to compensate for the absence of an experienced private tourism sector in many less-developed countries. The other side of this same coin is the need of developing countries for economic diversification, a strategy examined by Riley (1995) in his study of the Falkland Islands Development Corporation.

Since ecotourism is by definition rural in nature, the typology of funding and general support strategies developed by Hummelbrunner and Miglbauer (1994) is of particular relevance. According to their system, the nature of the promotional policy may be either endogenous (focusing on local resources), exogenous (focusing on the attraction of external investment), or combined. Numerous authors (Filani 1975; Chib 1980; Jenkins 1982a; Murphy 1985) have cited the need that the tourist industries of less-developed countries have for outside funding and Lindberg (1991) has provided a comprehensive listing of the incentives used. They include investment tax credits, accelerated depreciation, the leasing of property, subsidized utilities, and market support. Case studies of particular exogenous strategies are numerous. For example, Olindo (1991) has examined Kenya's Foreign Investment Act with its guarantee of the repatriation of capital and profits and found its effect to be problematical. According to Yacoumis (1990), Tahiti has been a successful tourist destination because of government support for airlines and Britton's (1982b) case study of Fiji demonstrates that country's tourism dependence on foreign multinational corporations.

The identities of the countries relying heavily on the exogenous strategy do not particularly matter; all will suffer from the same high degree of leakage of revenues back

to the developed countries where the investors are based. In fact, Lindberg (1991) estimates that 55 cents of every tourism dollar spent in developing countries finds its way back to the developed world. Estimates by Boo (1990) are similar.

To lessen this reverse flow of income, many countries rely on an endogenous or on a combined strategy to employ Hummelbrunner and Miglbauer's (1994) labels once again. A study of Bonaire by Pieters and Gevers (1995) outlines some of the financial incentives that government provides to local tourism investors. These include a total exemption from import duties for all construction and outfitting materials, an exemption from property taxes for up to 11 years, and a reduction of all income taxes for the same period. Bonaire similarly promotes local tourist businesses by banning certain types of competition, such as American-style fast food restaurants.

Most governments, however, pursue a "combined" strategy of exogenous and endogenous targeting. Ruschmann's (1992) study of 38 ecotourism projects in Brazil concluded that several were the proposals of multinational firms that had made their decisions because of the availability of government incentives. Similarly, the Olindo (1991) article cited earlier also discusses efforts by the Kenyan Tourist Development Corporation to finance domestic tour operators, travel agents, and hotel owners. It purchases shares of foreign-owned firms and sells them to Kenyans. According to Boo (1990), the government of Dominica does the same kind of thing through its Hotel Aids Ordinance Act. Hall's (1995c) study of Australia indicates that that country adds the sponsoring of research, on both mass and ecotourism projects, to its list of incentive strategies.

The fact that still other forms of governmental promotion are available was demonstrated by Greffe (1994) in his treatment of services to sustain and bolster rural tourism: assistance with the organization of particular events, support for cultural activities and crafts, the direct financing of rehabilitation operations, and the provision of technical assistance. With his study of art tourism in Santa Fe, New Mexico, Kimmel (1995) showed how public policies like special zoning, low-cost loans, and cluster building layout can be used to stimulate the art sector of local tourist destinations.

With so many different types of promotional incentives available we should perhaps be surprised at the findings of Weaver (1996) indicating that in the eyes of a surveyed sector of Canada's ecotourism industry the government is still not doing enough to help.

A last strategy involves marketing. Almost all nations engage in some form of supply-side work, promoting themselves as potential destinations for visitors from around the world. Fleming and Toepper (1990) have generated a methodology to assess the effectiveness of such promotional efforts in producing direct, indirect, and induced benefits.

SELF-REGULATORY POLICY

Having examined both regulatory and distributive policy, we will now proceed to a third type: self-regulatory. Anderson (1994) describes it as being similar to regulatory policy because it controls the behavior of certain groups. The key difference is that self-regulatory policies are pursued and implemented by the regulated group or nongovernmental organization (NGO) itself to advance its own agenda. In terms of the subject matter of this chapter, major players in this realm are the tourism and ecotourism operators.

As Wallace (1993b) puts it, the trend is heavily in this direction because developing

nations face so many financial and other burdens that they are frequently willing to simply turn regulatory operations over to the private sector. He uses the Galapagos Islands and Costa Rica to show how officials frequently substitute nongovernmental agencies as proxies for governmental resource managers. Moore (1998) also discusses this substitution effect in the Galapagos with his analysis of the pros and cons of using hired, commercial guides instead of park rangers.

Such governmental vacuums can be even greater in other countries. The Galapagos Archipelago is, at least, a national park. Elsewhere, the establishment of these reserves is frequently left up to private entrepreneurs and/or NGOs. For an example of the former, see Stonich et al. (1995), who discuss Half Moon Bay in Roatan, Honduras and the owner's creation of a private marine reserve. Regarding the latter, Rovinski's (1991) treatment of the Monteverde Cloud Forest Reserve emphasizes that it was originally a group of Quaker farmers, not the Costa Rican government, that established this world-famous site. It continues to be self-regulating to this day.

The same point is made indirectly by Fennell and Eagles (1990) with their ecotourism model based on Costa Rica. This conceptual framework focuses on the resource tour and finds that much of the control on visitation, fees, number of tour operators, and so forth comes from the private and nongovernmental sectors. They thus conclude that success with such regulation involves a complex interaction of public and private participants. For an excellent treatment of this interaction in Belize the reader is directed to a study by Horwich et al. (1993). Here we find that with sites such as the Community Baboon Reserve, it is the Belize Audubon Society whose activism substitutes for governmental leadership. Other case studies of NGO leadership and self-regulation are provided by Weaver (1995) in Montserrat, where the idea of creating national parks has been spearheaded by the Montserrat National Trust, and by Pajaro (1994) in the Philippines, where the Haribon Foundation, rather than the government, has led the way in educating natives about the damage to reefs caused by sodium cyanide fishing for the aquarium industry.

Another way in which the literature treats self-regulation in this field is through the discussion and assessment of environmental ethics. A scholarly overview of this subject is provided by Rolston (1988). One chapter of this excellent book is entitled "Environmental Policy—An Ethics of the Commons" and it lays out a set of environmental principles. These include several of particular relevance to the ecotourism industry and its internal controls on conduct: the optimization of natural stability, the avoidance of irreversible change, and the dictum that "species have no owners, the state is their recent trustee." This latter idea has particular relevance here since much of tourism's self-regulation is eventually codified. Going now from the general (environmental ethics) to the particular (ecotourism ethics), Wight (1993) presents nine ethics-based principles for this industry. At the top of the list is the precept that it should not degrade the resource. Millman (1989), on the other hand, is more concerned with equity among various groups involved in "green tourism" and to this end reports on a UK-based group known as CART—the Centre for the Advancement of Responsible Travel.

Even the ethics of the field's name have been examined (Wight 1994). Is it "ecotourism," or "ecosell" or "ecoexploitation"? Only the marketer knows for sure, since so much is left up to self-regulation in developing countries. Around the world, codes of ethics form one approach to self-regulation. Building on Leopold's (1949) famous statement that "a thing is right when it tends to preserve the integrity, stability and beauty of the biotic community", McAvoy (1990) examines principles for implementing environ-

mental ethics in the parks and recreation industry. These include education and the creation of environmental practice guidelines. Finally, for an overview of the extant literature on responsible tourism, the reader is referred to an excellent bibliographic essay by Lea (1993) in which he divides this body of work into three categories of ethics: development, tourism industry, and individual traveler ethics.

Thus far our discussion of self-regulation has dealt mainly with groups internal to tourist destination countries. However, we cannot leave this subject until we have included attention to the role of outside players based in the industrialized world—travel agencies, hotel chains, adventure outfitters, and so forth. There is a substantial body of literature (Hall 1994) that sees international tourism primarily as a form of neocolonialism in which powerful "first world" interests can use their economic power as leverage and essentially dictate the terms under which they will locate and operate in any particular country, i.e., self-regulation. An effective exploration of this interpretation can be found in Nash (1989), who, as an anthropologist, emphasizes the dangers that economic development can bring to indigenous cultures. He also shows how this loss of power to exogenous forces can be amplified by local "collaborators" who assist in codifying and legitimizing the outsiders' self-regulation.

Relying on the same logic, Richter (1983) claims that right-wing governments tend to be more open to neocolonialism than others because of their reliance on outside help for the maintenance of order and stability. Britton (1982a) also shows how local elites cooperate as the largely self-regulating industry sets its own rates and makes basic decisions concerning physical infrastructure, taxation, and employment. Since its scale of operation is generally very small, we might hypothesize that ecotourism will be less associated with such interpretations than its big brother, mass tourism—or, as Abbey (1968) has termed it, industrial tourism.

Because these economic and political decisions are not made at home, this view of the general tourism system is known as dependency theory (Mathews and Richter 1991). Among the more useful applications of dependency theory, the reader is referred to Burns' (1993) and Burns and Cleverdon's (1995) assessment of the Cook Islands plus Britton's (1982b) treatment of Fiji. The latter focuses on hotels, travel agencies, duty-free shopping, and airlines.

The question of whether such dependency affects a destination-nation's foreign policy has been examined by Francisco (1983), who analyzed U.N. General Assembly voting records to determine whether countries more heavily dependent on U.S.-based tourist interests also tended to side more frequently with the United States. His data showed that they did not and thus we may tentatively conclude that tourism self-regulation may have only a minimal impact on a nation's foreign policy.

REDISTRIBUTIVE POLICY

The fourth, and final, type of public policy discussed by Anderson (1994) is "redistributive." Such policies involve specific governmental programs to shift the distribution of wealth, income, and/or property within a society from one group to another. The shift may be class-based, between have's and have-not's; it may be regionally based, between one section of the country and another; or it may be ethnically and tribally based. Within the context of ecotourism this means a proactive government attempt to create tourism-

based income for certain local populations and thereby divert them from resource consumption and destruction.

Wealth and income are redistributed from urban to rural areas and from citizens of developed countries (ecotourists) to citizens of developing countries. When ecotourism is working well, it is creating jobs in selected areas at the same time that it is conserving natural resources. For example, an essay by Drake (1991) discussed how Costa Rica's Guanacaste National Park has created income-producing jobs for locals in park management. Natives live on the outer edges of the park where they farm. Involved, they help fight fires, stop poachers, and plant seeds. Local carpenters are also used for all construction.

In Thailand's Khao Yai National Park, as Brockehman and Dearden (1990) have shown, alternative economic activity has been generated via jobs for locals with nature-trekking companies—jobs such as porters, cooks, and guides. Income is thus redistributed from wealthy European hikers to poor subsistence framers. Furthermore, bonuses are frequently paid when large animals are spotted, thus creating a motivation to preserve both the animals and their habitat.

A comparable picture is painted by Norris (1992) in his discussion of the Belize government's creation of the Hol Chan Marine Reserve. The site selected was the small village of San Pedro because it would allow former fishermen to earn money by taking snorkelers and divers out to the barrier reef, sustaining the resource and shifting income from one region of the country to another at the same time. Although they may seem worlds apart, similar examples can be found in Long and Wall's (1995) treatment of *banjar* or neighborhood tourism in Bali and in Bryan's (1991) study of alternative hospitality in the American West. In the latter, the reader learns that working family farms, facing increasing financial exigency, have begun to supplement their incomes by offering ranch and farm stays to visitors.

As to the scale of the employment impact, Lindberg (1991) shows that while most ecotourism operators are small, some employ substantial numbers of people. For example, one outfitter in Nepal, the Tiger Mountain Group, employs 5000 people during peak season and in Latin America and Africa 63 privately owned nature reserves employ nearly 1300 people permanently and another 300 (+) on a seasonal basis. In Africa, Olindo (1991) has shown that not only jobs are used to transfer wealth, but outright grants and welfare payments—as in the case of room-tax sharing with the Masai tribes. He claims that the impact has been a decline in Serengeti poaching and a rise in the Masai standard of living.

The strategy may also have regional goals. For example, Urbanowicz (1989) describes Tongan government policy to build airstrips as a way to encourage tourist travel to outlying islands and thus presumably raise the standard of living on those islands served. Similarly, Farrell (1992) describes how Hawaii's state government decided during the 1970s to decentralize tourism development and redirect it from Oahu to Maui. The goal of these actions was a geographic redistribution of jobs and income.

Another form of income redistribution involves the limitation or prohibition of employment for foreign nationals and the reservation of it for natives. This was a conscious policy choice made by the government of the Solomon Islands (Rukia 1992) when it decided that professional staff members of the National Museum needed to be Islanders. Of course, we would hypothesize that a government's decision to help locals (rather than outsiders) through its preservation and tourism policies should result in more local support for the policy. Data appearing to support such a line of reasoning can be found

in Pizam's (1978) study of residents and entrepreneurs of Cape Cod, Massachusetts, as well as in Infield's (1988) analysis of attitudes in South Africa. The latter used a survey questionnaire to gather data on local reactions to a game reserve in Natal. After finding that the idea of the reserve was supported the most by those who benefited most directly from it, he concluded that the best way to preserve wildlife is through the creation of rural wealth. However, Brandon (1993) has argued that if the project is to succeed, this wealth must be widely distributed. Government programs need to identify the real community leaders and use them to involve a broad spectrum of the local population. She also discusses two other useful participation strategies: the creation of stakeholders and empowerment. As examples, she shows how the Annapurna Conservation Area in Nepal has used the strategies well while the NGO administering the Monarch Butterfly Overwintering Reserves in Mexico has been less successful.

Several other works have examined the nature of local participation in tourism and ecotourism decision making. According to Murphy (1985), it generally tends to be highly issue-oriented, but also very limited in scope since destination communities frequently lack a tradition of representative democracy. Traditions, instead, tend toward elitism. Other assessments of this issue can be found in the writings of Paul (1987) and Nelson (1994). The former examines overall community participation in development projects and presents a model with four levels: information sharing, consultation, decision making, and the initiation of action. Nelson, on the other hand, focuses exclusively on the third of these as applied to environmental conservation. His nonhierarchical "civics model" of decision making—planning, assessing, implementing, and so forth—is the result.

The literature reviewed thus far has been largely positive and optimistic about the ability of ecotourism programs to redistribute wealth, jobs, and income. Many writers, however, are not nearly as sanguine as these. Arguments presented by Wells and Brandon (1993) and by Southgate and Clark (1993) highlight several basic problems. To begin with there is the fact that the redistributed benefits tend to be too limited. There is too little for too many people and thus natives have generally been unwilling to change their consumption practices. Furthermore, even when adequate benefits are provided they generally are channeled through local county commissions, councils of chiefs and/or elders, and so forth. The result of this focus on the elite is that the grass roots go unrewarded; and because they are not rewarded, they do not change their behavior.

Numerous case studies of this dysfunctional syndrome are available. Hall (1994a) finds that across the southwest Pacific, nature-tour operators have paid insufficient attention to the needs of indigenous peoples. Myers (1975) examines a similar problem in Kenya and suggests that the benefits of tourism are probably too diffuse to meet the needs of a largely agricultural people.

The picture may be no better in Costa Rica where two different studies of Tortuguero National Park, host to visitors using walkways and canoes to view green turtle rookeries, paint a rather bleak picture. Lee and Snepenger (1992) apply an ecotourism assessment methodology—questionnaires, observation, and data on prices, fees, and so forth—to nearby villages and conclude that locals have failed to receive any enhanced community services, such as clinics and schools, because of the establishment of the park. Not only have services been lacking, but as Place (1991) points out, government policy has failed to provide local investment opportunities. The problem is that once Tortuguero was "discovered" the intensity of outside investment did not allow villagers the time to accumulate enough wealth to invest in ecotourism facilities of their own. In

the absence of truly proactive, redistributive government policy, they were thus doomed to menial rather than entrepreneurial or managerial opportunities.

Menial roles are also the rule in Papua New Guinea where May (1975) has analyzed the effect of tourism on art. Government policy concerning cultural property preservation regulates the sale by ex-patriates of "real" artifacts—defined as works produced before 1961. Thus, the very lucrative trade in "pseudotraditional art" can be dominated by outsiders who choose not to reinvest their profits in local villages. Again, redistribution policy fails, but as Hall (1992a) has shown with his study of Maori culture and heritage tourism in New Zealand, it is perhaps a wonder that we should ever have expected it to succeed at all. It is a question of philosophy and worldview. The Maori take little part in the management of parks because of their beliefs about the nature of the world and man's inability to have authority or control over it. European decision-making processes seem largely irrelevant to them.

THE POLICY PROCESS

Having examined the different types of tourism and ecotourism policy, we will now turn our attention to the process by which such policies are made. Anderson (1994) breaks the general process into a number of steps or stages including policy formation, policy adoption, and policy implementation. By examining these three steps, we can develop a better understanding of how and why tourism policy takes the shape that it does. Central to the first step, policy formation, is identification of the problem in need of solution. With tourism and ecotourism there can be no question that the central problem facing decision makers is sustainability. Definitions of the concept (Costanza 1991; Eber 1993) refer to the amount of use of a resource that can be continued indefinitely before it becomes degraded. According to the Brundtland Commission report (WCED 1987), development is sustainable if it meets the needs of both present and future generations—the principles of both intragenerational and intergenerational equity (Cater and Lowman 1994).

The formulation of the policy problem in this way had its origins in the work of Dasmann et al. (1973), which discussed such things as the importance of preserving essential ecological processes, human heritage, and biodiversity. Comprehensive or holistic planning would make this possible. Three years later, one of the most truly seminal pieces in all the vast body of ecotourism literature was published. In it Budowski (1976) argued that three different relationships can exist between tourism policy and conservation policy. There can be conflict, coexistence, or symbiosis. In the latter, both tourism and conservation are organized in such a way that each benefits. This became the policy goal of ecotourism and in all of the hundreds of books, articles, and reports reviewed for this chapter none was cited more frequently than Budowski's.

In fact, only Butler's (1980) model of the tourist area cycle of evolution—exploration, involvement, development, consolidation, stagnation, decline, and renewal—seems to have been so widely influential. Butler's point, however, especially as it is presented in subsequent writings (Butler 1990, 1991, 1992), is that ecotourism seems unlikely to ever result in true resource sustainability. Butler is not alone in his skeptical assessment of this subject (McKercher 1993b; Muller 1994; Robineau 1975; Smith 1992; Wheeler 1993; Zerner 1994).

The editors of the *Journal of Sustainable Tourism* see the issue differently and in

their introductory essay for the first issue of this journal, Bramwell and Lane (1993) argue that sustainability is an empirical and policy/managerial question. The subject is growing in terms of both content and geographic spread and it needs a strong theoretical base as well as a reliable source of empirical data. They set forth the provision of these as a raison d'être for this journal.

Ultimately, a key factor in determining whether sustainability will ever be reached in a particular country is that country's degree of commitment to planning, a major element of the policy formation stage. Both the academics and the practitioners who write on the subjects of tourism and ecotourism have put forward numerous planning models. There is the international tourism model (Culpan 1987) with its components of demand, marketing, transportation, and accommodations. There is the environmentally based tourism development planning model (Dowling 1993), which proceeds by identifying significant features, critical areas, and compatible activities.

There is the model advanced by Boo (1993), as ecotourism officer of the World Wildlife Fund. In it, she emphasizes three elements to the planning strategy: determining the current tourism situation, determining a desirable tourism situation, and writing the ecotourism strategy document. For each of these elements, there must be cooperation between the government ministries of tourism, agriculture, finance, and environment (Boo 1991). At a considerably less abstract level, Bell (1987) has written with particular attention to Africa that master planning must include data and projections on subjects such as permissible numbers of settlements, permissible types and modes of wildlife use, and permissible changes in biological resources. Planning can also target the seasonality problem by spreading tourist demand through the use of discounted prices (Inskeep 1987).

Several discussions of particular planning operations are worthy of note. Sykes (1996) examines preparations for low-impact tourism in Venezuela. Burnett and Uysal (1991) include a treatment of the planning for such infrastructure elements as airport construction, ferry service, and harbor renewal in their examination of tourism in Dominica. Planning for the Ruta Maya in the Yucatan is covered by Keenan (1989) and by Southworth (1989), while groundwork for Costa Rica's Central American Nature Tourism and Science Network, featuring mega-tourism complexes serving as hubs for smaller ecotourism operations, is examined by Hawkins (1995). Planning activity to facilitate cooperation between the public and private sectors is the subject of works by Inskeep (1987) and by Poetschke (1995).

Anderson's (1994) second stage in the policy process is known as policy adoption; it is the stage at which specific decisions are made regarding actions to solve the policy problem. In the current context, this would mean the passage of laws and regulations that foster sustainability, and the literature provides many examples. According to Steele (1995), ecotourism will become sustainable only when governing bodies decide to limit open access to sensitive sites. When this is done, an "owner" must be selected. He presents three case studies of this:

State ownership—Koh Phi Phi National Park of Phuket, Thailand
Community ownership—Annapurna, Nepal
Private ownership—the Monteverde Cloud Forest Reserve in Costa Rica

In all the three, sustainability was found to be a meaningful goal only when policy officially gave resource responsibility to a designated agency or organization. For a more specific taxonomy of ownership—eight categories instead of three—see Barborak (1995).

Once responsibility has been assigned, McIntyre (1993) believes that the government's role includes the establishment of environmental regulations, land-use planning, and the development of design and construction standards. Clark (1991) is more specific, cataloging the adoption of measures such as user fees, quotas, access restrictions, and activity restrictions. He points out that in most countries, only protected-areas legislation can authorize such limitations. In his case study of Berwick, England, Lane (1994) adds the caveat that the adoption of such policies must involve broad consultations with all affected groups.

Undoubtedly, one of the most effective policy options available to governments today concerns the establishment of national parks and preserves (Miezkowski 1990). Two economists, Dixon and Sherman (1991), have provided an examination of why this is so, and their logic is as follows: It is difficult for producers or consumers to adequately assess the benefits flowing from protected areas, while for the private sector, the costs of protection are prohibitive. Traditional markets thus cannot put a practical value on the maintenance of biodiversity. Because of this market failure public investment in protection is usually necessary.

The adoption of policies to provide this protection focuses on three levels: system planning, master planning, and site planning (Miezkowski 1990). Regarding levels two and three, Child (1985) points out that the government may, as it has done in Zimbabwe, establish different classes of protected areas ranging from parks and sanctuaries, through recreation areas. Cook (1988) suggests that it may be more useful to conceive of these natural areas in terms of a continuum. Furthermore, public policy decisions can affect infrastructure questions like roads and visitor centers, the selection and training of guides as well as physical security for park visitors (Abaia 1987). Government may also adopt a policy maintaining that certain functions within a park are better handled by the private sector, through mechanisms such as the granting of concessions (Buckley and Pannell 1990; Fowkes and Fowkes 1991; Parker 1998; Sax 1980).

While most of these approaches to sustainability through the creation of protected areas are laudable, they are not without problems. Obstacles to both adoption and management (Hough 1988) include lack of trust, difficulties in communication, and the existence of power differentials. In addition, there are basic problems related to political opposition to such areas, particularly because so many different actors are involved: developers, land speculators, land owners, environmentalists, local governments, and so forth (Beatley 1994). Several of the more insightful analyses of opposition to the establishment and/or effective management of public areas include the following: opposition from the fisheries industry in the Solomon Islands (Hughes 1992); opposition from dive operators to the imposition of a permit and fee system in the Bonaire Marine Park (Dixon et al. 1993); opposition from the tourism industry in general to park entrance fees in the Hol Chan Marine Reserve in Belize (Lindberg and Enriquez 1994); opposition from the gold mining and agriculture industries in Costa Rica and Mexico (Boo 1990); opposition from oil interests in Ecuador (Colvin 1994); opposition from the fishing industry in St. Lucia (Smith 1994); and opposition from the forestry industry in the United Kingdom (Leslie 1986) and in the United States (Fox 1981). Perhaps more serious than such group threats is the all-too-frequent situation in which the government itself adopts a policy of maximum economic return from its national parks as a means of generating foreign exchange (Ceballos-Lascurain, 1991). When this occurs, the goal of sustainability may be too easily sacrificed. For this and other reasons, private reserves are becoming more and more important (Langholz 1996).

On the subject of dealing with such problems and opposition, several authors have written on the central role to be played by coalition building. Munro (1995) suggests the creation of protected-area councils that draw their members from among those groups with the most to gain, while Lusigi (1995) casts a broader net: work toward adoption of conservation policies within the agriculture, livestock, and forestry industries by stressing the common denominator of the "origins of life" that are held sacred in many societies. Finally, Hale and Lemay (1994) examine collaborative alliance building in Phuket, Thailand. There, the cooperative relationship between tourism providers, government agencies, and several newspapers was so effective that it came to be known as the "coral constituency."

If internal opposition to park creation proves too strong, help may also be available internationally through the relatively new and innovative financing mechanism known as the "debt-for-nature swap" (Miezkowski 1990; Visser and Mendoza 1994). Once the legislative or executive branches of the government have adopted a policy permitting it, this practice reduces the debts owed to lenders based in industrialized countries, in exchange for the conservation of natural resources. For example, the Bolivian government worked with the group Conservation International and secured the cancellation of a $650,000 debt in exchange for making a 1.4-million-hectare addition to the Beni Biological Reserve (Cartwright 1989). One of the main terms of this agreement was the government's promise to provide legislative protection for the addition.

The final step that we will use from Anderson's (1994) process model is policy implementation, and here, the main focus is upon the administration and management of the policy's actual programs. This is the phase in which policy actually "goes to work," and in the areas that we have been discussing resource management is often a public-sector responsibility (Hvenegaard 1994). The subject of the management of sustainable tourism by government is a central concern of a monograph by McIntyre (1993). In it, he examines the development of major infrastructure, the administration of land use, and environmental protection regulations as well as the education and training of a workforce for the industry as examples.

This chapter will focus on three major tools of implementation and administration: calculating the carrying capacity of an ecotourism resource, zoning, and enforcement. Above we noted that tourism sustainability is a public policy goal in many nations. The most useful management tool for the implementation of this goal is the assessment and monitoring of carrying capacity. This concept refers to the amount of use a resource can absorb or withstand before it starts to deteriorate, or as Clark (1991) has said, it is an informed judgment about limits, based on the amount of change a resource-management agency is willing to accept. Obviously it makes a great deal of difference whether 50 or 500 scuba divers per day visit the Cozumel reef known as Punta Sur. However, the biophysical is not the only finite resource and thus a consensus has emerged in the literature concerning a site's three types of carrying capacity: ecological, tourist-social, and host-social (Ceballos-Lascurain 1996; Lindberg 1991; World Tourism Organization 1983, 1989). We will examine each of these separately.

Ecological carrying capacity is the ability of an ecosystem to support healthy organisms while maintaining its productivity, adaptability, and capability of renewal. It is a threshold beyond which tourist load cannot go without damaging the resource (Miezkowski 1995). Green and Hunter (1992) provide a useful listing of potential impacts of tourism on the environment, as does Romeril (1985a). Drawing on his knowledge of Kenya's Amboseli National Park, Western (1986) asserts that carrying capacity is not

fixed, but variable, and that it is affected by six factors: policy, resource capability, visitor behavior, environmental impact, management, and certain externalities. Shaw and Williams (1994) include an excellent example of this last factor in their tourism textbook, i.e., the lowering of the water table within a Spanish national park (Coto Donana) owing to excess demand by private tourism development outside the park's boundaries.

Several different tools or techniques exist for the actual measurement of environmental carrying capacity. The methodology, known as visitor impact management (VIM), is described by Ceballos-Lascurain (1996), while Getz (1983) provides an overview of the systems approach. However, the best-known and most widely used methodology is the limits of acceptable change (LAC) model. A dynamic approach, it rejects fixed quotas like those used in the Falkland Islands (Riley 1995) and instead sets limits based on the ongoing monitoring of the condition of specific biophysical indicators (Dahl 1981; Hill 1992; Manning 1996; Wallace 1993b).

The second type of carrying capacity mentioned above was termed "tourist-social." It is the number of people that a site can hold before the visitors themselves become dissatisfied by the crowding (McIntyre and Boag 1995). Not surprisingly, Abaia (1987) has found that as this threshold is approached, the visitor's willingness to pay declines.

The third type of carrying capacity is known as "host-social" and it focuses on what tourism's presence does to the indigenous population. Again, there is a certain threshold beyond which dynamics such as resentment—something that Romeril (1989) terms the "xenophobia factor"—inflation, and a general, cultural degradation begin to set in. As Patterson has said, "Tourism is like fire. It can cook your food or burn your house down" (Fox 1975). Most of this literature tends to focus on the "burning down," not on the "cooking," because the industry is organized for the tourist, not for the host country (Hiller 1975). Perhaps the best single overview of these impacts can be found in Craik (1995), who presents a framework or checklist of effects.

On the other hand, case studies and analyses of individual, usually negative, effects are legion. A sampling of this literature shows how tourism causes: inflation (Fukunaga 1975; Kent 1975); resettlement (Holland 1993; Homewood and Rodgers 1987; Lanfant and Graburn 1992; Teye 1987; Turton 1987); the substitution of new elites for traditional leaders (Hall 1994a); a generalized decline (Dearden 1989); increased social differentiation and stratification (Eadington and Smith 1992; Hitchcock and Brandenburgh 1990; Stonich et al. 1995); "staged authenticity" (Cohen 1988, 1989; Greenwood 1989; MacCannell 1973); oversimplification (Boniface and Fowler 1993); alienation (Nash 1989); the ills associated with the "demonstration effect" (Jafari 1974; Kloke 1975); and cultural dependency (Erisman 1983).

On the other side, there is by comparison a miniscule literature assessing positive social effects of tourism and ecotourism. There has been adaptation and reciprocity in Nepal (Adams 1992); a renaissance of Eskimo culture (Smith 1989); a restoration of infrastructure in the Yellowstone area in the United States (Glick 1991); and an "incubator effect" elsewhere (Hawkins 1995). This incubator effect focuses on microloans and assistance to individuals—phenomena much more likely to be found in the context of ecotourism than with mass tourism. In fact, the argument is frequently made that because of its far smaller scale ecotourism's social impacts should be more benign. In any case, the nature of these impacts and the decisions about how to manage them are ordinarily questions of public policy.

In addition to the calculation and monitoring of carrying capacity, the implementation phase of ecotourism's policy process includes the use of protected-area zoning as a

management tool. Its purpose is to limit visitor impact by controlling access to, and use of, different parts of the resource. Some areas will be completely off-limits, while others provide for intensive use. Ceballos-Lascurain (1996) sets out a system of sample zones: strict protection, wilderness, moderate tourism use, and development zones. Buffer zones (Wells and Brandon 1993) may also be created to protect the core biosphere.

Numerous case studies and individual descriptions of this tool can be found in the ecotourism literature. In two different articles Salm (1982, 1985) discusses the creation and zoning of the Seribu Islands National Marine Park in Indonesia, something that was done by the government's Ministry of Agriculture. The plan excludes tourists from several different sanctuary areas and carefully regulates their activities in others. For other case-study material on the managerial use of protected-area zoning, the reader is referred to Kenchington (1989) on the Galapagos, Keenan (1989) on the Yucatan's proposed Ruta Maya, and Lindberg and Enriquez (1994) on Belize.

If an area is zoned and access thereby controlled, then user fees can be charged, a device strongly recommended by Valentine (1992). As Lindberg (1991) has pointed out, these fees are based on the concept of scarcity rent and may be of several types: i.e., entrance fees, use fees, licenses, permits, sales and concession fees. Different methods of collection are also available: direct, on-site collection; indirect collection through tour operators; and indirect collection through other sectors of the tourism industry (Lindberg and Huber 1993). As with other devices surveyed in this chapter, numerous case studies of the setting and utilization of these fees are available. There is the Tisdell (1996) treatment of the Xishuaungbanna State Nature Reserve in China. Maille and Mendelsohn (1993) present a mathematical analysis for deciding how high fees should be for a protected area in Madagascar. There are also analyses from the Galapagos Islands (Edwards 1991) and from Costa Rica (Lee and Snepenger 1992).

The third, and final, element in the implementation stage of the policy process is enforcement: putting individual regulations into effect and controlling the actions of visitors, operators, entrepreneurs, and others. In the literature reviewed, there is little dissent from the view that this is one of the weakest links in the chain (Finucane and Dowling 1995; Helber 1995; McNeely 1995; Moore and Carter 1993; Weaver 1995). Policies of various types can be planned and adopted, but all too often problems relating to funding, politics, and lack of organizational coordination block their enforcement.

The first obstacle is financial, and it should not be surprising to discover that in many of these developing countries, there is simply not enough money available for enforcement (Laarman and Durst 1987). This is certainly the case in the Galapagos (de Groot 1983) and in Belize (Lindberg and Enriquez 1994), but it is also true in Great Britain (Cossons 1989). Increasingly, as nations use ecotourism as a foreign exchange generator, funds collected at particular sites wind up in the general treasury, rather than being returned to the individual parks that collected them and earmarked for purposes of conservation.

A second problem area has to do with politics (de Kadt 1979) and competition among multiple actors for government sanction (Holdan 1992; Murphy 1985). Pigram (1990, 1992) has identified four of these actors—the developer, the enforcement agency, the local community, and the tourist—and shown how their goals fail to coincide. Furthermore, de Kadt (1992) has shown how governmental agencies tend to speak and compete for the tourism groups that they are supposed to regulate. Closely related to this is the problem of corruption. Whether we are dealing with inspectors taking money from poachers in Kenya (Christ 1993), conflicts of interest and kickbacks for government

officials in charge of the financing of hotel construction in the Philippines (Richter 1980), or using political party patronage in Thailand (Elliot 1987), the problem is the same: a compromising of enforcement and efficiency.

The third obstacle identified above was lack of organizational coordination within the government itself. At the most general level, Inskeep (1991) informs us that the effect of political ideology cannot be denied and that, for example, the role of government in tourism development will be defined very differently in centralized and decentralized government structures. Beginning with this observation and knowing that in most developing countries the central government is relatively weak, we should not be surprised at Elliot's (1983) observations concerning the negative effects of bureaucratic factionalism and competition on the tourism industry in Thailand. This fragmentation mirrors that in the industry itself (Bottrill and Pearce 1995). Since bureaucrats are frequently just trying to survive, the result is government passivity, and if passivity creates a vacuum, it must be filled. For this reason, the military may play a large role in developing countries' tourism operations, for example in such fields as regulating and managing protected areas (D'Souza 1995).

CONCLUSION

The purpose of this chapter has been to examine world tourism and ecotourism, from the perspective of public policy, and thus we have looked at what governments do, and fail to do, with regard to this general subject. We have found that much of the work can be summarized by classifying it as either distributive, regulatory, self-regulatory, or redistributive. With regard to the first of these categories, we examined writings on government regulation of both ecotourism providers and ecotourism visitors, as well as those laws and regulations that focus on overall environmental protection. Our presentation of research on distributive policy focused on both endogenous and exogenous strategies used by public officials to subsidize and stimulate this industry, i.e., tax breaks, infrastructure, workforce training, and marketing.

The literature cited as "self-regulatory" emphasized the roles played by NGOs and by codes of ethics. Attention was also given to dependency theory. We found that in the context of ecotourism decision making, redistributive policy primarily involves the shifting of tourism income from one region of a country to another and that a substantial number of scholars and observers believe this to be one of its great shortcomings. It has failed to create enough jobs for enough people to motivate them to change their consumption and production patterns.

Finally, we examined three main steps in the public-policy process as it applies to tourism and ecotourism. The first stage, formulation, can be seen as focusing primarily on the issues of sustainability and planning, and a great deal of scholarly research exists on these subjects. Literature on the adoption stage deals with questions relating to the creation of nature preserves, plus access limits and the utilization of user fees. Finally, we provided an overview of research on the subject of implementation. Here, we showed that much attention has been paid to the subject of resource carrying capacity. We also summarized writings on two other aspects of implementation, i.e., zoning and enforcement.

REFERENCES

Abaia, D.O. 1987. "A Theoretical and Empirical Investigation of the Willingness to Pay for Recreational Services: A Case Study of Nairobi National Park." *Eastern Africa Economic Review* 3(2): 111–119.

Abbey, E. 1968. *Desert solitaire*. New York: Ballantine Books.

Adams, V. 1992. "Tourism and Sherpas, Nepal: Reconstruction of Reciprocity." *Annals of Tourism Research*, 19: 534–554.

Adventure Travel Society. 1991. *Proceedings of the 1991 World Congress on Adventure Travel and Ecotourism*. Englewood, CO: Adventure Travel Society.

Adventure Travel Society. 1993. *Proceedings of the 1993 World Congress on Adventure Travel and Ecotourism*. Englewood, CO: Adventure Travel Society.

Andersen, D. 1993. "A Window on the Natural World: The Design of Ecotourism Facilities." In K. Lindberg and D. Hawkins, eds., *Ecotourism: A Guide for Planners and Managers*. North Bennington, VT: Ecotourism Society: 116–133.

Anderson, J.E. 1994. *Public Policymaking: An Introduction*. Dallas: Houghton Mifflin.

Ankomah, P.K. and J. Crompton. 1990. "Unrealized Tourism Potential: The Case of Sub-Saharan Africa." *Tourism Management* March: 11–27.

Aronsson, L. 1994. "Sustainable Tourism Systems: The Example of Sustainable Rural Tourism in Sweden." *Journal of Sustainable Tourism* 2(1&2): 77–92.

Ashman, M. 1975. "Micronesia Tastes Tourism." In B.R. Finney and K.A. Watson, eds., *A New Kind of Sugar: Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies: 135–143.

Ashton, R.E., and P.S. Ashton. 1995. "Local Communities and Ecolodges." In D.E. Hawkins and M.E. Wood, eds., *The Ecolodge Sourcebook for Planners and Developers*. North Bennington, VT: Ecotourism Society: 9–17.

Ayala, H. 1995. "From Quality Product to Eco-product: Will Fiji Set a Precedent?" *Tourism Management* 16(1): 39–47.

Bacon, P. 1994. "Use of Wetlands for Tourism in the Insular Caribbean." *Annals of Tourism Research* 21(2): 344–354.

Barborak, J. 1995. "Institutional Options for Managing Protected Areas." In J.A. McNeely, ed., *Expanding Partnerships in Conservation*. Washington, DC: Island Press: 30–38.

Beatley, T. 1994. *Habitat Conservation Planning*. Austin: University of Texas Press.

Bell, R.H.V. 1987. "Conservation with a Human Face: Conflict and Reconciliation in African Land-Use Planning." In D. Anderson and R. Grove, eds., *Conservation in Africa: People, Policies and Practice*. Cambridge, MA: Cambridge University Press: 79–101.

Bernstein, A. 1995. "The Conservation Corporation: Development and Management of Eco-lodging in Africa." In D.E. Hawkins and M.E. Wood, eds., *The Ecolodge Sourcebook for Planners and Developers*. North Bennington, VT: Ecotourism Society: 104–106.

Blane, J. and R. Jaakson. 1994. "The Impact of Ecotourism Boats on the St. Lawrence Beluga Whales." *Environmental Conservation* 21(3): 267–269.

Blangy, S. and T. Nielsen. 1993. "Ecotourism and Minimum Impact Policy." *Annals of Tourism Research* 20: 357–360.

Blangy, S. and M.E. Wood. 1993. "Developing and Implementing Ecotourism Guidelines for Wildlands and Neighboring Communities." In K. Lindberg and D. Hawkins, eds., *Ecotourism: A Guide for Planners and Managers*. North Bennington, VT: Ecotourism Society: 32–54.

Boniface, P. and P. Fowler. 1993. *Heritage and Tourism in the Global Village*. New York: Routledge.

Boo, E. 1990. *Ecotourism: The Potentials and Pitfalls*. Washington, DC: World Wildlife Fund.

Boo, E. 1991. "Making Ecotourism Sustainable: Recommendations for Planning, Development and Management." In T. Whelan, ed., *Nature Tourism*. Washington, DC: Island Press: 187–199.

Boo, E. 1993. "Ecotourism Planning for Protected Areas." In K. Lindberg and D.E. Hawkins, eds., *Ecotourism: A Guide for Planners and Managers*. North Bennington, VT: Ecotourism Society: 15–31.

Bosselman, F. 1978. *In the Wake of the Tourist*. Washington, DC: Conservation Foundation.

Bottrill, C. and D. Pearce. 1995. "Ecotourism: Towards a Key Elements Approach to Operationalizing the Concept." *Journal of Sustainable Tourism* 3(1): 45–54.

Bramwell, B. and B. Lane. 1993. "Sustainable Tourism: An Evolving Approach." *Journal of Sustainable Tourism* 1(1): 1–5.

Brandon, K. 1993. "Basic Steps Toward Encouraging Local Participation in Nature Tourism Projects." In K. Lindberg and D.E. Hawkins, eds., *Ecotourism: A Guide for Planners and Managers*. North Bennington, VT: Ecotourism Society: 134–151.

Britton, S.G. 1982a. "The Political Economy of Tourism in the Third World." *Annals of Tourism Research* 9: 331–358.

Britton, S.G. 1982b. "International Tourism and Multinational Corporations in the Pacific: The Case of Fiji." In M.J. Taylor and N.J. Thrift, eds., *The Geography of Multinationals*. New York: St. Martin's Press: 252–273.

Brockelman, W. and P. Dearden. 1990. "The Role of Nature Trekking in Conservation." *Environmental Conservation* 17(2): 141–248.

Bryan, B. 1991. "Ecotourism on Family Farms and Ranches in the American West." In T. Whelan, ed., *Nature Tourism: Managing for the Environment*. Washington, DC: Island Press: 75–88.

Buckley, R. and Pannell, J. 1990. "Environmental Impacts of Tourism and Recreation in National Parks and Conservation Reserves." *Journal of Tourism Studies* 1(2): 24–32.

Budowski, G. 1976. "Tourism and Environmental Conservation: Conflict, Coexistence and Symbiosis." *Environmental Conservation* 3(1): 27–31.

Buhat, D. 1994. "Community Based Coral Reef Fisheries Management San Salvador Island, Philippines." In A. White, L.Z. Hale, Y. Renard, and L. Cortesi, eds., *Collaborative and Community Based Management of Coral Reefs*. Hartford, CT: Kumarian Press: 33–50.

Burger, J. and M. Gochfeld. 1993. "Tourism and Short-Term Behavioral Responses of Nesting Masked, Red-Footed, and Blue-Footed, Boobies in the Galapagos." *Environmental Conservation* 20(3): 255–259.

Burnett, G.W. and M. Uysal. 1991. "Dominica: Geographic Isolation and Tourism Prospects." *Tourism Management* 12(2): 141–145.

Burnie, D. 1994. "Ecotourists to Paradise." *New Scientist* April: 23–27.

Burns, P. 1993. "Sustaining Tourism Employment." *Journal of Sustainable Tourism* 1(2): 81–96.

Burns, P. 1995. "Sustaining Tourism Under Political Adversity: The Case of Fiji." In M. Conlin and T. Baum, eds., *Island Tourism: Management Principles and Practice*. New York: Wiley: 259–272.

Burns, P. and R. Cleverdon. 1995. "Destination on the Edge? The Case of the Cook Islands." In M.V. Conlin and T. Baum, eds., *Island Tourism: Management Principles and Practice*. New York: Wiley: 217–228.

Butler, R.W. 1980. "The Concept of a Tourist Area Cycle of Evolution: Implications for Management Resources." *Canadian Geographer* 24(1): 5–12.

Butler, R.W. 1990. "Alternative Tourism: Pious Hope on Trojan Horse?" *Journal of Travel Research* 40–45.

Butler, R.W. 1991. "Tourism, Environment and Sustainable Development." *Environmental Conservation* 18(3): 201–209.

Butler, R.W. 1992. "Alternative Tourism: The Thin Edge of the Wedge." In F.L. Smith and W.R. Eadington, eds., *Tourism Alternatives: Potentials and Problems in the Development of Tourism*. Philadelphia: University of Pennsylvania Press: 31–46.

Carr, T.A., H.L. Pedersen, and S. Ramaswamy. 1993. "Rain Forest Entrepreneurs: Cashing In on Conservation." *Environment* September: 12–38.

Cartwright, J. 1989. "Conserving Nature, Decreasing Debt." *Third World Quarterly* April: 114–127.

Cater, E. 1987. "Tourism in the Least Developed Countries." *Annals of Tourism Research* 14: 202–226.

Cater, E. 1992. "Profits from Paradise." *Geographical Magazine* March: 16–21.

Cater, E. 1994a. "Ecotourism in the 3rd World: Problems and Prospects for Sustainability." In E. Cater and G. Lowman, eds., *Ecotourism: A Sustainable Option?* New York: Wiley: 69–86.

Cater, E. 1994b. "Introduction." In E. Cater and G. Lowman, eds., *Ecotourism: A Sustainable Option?* New York: Wiley: 3–18.

Ceballos-Lascurain, H. 1991. "Tourism, Ecotourism and Protected Areas." *Parks* 2(3): 31–35.

Ceballos-Lascurain, H. 1996. *Tourism, Ecotourism and Protected Areas.* Caracas, VZ: World Conservation Union.

Chalker, B. 1994. "Ecotourism: On the Trail of Destruction or Sustainability?" In E. Cater and G. Lowman, eds., *Ecotourism: A Sustainable Option?* New York: Wiley: 87–99.

Chib, S.N. 1980. "Financing Tourism Development: A Recipient View." *International Journal of Tourism Management* 1(4): 231–237.

Child, G. 1985. "Tourism and the Parks and Wild Life Estate of Zimbabwe." *Tourism Recreation Research* 10(2): 7–11.

Christ, C. 1993. "Nature Tourism in Kenya: What happened?" *Ecotravel.* Boulder, CO: Buzzworm: 8–10.

Clark, J. 1991. "Carrying Capacity and Tourism in Coastal and Marine Areas." *Parks* 2(3): 13–17.

Coburn, B.A. 1984. "Sagarmatha: Managing a Himalayan World Heritage Site." *Parks* 9(2): 10–13.

Cohen, E. 1978. "The Impact of Tourism on the Physical Environment." *Annals of Tourism Research* 5(2): 215–235.

Cohen, E. 1988. "Authenticity and Commoditization in Tourism." *Annals of Tourism Research* 15: 371–386.

Cohen, E. 1989. "Primitive and Remote: Hill Tribe Trekking in Thailand." *Annals of Tourism Research* 16: 30–61.

Collett, D. 1987. "Pastoralists and Wildlife: Image and Reality in Kenya Maasailand." In D. Anderson and R. Grove, eds., *Conservation in Africa: People, Policies and Practice.* Cambridge, MA: Cambridge University Press: 129–148.

Colvin, J. 1994. "Ecotourism: A Sustainable Alternative." *NACLA Report on the Americas* 28(2): 9.

Conant, J.S., T. Clark, J.J. Burnett, and G. Zank. 1988. "Terrorism and Travel." *Journal of Travel Research* 16–20.

Cook, G. 1994. "A Trek to Save the Russian Wilds." *Earth-Island Journal* 9(1): 10.

Cook, W.L. 1988. "Compatibility of Tourism and Wilderness." *Tourism Recreation Research* 13(1): 3–7.

Cossons, N. 1989. "Heritage Tourism—Trends and Tribulations." *Tourism Management* Septemer: 192–94.

Costanza, R. 1991. *Ecological Economics.* New York: Columbia University Press.

Craik, J. 1995. "Are There Cultural Limits to Tourism?" *Journal of Sustainable Tourism* 3(2): 87–98.

Cronin, L. 1990. "A Strategy for Tourism and Sustainable Development." *World Leisure and Recreation Journal* 32(3): 12–17.

Crotts, J. and S. Holland. 1993. "Objective Indicators of the Impact of Rural Tourism Development in the State of Florida." *Journal of Sustainable Tourism* 1(2): 112–120.

Culpan, R. 1987. "International Tourism Model for Developing Economies." *Annals of Tourism Research* 14(4): 541–552.

Cummings, R.G., D.S. Brookshire, and W.D. Schultze. 1986. *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method.* Totowa, NJ: Rowman and Allanhel.

Dahl, A. 1981. *Coral Reef Monitoring Handbook.* New Caledonia: South Pacific Commission.

D'Amore, L. 1993. "A Code of Ethics and Guidelines for Socially and Environmentally Responsible Tourism." *Journal of Travel Research* 31(3): 64–66.

Dasmann, R., J. Milton, and P. Freeman. 1973. *Ecological Principles for Economic Development.* London: Wiley.

Davies, M. 1990. "Wildlife as a Tourism Attraction." *Environments* 20(3): 74–77.

De Albuquerque, K. and J.L. McElroy. 1995. "Alternative Tourism and Sustainability." In M.V.

Conlin and T. Baum, eds., *Island Tourism: Management Principles and Practice*. New York: Wiley.

Dearden, P. 1989. "Tourism in Developing Societies: Some Observations on Trekking in the Highlands of North Thailand." *World Leisure and Recreation*, Winter: 40–47.

de Groot, R.S. 1983. "Tourism and Conservation in the Galapagos Islands." *Biological Conservation* 26: 291–300.

de Kadt, E. 1976. *Tourism: Passport to Development?* New York: Oxford University Press.

de Kadt, E. 1979. "Social Planning for Tourism in the Developing Countries." *Annals of Tourism Research* (1): 36–47.

de Kadt, E. 1992. "Making the Alternative Sustainable: Lessons from Development for Tourism." In V.L. Smith and W.R. Eadington, eds., *Tourism Alternatives Potentials and Problems in the Development of Tourism*. Philadelphia: University of Pennsylvania Press: 47–75.

Dieke, P. 1989. "Fundamentals of Tourism Development: A Third World Perspective." *Hospitality Education and Research* 7–22.

Dixon, J. and P. Sherman. 1991. "Economics of Protected Areas." *Ambio* 20(2): 68–74.

Dixon, J., L. Scura, and T. vant Hof. 1993. "Meeting Ecological and Economic Goals: Marine Parks in the Caribbean." *Ambio* 22(2–3): 117–125.

Dowling, R. 1991. "Tourism and the Natural Environment." *Tourism Recreation Research* 16(2): 44–48.

Dowling, R. 1993. "An Environmentally Based Planning Model for Regional Tourism Development." *Journal of Sustainable Tourism* 1(1): 17–37.

Drake, S. 1991. "Local Participation in Ecotourism Projects." In T. Whelan, ed., *Nature Tourism: Managing for the Environment*. Washington, DC: Island Press: 132–163.

Driml, S. and M. Common. 1995. "Economic and Financial Benefits of Tourism in Major Protected Areas." *Australian Journal of Environmental Management* 2(March): 19–29.

D'Souza, E. 1995. "Redefining National Security: The Military and Protected Areas." In J. McNeeley, ed., *Expanding Partnerships in Conservation*. Washington, DC: Island Press: 156–165.

Duffus, D. and P. Dearden. 1993. "Recreational Use, Valuation and Management of Killer Whales (*Orcinus ara*) on Canada's Pacific Coast." *Environmental Conservation* 10(2): 149–156.

Durst, P. and C.D. Ingram. 1988. "Nature-Oriented Tourism Promotion by Developing Countries." *Tourism Management* March: 39–43.

Eadington, W. and V. Smith. 1992. "Introduction: The Emergence of Alternative Forms of Tourism." In V.L. Smith and W.R. Eadington, eds., *Tourism Alternatives Potentials and Problems in the Development of Tourism*. Philadelphia: University of Pennsylvania Press: 1–12.

Eagles, P. 1984. *The Planning and Management of Environmentally Sensitive Areas*. New York: Longman.

Eagles, P. 1996. "Seeking Eco Benefits." *Ecodecision* Spring: 17–20.

Eber, S. 1993. *Beyond the Green Horizon: Principles for Sustainable Tourism*. United Kingdom: World Wildlife Fund.

Edgell, D. 1990. *International Tourism*. New York: Van Nostrand Reinhold.

Edwards, S. 1991. "The Demand for Galapagos Vacations: Estimation and Application to Wilderness Preservation." *Coastal Management* 19(2): 155–169.

Elliott, J. 1983. "Politics, Power and Tourism in Thailand." *Annals of Tourism Research* 10: 377–393.

Elliott, J. 1987. "Government Management of Tourism: A Thai Case Study." *Tourism Management* September: 223–232.

Erisman, H.M. 1983. "Tourism and Cultural Dependency in the West Indies." *Annals of Tourism Research* 10: 337–361.

Farrell, B. 1992. "Tourism as an Element in Sustainable Development: Hana, Maui." In V.L. Smith and W.R. Eadington, eds., *Tourism Alternatives Potentials and Problems in the Development of Tourism*. Philadelphia: University of Pennsylvania Press: 115–34.

Farrell, B. and D. Runyan. 1991. "Ecology and Tourism." *Annals of Tourism Research* 18: 26–40.

Fennell, D. and P. Eagles. 1990. "Ecotourism in Costa Rica: A Conceptual Framework." *Journal of Park and Recreation Administration* 8(1): 23–34.

Fennell, D. and B. Smale. 1992. "Ecotourism and Natural Resource Protection." *Tourism Recreation Research* 17(1): 21–32.

Filani, M.O. 1975. "The Role of National Tourist Associations in the Preserving of the Environment in Africa." *Journal of Travel Research* 13(4): 7–12.

Finney, B. and K. Watson. 1975. *A New Kind of Sugar: Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies.

Finucane, S. and R. Dowling. 1995. "The Perceptions of Ecotourism Operators in Western Australia." *Tourism Recreation Research* 20(1): 14–21.

Fleming, W. and L. Toepper. 1990. "Economic Impact Studies: Relating the Positive and Negative Impacts to Tourism Development." *Journal of Travel Research* 29(1): 35–42.

Foehr, S. 1993. *Ecojournies*. Chicago: Noble Press.

Fowkes, J. and S. Fowkes. 1991. "Roles for Private Sector Ecotourism in Protected Areas." *Parks* 2(3): 26–30.

Fox, M. 1975. "The Social Impact of Tourism." In B.R. Finney and K.A. Watson, eds., *A New Kind of Sugar Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies: 27–48.

Fox, S. 1981. *John Muir and His Legacy: The American Conservation Movement*. Boston: Little Brown.

Francisco, R. 1983. "The Political Impact of Tourism Dependence in Latin America." *Annals of Tourism Research* 10: 363–376.

Frueh, S. 1988. "Report to World Wildlife Fund on Tourism to Protected Areas." Mimeo. Washington, DC: World Wildlife Fund-U.S.

Fukunaga, L. 1975. "A New Sun in North Kohala." In B.R. Finney and K.A. Watson, eds., *A New Kind of Sugar Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies.

Gannon, A. 1994. "Rural Tourism as a Factor in Rural Community Economic Development for Economies in Transition." *Journal of Sustainable Tourism* 2(1): 51–60.

Geffen, A. and Berglie. 1993. *Ecotours and Nature Getaway*. New York: Clarkson Potter Publishers.

Getz, D. 1983. "Capacity to Absorb Tourism: Concepts and Implications for Strategic Planning." *Annals of Tourism Research* 10: 239–263.

Getz, D. and T. Jamal. 1994. "The Environment-Community Symbiosis: A Case for Collaborative Tourism Planning." *Journal of Sustainable Tourism* 2(3): 152–173.

Glick, D. 1991. "Tourism in Greater Yellowstone: Managing the Good, Minimizing the Bad, Eliminating the Ugly." In T. Whelan, ed., *Nature Tourism: Managing for the Environment*. Washington, DC: Island Press: 58–74.

Goodwin, H. 1996. "In Pursuit of Ecotourism." *Biodiversity and Conservation* 5: 277–291.

Green, H. and C. Hunter. 1992. "The Environmental Impact Assessment of Tourism Development." In P. Johnson and B. Thomas, eds., *Perspectives on Tourism Policy*. London: Mansell Publishing: 29–48.

Greenwood, D.J. 1989. "Culture by the Pound: An Anthropological Perspective on Tourism as Cultural Commoditization." In Smith, ed., *Hosts and Guests*. Philadelphia: University of Pennsylvania Press.

Greffe, X. 1994. "Is Rural Tourism a Lever for Economic and Social Development?" *Journal of Sustainable Tourism* 2(1): 22–40.

Hale, L.Z. and M. Lemay. 1994. "Coral Reef Protection in Phuket, Thailand: A Step Toward Integrated Coastal Management." In A. White, L. Hale, Y. Renard, and L. Cortesi, eds., *Collaborative and Community Based Management of Coral Reefs*. Hartford, CT: Kumarian Press: 68–79.

Hall, C.M. 1992. "Tourism in Antarctica: Activities, Impacts and Management." *Journal of Travel Research* 30(4): 2–9.

Hall, C.M. 1994a. "Ecotourism in Australia, New Zealand and the South Pacific: Appropriate Tourism or a New Form of Ecological Imperialism?" In E. Cater and G. Lowman, eds., *Ecotourism: A Sustainable Option?* New York: Wiley: 137–158.

Hall, C.M. 1994b. *Tourism and Politics: Policy, Power and Place*. New York: Wiley.

Hall, C.M. 1995. *Introduction to Tourism in Australia*. Sydney: Longman.

Hall, C.M. and S. McArthur. 1993. "Ecotourism in Antarctica and Adjacent Sub-Arctic Islands." *Tourism Management* April: 117–122.

Hall, C.M. and B. Weiler. 1992. "What's Special About Special Interest Tourism?" In C.M. Hall and B. Weiler, eds., *Special Interest Tourism*. London: Belhaven Press: 1–14.

Hall, C.M., I. Mitchell, and N. Keelan. 1992. "Maori Culture and Heritage Tourism in New Zealand." *Journal of Cultural Geography* 12(2): 115–128.

Hannigan, K. 1994. "National Policy, European Structural Funds and Sustainable Tourism: The Case of Ireland." *Journal of Sustainable Tourism* 2(4): 179–192.

Hartley, K. and N. Hooper. 1992. "Tourism Policy: Marketing Failure and Public Choice." In P. Johnson and B. Thomas, eds., *Perspectives on Tourism Policy*. London: Mansell Publishing: 15–28.

Hawkins, D. 1995. "Ecolodge Finance and Investment Strategies." In D. Hawkins, M.E. Wood, and S. Bittman, eds., *The Ecolodge Sourcebook*. Bennington, VT: Ecotourism Society: 57–63.

Helber, L.E. 1995. "Redeveloping Mature Resorts for New Markets." In M.V. Conlin and T. Baum, eds., *Island Tourism: Management Principles and Practice*. New York: Wiley: 105–113.

Hill, B. 1992. "Sustainable Tourism." *Parks and Recreation*: 84–89.

Hill, C. 1990. "The Paradox of Tourism in Costa Rica." *Cultural Survival Quarterly* 14(1): 14–19.

Hiller, H. 1975. "The Organization and Marketing of Tourism for Development." In B.R. Finney and K.A. Watson, eds., *A New Kind of Sugar Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies: 237–251.

Hitchcock, R. and R. Brandenburgh. 1990. "Tourism, Conservation and Culture." *Cultural Survival Quarterly* 14(2): 20–24.

Holdan, J.S. 1992. "The Need for Public-Private Sector Cooperation in Tourism." *Tourism Management* June: 157–162.

Homewood, K. and W.A. Rodgers. 1987. "Pastoralism, Conservation and the Overgrazing Controversy." In D. Anderson and R. Grove, eds., *Conservation in Africa: People, Policies and Practice*. New York: Cambridge University Press: 112–128.

Honey, M. 1994. "Paying the Price of Ecotourism: Two Pioneer Biological Reserves Face the Challenge Brought by a Recent Boom in Tourism." *Americas* 46(6): 40–47.

Horwich, R., D. Murray, E. Saqui, J. Lyon, and D. Godrey. 1993. "Ecotourism and Community Development: A View from Belize." In K. Lindley and D. Hawkins, eds., *Ecotourism A Guide for Planners and Managers*. North Bennington, VT: Ecotourism Society: 152–168.

Hough, R. 1988. "Obstacles to Effective Management of Conflicts Between National Parks and Surrounding Human Communities in Developing Countries." *Environmental Conservation* 15(2): 129–136.

Hughes, A.V. 1992. "Climbing the Down Escalator: The Economic Condition and Prospects of Solomon Islands." In R. Crocombe and E. Tuza, eds., *Independence, Dependence, Interdependence: The First 10 Years of Solomon Islands Independence*. Honiara, Solomon Islands: Government Printing Press: 35–54.

Hummelbrunner, R. and E. Miglbauer. 1994. "Tourism Promotion and Potential in Peripheral Areas: The Australian Case." *Journal of Sustainable Tourism* 2(1): 41–50.

Hunter, C.J. 1995. "On the Need to Re-conceptualise Sustainable Tourism Development." *Journal of Sustainable Tourism* 3(3): 155–165.

Hvenegaard, G. 1994. "Ecotourism: A Status Report and Conceptual Framework." *Journal of Tourism Studies* 5(2): 24–35.

Hvenegaard, G.T., J.R. Butler, and D.K. Krystofiak. 1989. "Economic Values of Bird Watching at Point Pelee National Park, Canada." *Wildlife Society Bulletin* 17: 526–531.

Infield, M. 1988. "Attitudes of a Rural Community Toward Conservation and a Local Conservation Area in Natal, South Africa." *Biological Conservation* 45: 21–46.

Ingram, C.D. and P. Durst. 1989. "Nature-Oriented Tour Operators: Travel to Developing Countries." *Journal of Travel Research* Fall: 11–15.

Inskeep, E. 1975. "Physical Planning for Tourism Development." In B.R. Finney and K.A. Watson, eds., *A New Kind of Sugar Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies: 247–251.

Inskeep, E. 1987. "Environmental Planning for Tourism." *Annals of Tourism Research* 14: 118–135.

Inskeep, E. 1991. *Tourism Planning: An Integrated Sustainable Development Approach*. New York: Van Nostrand Reinhold.

Jacobson, S. and A. Figueroa-Lopez. 1994. "Biological Impacts of Ecotourism: Tourists and Nesting Turtles in Tortuguero National Park." *Wildlife Society Bulletin* 11(3): 414–419.

Jafari, J. 1974. "The Socioeconomic Cost of Tourism to Developing Countries." *Annals of Tourism Research* 1: 227–259.

Jenkins, C.L. 1980. "Tourism Policies in Developing Countries: A Critique." *International Journal of Tourism Management* 1(March): 22–29.

Jenkins, C.L. 1982a. "The Use of Investment Incentives for Tourism Projects." *International Journal of Tourism Management* 3: 91–97.

Jenkins, C.L. 1982b. "The Effects of Scale in Tourism Projects in Developing Countries." *Annals of Tourism Research* 9: 229–249.

Jenkins, C.L. and B.M. Henry. 1982. "Government Involvement in Tourism in Developing Countries." *Annals of Tourism Research* 9: 499–521.

Keenan, J. 1989. "Ecotourism: Where Capitalism and Conservation Meet." *Mexico Journal* May: 16–24.

Kenchington, R. 1989. "Tourism in the Galapagos Islands: The Dilemma of Conservation." *Environmental Conservation* 16(3): 227–236.

Kent, N. 1975. "A New Kind of Sugar." In B.R. Finney and K.A. Watson, eds., *A New Kind of Sugar: Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies: 169–197.

Kimmel, J. 1995. "Art and Tourism in Santa Fe, New Mexico." *Journal of Travel Research* Winter: 28–30.

King, R. and S. Weaver. 1993. "The Impact of the Environment on the Fiji Tourism Industry: A Study of Industry Attitudes." *Journal of Sustainable Tourism* 1(2): 97–111.

Kloke, C. 1975. "South Pacific Economics and Tourism." In B.R. Finney and K.A. Watson, eds., *A New Kind of Sugar: Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies: 3–26.

Laarman, J.G. and P. Durst. 1987. "Nature Travel in the Tropics." *Journal of Forestry* 85(5): 43–46.

Laarman, J.G. and R.R. Perdue. 1989a. "Science Tourism in Costa Rica." *Annals of Tourism Research* 16: 205–215.

Laarman, J.G. and R.R. Perdue. 1989b. "Tropical Science and Tourism: The Case of OTS in Costa Rica." *Tourism Management* March: 29–38.

Lal, V. 1990. *Fiji: Coups in Paradise*. London: Zed Books.

Lal, V. 1992. *Broken Waves: A History of the Fiji Islands in the 20th Century*. Honolulu, HI: University of Hawaii Press.

Lane, B. 1994. "Sustainable Rural Tourism Strategies: A Tool for Development and Conservation." *Journal of Sustainable Tourism* 2(1&2): 102–111.

Lanfant, M. and N. Graburn. 1992. "International Tourism Reconsidered: The Principle of the

Alternative." In V.L. Smith and W.R. Eadington, eds., *Tourism Alternatives: Potentials and Problems in the Development of Tourism*. Philadelphia: University of Pennsylvania Press: 88–112.

Langholz, J. 1996. "Economics, Objectives, and Success of Private Nature Reserves in Sub-Saharan Africa and Latin America." *Conservation Biology* 10(1): 271–280.

Larson, K. 1993. "Zimbabwe's Campfire Program." In *Ecotravel*. Boulder, CO: Buzzworm: 12–14.

Lawson, S. 1991. *The Failure of Democratic Politics in Fiji*. Oxford, UK: Clarendon Press.

Lea, J. 1988. *Tourism and Development in the Third World*. New York: Routledge.

Lea, J.P. 1993. Tourism Development Ethics in the Third World. *Annals of Tourism Research* 20: 701–715.

Lee, D. and D. Snepenger. 1992. "An Ecotourism Assessment of Tortuguero, Costa Rica." *Annals of Tourism Research* 19: 366–371.

Le Fevre, T. 1975. "Tourism: Who Gets What from Tourists." In D.R. Finney and K.A. Watson, eds., *A New Kind of Sugar: Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies: 101–109.

Lemky, K. 1992. "The Amazon Rainforest Ecotourism Industry of Napo, Ecuador." Master's thesis, University of Ottawa.

Leopold, A. 1949. *A Sand County Almanac*. New York: Oxford University Press.

Leslie, D. 1986. "Tourism and Conservation in National Parks." *Tourism Management* March: 52–56.

Levy, J.M. 1997. *Contemporary Urban Planning*. Englewood Cliffs, NJ: Prentice-Hall.

Lickorish, L. 1991. "Administrative Structure for Tourism Development: Roles of Government and the Private Sector." In J. Bodlender, A. Jefferson, C. Jenkins, and L. Lickorish, eds., *Developing Tourism Destinations*. London: Longman: 119–146.

Lindberg, K. 1991. *Policies for Maximizing Nature Tourism's Ecological and Economic Benefits*. Washington, DC: World Resources Institute.

Lindberg, K. and J. Enriquez. 1994. *An Analysis of Ecotourism's Economic Contribution to Conservation and Development in Belize*. Washington, DC: World Wildlife Fund.

Lindberg, K. and Hawkins. 1993. *Ecotourism: A Guide for Planners and Managers*. North Bennington, VT: Ecotourism Society.

Lindberg, K. and R. Huber. 1993. "Economic Isues in Ecotourism Management." In K. Lindberg and D. Hawkins, eds., *Ecotourism: A Guide for Planners and Managers*. North Bennington, VT: Ecotourism Society: 82–115.

Lindsay, W.K. 1987. "Integrating Parks and Pastoralists: Some Lessons from Amboseli." In D. Anderson and R. Grove, eds., *Conservation in Africa: People, Policies and Practice*. New York: Cambridge University Press: 149–167.

Linton, N. 1987. "Trends in Tourism and Development: A Third World Perspective." *Tourism Management* 96–97.

Long, V.H. and G. Wall. 1995. "Small-scale Tourism Development in Bali." In M.V. Conlin and T. Baum, eds., *Island Tourism: Management Principles and Practice*. New York: Wiley: 238–259.

Lowi, T.J. 1964. "American Business, Public Policy Case Studies, and Political Theory." *World Politics* 16: 677–715.

Lusigi, W. 1995. "How to Build Local Support for Protected Areas." In J. McNeeley, ed., *Expanding Partnerships in Conservation*. Washington DC: Island Press: 19–24.

MacCannell, D. 1973. "Staged Authenticity: Arrangements of Social Space in Tourist Settings." *American Journal of Sociology* 79(3): 589–603.

Maenu'u, L. 1992. "Our Mother Earth: Land Tenure Effects." In R. Crocombe and E. Tuza, eds., *Independence, Dependence, Interdependence*. Honiara Solomon Islands: Government Printing Press: 67–70.

Maille, P. and R. Mendelsohn. 1993. "Valuing Ecotourism in Madagascar." *Journal of Environmental Management* 38: 213–218.

Manning, E. 1996. "Tourism: Where Are the Limits?" *Ecodecision* Spring: 35–39.
Marshall, A. 1994. *Zoo*. New York: Random House.
Massinga, A. 1996. "Between the Devil and the Deep Blue Sea: Development Dilemmas in Mozambique." *Ecologist* 6(2): 73–75.
Mathews, H. and L. Richter. 1991. "Political Science and Tourism." *Annals of Tourism Research* 18: 120–135.
Mathieson, A. and G. Wall. 1982. *Tourism: Economic, Physical and Social Impacts*. New York: Longman.
May, R.J. 1975. "Tourism and the Artifact Industry in Papua New Guinea." In B.R. Finney and D.A. Watson, eds., *A New Kind of Sugar: Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies: 125–133.
McAvoy, L. 1990. "An Environmental Ethic for Parks and Recreation." *Parks and Recreation* September: 68–72.
McIntyre, G. 1993. *Sustainable Tourism Development: Guide for Local Planners*. Madrid: World Tourism Organization.
McIntyre, N. and A. Boag. 1995. "The Measurement of Crowding in Nature-based Tourism Venues: Uluru National Park." *Tourism Recreation Research* 20(1): 37–42.
McKercher, B. 1993a. "Some Fundamental Truths About Tourism: Understanding Tourism's Social and Environmental Impacts." *Journal of Sustainable Tourism* 1(1): 6–16.
McKercher, B. 1993b. "The Unrecognized Threat to Tourism: Can Tourism Survive Sustainability?" *Tourism Management* April: 131–136.
McNeely, J. 1995. "Partnership for Conservation: An Introduction." In J.A. McNeely, ed., *Expanding Partnerships in Conservation*. Washington, DC: Island Press: 1–10.
McNeely, J. and R. Dobias. 1991. "Economic Incentives for Conserving Biological Diversity in Thailand." *Ambio* 20(2): 86–90.
McNeely, J. and J. Thorsell 1989. "Jungles, Mountains and Islands: How Tourism Can Help Conserve the Natural Heritage." *World Leisure and Recreation* 31(4): 29–39.
Miezkowski. 1990. *World Trends in Tourism and Recreation*. New York: Peter Lang.
Miezkowski. 1995. *Environmental Issues of Tourism and Recreation*. New York: University Press of America.
Millman, R. 1989. "Pleasure Seeking v. the 'Greening' of World Tourism." *Tourism Management* December: 275–278.
Milne, S. 1992. "Tourism and Development in South Pacific Microstates." *Annals of Tourism Research* 19: 191–212.
Moore, A. 1981. "Tour Guides as a Factor in National Park Management." *Parks* 6(1): 12–15.
Moore, S. and B. Carter. 1993. "Ecotourism in the 21st Century." *Tourism Management* April: 123–130.
Muller, H. 1994. "The Thorny Path to Sustainable Tourism." *Journal of Sustainable Tourism* 2(3): 131–136.
Munro, D. 1995. "New Partners in Conservation: How to Expand Public Support for Protected Areas." In J. McNeely, ed., *Expanding Partnerships in Conservation*. Washington, DC: Island Press: 13–18.
Murphy, P.E. 1985. *Tourism: A Community Approach*. New York: Methuen.
Myers, N. 1975. "The Tourist as an Agent for Development and Wildlife Conservation: The Case of Kenya." *International Journal of Social Economics* 2(1): 26–42.
Nash, D. 1989. "Tourism as a Form of Imperialism." In V. Smith, ed., *Hosts and Guests*. Philadelphia: University of Philadelphia Press: 37–52.
Navrud, S. and E.D. Mungatana. 1994. "Environmental Valuation in Developing Countries: The Recreational Value of Wildlife Viewing." *Ecological Economics* 11: 135–151.
Nelson, J. 1994. "The Spread of Ecotourism: Some Planning Implications." *Environmental Conservation* 21(3): 248–255.
Norris, R. 1992. "Can Ecotourism Save Natural Areas?" *National Parks* January/February: 30–34.

Olindo, P. 1991. "The Old Man of Nature Tourism: Kenya." In T. Whelan, ed., *Nature Tourism: Managing for the Environment*. Washington, DC: Island Press: 23–38.

Pajaro, M. 1994. "Using Education to Stop Destructive Fishing Practices: A Partial Success in Several Communities." In A. White, L. Hale, Y. Renard, and L. Cortesi, eds., *Collaborative and Community-Based Management of Coral Reefs*. Hartford, CT: Kumarian Press: 51–58.

Parker, S. 1998. "Concessions Policy in America's National Parks." *National Social Science Journal*. 10(1): 114–121.

Paul, S. 1987. *Community Participation in Development Projects: The World Bank Experience*. Washington, DC: World Bank.

Pearce, D. 1985. "Tourism and Environmental Research: A Review." *International Journal of Environmental Studies* 25: 247–255.

Pearce, D. 1989. *Tourist Development*. London: Longman.

Pearce, D. 1992. "Alternative Tourism: Concepts, Classifications and Questions." In V.L. Smith and W.R. Eadington, eds., *Tourism Alternatives: Potentials and Problems in the Development of Tourism*. Philadelphia: University of Pennsylvania Press: 15–30.

Pearce, D. and D. Morgan. 1994. *The Economic Value of Biodiversity*. London: ICUN & Earthscan Publications.

Pieters, R. and D. Gevers. 1995. "A Framework for Tourism Development on Fragile Island Destinations: The Case of Bonaire." In M.V. Conlin and T. Baum, eds., *Island Tourism: Management Principles and Practice*. New York: Wiley: 123–132.

Pigram, J. 1990. "Sustainable Tourism: Policy Considerations." *Journal of Tourism Studies* 1(2): 2–9.

Pigram, J. 1992. "Alternative Tourism." In V.L. Smith and W.R. Eadington, eds., *Tourism Alternatives: Potentials and Problems in the Development of Tourism*. Philadelphia: University of Pennsylvania Press: 76–87.

Pizam, A. 1978. "Tourism's Impacts: The Social Costs to the Destination Community as Perceived by Its Residents." *Journal of Travel Research* Spring: 8–12.

Place, S. 1991. "Nature Tourism and Rural Development in Tortuguero." *Annals of Tourism Research* 18: 186–201.

Pleumarom, A. 1994. "The Political Economy of Tourism." *Ecologist* 24(4): 142–48.

Poetschke, B. 1995. "Key Success Factors for Public/Private-Sector Partnerships in Island Tourism Planning." In M.V. Conlin. and T. Baum, eds., *Island Tourism: Management Principles and Practice*. New York: Wiley: 53–63.

Prosser, R. 1994. "Societal Change and the Growth in Alternative Tourism." In E. Cater and G. Lowman, eds., *Ecotourism: A Sustainable Option?* New York: Wiley: 19–38.

Richter, L. 1980. "The Political Uses of Tourism: A Philippine Case Study." *Journal of Developing Areas* 237–257.

Richter, L. 1983. "Tourism Politics and Political Science: A Case of Not So Benign Neglect." *Annals of Tourism Research* 10: 313–335.

Riley, M. 1995. "Tourism Development Under Close Control: The Case of the Falkland Islands." *Tourism Management* 16(6): 471–474.

Robineau, C. 1975. "The Tahitian Economy and Tourism." In B.R. Finney and K.A. Watson, eds., *A New Kind of Sugar: Tourism in the Pacific*. Santa Cruz, CA: Center for South Pacific Studies: 61–76.

Rolston, H. 1988. *Environmental Ethics*. Philadelphia: Temple University Press.

Romeril, M. 1985a. "Tourism and the Environment—Towards a Symbiotic Relationship." *International Journal of Environmental Studies* 25: 215–218.

Romeril, M. 1985b. "Tourism and Conservation in the Channel Islands." *Tourism Management* March: 43–49.

Romeril, M. 1989. "Tourism and the Environment: Accord or Discord?" *Tourism Management* September: 204–208.

Rovinski, Y. 1991. "Private Reserves, Parks and Ecotourism in Costa Rica." In T. Whelan,

ed., *Nature Tourism: Managing for the Environment*. Washington, DC: Island Press: 39–57.

Rukia, A. 1992. "The Growth of Culture Preservation." In R. Crocombe and E. Tuza, eds., *Independence, Dependence and Interdependence: The First Ten Years of Solomon Islands Independence*. Honiara, Solomon Islands: Government Printing Press: 128–136.

Ruschmann, D. 1992. "Ecological Tourism in Brazil." *Tourism Management* March: 125–128.

Ryel, R. and T. Grasse. 1991. "Marketing Ecotourism: Attracting the Elusive Ecotourist." In T. Whelan, ed., *Nature Tourism: Managing for the Environment*. Washington, DC: Island Press: 164–186.

Salisbury, R.H. 1968. "The Analysis of Public Policy: A Search for Theories and Roles." In A. Ranney, ed., *Political Science and Public Policy*. Chicago: Markham: 13–18.

Salm, R. 1985. "Integrating Marine Conservation and Tourism." *International Journal of Environmental Studies* 25: 229–238.

Salm, R., M. Halim, and A. Abdullah. 1982. "Proposed Pulau Seribu Marine National Park: Conservation and Tourism." *Parks* 7(2): 15–20.

Sanson, L. 1994. "An Ecotourism Case Study in Sub-Antarctic Islands." *Annals of Tourism Research* 21(2): 344–354.

Sax, J. 1980. *Mountains Without Handrails*. Ann Arbor: University of Michigan Press.

Selengut, S. 1995. "Protected Areas and the Tourism Industry." In J.A. McNeely, ed., *Expanding Partnerships in Conservation*. Washington, DC: Island Press; 127–133.

Shackley, M. 1995. "The Future of Gorilla Tourism in Rwanda." *Journal of Sustainable Tourism* 3(2): 61–72.

Shaw, G. and A. Williams. 1990. "Tourism and Development." In D. Pinder, ed., *Western Europe: Challenge and Change*. London: Belhaven Press: 240–257.

Shaw, G. and A. Williams. 1994. *Critical Issues in Tourism*. Cambridge, MA: Blackwell.

Sherman, P.B. and J.A. Dixon. 1991. "The Economics of Nature Tourism: Determining If It Pays." In T. Whelan, ed., *Nature Tourism: Managing for the Environment*. Washington, DC: Island Press: 89–131.

Sindiyo, D. and F. Pertet. 1984. "Tourism and Its Impact on Wildlife Conservation in Kenya." *UNEP Industry and Environment* January/February: 14–19.

Sisman, R. 1994. "Tourism: Environmental Relevance." In E. Cater and G. Lowman, eds., *Ecotourism: A Sustainable Option?* New York: Wiley: 57–68.

Smith, A. 1994. "Community Involvement in Coral Reef Monitoring for Management in the Insular Caribbean." In A. White, L. Hale, Y. Renard, and L. Cortesi, eds., *Collaborative and Community-Based Management of Coral Reefs*. Hartford CT: Kumarian Press: 59–67.

Smith, V. 1989. "Eskimo Tourism: Micro-Models and Marginal Men." In V. Smith, ed., *Hosts and Guests*. Philadelphia: University of Pennsylvania Press: 55–82.

Smith, V. 1992. "Boracay, Philippines: A Case Study in 'Alternative' Tourism." In V.L. Smith and W.R. Eadington, eds., *Tourism Alternatives: Potentials and Problems in the Development of Tourism*. Philadelphia: University of Pennsylvania Press: 135–157.

Smith, V.L. and W.R. Eadington. 1992. *Tourism Alternatives: Potentials and Problems in the Development of Tourism*. Philadelphia: University of Pennsylvania Press.

Southgate, D. and H.L. Clark. 1993. "Can Conservation Projects Save Biodiversity in South America?" *Ambio* 22(2–4); 163–166.

Southworth, A. 1989. "The Environmental Tourist." *Environmental Forum* July/August: 32–35.

Steele, P. 1995. "Ecotourism: An Economic Analysis." *Journal of Sustainable Tourism* 3(1): 29–44.

Stephenson, P. 1993. "The Impacts of Tourism on Nature Reserves in Madagascar: Perinet, a Case-Study." *Environmental Conservation* 3: 262–265.

Stolzenburg, W. 1996. "Collison at the Galapagos." *Nature Conservancy* 46(6): 10–16.

Stonich, S., J. Sorensen, and A. Hundt. 1995. "Ethnicity, Class and Gender in Tourism Development: The Case of the Bay Islands, Honduras." *Journal of Sustainable Tourism* 3(1): 1–28.

Sutton, D. 1990. "From Taj to the Tiger." *Cultural Survival Quarterly* 14(2): 15–19.
Sykes, L. 1996. "Small Is Beautiful." *Geographical Magazine* March: 36–38.
Teye, V. 1987. "Developing Africa's Tourism Potential: Prospects and Issues." *Tourism Recreation Research* 12(1): 9–14.
Thresher, P. 1981. "The Present Value of an Amboseli Lion." *World Animal Review* October/December: 30–33.
Tisdell, C. 1996. "Ecotourism, Economics and the Environment: Observations from China." *Journal of Travel Research* 34(4): 11–19.
Tobias, D. and R. Mendelsohn. 1991. "Valuing Ecotourism in a Tropical Rain-Forest Reserve." *Ambio* 20(2): 91–93.
Tong, D. 1975. "Planning for Tourism on the Island of Hawaii." In B.R. Finney and A.W. Watson, eds., *A New Kind of Sugar*. Santa Cruz, CA: Center for South Pacific Studies: 157–164.
Turton, D. 1987 "The Masai and National Park Development in the Lower Omo Valley." In D. Anderson and R. Grove, eds., *Conservation in Africa: People, Policies and Practice*. New York: Cambridge University Press: 169–186.
Urbanowicz, C. 1989. "Tourism in Tonga Revisited: Continued Troubled Times?" In V. Smith, ed., *Hosts and Guests*. Philadelphia: University of Pennsylvania Press: 105–117.
Valentine, P. 1992. "Nature-Based Tourism." In B. Weiler and M. Hall, eds., *Special Interest Tourism*. London: Belhaven Press: 105–127.
Valentine, P. 1993. "Ecotourism and Nature Conservation: A Definition with Some Recent Developments in Micronesia." *Tourism Management* April: 107–115.
Visser, D. and G. Mendoza. 1994. "Debt for Nature Swaps in Latin America." *Journal of Forestry* 92(6): 13–16.
Wall, G. 1993. "International Collaboration in the Search for Sustainable Tourism in Bali Indonesia." *Journal of Sustainable Tourism* 1(1): 38–47.
Wallace, G. 1993a. "Wildlands and Ecotourism in Latin America." *Journal of Forestry* 91(2): 37–40.
Wallace, J. 1993b. "Visitor Management: Lessons from Galapagos National Park." In K. Lindberg and D. Hawkins, eds., *Ecotourism: A Guide for Planners and Managers*. North Bennington VT: Ecotourism Society: 44–81.
Wanhill, S. 1992. "Tourism Manpower Planning: The Case of Nepal." In P. Johnson and B. Thomas, eds., *Perspectives on Tourism Policy*. London: Mansell Publishing: 87–104.
WCED: World Commisson on Enviromment and Development. 1987. *Our Common Future* (Brundtland Report). New York: Oxford University Press.
Wearing, S. and R. Pearson. 1991. "Rainforest Tourism." *Tourism Management* September: 236–244.
Weaver, D. 1991. "Alternative to Mass Tourism in Dominica." *Annals of Tourism Research* 18: 414–432.
Weaver, D. 1994. "Ecotourism in the Caribbean Basin." In E. Cater and G. Lowman, eds., *Ecotourism: A Sustainable Option?* New York: Wiley: 159–176.
Weaver, D. 1995. "Alternative Tourism in Montserrat." *Tourism Management* 16(8): 593–604.
Weaver, D. 1996. "Private Ecotourism Operations in Manitoba, Canada." *Journal of Sustainable Tourism* 4(3): 135–146.
Weiler, B. and M. Hall. 1992. *Special Interest Tourism*. London: Belhaven Press.
Wells, M. and K. Brandon. 1993. "The Principles and Practice of Buffer Zones and Local Participation in Biodiversity Conservation." *Ambio* 22(2–3): 157–162.
Western, D. 1986. "Tourist Capacity in East African Parks." *UNEP Industry and Environment* January–March: 14–16.
Western, D. and W. Henry. 1979. "Economics and Conservation in Third World National Parks." *Bioscience* 29(7): 414–418.
Wheeler, B. 1993. "Sustaining the Ego." *Journal of Sustainable Tourism* 1(2): 121–129.
Whelan, T. 1991. "Ectourism and Its Role in Sustainable Development." In T. Whelan, ed., *Nature Tourism*. Washington, DC: Island Press: 3–22.

White, A., L. Hale, Y. Renard, and L. Cortesi. 1994. *Collaborative and Community-Based Management of Coral Reefs*. Hartford CT: Kumarian Press.

Wight, P. 1993. "Sustainable Ecotourism: Balancing Economic, Environmental and Social Goals with an Ethical Framework." *Journal of Tourism Studies* 4(2): 54–66.

Wight, P. n.d. "Environmentally Responsible Marketing of Tourism." In E. Cater and G. Lowman, eds., *Ecotourism: A Sustainable Option?* New York: Wiley: 39–56.

Wilkinson, P.R. 1989. "Strategies for Tourism in Island Microstates." *Annals of Tourism Research* 16: 153–177.

World Tourism Conference. 1980. *Manila Declaration on World Tourism*. Manila: World Tourism Conference.

Yacoumis, J. 1990. "Tourism in the South Pacific: A Significant Development Potential." *The Courier* 122: 81–83.

Zerner, C. 1994. "Tracking Sasi: The Transformation of a Central Moluccan Reef Management Institution in Indonesia." In A. White, L. Hale, Y. Renard, and L. Cortesi, eds., *Collaborative and Community-Based Management of Coral Reefs*. Hartford, CT: Kumarian Press: 19–32.

Zurick, D. 1995a. "Preserving Paradise." *Geographical Review*, 85(2): 157–172.

Zurick, D. 1995b. *Errant Journeys*. Austin: University of Texas Press.

This page intentionally left blank

17

Political Elite Commitment to the Environment in Nepal

Brent S. Steel
Oregon State University, Corvallis, Oregon

Sushil Pandey
Tribhuvan University, Kathmandu, Nepal

INTRODUCTION

Environmental issues must compete with many other public policy issues for the attention of legislators. In advanced industrial countries such as the United States, environmental issues are increasingly at the center of political debate and a majority of the public is sympathetic to environmental issues. The salience of these issues to the public and elite, however, is often less than other issues such as unemployment, inflation, and taxes. While over 70% of Americans call themselves an "environmentalist," only 11% are willing to identify environmental issues as the most important problems facing the nation (Dunlap et al. 1993). If the salience of such issues is low in affluent advanced industrial nations, how much importance would they be given in less economically developed nations that have recently adopted democratic reforms and face terrible economic, political, and social problems?

There is no shortage of research on the increasing pressure imposed on the environment in developing nations, and on the close relationship between humans and ecosystems. It is also true that rural populations of less-developed countries are closely connected with the use and management of natural resources because most of the population is rural and involved in subsistence agriculture (Gurung 1994). Droughts, floods, and other natural calamities can be life-threatening events. At the same time, human-caused disturbances—such as rapid population growth, resource depletion, pollution, and general ecological degradation—pose additional hardships and threaten the very foundation of the human–natural environment relationship and thus socioeconomic sustainability.

The purpose of this chapter is to examine the salience of environmental issues to the newly elected parliament and party elite in Nepal. Given the very serious short-term problems of poverty, rising prices, unemployment, and potential political instability, what

is the level of commitment to the environment among those people charged with running the country? What are the factors that lead some political elite to identify environmental issues as important national issues? These questions and other related issues are investigated utilizing data gathered in a survey of Nepalese parliamentarians and political party elite in postrevolution Nepal.

STUDY SETTING

To discuss elite commitment to the environment in Nepal, it is important to present contextual information concerning the socioeconomic, political, and ecological condition of the country. Nepal occupies approximately one-third of the Himalayan mountain system in south Asia. About 75% of the total land of the country is covered by mountains and hills. The most obvious geographical differences are the plains (Terai), hills including the Kathmandu Valley (Pahad), and the high mountains (Himal), which form three broad geographic regions with distinctive ecosystems. The Terai is a broad subtropical zone along the border of India and has the most fertile agricultural land in the country. This area is predominantly Hindu and exhibits much social and economic influence from India. The hills and the Kathmandu Valley are located between the low-level Terai and the Himalayan Mountains to the north. This area is ethnically diverse, contains sizable Hindu and Buddhist populations, and has many terraced hillsides and valleys where rice and other staples are grown. The Kathmandu Valley is located in the western part of this region and is experiencing enormous population growth and subsequently declining amounts of agricultural land. The mountain region of Nepal forms the northern border of Nepal with Tibet. This area has timber resources, some agriculture (rice, potatoes) in the lower altitudes, and much tourism in the last decade (mountain trekking and climbing). The culture of the mountain region is where Tibetan and Buddhist influences are most likely found.

Nepal has one of the highest population densities in the world among mountainous countries (142 persons/km^2). According to the 1981 and 1991 census reports, the rate of population growth has been 2.1% annually. Despite government development efforts, national productivity has failed to keep pace with this enormous population growth. Some other salient statistics concerning Nepal's socioeconomic situation in 1991 are presented in Table 1.

In regard to the political context of this study, Nepal has recently embarked on a democratic path of governance after many years of monarchy. In 1990 prodemocracy protests and demonstrations led to the adoption of a new constitution that established a constitutional monarchy and a democratic government broadly based on the British system. This constitution ended almost 30 years of absolute monarchy. The new constitution safeguards many civil liberties and provides for enfranchisement of all adults, regular elections, and the legality of political parties.

After the first election in 1991 and the second election in 1994, eight parties were represented in parliament with no single party gathering enough votes to form a majority government. The largest parties in parliament include the National Congress Party (NC) and the Unified Marxist-Leninists (UML), which have very different views and priorities concerning the future of Nepal. The party ideologies existing in parliament range from the far right (monarchists) to the far left (various Communists). As a result, there has been much political instability and uncertainty about the political future of Nepal. One

Table 1 Socioeconomic Picture of Nepal

Population	18,491,097 million
Rural population	90.8%
Urban population	9.2%
Average annual population growth rate	2.10%
Population doubling time	33 years
Population density	142/km^2
Life expectancy	Men—55 years; women—53 years
Percent of population under 15 years of age	41%
Infant mortality rate	101 per 1000 births
Leading cause of infant mortality	Diarrhea
Population with access to safe drinking water	28%
Population with access to sanitation services	2%
Literacy rate	39%

Source: *Population Monograph of Nepal* 1995; Singh 1995.

could make an argument that the dire socioeconomic and political problems facing Nepal may well exacerbate existing environmental conditions and delegate environmental issues to less important status in the policy arena. Pressures to provide basic needs, economic development, and political stability may supersede efforts at environmental protection. The following discussion of Nepal's current environmental situation will illustrate the inherent dangers to socioeconomic sustainability if the environment is ignored.

ENVIRONMENTAL CONDITIONS IN NEPAL

The newly elected government of Nepal has recognized the environment as an important issue in the nation's development programs.[1] For example, the new constitution of Nepal (1991) mandates environmental protection and conservation as national priorities in state policies. Nepal signed the 1992 UNCED (Rio Treaty) and firmly placed environmental issues in the forefront of the nation's eighth development plan (1992–97). However, much of this emphasis on environmental conditions is only symbolic. Because Nepal is struggling to achieve basic necessities of life as outlined above, environmental issues are often ignored during policy design and implementation. As a result the country suffers from severe environmental degradation. The nature of this degradation also differs somewhat by ecosystem and region. Therefore, the following section will discuss environmental conditions in the mountains, hills, and Terai separately while recognizing the interdependence of these regions.

MOUNTAIN AND HILL REGIONS

In recent years the ecological situation in the Nepal Himalaya has become of great concern to some observers who have argued that ecological collapse is quickly approaching (Gurung 1982; Karan and Iijima 1986; Shrestha 1986; Ives and Messerli 1989; Bajracharya and Gurung 1992). Due to rapid growth of population and the subsequent impact of overexploitation of already depleted resources, ecological degradation of Nepal's for-

ests for fuel, timber, and fodder and the expansion of agricultural land in previously forested areas is proceeding at a very rapid rate (Moddie 1981).

According to the Ministry of Forest and Soil Conservation, Nepal lost 50% of its forest cover by 1971. This rate of deforestation has continued during the last two decades culminating in only 27% of Nepal's original forests remaining (Rising Nepal 1992). The present rates of deforestation are far higher than the natural regenerative capacity, causing severe environmental problems.

At present, according to the census report of 1991, 53.3% of the total population of Nepal lives in the hills and mountains. They cannot feed themselves on the deteriorating environment, forcing many hill and mountain people to migrate to the Terai and to the Kathmandu Valley. In addition, the fast-growing population in the mountains and hills is extending its cropland to more and more marginal land, which for reasons of topography and soil quality is unsuitable for sustainable agricultural use (Shrestha 1990). New croplands on steep and unstable slopes, overgrazing of animals in forested areas, and harvesting of trees from dwindling forests for fuel, fodder, and timber is continuing at a catastrophic rate.

The destruction process of forest resources in the Nepal Himalaya has resulted in climate changes leading toward aridity and loss of organic topsoil. Each year monsoon rains wash away more than 12 tons of soil from each acre of land. In the worst areas 80 tons of topsoil are washed away annually (Lean 1983). Complicating this situation has been the increase of livestock in the region (goats, yaks, sheep, and even water buffalo), which are usually herded over these depleted slopes consuming whatever comes into their paths.

The process of deforestation, soil erosion, and desertification has an impact on other regions of Nepal as well. Land slides and floods wash debris down into the Kathmandu Valley and lowlands endangering human life, villages, and arable lands. It has been observed that rivers in the Terai are rising 15–30 cm every year (Rana 1976). The destruction caused by the increased flood levels is catastrophic. During 1993, heavy rains hit most areas of Nepal causing landslides and floods that killed 1157 people and displaced 428,851 others.

Similarly, new industrial activities such as carpet making and tourism have negatively affected mountain ecosystems (Gurung 1982). The carpet industry requires a lot of firewood for the drying process and also produces an enormous amount of pollutants, which work their way into waterways. The soaring number of tourists (trekking) and mountaineers in Nepal is damaging mountain ecosystems as well (Sharma 1989; Shah 1990; Bajracharya 1990). Tourism in the upper slopes of the Himalayas has created a demand for firewood by local villagers to cook meals and heat guesthouse rooms for tourists. In addition, many campsites and villages are becoming very unhygienic because of human and mule waste and garbage left by these visitors. One noticeable source of garbage, which is increasing, is the use of bottled water by tourists to avoid contaminated local water sources. There are now growing dumpsites full of these bottles (and other garbage) located near almost every mountain village in trekking areas.

TERAI AND KATHMANDU VALLEY ENVIRONMENTS

As discussed above, rapid population growth, haphazard development, urbanization, and short-term environmental management practices pose serious threats to Nepal's lowlands

and valleys. Environmental decay in these areas is exacerbated by mountain ecosystem degradation as well. The most serious environmental problems in these areas—especially the Kathmandu Valley—include land, water, and air pollution and loss of agricultural land due to urbanization and erosion.

In regard to land pollution, solid waste management is almost nonexistent. Except for some tourist areas in Kathmandu (Thamel area) where local merchants and hotels provide some solid waste disposal, there is widespread dumping of garbage, open landfills, and human and animal excrement on streets and paths. Surface and ground water is severely polluted in the region as well by industrial effluent, waste dumping, and discharge of untreated sewage into rivers. The Bagmati, Vishnumati, Manohara, and Hanumante Rivers are all seriously polluted and yet are used for bathing (humans and animals) and household water. Piped drinking water in Kathmandu also is improperly treated and contains much waste from broken sewer and water lines. One study of the Kathmandu Valley disclosed that almost 90% of all piped drinking water contained disease-causing microbes and hazardous chemicals (Environmental Policy Council, 1993).

Air pollution is another growing problem in the lower valleys (including Kathmandu) of Nepal. In recent years many people have started wearing facemasks to protect themselves from the smog and dust. The increase in air pollution is the result of polluting factories, growing population, an increase in motor vehicles, and use of leaded oil products. Kathmandu is now considered one of the most polluted cities in the world (Dahal and Dahal 1993).

Environmental degradation of the valleys and Terai has significant negative effects on public health and the economy. Numerous diseases are prevalent among the populace such as typhoid, cholera, diarrhea (leading cause of death among children), hepatitis, bronchial infections, and skin allergies. This situation disproportionately affects the poor, according to a World Bank study (World Bank 1993).

The economic costs of environmental degradation include a potential loss of foreign capital in the Kathmandu Valley due to declining tourism, increased costs of importing or boiling water for drinking, declining agricultural productivity, loss of amenities such as parks, public baths, playgrounds, and rivers (Adhikari 1995). There has also been environmental damage to Nepal's cultural heritage with corrosive chemicals in polluted air destroying many of the ancient brick, stone, and wood temples in Nepal.

ELITE COMMITMENT TO THE ENVIRONMENT

The discussion above portrays a vivid picture of human-caused disturbances to Nepal's environment. Rapid population growth, deforestation, resource depletion, and pollution all pose serious questions about sustainable development in the Nepalese context. While there have been some successful efforts at sustainable agriculture and forestry practices in some areas (Chhetri and Pandey 1992; Dahala 1994; Gilmour and Fisher 1992; Von der Heide 1993), the overall condition of mountain, valley, and Terai environments has continued to deteriorate at an alarming rate. Given the vast short-term socioeconomic and political problems facing the country, however, what level of commitment to the environment is accorded by the political establishment?

Elite commitment to the environment is likely influenced by a variety of factors. Research conducted in advanced industrial countries has focused on socioeconomic factors—such as education, income, occupation, residence, age, and gender—and political

factors including ideology and partisanship (Steel 1996; Pierce et al. 1992). Other factors that may be of great importance in understanding public policy issues and commitment to the environment—particularly in a heterogeneous society like Nepal—are religion and ethnicity (Tuladhar 1994). Recently there has been a call to examine the impact of religion on environmental attitudes and behavior. For example, Coward has argued, "[R]eligions can and do strongly shape people's attitudes and behavior toward the environment" (1995: 2).

SOCIOECONOMIC FACTORS

Group-based social attributes have long been a salient feature of research concerning environmental attitudes in advanced industrial countries (Dunlap et al. 1983; Milbrath 1984; Pierce et al. 1992). Among the most commonly employed measures are gender, age, income, and education. Age is a widely used variable in evaluating attitudes toward the environment. For example, younger cohorts in Western societies are considered to be more likely to focus on environmental concerns than older cohorts (Inglehart 1995; Pierce et al. 1992); consequently, age (as an indicator of cohort) is an important background factor in any environmental study. Interviews conducted with Nepalese elite (governmental and nongovernmental) during 1995 revealed similar patterns.[2]

In addition, there may be a link between attitudes toward the environment and gender. In Nepal, most women legislative elite and party activists have rural backgrounds and depend on agriculture as the main source of their livelihood (Chalise 1995: 65–66). We would expect this close association with the land as well as differential socialization experiences to lead women to take a more (personally) protective view toward nature (Gurung 1994). However, the number of women represented in parliament and party organizations is very small due to a strongly patriarchal culture in Nepal (Chalise 1995; Singh 1995; Tuladhar 1994). In fact, Nepal is only one of three countries in the world where men's life expectancy exceeds that of women (Singh 1995).

Level of formal educational attainment is included in this analysis because it is broadly associated with having a strong impact on orientations toward the environment (Milbrath 1984). Because of the increased likelihood of exposure to principles of ecology in a formal educational setting, those individuals with higher levels of educational attainment are significantly more likely to have attitudes sympathetic to environmental concerns when compared to individuals with less formal education.

Another variable sometimes linked to environmental attitudes is income (or economic class as operationalized in this study). Some observers have argued that environmentalism in Western societies is the product of growing affluence and the emergence of the middle and upper-middle classes (see Inglehart 1995). While this variable is strongly linked to education, it is an important control variable to consider when examining attitudes toward the environment.

Two additional variables to investigate in the Nepal setting for their potential affect on commitment to environmental issues are ethnicity (which is sometimes synonymous with caste among Hindus) and religion. Characteristic of many developing countries, these two variables tend to be "reinforcing" instead of "cross-cutting" factors. In Nepal, ethnic groups typically are located in specific geographic regions and are associated with specific religious orientations. For example, the Terai and Kathmandu valley are predominantly Hindu in religious orientation and comprised of the following ethnic groups/castes: Brahmin, Chhetri, Newars, Singh, Shah, and so forth. The hill and moun-

tain regions have Tibetan influence and are therefore more likely to be Buddhist and represented by ethnic groups such as the Gurungs, Sherpas, Tamangs, and so forth. (Allen 1994; Chalise 1995; Tuladhar 1994; *Population Monograph of Nepal* 1995).

Because the caste system in Hindu societies creates a socioeconomic hierarchy among groups, we expect to find few, if any, lower castes (e.g., untouchables such as Kami, Sarki, Damia, etc.) in our analysis of Nepalese political elite and their commitment to environmental issues. The Hindu caste most represented in Nepal's political establishment includes Brahmin (priest), Chhetri (warrior), and Newars (original inhabitants of Nepal) from Hindu regions (Chalise 1995; Kumar 1995; POLSAN, 1992; Tuladhar, 1994). From the hill and mountain regions other ethnic groups will predominate such as Sherpas and Tamangs.

Because there is very little literature in regard to the environmental attitudes of various ethnic groups in the region, we will rely upon what has been written concerning Asian religions and orientations toward the environment. Buddhism is a religion that has been identified as espousing nonviolence to animals and harmony with nature (Chappel 1993). One of the most basic teachings of Buddhism concerns an interdependent and holistic view of the world (*pratityasamutpada* in Sanskrit). This view of the world calls for moderation in activities involving the environment. Overconsumption of resources in one part of the world can cause damage in another part of the world. For each action taken by a person or a society there are consequences for other parts of the universe (Gross 1995). This principle is very similar to Western ecologist views of ecosystems and the interdependence of plants, animals, and humans in those ecosystems (see Smith 1992: Chapter 1).

Hinduism (like other religions) operates at many different levels for different people. It is a very complex religion with much diversity inherent in its teachings. However, Hinduism traditionally has a relatively pessimistic view of the present and the future. While it has a very holistic view of the world much like Buddhism, it sees humankind as going downhill from its beginnings. The Vishnu Purana (fifth century Hindu text) characterizes present times as follows: "Wealth and piety will decrease day by day, until the world will be wholly depraved. . . . Earth will be treasured only for her mineral resources, dishonesty will be a universal means of subsistence, presumption will take the place of learning. Thus in the Kali age decay will constantly proceed, until the human race approaches annihilation" (quoted in Klostermaier 1995: 139).

Because of this pessimistic view concerning the environment and the "widespread incidence of overuse of land, of neglect of maintenance, of overgrazing and deforestation of Hindu farmers," Klostermaier has doubt concerning the "effectiveness of Hindu ideas of ecology" (1995: 150). This is not to say that Hindu societies are devoid of environmental consciousness. There have been many grass-roots movements (see Akula 1995) that have fought for sustainable forestry (e.g., the *Chipko* movement in India), opposed destructive dams (e.g., the Narmada Valley Development Program), and promoted sustainable development and resource use (e.g., the *Jharkhand* movement). Because of these suggested differences between Hindus and Buddhists, we would expect political elite who are Buddhists to be more likely to identify environmental issues as important national priorities when compared to Hindus.

POLITICAL FACTORS

Attitudes toward the environment are also conceivably influenced by, or are a component of, general political and social values. In advanced industrial countries, for example, the

liberal-left perspective has been identified with support for environmental protection while the conservative-right perspective has been viewed as less supportive (Steel and Soden 1989; Pierce et al. 1992). In part, this is due to conservative attachment to the status quo and use of the marketplace to allocate values while liberals are more likely to critique the existing economic and political system and to support noneconomic uses of the environment.

In the Nepal context, however, the ideological spectrum is much different than what you would find in most advanced industrial countries. Of the eight parties that have been successfully winning parliamentary seats in the 1991 and 1994 elections, four are Marxist-based (Unified Marxist Leninists; Nepal Communist Party, Nepal Workers and Peasant Party, and United People's Front Party), and three are right-wing parties (National Democratic Party—Chand, National Democratic Party—Thapa, and Nepal Sadbhavana Party). The Nepal Congress Party is considered to be the centrist party. Content analysis of party manifestos/platforms conducted by Pandey (1995) reveals that the parties of the left and right consider economic and political issues to be some of the most important problems facing the country. The centrist Congress Party was most likely to mention environmental issues in their electoral materials as important political priorities. Nepalese leftist parties are concerned with the advent of market capitalism and exploitation while parties of the right are concerned with political stability and national sovereignty (Thapa 1992). Based on these observations, we expect to see a similar pattern of environmental commitment (and noncommitment) by party activists and parliamentarians in the forthcoming analyses.

STUDY AND DATA

The data utilized in this study to investigate political elite commitment to the environment in Nepal are from structured interviews and surveys conducted of all parliamentarians (both upper and lower houses) and a random sample of party activists conducted in 1992. The surveys were conducted by the Political Science Association of Nepal and were the first surveys ever conducted of the newly elected government of Nepal. For the survey of parliamentarians, all 265 members of both houses were contacted and 256 completed the interviews and surveys for a response rate of 96.6%.

In regard to the party activist interviews and survey, only activists from the eight parties represented in parliament were included in the study. Potential respondents were identified and randomly selected from lists provided by the parties while controlling for party strength in parliament, geography, and organizational level of activist (i.e., village, town, district, central committee). The response rate for the activist survey also was over 96% ($n = 805$). Funding and training for both of these surveys was provided by the Danish International Development Agency (DANIDA).

DEPENDENT VARIABLE

Parliamentarians and party activists were asked three open-ended questions to ascertain what they felt were the three most important national problems facing Nepal. The first question was: "In your opinion, what is the most important problem facing Nepal today?" The second and third questions were: "Can you mention a second (third) important problem facing Nepal? Answers were then coded into 62 possible responses for all three

problems identified. For purposes of this chapter, problems were then categorized into seven general areas—economic development/stability, political development/stability, basic needs, social development/stability, international relations/security, the environment, and other problems. Table 2 lists these problem areas as well as examples of specific responses given by political elite.

INDEPENDENT VARIABLES

The independent variables used to assess the impact of socioeconomic and political factors on elite identification of environmental problems include age in years, sex, subjective class, level of formal educational attainment, religion, ethnicity, political party, and an indicator of party activity level (i.e., village/town, district, and central committee).

ANALYSES

In a developing and newly democratic society such as Nepal, the problems facing the country are innumerable, ranging from basic needs such as food and water to mass literacy. As discussed above, there also are serious environmental problems facing the nation. When asked to identify the most serious problem facing the nation, parliamentarians and party activists were most likely to identify economic development and stability issues. Almost half of parliamentarians (49%) and 40% of party activists identified economic issues (most notably "unemployment" and "price rise") as the most important issues facing the country (see Table 2).

The second most important category of issues for parliamentarians was basic needs (21%), followed by political issues (14%), international relations and security issues (6%), and then social issues and environmental issues (3%, respectively). For party activists, the second most important category of issues was political development and stability, followed by basic needs (16%), international relations and security (8%), social issues (7%), and then environmental issues (5%).

The second and third most important groups of issues identified by parliamentarians and party activists are very similar to this pattern of response for the most important issue. However, slightly higher percentages of parliamentarians and party activists were willing to identify environmental issues as important national problems. This does not mean that parliamentarians and party activists do not consider environmental issues important; they are just not as salient as economic and political problems facing the country. These results are not surprising given that Nepal ranks as one of the 10 poorest countries in the world, has a per capita GNP of approximately $180, and is experiencing political instability (Borre and Tiwari 1994: 98–99).

Table 3 presents the percentage of parliamentarians and party activists who selected at least one environmental issue as an important national problem in Nepal. A dichotomous variable was created from recording the response categories in Table 2 for presentation in this table. The results indicate that for parliamentarians, over 14% selected at least one environmental issue as one of the top three problems facing the country. For party activists, this level was somewhat higher with over 18% of activists naming an environmental issue as an important national problem. The two environmental issues mentioned most frequently by parliamentarians and party activists include health sanita-

Table 2 Political Elite Identification of the Three Most Important Problems Facing Nepal

	Members of Parliament			Political party Activists		
Problems identified	#1	#2	#3	#1	#2	#3
Economic development/stability (unemployment, market system, roads and transportation, price rise, international markets, industrialization, economic development, technology)	49%	43%	36%	40%	37%	31%
Political development/stability (official graft, political instability, political consciousness, citizenship, people-oriented government, political culture, sound administration, confidence crisis)	14%	13%	15%	19%	20%	29%
Basic needs (poverty, food shortage, food and shelter, landless problem, agriculture)	21%	13%	12%	16%	12%	12%
Social development/stability (education, dowry, drinking alcohol, migration, community development, ethnic problems)	3%	10%	9%	7%	10%	9%
International relations/security (relations with India, relations with China, peace and security, national sovereignty)	6%	10%	8%	8%	9%	7%
Environment (health, sanitation, ecology, deforestation, rivers, drainage drinking water)	3%	4%	9%	5%	9%	7%
Other problems	4%	7%	11%	5%	3%	5%
Total	100%	100%	100%	100%	100%	100%
n	256	256	256	805	805	805

tion and drinking water. Remember from previous discussion that only 28% of the population have access to safe drinking water and 2% have access to sanitation services.

The data presented in Table 4 provide some insight into the factors leading some political elite to identify environmental issues as important national problems in Nepal. As discussed earlier, elite commitment to the environment is potentially influenced by a variety of socioeconomic and political factors. Using the dichotomous variable created for presentation in Table 3, we can examine group differences in identification of environmental issues as important national problems by political elite.

Table 3 Percentage of Political Elites Selecting at Least One Environmental Issue as an Important National Problem

	Members of Parliament	Political party activists
Selecting an environmental issue as one of top three national problems	14.4%	18.3%
Not selecting an environmental issue as a top national problem	85.6%	81.7%
Total	100%	100%
n	256	805

When examining cohort differences among political elite concerning their identification of environmental issues as important national issues, we find that the oldest cohort (46 years and older) was least likely to identify such issues as one of the three most important problems facing the country (8% for parliamentarians and 14% for activists). The youngest cohort (35 years and less) among parliamentarians and party activists was slightly more likely to identify an environmental issue as an important national problem.

In regard to gender differences, we find that women are more likely to identify environmental issues as important national problems when compared to men. One-fourth of women parliamentarians and 19% of women party activists identified an environmental issue as an important problem when compared to 14% and 7% of men, respectively. One should keep in mind, however, that the number of women represented in each study is very small. Only 12 women were elected to parliament in 1991 and only 27 women are included in the party activist sample.

The subjective measure for class has a very interesting relationship with the identification of environmental issues as important national problems. Those parliamentarians and party activists who identified themselves as "middle class" were the most likely to identify environmental issues as important national problems. Those party activists who identified themselves as "poor" and "rich" were least likely to identify environmental issues as important. Because none of the parliamentarians identified themselves as poor or lower-middle class, comparisons can only be made between the upper three classes.

For formal educational attainment we find that the higher the level of education, the more likely the individual political elite is willing to identify environmental issues as important. Almost one-third of party activists and 19% of parliamentarians identified an environmental issue as an important national problem. This is compared to 11% for party activists with no formal education and 9% of parliamentarians with primary/secondary education (none of the parliamentarians had less than a primary/secondary education). As discussed above, the increased likelihood of exposure to principles of ecology in a formal educational setting may lead those individuals with higher levels of educational attainment to identify environmental issues of national importance when compared to individuals with less formal education.

In regard to the impact of religion and ethnicity, as expected we find that Buddhists were much more likely to identify an environmental issue as an important national problem (33% of parliamentarians and 34% of party activists) than Hindus (10% of both elite groups). Similarly, we find that those ethnic groups most likely to be Buddhists and located in the hill and mountain regions are more likely to identify environmental issues

Table 4 Socioeconomic and Political Factors Associated with Identification of Environmental Issues as an Important National Problem

	Members of Parliament[a]	Political party activists[a]
Socioeconomic factor		
Age		
Under 35 years	18%	22%
36–45 years	16%	17%
46 and over	8%	14%
Gender		
Female	25%	19%
Male	14%	7%
Class		
Rich	12%	11%
High-middle class	13%	19%
Middle class	17%	20%
Lower-middle class	NA	17%
Poor	NA	10%
Education		
None	NA	11%
Literate	NA	14%
Primary/secondary	9%	16%
Intermediate	12%	18%
B.A.	17%	22%
M.A./Ph.D.	19%	30%
Religion		
Hindu	10%	10%
Buddhist	33%	34%
Secular	3%	10%
Other	9%	14%
Ethnicity		
Brahmin	11%	15%
Chhetri	8%	11%
Newars	17%	20%
Hill/mountain	19%	24%
Terai Groups	4%	8%
Other	6%	7%
Political factor		
Political party		
Left		
UML	9%	12%
UPFN	0%	8%
NeWPP	0%	13%
CPN	13%	14%
Centrist		
Congress	22%	25%
Right		
NDP-C	0%	15%
NSP	0%	15%
NDP-T	0%	0%

Table 4 Continued

	Members of Parliament[a]	Political party activists[a]
Party level		
Village/town	NA	22%
District	NA	17%
Central committee	NA	0%
$n = 253$	$n = 801$	

[a]Percent selecting an environmental issue as important.

as important national problems than many other ethnic groups. Newars, the original inhabitants of Nepal, who typically reside in the polluted Kathmandu Valley, also were more likely than some of the other ethnic groups/castes to identify environmental issues as important national problems.

Turning now to the impact of political party we find that left-wing and right-wing parliamentarians were less likely to identify environmental issues as national problems when compared to Congress Party members of parliament. In fact, none of the right-wing parliamentarians (NDP-Chand, NDP-Thapa, and NSP) and parliamentarians from two leftist parties (UPFN and NeWPP) identified environmental issues as important problems. Similarly, when examining the results from the party activist sample we find that Congress Party activists are more likely to have identified an environmental issue as a national problem than activists in other parties. However, there is much more support for identifying environmental issues as national problems among activists of all parties (with the exception of the NSP) than their colleagues elected to parliament.

The last variable included in Table 4 examines the organizational level of party activists in the sample. Interestingly, the lower the level of activist, the more likely he will identify an environmental issue as a national problem. Over 20% of village/town activists compared to 17% of district activists and 0% of central committee members identified environmental issues as national problems. This finding illustrates the grassroots nature of environmental issues in the Nepalese context. One could argue that this pattern is the result of lower-level activists having greater levels of knowledge and empathy for the enormous environmental problems facing the Nepalese people on a daily basis.

SUMMARY AND CONCLUSIONS

This chapter has provided a brief overview of current environmental problems in the south Asian country of Nepal and has examined the salience of these issues to the new political elite in this newly democratic country. Rapid population growth, deforestation, resource depletion, and pollution have led to ecological degradation in the mountain, hill, and Terai regions and pose enormous risks to sustainable development of the country. Given the vast short-term socioeconomic and political problems facing the country, however, the problems facing the nation as identified by political elite were predominantly economic and political. For many parliamentarians and party activists, the condition of the environment, which of course is interrelated with development of the country, was

not considered as salient as issues such as unemployment, inflation, and poverty. It is obvious that the precarious ecology of the country cannot be improved without tackling economic hardships at the same time.

One area of hope concerning elite attention to the environment was identified in this study. Elite identification of environmental issues as important national problems was influenced by several factors. Younger and more highly educated elite (and party activists in general) were the most likely to identify environmental issues as important problems. Perhaps as there is candidate recruitment from within party ranks and generational replacement within the parliament, there will be a greater recognition of environmental problems and the interdependence of these problems with sustainable development strategies. There are some areas of concern as well. Continuing political instability resulting from the polarized nature of Nepalese politics (i.e., the continuing struggle between the Marxist-Leninists and the Congress Party) may relegate environmental issues to the back burner.

ENDNOTES

1. His majesty's Government of Nepal established a Ministry of the Environment in 1992 under the direction of the Prime Minister. An Agriculture, Forestry, and Environment Division was also established within the national Planning Commission, the most important government development and economic agency.

2. As part of the project, interviews were conducted with 86 governmental and nongovernmental (NGO) elite in Kathmandu and Pokhara, Nepal during the fall of 1995 and winter of 1996. A strong pattern of concern for the environment was prevalent among younger, college-educated elite in both governmental and NGO organizations.

REFERENCES

Acharya, B.M. 1976. "Interdependence of Cottage Industries and Ecological Situations." *Mountain Environment and Development*. Kathmandu: SATA.

Adhikari, A. 1995. "Environmental Problems in the Kathmandu Valley: Some Issues in Planning and Management." *Contributions to Nepalese Studies*. 22: 1–19.

Ahmad, A., J. Clarke, C.B. Shrestha, and A. Trilsbach, eds. 1990. *Mountain Population Pressure*. New Delhi: Vikas Publishing House.

Akula, V. 1995. "Grassroots Environmental Resistance in India." In Bron Raymond Taylor, ed., *Ecological Resistance Movements: The Global Emergence of Radical and Popular Environmentalism*. Albany, NY: SUNY Press: 127–145

Allen, M., ed. 1994. *Anthropology of Nepal: Peoples' Problems and Process*. Kathmandu: Mandala Book Point.

Bajracharya, D. 1983. "Deforestation in the Food/Fuel Context: A Historical and Political Perspective of Nepal." *Mountain Research and Development* 3: 227–240.

Bajracharya, D. and S. Gurung. 1992. "Deforestation in the Nepal Himalayas: Is Fuel Wood the Real Culprit?" *Spotlight* January 7: 7–10.

Bajracharya, P. 1990. "Environmental Impact of Tourism Development." *World Today*. 8: 12–15.

Borre, O.S.P. and C. Tiwari. 1994. *Nepalese Political Behavior*. Denmark: University of Aarhus Press.

Chalise, S.C. 1995. *Sociology of the Legislative Elite in a Developing Society*. Kathmandu: Nepal Foundation for Advanced Studies.

Chappel, C. 1993. *Nonviolence to Animals, Earth, and Self in Asian Traditions.* Albany, NY: SUNY Press.

Chhetri, R. and T. Pandey. 1992. *User Group Forestry in the Far-Western Region of Nepal.* Kathmandu: International Centre for Integrated Mountain Development.

Coward, H. 1995. *Population, Consumption, and the Environment.* Albany, NY: SUNY Press.

Dahal, M. and E. Dahal. 1993. *Environmental and Sustainable Development: Issues in Nepalese Perspective.* Kathmandu: Nepal Foundation for Advanced Studies.

Dahala, D. Ram. 1994 *A Review of Forest User Groups: Case Studies from Eastern Nepal.* Kathmandu: International Centre for Integrated Mountain Development.

Dunlap, R., G. Gallup, and A. Gallup. 1993. "Of Global Concern: Results of the Health of the Planet Survey." *Environment* 35(November): 6–15.

Dunlap, R., J.D. Grieneeks, and M. Rokeach. 1983. "Human Values and Proenvironmental Behavior." In R. Dunlap, ed., *Energy and Material Resources: Attitudes, Values and Public Policy.* Boulder, CO: Westview.

Eckholm, E. 1975. "Deterioration of Mountain Environment." *Science* 189: 164–170.

_____. 1976. *Losing Ground: Environmental Stress and World Food Prospects.* New York: W.W. Norton.

Environmental Policy Council. 1993. *Nepal Environmental Policy and Action Plan.* Kathmandu, Nepal: HMGN.

Gilmour, D.A. and R.J. Fisher. 1992. *Villagers, Forests and Foresters: The Philosophy, Process and Practice of Community in Nepal.* Kathmandu: Sahayogi Press.

Gross, R. 1995. "Buddhist Resources for Issues of Population, Consumption, and the Environment." In H. Coward, ed., *Population, Consumption, and the Environment: Religious and Secular Responses.* Albany, NY: SUNY Press: 155–172.

Gurung, H. 1981. *Ecological Change in Nepal: A Native Interpretation.* Kathmandu: New Era Publications.

_____. 1982. "Ecological Change." *Seminar* 274: 46–52.

_____. 1990. "Environment Conservation of the Highlands." *Ecovoice* May: 16–19.

Gurung, S. 1994. "Gender Dimension of Edo-Crisis and Resource Management." In M. Allen, ed., *Anthropology of Nepal: Peoples' Problems and Process.* Kathmandu: Mandala Book Point: 330–338.

Inglehart, R. 1995. "Public Support for Environmental Protection: Objective Problems and Subjective Values in 43 Societies." *PS: Political Science and Politics* March: 57–72.

Ives, J. and D. Messerli. 1989. *The Himalayan Dilemma: Reconciling Development and Conservation.* London: Routledge.

Karan, P.P. and S. Iijima. 1986. "Environmental Protection and Economic Development." In S.C. Joshi, ed., *Nepal Himalaya: GeoEcological Perspectives.* Nainital: Himalayan Research Group: 283–294.

Kumar, D., ed. 1995. *State Leadership and Politics in Nepal.* Kathmandu: Centre for Nepal and Asian Studies.

Klostermaier, K. K. 1995. "Hinduism, Population, and the Environment." In H. Coward, ed., *Population, Consumption, and the Environment: Religious and Secular Responses.* Albany, NY: SUNY Press: 137–154.

Lean, G. 1983. "Himalayas Are Being Wasted Away." *Times of India* June 11.

Milbrath, L. 1984. *Environmentalists: Vanguard for a New Society.* Albany, NY: SUNY Press.

Moddie, A.D. 1981. "Himalayan Environment." In Lall and Moddie, eds., *The Himalaya Aspects of Change.* New Dehli: Oxford University Press: 341–350.

Mohai, P. 1992. "Men, Women, and the Environment: An Examination of the Gender Gap in Environmental Concern and Activism." *Society and Natural Resources* 5(1): 1–19.

Pandey, S. 1995. "Election Manifestos of Nepalese Political Parties." Unpublished manuscript. Kathmandu: Tibhuvan University.

Pierce, J., N. Lovrich, B. Steel and M. A. Steger. 1992. *Citizens, Political Communication, and*

Interest Groups: Environmental Organizations in Canada and the United States. Westport, CT: Praeger.

POLSAN. 1992. *Political Parties and the Parliamentary Process in Nepal*. Kathmandu: Political Science Association of Nepal.

Population Monograph of Nepal. 1995. Kathmandu: His Majesty's Government National Planning Commission Secretariat.

The Rising Nepal. 1992. Kathmandu: National Daily September 2.

Rana, R. 1976. "Notes for Design: Environment and Development Planning." In *Mountain Environment and Development*. Kathmandu: SATA: 111–112.

Sachs, C. 1996. *Gendered Fields: Rural Women, Agriculture, and the Environment*. Boulder, CT: Westview.

Shah, K. 1990. "Mountaineering in Nepal." *Kathmandu Review* 10: 10–14.

Sharma, L.P. 1989. *Mountain Tourism in Nepal: How Much Compatible Is it to the Fragile Himalaya Environment?* Meerut, India: Research India Publication.

Shrestha, V. 1986. "Resource Use and Its Ecological Implications: A Case Study of Tinau Watershed." *Himalayan Review* 17: 63–76.

_____. 1990. "Environment Protection: Need of the Hour." *Rising Nepal* June 5.

_____. 1994. "Environmental Problems in the Nepal Himalaya." *Contributions to Nepalese Studies* 21: 137–151.

Singh, S. 1995. *Statistical Profile on Women in Nepal*. Kathmandu: Sheela Printers.

Smith, Z.A. 1992. *The Environmental Policy Paradox*. Englewood Cliffs, NJ: Prentice-Hall.

Steel, B.S. 1996. "Thinking Globally and Acting Locally: Environmental Attitudes, Behavior and Activism." *Journal of Environmental Management* 47: 27–36.

Steel, B.S., P. List and B. Shindler. 1994. "Conflicting Views of Federal Forests: A Comparison of National and Oregon Publics." *Society and Natural Resources* 7: 137–153.

Steel, B.S. and D. Soden. 1989. "Acid Rain Policy in Canada and the United States: Attitudes of Citizens, Environmental Activists, and Legislators." *Social Science Journal* 26: 27–44.

Thapa, G. 1992. "National and Local Problems: Views of Political Parties." In POLSAN, *Political Parties and The Parliamentary Process in Nepal*. Kathmandu: Political Science Association of Nepal: 164–184.

Tuladhar, A.R. 1994. "Naming Anti-Developmental Attitudes." *Contributions to Nepalese Studies* 21(July): 191–212.

Von der Heide, S. ed. 1993. *Appropriate Technologies and Environmental Education as Possibilities for Intercultural Perception in the Himalayan Area*. Kathmandu: Kantipur Offset Press.

World Bank. 1993. *Annual Report*. Washington, D.C.

18

Bureaucratic Politics in Korean Environmental Policy

Chun-Oh Park and Sung-Chul Kim
Myong-Ji University, Seoul, Korea

INTRODUCTION

Since the early 1960s the Korean government has pursued industrialization policies with little concern for environmental protection. Although Korea has been successfully transformed from an agrarian society into a newly industrialized society in less than three decades, it now faces serious environmental problems due to the rapid expansion of heavy industry. The social costs of pollution and ecological destruction began to loom large during the 1970s. Environmental accidents occurred frequently and received increasing exposure in the media. Some of the incidents provoked violent antigovernment protests from the public. Under these circumstances the government belatedly enacted the Environmental Protection Act (EPA) in 1979 and created the Environmental Administration (EA), the first environmental agency, in 1980. Since then, the government has passed a series of statutes and regulations proscribing certain industrial behaviors and mandated various procedures, including such modern regulatory instruments as environmental impact assessments, discharge permits, and effluent fines to reduce future environmental problems. In recent years the government has been paying more attention to environmental matters as more citizens and environmental groups have expressed greater expectations for effective environmental policies. In spite of all these signs of government efforts, Korean environmental quality has continued to deteriorate.[1] Municipal and industrial waste clogs rivers, streams, and lakes: sewage goes untreated: wildlife and wilderness areas diminish; and metropolitan sprawl is unplanned. By now it is all too obvious that the government response to the challenges of environmental problems has been inadequate and ineffective (Ha 1991). Why is the government's answer to the environmental challenges, at best, an unfulfilled promise? This chapter focuses on the effects of the interaction among public agencies on Korea's environmental policy process in order to address this question.

In Korea, bureaucratic institutions have dominated policymaking, as well as policy

implementation under authoritarian regimes since 1961. Typically, policies are proposed by one of the ministries. The proposals are reviewed with other ministries before their submission to the cabinet and the president for the final decisions. It is, in fact, this process of review and coordination of policy proposals among ministries that determines policies. Other political actors such as the legislature, political parties, and interest groups play a minimal role in this process. For example, the legislature has passed almost all proposals coming from the executive branch without careful review for decades. Even under the current President Kim, this pattern of bureaucratic dominance in the policy process so far has not experienced significant change.

Research on policy processes in Korea has long pointed to the dynamics of bureaucratic politics and acknowledges the imbalance of political power among ministries as an important factor in this process. This situation applies to environmental policy as well. A number of studies suggest that the main reason for ineffective environmental policies can be found in the Ministry of Environment's (MOE) inability to initiate strong environmental policy proposals, or to persuade other relevant ministries to adopt them (Jung 1991; Kim 1993). In this chapter we intend to verify MOE's lack of political power and the reasons for the lack of this power.

This study begins with a review of the progress that has been achieved in both environmental policy and its management in Korea for the last several decades. Next we discuss why MOE has little political power by reviewing previous research in the field. In conclusion, we provide some survey results to verify these analyses of the situation.

THE EVOLUTION OF KOREAN ENVIRONMENTAL POLICY

Environmental policies in Korea have been significantly influenced by rapid economic growth, Korean's unique political and administrative culture, prevalent societal values, and certain serious environmental incidents. After the Korean War (1950–1953), Korean society as a whole tried to restore the national economy and return political stability. The first priority of government policy was economic development.[2] Since this concern was so important among the public, as well as for politicians in the period of the 1950s to the early 1960s, very few wanted to raise environmental issues.[3] The government above all had to find a way to satisfy people's basic needs.

From the early 1960s to the mid-1970s, under the strong leadership of President Park, the first economic development plan was established and implemented. All public policies were designed and controlled by elites in the bureaucracy (Ahn 1995). To accomplish industrialization, modernization, and economic development, all possible human and material resources were mobilized for export. Though a few people, including clergy and scholars, had gradually perceived the importance of the environment, they could not raise this issue for governmental consideration because they failed to get the public's attention. Furthermore, anyone who advocated environmental protection seriously was in danger of being viewed as an antigovernmental activist or communist.

However, there was some minimal progress toward attacking environmental problems in this period. The Pollution Prevention Law (PPL) was passed in 1963.[4] The Ministry of Health and Social Affairs (MOHSA) was established in 1967 and was made responsible for pollution prevention, along with many other assignments.[5] The MOHSA, however, was unable to carry out the PPL because economic ministries (e.g., the Ministry of Finance, the Ministry of Commerce and Industry, and the Ministry of Construction) strongly opposed implementing the PPL. These ministries believed it was an obstacle in

pursuit of accomplishing fast economic development.[6] In addition, for the MOHSA, pollution prevention was not a top-priority mission. Therefore, no agency really wanted to be responsible for the PPL and, as a result, virtually no budget was allocated for it. The PPL was at best symbolic (Moon 1993).

During the 1970s, economic growth was still the prime agenda for the Korean government. However, high officials started to realize the importance of an environmental policy. Accordingly, policy organizations and research institutes in environmental policy were established and expanded. The Environmental Preservation Law (EPL) was enacted in 1978. New positions, such as a Director for Nature Preservation, were added to the Ministry of Home Affairs in 1978. The National Environment Research Institute was founded in the same year. In 1980, the Environment Administration (EA) was established under the MOHSA. The size and functions of the EA were expanded thereafter. More importantly, during the 1980s the Environment Rights Clause, which calls for clean environment, was added to the Constitution. People began to consider environmental rights as a basic right. Unfortunately, however, government responsibility for the environment and nature preservation was spread among several ministries. The newly created EA was not given full responsibility for environmental protection because of the strong resistance from other ministries that had partial jurisdiction in environmental affairs. In addition, the budget and human resources for environmental protection were not enough. Implementation was weak. In 1980, for example, only 0.187% (including financial support for local government) out of the total government budget was allocated for the EA and 0.242% in 1992.

Since the late 1980s, the Korean public has wanted a more dynamic policy for environmental protection as environmental problems have become diversified and complicated. Above all, people became more concerned with the quality of life, as scholars in academia and the media contributed with studies and reports bringing environmental issues to the public forum. Finally, in 1991, six bills were enacted by the government and were designed to deal with environmental problems more systematically. They are the Basic Environmental Policy Act (BEPA), Toxic Chemicals Control Act, Environmental Dispute Settlement Act, Water Quality Preservation Act, Air Quality Preservation Act, and Noise and Vibration Control Act (MOE 1995). Among them, the BEPA of 1990 was the most important law because it defines the rights and duties of citizens as well as the obligations of the government on environmental preservation, and provides for overall fundamental needs (MOE 1995: 337).

There was indeed resistance from economic ministries. They suggested amending existing environmental laws rather than making new ones. They argued that rapid increases in implementing environmental policies could hurt many industries in the Korean economy. Along with this, noncompliance on the part of large corporations was a serious challenge to the effectiveness of the new laws. In 1990, the EA became the Ministry of Environment (MOE), a junior ministry with no cabinet position. The MOE's organization was later expanded to include six branch offices in various locations. However, the nagging problem of fragmented authority remained as a main obstacle to effective policymaking and implementation.

In 1994, the MOE was raised to a cabinet ministry with the same title as before and its functions were expanded again. Along with this, some environmental functions were transferred from other ministries to the MOE. The Environmental Impact Assessment System was adopted for balancing economic development and environmental preservation in an efficient manner.[7] In spite of all these efforts, the government is still

blamed for not doing enough to address the problems of environmental pollution. It is, in fact, true that all the policies above are not adequate and the government's will toward policy implementation concerning environmental issues is relatively weak.

WHY DOES THE MOE LACK POWER?

Theoretical Background of Bureaucratic Politics

It has been pointed out that the contemporary policymaking process is, in general, led by the executive branch and policy decisions emerge out of those interactions among departments and agencies within the executive branch (Long 1949; Allison and Halperin 1972; Wamsley and Zald 1967, 1973; Rourke 1984; Rosenbaum 1985; Meier 1993). In other words, in many cases policy outcome and implementation by the executive branch are the result of a power struggle among several ministries and agencies that want to maximize, or at least protect, their own interest. This is especially true when various agencies' jurisdictions overlap each other as does environmental policy in Korea.[5] Therefore, the following section briefly describes the reality of bureaucratic politics in the process of environmental policymaking and implementation in Korea and provides some illustrating cases (Ku 1989; Kim 1993; Jung 1991).

BUREAUCRATIC POLITICS IN KOREA

The inadequate response of the Korean government to environmental problems results largely from the inability of the MOE to integrate environmental concerns into policy formulation and implementation. Environmental policy in Korea reflects a fragmented authority structure and myopic view: (1) where pressing needs that arise from continuing spoliation of the natural and social environment are met with stingy and inadequate remedies; (2) where long-range plans rarely are framed and even more rarely acted upon; and (3) where environmental policies are restricted largely to limited issues addressed by compartmentalized services. There are no far-sighted comprehensive plans thar are expressed in concerted action and constantly improved by impartial monitoring and evaluation. Most wars on environmental problems are skirmished, hastily mounted, isolated defensive actions (Moon 1993; Kim 1993).

The most serious cause of such problems is that MOE shares the responsibilities for environmental management with many other ministries. For example, without the economic ministries' agreement, the MOE cannot establish environmental policy. Furthermore, there is no systematic linkage of functions between the MOE and these other ministries. This absence of linkage makes it hard for the MOE to consider environmental problems originating from policies implemented by other ministries. As a result of the MOE's relatively weak power in the bureaucratic hierarchy, other ministries have little incentive to pay attention to the environmental consequences of their policies. When the environmental organization was either the EA (1980–1991) or a non-cabinet-level MOE (1991–1994), one reason for its weakness in bureaucratic struggles was that it did not have a full cabinet-level ministry. Although the MOE was raised to a cabinet-level ministry in December 1994, it still remains a relatively powerless agency in the government. The more powerful cabinet ministries continue to neglect environmental concerns with relative impunity. For example, in a number of cases government projects were initiated by other ministries before they obtained the required environmental clearance from the MOE (Jung 1995; Kim 1993).

It is unlikely that the MOE can gain political power quickly in the near future considering the strong bias in favor of economic development within the executive branch. The government administrative culture has not kept pace with the dramatic deterioration of the environment. Emphasis on economic growth rather than environmental protection pervades the government bureaucracy. Higher officials in many ministries still give precedence to the short-term benefits of economic development rather than the long-term benefits of sustainable growth or the full costs of environmental deterioration. For politicians, including the president, environmental issues have received little attention, because the mega-projects and prestige projects, which provide employment, visibility, and other political benefits for constituents, have attracted the majority of votes, money, and priorities.

CASE ANALYSES OF BUREAUCRATIC POLITICS

This section selects some cases to provide a better picture of how bureaucratic politics influence Korean environmental policy. The first case is about fragmented authority in water quality management and the second case covers the implementation problems of untreated wastewater discharge in the city of Taegu.

Case 1: How Did the Economic Ministries Block the MOE's Intention to Expand Its Authority in Water Quality Management?

In 1989, it was found that tap water in Taegu was seriously contaminated by heavy metals and cancer-causing substances. In the early 1990s, high officials in the Korean government raised this issue and searched for a solution. In July 1990, the Ministry of General Administration (MOGA) formulated and announced a proposal that the authority over water quality management, dispersed among 15 ministries and administrations, would be transferred to the MOE. The MOE, after replacing the Environment Administration (EA) in 1990, was very eager to take over all authority on environmental issues from other ministries as the MOGA proposed. But the proposal could not be carried out because of opposition from other ministries. In October 1990, the MOGA once again brought up this proposal, but a few months later withdrew it. It turned out that the Ministry of Health and Social Affairs (MOHSA) and the Ministry of Construction (MOC) strongly insisted that they had vested rights in controlling water quality.

In March 1991, there was a phenol incident that seriously threatened public health. In April 1991, the Minister of the MOE publicly announced that the MOE had a master plan for better water quality management from small creeks to lakes. The MOE attempted to contact and persuade other ministries to accept its master plan. There were no positive responses from the other ministries.

These days, the MOE has more authority and policy discretion than ever before, but its political power is still limited compared with that of other ministries. A similar case, illustrating the MOE's lack of power, was found when the MOE proposed to designate Phaldang and Daechung Lakes as special areas for water preservation since those lakes are a water source for Seoul. Nevertheless, the MOE could not carry out this plan owing to the resistance of other ministries, including the Ministry of Home Affairs and the Ministry of Construction. The plan was pending at the cabinet level for a year before it was finally passed. By that time, many hotels and big restaurants had already impaired the water quality of the lakes (Park 1993).

Case 2: How Did Large Corporations Mobilize Economic Ministries and Others to Block the MOE's Implementation Efforts?

In April 1991, the local office of the MOE in Taegu illegally allowed dyeing factories to discharge untreated wastewater into the Nakdong River. The central office of the MOE investigated the incident. The river was seriously polluted. For example, biochemical oxygen demand (BOD) level was significantly increased from 1 mg/L to 4 mg/L.[9] The media covered this incident in headline news for days. The public and environmental groups all called for prompt government action. Some scholars argued that this was a typical political corruption case.

Under pressure from public opinion, the MOE hastily ordered the factories in the Dyeing Industrial Complex to shut down every seventh day. The manufacturers complied with the MOE's order and installed a wastewater treatment device. There was a significant reduction in pollution that was close to the MOE's standard. However, later the factories in the Complex asked the MOE to return a break every 10 days rather than every 7 days since they had made significant efforts to reduce pollution level. The MOE warned that if the factories did not comply with its decision, it would order suspension of all manufacturing operation.

In the meanwhile, the economic ministries (e.g., the Ministry of Commerce, the Economic Planning Agency, and the Ministry of Internal Affairs) and the Taegu city government persuaded the local office of the MOE in Taegu not to suspend factory operations, pointing out that such a decision would seriously damage the national economy. This became a political issue. Finally, the highest political figures intervened and ordered the factories to take a break every seven days.

Similar implementation cases are found in other situations. In 1990, for example, the Ministry of Construction and the Seoul city government did not comply with the Environmental Impact Assessment policy when they built the West Bank Highway and the Fifth Subway Line. Obviously, the political power of economic ministries was much greater than that of the MOE. Another case is the phenol accident in 1991. The MOE suspended Doo-San Electric's operations shortly after the corporation discharged phenol, a chemical very harmful to the human body, into a nearby river and caused a strong public protest. However, the Ministry of Economic Planing and the Ministry of Commerce and Industry pressured the MOE to let Doo-San Electric continue its operation. The MOE reluctantly gave in to the pressure, and allowed the corporation to reopen operations. However, in 10 days, the corporation did the very same polluting.

THE CAUSES OF THE MOE'S LACK OF POWER

In general, the level of political power of an administrative agency is determined by its internal organizational characteristics[10] and its external base (Rourke 1984; Meier 1980, 1993). However, in the case of Korea with its own particular political culture, an agency's political power mainly depends upon the latter (Jung 1991, 1992; Kim 1993). This has been confirmed by many previous studies. Using these studies, this chapter explains MOE's relative lack of power focusing on disadvantages in its external power base.

The external base of an agency's political power is believed to consist of two parts. One is political support form other political actors (e.g., the president, legislature, other administrative agencies, interest groups, the public, and the media). The other is its own policy jurisdiction. As a general rule, those agencies that have both a strong political

support from other political actors and a solid jurisdiction have stronger political power (Meier 1985, 1993; Rourke 1984; Long 1949; Wilson 1989; Salamon and Wamsley 1975; Van Horn et al. 1989). This section describes why the MOE lacks political power in terms of these two components of power base.

LACK OF POLITICAL SUPPORT FROM EXTERNAL ACTORS

In general, an administrative agency has two political supporting bases: (1) political forces such as the president, legislature, other administrative agencies; and (2) social forces such as the general public, interest groups, and the media. We will look at six actors in this section: (1) the public; (2) interest groups; (3) mass media; (4) national assembly; (5) the president; and (6) other ministries.

Public Opinion

Though public opinion can change rapidly (Downs 1972; Meier 1980, 1993), it sometimes influences public policy. This is especially true in the case of highly visible issues such as environmental policy (Meier 1993). Since the 1980s, the Korean people have become increasingly aware of the importance of environmental protection (Jung 1988). According to government surveys (Environment Agency 1982, 1987; Taelyuk Research Institute 1990), the public has been more sensitive to pollution incidents.[11] As seen in the phenol accident in 1991, the public's high awareness sometimes strengthened the MOE's political power briefly.[12] The public's awareness of environmental issues, however, is still limited to either the most visible local issues or their own salient regional issues. Therefore, it will take time for public opinion to become a stable political base for the MOE.

Interest Groups

In general, a well-organized interest group can enhance the political power of an administrative agency (Rourke 1984; Wamsley and Zald 1973); in Korea, however, the influence of interest groups in the environmental policy process has been rather weak. Since the authoritarian regimes have given top priority to economic growth, industrial interests have had the most influence (Kim 1987). Industrial interests could either directly pressure the MOE or indirectly influence it by mobilizing the economic ministries to take sides with them. This was one reason why the MOE could not formulate or implement strict environmental policies. Even under current democratic administration, the direct and indirect influence of the industrial groups in the environmental policy process has not been significantly reduced (Moon 1993; Kim 1994).

Those groups that could be potential supporters of the MOE are not well organized even though their total number has remarkably increased since the late 1980s. They have neither organizational cohesiveness nor professionalism. Furthermore, their membership is still limited to a small number of intellectuals and clergy, and their financial bases are very weak. Their activities are sporadic and focus on demonstrations, accusations, and fact finding. They do not have formal or informal access to the MOE (Ryu 1993; Kim 1992). Recently, however, a movement began among environmental groups to combine their organizations into a larger one to enhance their political clout. While these interest

groups in environmental policy have become more active compared with those in the 1970s,[13] they certainly cannot compete with industrial groups in the policy process. Moreover, they do not support the MOE. Except for some officially registered groups, most of them have an uncomfortable relationship with the MOE,[14] because they believe that the MOE covers up environment-related information or protects some polluting companies (Moon 1993). Similarly, the MOE does not regard environmental groups as friends. It believes that the groups disclose classified information to the public and bring about unnecessary environmental crises. The MOE also believes that many environmental groups are involved in politics that go far beyond mainstream environmental activities. Thus, the MOE is not willing to work with environmental groups nor give them relevant information (Kim 1992). It is, therefore, difficult to expect good relations between environmental groups and the MOE, like the close relationship between economic ministries and industrial groups (Kim 1992, 1994).[15]

Mass Media

The media can either help or hinder the political power of an administrative agency (Van Horn et al. 1989) by reporting and highlighting the importance of the agency's activity in the former case, and reporting improper uses of the agency's power, dereliction of duty, and faulty policy implementation in the latter case (Lynsky 1986; Rourke 1984). The media, in general, focus on the incidents that have a visual interest and a strong story line and make people identify with their outcome. Since environmental incidents have all these characteristics, they often attract the attention of the media (Gans 1979; Laundy et al. 1990; Key 1961).

It is true that the mass media in Korea have contributed to informing the Korean public of the seriousness of polluted environment (Jung 1991). However, it is not clear whether the media is an ally or foe to the MOE. Unfortunately, there is no known research on this topic. Recently, however, the media have shown a tendency to emphasize the troubles the MOE experienced in the policy process, such as the lack of political power and a limited budget, rather than the negative aspects of the MOE's activity, such as covering up environmental incidents (EA 1992).

The National Assembly

Many observers agree that the legislative branch can enact a law favorable to an administrative agency (Rourke 1984; Meier 1993; Jung 1992). The actual role of the legislature in the policy process, however, varies depending upon political situations and the country. In Korea, the role and influence of the National Assembly were considerably limited under the past regimes. The executive branch played the leading role in the political process (Jung 1988; Kim 1992; Park 1993). Under the current democratic government, this situation has not changed much (Lee 1994). Although the legislative branch has a little more power now than in the past, it does not support the MOE. Its members are not particularly interested in environmental issues. They have passed most of the environment-related bills prepared by the executive branch without careful examination (Jung 1992; Kim 1992).

Although some members of the opposition party have shown slightly more interest in environmental issues than the ruling party,[16] they too are more interested in economic development in their own districts. They often do not support the MOE. During the

period of formal legislative auditing they tend to blame the MOE's mistakes, rather than suggest the MOE's budget be increased (Moon 1993).

The President

Under a presidential system, the president can be the most important political supporter for a government agency. There are various ways for the president to support a particular administrative agency. He can appoint an influential political figure as a head of the agency or expand the agency's budget (Meier 1993; Kelman 1987; Moe 1989).

Unfortunately, environmental issues and agencies have not attracted much presidential attention. Since President Park's regime industrialization and economic growth have been the ruling doctrine of the Korean government (Choi 1990; Kim 1992). Current President Kim's democratically elected administration also promised "small government" (i.e., basically economic growth, reinforcing international trade competitiveness, and deregulation). Some have argued that the enforcement of environmental policy has stepped backward in the current administration (Lee 1995).

Of course, Korean presidents sometimes emphasize the importance of environmental preservation or call for the expansion of the MOE's role. However, such an emphasis was symbolic in nature. Though presidents promise to strengthen environmental policy to avoid criticism from the public after serious environmental incidents, they seldom keep such promises.[17] For example, until recently no politically important figure has been appointed as the head of the MOE. The MOE's budget is still very small (Kim 1992; Jung 1988).[18]

Other Administrative Agencies

Horizontal support from other agencies can be a power basis for an administrative agency (Meier 1993). In the case of Korea, the support from the Ministry of Finance and Economy (MOFE), the former Economic Planning Agency, is most important since it has the functions of planning and budget allocation (Choi 1992).

However, the MOE cannot expect the MOFE's support. The MOFE is basically development-oriented. It was originally established for planning economic development and its major function is supporting economic agencies. In fact, the MOFE has shown a tendency to cut down a significant portion of the MOE's budget for years. In the cases where there are conflicts between the MOE and other economic ministries, the MOFE tends to support the latter agencies (Kim 1993).

The MOE cannot expect cooperation of support from other agencies either (Cho 1994). Most agencies think the MOE's environmental policies could hurt their own policies and interests (Ha 1991).[19] Some of them have responsibility for the environment; nevertheless, their perspective is quite different from the MOE's since their primary mission is not environmental (Jung 1991). Previous studies point out this lack of cooperation from other agencies as the main reason for Korea's current weak environmental policy.

THE LIMITED SCOPE OF MOE'S JURISDICTION

As previously discussed, those agencies that have clear administrative jurisdiction enjoy more political power than those that do not. In other words, those agencies that require

other agencies' coordination and agreement in their policy area have weaker political power since they must overcome these other agencies' veto power and must pass multiple clearance points for their operation (Sabatier and Mazmanian 1979–1980). For this reason, an agency prefers "less money with greater control" rather than "more money with less control" (Halperin 1974). However, reality is much more complex as most jurisdictions of most agencies overlap one another. Today, government activities are becoming "a complex set of matrices." Policy areas that link multiple agencies are expected to expand more rapidly in the future. Along with this, the conflict over jurisdictions among agencies has increased (Wilson 1989; Fesler and Kettl 1991). The environmental policy area is not an exception.

The MOE is legally responsible for formulating and implementing environmental policy. It supports the preservation of the natural environment and tries to prevent pollution. It is also responsible for coordinating all environmental-related operations of other agencies (MOE 1992). However, the MOE does not function as a leading agency in the environmental policy process because many other ministries share authority in environmental affairs with the MOE and they are more politically influential than the MOE. In reality, the MOE's role is limited to the prevention of industrial pollution (Lee 1995).

As previously explained, when the EA was established in 1980, other agencies did not want to transfer their authority to the EA. The authority for environmental policy is still spread across many other ministries. One reason that the MOE's political power is weak in the environmental policy process is that the MOE as a main environmental agency does not have its own independent jurisdiction and shares policy authority with other ministries that have competing interests (Lee 1995; Kim 1993)

MOE'S LACK OF POWER AND POLITICAL SUPPORT: SURVEY ANALYSES

What has been discussed about Korean environmental policy and the MOE in this chapter can be summarized under four headings. First, there are fractured structures in the environmental policy area. The administrative structure in this particular policy area is very complex. Many ministries, including the Ministry of Construction and Transportation, Ministry of Commerce and Industry, and the Ministry of Interior, have some responsibility for environment policy, as well as their primary assignments. Each ministry has its own directives regarding environmental affairs. Often these ministries have been at cross-purposes with one another. The MOE does not have much freedom for initiating and implementing environmental policy. This limited scope of the MOE's independent jurisdiction is one of the primary sources of the MOE's weakness in the environmental policy process.

Second, there are notable conflicts in environmental policy between the MOE and relevant ministries, arising from the differences of perception about environmental problems. Ministries differ in their assessment of environmental phenomena, depending upon their primary missions and their constituencies. Each ministry competes with others and forms a set of strategies in pursuit of its myopic concern and interests. Each ministry gives priority to its own bailiwick and its most immediate and pressing issues in dealing with environmental issues. The consequence of these narrow-focused views is that almost all policy proposals for environmental enhancement or protection by the MOE are greeted by objections from other ministries since their areas and interests could be ad-

versely affected. The wide variety of responses of ministries to basically the same environmental issues is due to these struggles.

Third, the pattern of resolving conflicts depends on the institutional strength of ministries involved in environmental policy. Overlapping jurisdiction frequently causes tensions among these ministries. While some ministries have demonstrated their capability to make their viewpoint prevail in shaping environmental policies and subsequent options, the MOE lacks the power to find acceptance for its proposals in the policy process. Thus, the MOE has little influence over the other ministries in addressing Korea's environmental concerns.

Finally, as pointed out by many Korean scholars, the relative strength of a ministry's power in the policy process depends on the nature of its linkages with other political actors.[20] That is, the networks and relationships of each ministry with other legitimate policymaking bodies and the major societal groups determine the clout of each ministry in the political actors. The MOE, however, does not have much support from political actors in Korea.

Two surveys of data are introduced and analyzed below to give empirical support to the above observations regarding Korean environmental policy and the MOE. In 1995, a survey of 96 higher officials from various ministries was conducted to gather information on the overall influence of each ministry in the policy process. It was designed to measure the general power relationships among ministries. In another survey conducted in 1993, officials in the MOE were asked to show the reality of the MOE's relative weakness in bureaucratic struggles.[21]

Table 1 presents a ranked order of each ministry's current power and expected future power in the executive branch. In the 1995 survey, the respondents were asked to rank the relative influence—current and future—of 20 ministries in the policy process. The clout of each ministry was rated on a five-point scale (1 = least powerful; 5 = most powerful). The MOE was ranked 10th out of 20 ministries in terms of current power. This represents some empirical confirmation that the MOE is indeed less powerful than almost all other ministries in the environmental policy area.[22] It is notable that with the single exception of the Ministry of Agriculture, Forestry, and Fisheries all economic ministries are ranked higher than the MOE.[23] In contrast, the MOE was ranked third in future power. This disparity in perception of the MOE's current and future role probably reflects the respondents' belief that environmental problems will be one of the most serious social problems in the future. In fact, many scholars in Korea have made similar predictions.

The questions in the 1993 survey were divided into five categories: (1) the relative power of the MOE compared with other ministries in the environmental policy process; (2) the pattern of conflict resolutions between the MOE and other ministries; (3) the level of support among political actors toward MOE; (4) the difference in relative strength among external actors involved in the environmental policy process; and (5) the scope of independent jurisdiction of the MOE.

Table 2 presents the general perception of the respondents regarding the relative influence of the MOE compared with other ministries in the environmental policy process. Sixty percent of respondents felt that the MOE was less influential than other ministries, and 36% believed the MOE had as much power as the others. However, only 4% believed the MOE to have greater influence than others.

Table 3 indicates the pattern of conflict resolutions between the MOE and other ministries that have some environmental responsibility. The respondents were asked

Table 1 The Power of Each Ministry

	Present power (p)	Future power (f)	Change of power (f-p)
Ministry of Finance and Economy	(1) 4.62	(1) 4.48	-0.14
Ministry of Home Affairs	(2) 4.26	(11) 3.46	-0.80
Ministry of Justice	(3) 4.00	(7) 3.46	-0.43
Ministry of National Defense	(4) 3.88	(9) 3.55	-0.34
Ministry of Government Administration	(5) 3.80	(14) 3.19	-0.62
Ministry of Foreign Affairs	(6) 3.70	(5) 3.91	0.21
Ministry of Trade, Industry, and Energy	(7) 3.67	(2) 3.97	0.30
Ministry of Construction and Transportation	(8) 3.28	(7) 3.57	0.28
Ministry of Labor	(9) 3.01	(11) 3.46	0.45
Ministry of Environment	(10) 2.84	(3) 3.94	1.10
Ministry of Health and Welfare	(11) 2.83	(6) 3.58	0.75
Ministry of Information-Communication	(12) 2.82	(4) 3.92	1.10
Ministry of National Unification	(13) 2.57	(9) 3.54	0.97
Ministry of Agriculture, Forestry, and Fisheries	(14) 2.51	(17) 2.82	0.31
Ministry of Education	(15) 2.43	(14) 3.18	0.75
Ministry of Information	(16) 2.42	(18) 2.62	0.20
Ministry of Culture and Sports	(17) 2.21	(16) 2.87	0.66
Ministry of Legislation	(18) 2.16	(19) 2.34	0.18
Ministry of Science and Technology	(19) 2.11	(13) 3.39	1.28
Ministry of Patriots and Veteran Affairs	(20) 1.83	(20) 1.90	0.07

Table 2 The Influence of the MOE in the Environment Policy Process

	Frequency	Percent
1. Very strong	1	2
2. Strong	1	2
3. Moderate	17	36
4. Weak	2	52
5. Very weak	4	8

Table 3 The Pattern of Conflict Resolution Between MOE and Other Ministries

	Frequency	Percent
1. Highly favors the MOE's view	0	0
2. Somewhat favors the MOE's view	3	6
3. Neutral	22	48
4. Somewhat favors other ministries views	15	32
5. Highly favors other ministries' views	6	14

Table 4 The Seriousness of Implementation Problems Confronting the MOE

	Mean score
1. Lack of resources	5.83
2. Lack of cooperation from other ministries	5.28
3. Lack of cooperation from people and industries	4.22
4. Lack of cooperation from local government	4.00

whether the conflict solutions are generally in favor of the MOE or of the other ministries. Forty-six percent of respondents believed that conflicts tended to be resolved in favor of the other ministries, and 48% thought the conflicts were resolved on an equal basis. However, only 6% viewed those solutions as favoring the MOE's view.

Table 4 illustrates the significance of the problems the MOE confronts in policy implementation. Respondents were asked to rate the seriousness of each selected implementation problem on a seven-point scale (1 = not serious; 7 = very serious). According to Table 4, respondents viewed lack of resources and lack of cooperation from other ministries as more significant problems. These two are much above the average score of 3.5.

The fact that lack of cooperation from other ministries was ranked as the second most serious problem reveals the weak influence of the MOE in the bureaucratic politics of modern Korea. The most serious problem, lack of resources, is also related to the MOE's low clout in the bureaucratic struggle, because the allocation of funds and of human resources in the executive branch reflects the power relationships among ministries in today's era of tight budget and "less government." Taken together, Tables 2, 3, and 4 support the observations regarding the relatively low clout of the MOE in the environmental policy process.

The level of political actors' support for the MOE is shown in Table 5. The respondents were asked to rate the support of each actors on a seven-point scale (1 = little support; 7 = very strong support). While the public, the media, and environmental groups were somewhat highly rated as strong supporters, other ministries were ranked second to the last. According to the findings in Table 5, the MOE enjoys little support from formal actors in the policy process.

Table 5 The Political Support from Political Actors for MOE

	Mean Score
The public	5.01
Media	4.09
Environmental groups	4.10
Legislature	3.98
President	3.86
Parties	3.11
Other ministries	2.64
The academic world	2.56

Table 6 The Influence of Political Actors on the Environmental Policy

	Mean Score
President	5.94
Other ministries	5.43
The public	4.83
Legislature	4.57
Industries	4.26
The media	4.01
Parties	4.00
Environmental groups	3.97
The academic world	3.43

Table 6 focuses on the extent of influence wielded by political actors on the environmental policy process. The respondents were asked to rate each actor on a seven-point scale (1 = little influence; 7 = very strong influence). As shown in Table 6 the president, other ministries responsible for some environmental tasks, the public, and the legislature were viewed as key actors. This finding underscores that formal actors exert strong influence in the process of environmental policy process. With the exception of the public, informal actors outside of the government, such as media and environmental groups, were rated relatively low.

Tables 5 and 6 indicate that while the MOE gets some support from actors that have limited influence in the environmental policy process, it enjoys little support from actors exercising a strong influence in the process. Table 7 summarizes these findings. These findings substantially support the observation that the MOE's comparatively low standing in the executive branch is linked to the lack of support from political actors.

In conclusion, Table 8 shows the limited scope of the MOE's jurisdiction. Respondents were asked to estimate the scope of MOE's independent jurisdiction where it has institutional autonomy and flexibility in shaping and implementing environmental policy.

Table 7 The Rank of the Support from Political Actors for the MOE, and the Influence of Political Actors on the Environmental Policy

	Rank of influence	Rank of support
President	1	5
Other ministries	2	7
The public	3	1
Legislature	4	4
Industries	5	9
The media	6	3
Parties	7	6
Environmental groups	8	2
Academia	9	8

Table 8 The Scope of the MOE's Jurisdiction

	Frequency	Percent
Very wide	1	2
Wide	7	14
Moderate	7	14
Narrow	27	54
Very narrow	8	16

As shown in Table 8, 70% of the respondents considered the MOE's independent jurisdiction to be narrow. This is consistent with the previous discussion concerning the MOE's limited jurisdiction.

CONCLUSION AND IMPLICATIONS

Recently, a number of studies in the areas of public administration and political science point to the limited political power of the MOE as the main reason for ineffectual environmental policies in Korea. This chapter has tried to extend those studies by theoretically and empirically verifying not only that the MOE's political power is indeed weak, but also that the MOE's weakness results from the lack of external power base.

With regard to the MOE's power base, for policy formulation and implementation it has received little support from powerful political actors such as the president and other administrative ministries. In addition, the MOE does not have a clearly defined independent jurisdiction. Although the MOE was promoted to a cabinet level ministry in 1994 and the number of its employees and size of its budget have been gradually increasing in recent years,[24] it is still misleading to anticipate dramatic changes in the MOE's political power as long as its external power base is not strengthened. Unfortunately, considering that other urgent issues in Korean society, such as national unification, shaky national economy, and the settlement of local government, are the center of attention for political actors, it seems unlikely that the MOE will strengthen its external power base in the near future. This also means that environmental policy is expected to remain ineffective for years to come.

ENDNOTES

1. For example, industrial waste water has increased 4.5 times and pesticides 3.5 times in the last 15 years.

2. For example, per capita GNP was less than $100 (Ahn 1995).

3. Ahn characterizes this period as the "Dark Age."

4. Officially, this was the first law in the environmental policy area (Kim 1995).

5. The titles of ministries and agencies have changed several times over the last three decades due to frequent reorganization.

6. The National Supreme Council for Reconstruction actually functioned as the legislature in this period.

7. The Environmental Impact Assessment Act was enacted in 1993. Its objective is to "maintain and create a pleasant environment by assessing the environmental impacts of business and government projects before they are undertaken" (MOE 1995: 338).

8. In the case of Korea, the results of a survey (94.5%) support this argument. The survey was conducted on high government officials who participated in central government's training program, designed for candidates for the position of bureau director (Lee 1994).

9. The BOD level has been used as an indicator to check the amount of effluent. Recently, the MOE tightened the standard for the BOD level after the leakage of phenols into the Nakdong River in 1991 (MOE 1995).

10. Internal organizational characteristics include technical expertise, professional knowledge and information, organizational cohesion, leadership, etc. (Meier 1993: 8–77).

11. A good example would be the residents of Ahn-myun Island, who demonstrated against radioactive waste (Taelyuk Institute, 1990).

12. In 1991 right after the phenol accident, the MOE, with strong support from the general public, was able to stop the construction of the Ilsan New-City subway system on the grounds that an environmental impact assessment had not been submitted.

13. In the 1970s the establishment of environmental groups was regarded as an unjustifiable activity.

14. Those organizations that have a good relationship with the MOE are: Environment Preservation Association; Pan-National Propulsion Movement Committee for Environment Preservation; and the Environment Management League (Kim 1994).

15. According to survey results by the Environment Policy Institute, about 45 environmental groups support this argument.

16. During the 147th regular session of the National Assembly, an assemblyman in the Peace and Democratic Party proposed a government organization reform bill in which the EA should be made a cabinet-level ministry.

17. In 1991, the manner in which the Rho administration resolved the wastewater incident in Taegu illustrated this point. President Rho officially emphasized the importance of the environment while actually supporting economic development agencies.

18. Historically, the budget for the EA was small (EA 1992). The EA's budget in 1992 was only 0.24% of the Korean government's total budget (EA 1992).

19. For instance, the Ministry of Commerce was anxious about possible conflicts between environmental policy and its export policy. In addition, the Ministry of Internal Affairs was concerned about the limitation in regional development and property rights. Furthermore, the Ministry of Construction and the Ministry of Health and Social Service worried that their own jurisdiction might be transferred to the EA (Jung 1991).

20. One of the distinctive features of public organizations is the great degree to which external actors are directly involved in setting goals, allocating resources, and granting or withholding legitimacy. Agencies must secure the political support necessary for survival, growth, and function.

21. The first survey comes from Professor Chun-Oh Park's class at the National Education Center for Civil Servants in 1995, and the second was conducted by the authors at the MOE in 1993.

22. Ministries such as the Ministry of Home Affairs, Ministry of Defense, Ministry of Trade Industry and Energy, Ministry of Construction and Transportation, and Ministry of Labor are included here.

23. Economic ministries in Korea are known for their prodevelopment orientations.

24. Jung (1995) and Lee (1995) argue that there have been no substantial changes in terms of the MOE's function and substructure after it was upgraded to a cabinet-level ministry.

REFERENCES

Ahn, Moon-Suk. 1995. "Direction of Korean Environmental Policy in 21st Century." *Korean Public Administration Journal* 4(3): 5–21. (in Korean)

Allison, Graham T. and Morton H. Halperin. 1972. "Bureaucratic Politics: A Paradigm and Some Social Implications." *World Politics* 24: 40–79.

Bachrach, Peter and Morton S. Baratz. 1963. "Decisions and Nondecisions: An Analytical Framework." *American Political Science Review* 57: 632–642.

Cho, Suk-Jun. 1994. *Theory of Korean Public Organization*. Seoul: Pakyungsa. (in Korean)

Choi, Byung-Sun. 1992. *Korean Regulatory Policy*. Seoul: Beopmunsa. (in Korean)

Choi, Ryul. 1990. "Pollution Republic, the Consequence of Growth-oriented Industrial Policy in Korea." *Shindong'ah* (Monthly Magazine) 396(July): 614–623. (in Korean)

Downs, Anthony. 1972. "Up and Down with Ecology: The 'Issue-Attention Cycle'" *Public Interest* 28(Summer): 38–50.

Environmental Agency. 1982. *Survey on the Public Awareness About Environmental Preservation*. Seoul, Korea: Public Information Office. (in Korean)

_____. 1987. *Survey on the Public Awareness About Environmental Preservation*. Seoul, Korea: Public Information Office. (in Korean)

Fesler, James W. and Donald Kettl. 1991. *The Politics of the Administrative Process*. Chatham, NJ: Chatham House Publishers.

Gans, Herbert J. 1979. *Deciding What's News*. New York: Pantheon.

Ha, Hae-Su. 1991. "No Willingness, No Capacity in Korean Environmental Regulations." *Korean Local Government Review* 5: 104–109. (in Korean)

Jung, Jeong-Kil. 1988. *Theory of Policy Making*. Seoul, Korea: Taemyung Publishing Company. (in Korean)

Jung, Jun-Keum. 1991. "A Study on Conflicts in the Decision Making Process of Environmental Regulation." *Modern Society* 4(1): 36–52. (in Korean)

_____. 1992. "The Role of Korean National Assembly for Environmental Protection." *Korean Society and Public Administration Studies* 3: 301–325. (in Korean)

Jung, Yong-Duk. 1995. "Reorganization of Korean Government." *Korean Policy Studies Review* 4(1): 58–84. (in Korean)

Kelman, Steven. 1987. *Making Public Policy*. Englwood Cliffs, NJ: Prentice-Hall.

Key, V.O., Jr. 1961. *Public Opinion and American Democracy*. New York: Alfred Knopf.

Kim, Byung-Wan. 1992. "Korean Environmental Policy and Bureaucratic Politics." Ph.D. dissertation. Korea University. (in Korean)

_____. 1993. "Bureaucratic Politics inside of Korean Government: Relationship Between Economic Development Agencies and Environment Preservation Agencies on the Environmental Policy." *Korean Public Administration Review* 27(1): 171–179. (in Korean)

_____. 1994. *Korean Environmental Policy and Green Movement*. Seoul: Na-nam Publishing Company. (in Korean)

_____. 1995. "Triangular Relationship Among Political Institution, Business, and Bureaucracy in the Environmental Policy Making." *Korean Public Administration Journal* 4(3): 23–41. (in Korean)

Kim, Young-Rae. 1987. *Interest Groups in Korea*. Seoul: Taewangsa. (in Korean)

Ku, Yun-Chang. 1989. "Problem and Its Solution in the Functional Allocation of Environmental Administration in Korea." *Journal of Kyunghee Public Administration* 4(1): 33–55. (in Korean)

Laundy, Marc K., Marc J. Roberts, and Stephen R. Thomas. 1990. *The Environmental Protection Agency: Asking the Wrong Questions*. New York: Oxford University.

Lee, Jong-Beom. 1994. "Characteristics of President Kim, Young-Sam's Leadership and His Administrative Style in Domestic Policy: Evaluation of Democratic Government's First Year Performance." *Korean Public Administration Review* 28(4): 1121–1138. (in Korean)

Lee, Sang-Don. 1995. *Global Environmental Protection and Korean Environmental Policy*. Seoul: Taehak Publishing Company. (in Korean)

Long, Norton. 1949. "Power and Administration." *Public Administration Review* 9: 257–264.

Lynsky, Martin. 1986. *Impact: How the Press Affects Federal Policy Making*. New York: W.W. Norton.

Meier, Kenneth J. 1980. "Measuring Organizational Power: Resources and Anatomy of Governmental Agencies." *Administration and Society*. 12(3): 357–375.

_____. 1985. *Regulation: Politics, Bureaucracy, and Economics*. New York: St. Martin's Press.

_____. 1993. *Politics and the Bureaucracy: Policymaking in the Fourth Branch of Government*. Pacific Grove, CA: Brooks/Cole Publishing Company.

Ministry of Environment. 1992. *White Paper*. Seoul, Korea: Administrative Management Office. (in Korean)

_____. 1995. *Environmental Protection in Korea*. Seoul, Korea: MOE.

Moe, Terry M. 1989. "Regulatory Performance and Presidential Administration." *American Journal of Political Science* 26: 197–225.

Moon, Taehoon. 1993. "Korean Environmental Preservation Policy: With Special Emphasis on the Relationship Between Government and Business." *Korean Policy Studies Review* 1(1): 165–193. (in Korean)

Park, Chun-Oh. 1993. "Changes in Implementation Environment and Bureaucratic Reform in Korean Government: Prospects and Remained Tasks." *Korean Public Administration Journal* 2(1): 133–152. (in Korean)

Peters, B. Guy. 1981. "The Problem of Bureaucratic Government." *Journal of Politics* 43(1): 56–82.

_____. 1986. *American Public Policy: Promise and Performance*, 2nd ed. Chatham, NJ: Chatham House Publishers.

Rosenbaum, Walter A. 1985. *Environmental Politics and Policy*. Washington, DC: Congressional Quarterly Press.

Rourke, Francis E. 1972. "Variations in Agency Power." In Francis E. Rourke, ed. *Bureaucratic Power and National Politics*. Boston: Little Brown.

_____. 1984. *Bureaucracy, Politics, and Public Policy*. Boston: Little Brown.

Ryu, Byung-Jin. 1993. "History and Current Status of Korean Environment Preservation Movement." *Environmental Preservation* 15(1): 6–9. (in Korean)

Sabatier, Paul and Daniel Mazmanian. 1979–1980. "The Implementation of Public Policy: A Framework of Analysis." *Policy Studies Journal* 8: 538–560.

Salamon, Lester B. and Gary Wamsley. 1975. "The Federal Bureaucracy: Responsive to Whom?" In Leroy N. Rieselbach, ed. *People vs. Government: The Responsiveness of American Institutions*. Bloomington: Indiana University Press.

Taelyuk Research Institute. 1990. *Survey on the Public Awareness About Environmental Preservation*. Seoul, Korea: Ministry of Environment. (in Korean)

Van Horn, Carl E., Donald C. Bauamn, and William T. Gomley. 1989. *Politics and Public Policy*. Washington, DC: A Division of Congressional Quarterly.

Wamsley, Gray L. and Mayer N. Zald. 1973. "The Political Economy of Public Organizations." *Public Administration Review* 33(1): 62–73.

Wilson, James Q. 1989. *The Politics of Regulations*. New York: Basic Books.

19

The Environment and the People's Republic of China

Edward Chiu-Yeng Tseng
California Lutheran University, Thousand Oaks, California

INTRODUCTION

From the works of poets and painters in China, one may get the impression that the Chinese have an enormous appreciation of nature. This may be so from the aesthetic standpoint. But, in reality, there are few signs of real concern for the natural world from the Chinese. Instead, there is much evidence of the Chinese people abusing nature and squandering its resources. For example, there is widespread pollution of air and water. In addition, a shortage of water resources, caused partly by humans, has contributed to an acceleration of desertification. The latter serves to aggravate the scarcity of cultivable land in China—a country where the livelihood of most of her people still depends largely on agriculture. This chapter will examine China's performance in protecting the natural environment and determine the reasons for its dismal record in alleviating environmental ills. In addition, some recommendations will be advanced as to how other countries should react to China's environmental policies and attitudes.

Historically, Daoism and Confucianism were the two principal philosophies of China. Daoism evolved around a glorification of nature. It vehemently denounced civilization for defiling all natural things, both tangible and intangible. Its principal concept of "inaction," which literally means doing nothing, was designed to keep all natural conditions from becoming corrupted. Daoism, for example, would prefer a tree to be in its natural state and not be modified into a piece of art. Similarly, it would want humans to preserve natural ignorance and be devoid of all knowledge. It should be noted, however, that environmental protection was not generally considered to be a principal concern of the philosophy. Its references to the goodness of nature were mainly designed as a means to belittle the products of civilization. Even so, it can still be asserted that Daoism as a philosophy is friendly to the environment.

From the practical standpoint, the Chinese had to care about nature in premodern times. Before the twentieth century, China was an agrarian society. The bulk of her

people were poor farmers, who cultivated land belonging to rich landlords (Tseng 1968). They were constantly plagued by problems such as high rent for tillable land, high taxes, inadequate irrigation facilities, and, above all, natural calamities. Therefore, hard work did not guarantee that the people would be able to subsist, let alone flourish.

As the years passed, the economic problems of the people multiplied. Exacerbating this was the rapid increase in China's population from 59.5 million in A.D. 2 to 362 million in 1812 (Tseng 1968). Food production was not able to keep pace with the growth in population. Any major attempt to industrialize China, when other countries were industrializing, could have helped to improve the economic conditions of the Chinese people. But the people were ruled by an elite, with no participation from the masses. The common people were conditioned to obey their leaders, and their tolerance of abuse was high. The ruling class was unwilling to industrialize for a couple of reasons.

First, members of the elite, because of their academic training, looked with contempt upon materialism and commercialism, both of which they believed would be the inevitable results of industrialization. Second, large-scale industrialization would undoubtedly have affected the economic interests of the ruling class, which was essentially a landowning class. However, even if the ruling class were willing to change its attitudes, China would still have been unable to become highly industrialized for two additional reasons: the lack of investment capital and the absence of relatively long periods of peace. Hence, China remained a backward agrarian society for most of its history, with food production constantly lagging behind the demands of the people. This condition was aggravated by a long-lasting inequitable system of distribution. The members of the officialdom and well-to-do families had more than their share of food, while the great majority of the Chinese people barely subsisted. In fact, the people were left with very little of the fruits of their labor. Their lives were extremely precarious. They ate whatever could be eaten (including animals that we consider to be pets or pests). Many of them died of starvation during periods of famine. Under these harsh conditions, economic improvement became the major concern of the people. They looked to the government for relief of their plight. They felt that the government had a special responsibility, as prescribed by Confucianism, to undertake projects that would contribute substantially to their well-being.

The ancient regime indicated that it was willing to improve the lot of the people by constructing agriculturally beneficial projects such as irrigation and flood control systems. But to do this, in the absence of adequate capital and machinery, it would need the organization and power necessary to effectively mobilize human resources. It was in this way, historically, that the government derived a sanction for establishing an elaborate and implacable control mechanism to "force the individuals to do what was necessary for their society and thus for themselves" (Tseng 1968: 3). In time, however, the coercive power of the state was diverted from accomplishing the basic tasks of water control to mobilizing the people for national defense, military expeditions, public works, or projects designed to "further the central power, to symbolize it, or to satisfy its fancies" (Tseng 1968: 3).

During the imperial period, there were indeed many public undertakings that required the utilization of massive human resources. It is estimated that 700,000 people were involved in the building of the "superpalace" and tomb for the first emperor of the Chin Dynasty (221–207 B.C.) (Tseng 1968). More imposing, however, are the statistics that show one million people engaged in the construction of the Grand Canal and two

million people per month working on the eastern capital of the Sui Dynasty (A.D. 589–618) (Tseng 1968). If nothing else, these figures illustrate, most convincingly, the mobilization power of the government in imperial China. At the same time, they also show how human labor was used in enterprises that were far removed from the people's concerns and often could not be justified in terms of providing for the public welfare.

The government, through its management of major irrigation projects, was able to effectively control agricultural production, and thus the "lifeline" of the society. Meanwhile, the people continued to suffer, not only because of problems created by humans, but also because of overwhelming natural problems (e.g., shortage of cultivable land, natural calamities, etc.). Under these circumstances, one would assume that the populace would do what they could to protect what they had. But for many, this was not the case. Due to reasons such as ignorance and economic necessity, they not only did nothing to alleviate the effects of natural calamities, but also engaged in practices (e.g., stripping forests) that further damaged the environment.

In contemporary China, at least, the officials appear to be more sensitive to environmental issues than their predecessors. In his report to the 15th Chinese Communist Party National Congress on September 12, 1997, President Jiang Zemin of China, who is also the General Secretary of the Chinese Communist Party, asserted that the pressures of overpopulation and development on the environment pose a major problem for his country (Tempest 1997). The other principal threats to China, he said, are official corruption, disparities in economic development among different segments of the Chinese society, and a national economy consisting mainly of sluggish, inefficient, state-owned enterprises (Tempest 1997). The President's concern for the environment does not represent a change in Chinese attitudes. In fact, the Chinese government established environmental protection as one of its basic national policies in 1983 (Zhao 1996). A few years later, in 1989, China launched her first major campaign against environmental pollution (Zhao 1996). This kind of concern for the environment was reinforced by Chinese Premier Li Peng on March 3, 1995. In his report to the third session of the Eighth National People's Congress (NPC) in Beijing, Li emphasized that China would follow faithfully its two basic national policies of family planning and environmental protection (CCICED 1997). Furthermore, he said that China would continue to give an important role to environmental protection in dealing with economic growth and construction in both urban and rural areas (CCICED 1997). To ensure this, the Premier promised that China would strictly adhere to its environmental laws and regulations, and improve its administration of environmental matters. The latter would include better control of pollution, promotion of nationwide afforestation, and improvement of soil conservation programs.

Some of the official sentiments relating to the environment have found their way into Chinese laws, the most important of which is the Chinese Constitution, as amended in December 1982. According to it, the government of the People's Republic of China pledges to protect the environment and natural resources by controlling pollution and its societal impact, ensure the sensible use of natural resources, and safeguard rare animals and plants (BRIM 1997). Besides the Constitution, a host of lesser Chinese laws deal with such environmental issues as the protection, conservation, and/or utilization of land, forests, grasslands, wild plants, aquatic resources, rare wild animals, and wild animal resources (BRIM 1997).

One of the agencies of the Chinese government entrusted with the enforcement of environmental laws is the National Environmental Protection Agency (NEPA). It sends

out teams to enforce environmental statutes in various parts of the country. In 1994 alone, the Chinese government collected "pollution charges" totaling US$353 million (CCICED 1997). This money was used to finance a number of environmental projects.

Another major institution that is involved in protecting the natural environment is the People's Bank of China. As the Chinese central bank, it enjoys ministry-level status and acts as the government's principal regulator of public finance (CCICED 1997). Recently, it reiterated the importance of combining economic development with environmental protection, and thus, the Bank announced that financial institutions should not issue loans to enterprises and projects that do not meet environmental requirements. Some examples of the requirements are that the loan applicants have to obtain approval before engaging in the manufacturing of hazardous or pollution-intensive products and that they have to meet the "three-at-the-same-time" rule (CCICED 1997). This rule specifies that pollution prevention and control facilities have to be designed, installed, and operated in conjunction with the implementation of the main project. The Bank called on financial institutions at all levels to support environmentally friendly projects that promote such things as afforestation, recycling and reutilization, sand control for protecting the ecological system, the abatement and elimination of pollution, and the development of applied technology for cultivating improved varieties of agricultural products (CCICED 1997). In addition, the central bank said that the "national development banks" should offer their financial assistance to those projects that have obvious environmental benefits, but which may be less beneficial from the economic standpoint, and either commercial banks or "nonbank financial institutions" should give their full support to those firms that may yield both economic and environmental benefits (CCICED 1997).

The central bank's position on the environment is impressive, and it uses the power of money to carry out its policies. Another program that depends on money as its backbone is Agenda 21, which was introduced in 1994 for dealing with population, the environment, and development in the twenty-first century (Zhao 1996). Under Agenda 21, China would continue to emphasize both environmental protection and economic development from 1996 to 2010. In addition, the Chinese government would formulate the National Cross-Century Green Project, which has as its goal the gathering of funds and materials to control wastes and pollution in various important geographical areas plagued by environmental problems (Zhao 1996). For its first phase (to be carried out between 1996 and 2000), China planned to invest a total of 188.8 billion yuan. This amount represents a major increase from the 47.6 billion yuan that China earmarked for environmental protection between 1985 and 1990. By the year 2000, the projections call for a total of 450 billion yuan for environmental protection (Zhao 1996).

In addition to using financial power to promote environmental well-being, China has also been using other types of institutions to do so. For example, in 1992, the China Council for International Cooperation on Environment and Development (CCICED), a high-level advisory body, was established for the purpose of strengthening cooperation and exchange in environmental and developmental matters between China and the global community (CCICED 1997). Another important organization is the Working Group on Trade and Sustainable Development. Its main objective is to assist China in formulating and carrying out comprehensive, long-term, and integrated policies and measures that are supportive of sustainable development (CCICED 1997). In November 1997, at a forum in Beijing sponsored by both Chinese and foreign organizations such as General Electric, Motorola, Kodak, and Du Pont, the topic of sustainable development will be addressed. In addition, that gathering will also consider such environmental concerns as

biodiversity, ecotourism, wastewater treatment, the Trans-Century Green Engineering Plan, and the role of technology and the armed forces in environmental protection (Agenda 1997).

It may be useful, at this point, to consider how well some of the environmental plans and policies have been implemented. China's performance is a yin and yang mixture of impressive achievements and major failures. One of the major accomplishments is that the government has closed more than 500 paper mills, which were well known for discharging pollution in the Huaihe River Valley (Zhao 1996). With the assistance of the Multilateral Fund of the Montreal Protocol (MF), China has begun to undertake projects for reducing "ozone-depleting substances" (ODS) (CCICED 1997). China plans to have the capacity to eventually eliminate a large amount (28,000 tons) of ODS per year and to terminate the use of a particular kind of chlorofluorocarbon (CFC-11) by 2005 (CCICED 1997). In addition, Chinese programs of afforestation in the past decade have produced numerous shelter belts in the north (including the northeastern and northwestern parts of China). These natural screens have enabled the Chinese to turn 40,000 km^2 of desert into green forests and have provided protection to 11 million hectares of farmland (Zhao 1996). This, indeed, is an impressive accomplishment.

Currently, about 4% of Chinese territory has been designated as "natural reserves," and some areas in a number of regions have been set aside as zones in which hunting, fishing, and cutting are prohibited (BRIM 1997). China is also becoming more aware of the possibility that about 15–20% of its animal species may disappear by the end of this century, so it is devoting a great deal of attention to protecting and propagating rare and endangered species like the giant panda, the nipponia nippon, the Chinese alligator, the lipotes vexillifer, the Siberian tiger, the cathya, and many others (BRIM 1997). Of these animals, perhaps one of the best known outside of China is the giant panda (*Ailuropoda melanoleuca*). Originally, the giant panda had the characteristics of a carnivore. But long ago, it became adjusted to a vegetarian diet. On the average, each panda now eats up to 14 kg of bamboo stems and leaves (almost exclusively) for up to 14 hours a day (WWF 1996).

At one time, the giant panda was found in many parts of southern and eastern China and in Myanmar and North Vietnam (WWF 1996). But between 1973 and 1984, the panda's habitat in isolated, but previously ideal, parts of China shrunk by 50% (WWF 1996). This was due partly to senseless harvesting of bamboo forests. In addition, bamboo flowering causes another major problem. Depending on the species, bamboo plants bear flowers in many areas periodically (at regular intervals ranging from 10 years to 100 years). Afterward, the plants and flowers die, and then the plants regenerate from seeds within a year. However, it can take up to 20 years before a panda population can be supported by the bamboo plants again. In the past, when the bamboo in one location had flowers, the pandas simply moved to another area where the bamboo were not flowering. But as bamboo forests were cleared for whatever reason, panda migration became increasingly more difficult, and many pandas died for lack of food (WWF 1996).

At the same time, the infant mortality rate among pandas continues to be high. In addition, there are still people willing to risk even capital punishment by killing pandas for their skins. To add to the woes of pandas, sometimes these adorable creatures are caught in traps set for other animals (WWF 1996). Consequently, the giant panda is becoming an endangered species. Because of the declining panda population, which was estimated to be about 1000 a few years ago, China began a panda conservation program

during the 1940s, one that was initially restricted to only field research (WWF 1996). In 1963, the Chinese Government designated Wolong as a forest reserve. Now it is considered a panda reserve because of the large number of pandas living there. By 1992, China had a total of 13 panda reserves, occupying a total of 6049 km^2 (WWF 1996).

In 1980, the World Wildlife Fund began its support of panda conservation in China. Since then, the Fund has continued to work with the Chinese government in a variety of projects relating to the giant panda, such as bringing a United Nations volunteer to China to develop better methods for safeguarding the pandas and a veterinary expert to provide research assistance to the China Conservation and Research Center for the giant panda. Since the veterinarian's arrival in 1991, the Center has become one of the most successful places for panda breeding in China (along with the Beijing and Chengdu zoos) (WWF 1996).

At least on the basis of these few examples, conservation and environmental protection programs in China appear to be well implemented. But, of course, appearances can be deceiving. The fact is that contemporary China has not been completely kind to nature. According to an annual report issued by the National Environmental Protection Agency (NEPA) in June 1996, China's ecosystem was further damaged and the environmental situation worsened in 1995 (Pollution 1996). NEPA placed the blame for the maladies on population growth, rapid economic development, and inadequate technical facilities and management standards (Pollution 1996). The latter are partly responsible for the state of water resources in China.

According to a circular published in 1997 by Arthur Andersen's China Investment Center (CIC), China is sixth in the world in terms of annual river flow and annual flow of underground water. However, China's meager per capita water resources (less than 25% of the global average) place China in the 88th position in the world (CIC 1997). The fact is that only 17% of the water resources on the Chinese mainland have been developed (CIC 1997). Compounding the problem of water shortage are a number of factors. One of them is the poor distribution of water resources. According to CIC (1997), 70% of China's precipitation falls in the same general area. In southeastern China, annual rainfall can exceed 1800 mm. However, in the northwestern part of the country, it can be below 200 mm (CIC 1997). It was reported in August 1997 that a severe heat wave and drought in China's Shandong peninsula killed 200 people and forced factories to close. It left cities with a shortage of water and cost the Chinese more than $1.2 billion in economic losses. Only 3 in. of rain has fallen in that area since June 1, 1997, the lowest amount of recorded rainfall in Shandong since 1916 (Earthwatch 1997).

It is believed that China has a water shortage of about 40 billion m^3/year (CIC 1997). The shortfall is mainly experienced in the north, especially around the cities of Beijing and Tianjin, and it is being alleviated in a small way by the construction of reservoirs and the implementation of small-scale river diversion projects. Since the Yangtze River and rivers to its south provide 83% of China's river water, the Chinese Ministry of Water Resources is examining the possibility of using the Grand Canal as the major conduit to divert water from the Yangtze River to the North (CIC 1997). Meanwhile, the water shortage problem is contributing to the desertification of many areas.

Stories abound that once-vibrant settlements and oases, with plenty of people, trees, and water, have all vanished from northwestern China along the "green corridor" and the fabled Silk Road (Chandra 1995). They have been devoured by sand dunes that rise to a height of almost 150 m. The Taklimakan Desert, which is known in the Uighur language as the "Land of Death," with its fierce winds and temperatures of up to 47°C

in the summer, has earned the awe of many Chinese who have seen its shifting sands mercilessly burying people, animals, oases, and cities since the beginning of the Christian era (Chandra 1995). The Gobi Desert too is keeping pace with Taklimakan's destructive work. Together, the two deserts in China's north and northwest already occupy more than 15% of Chinese territory (Chandra 1995). Yet the deserts, including Kuruktag, are still expanding at the alarming rate of about 1000 km^2/year. Shifting sands and drought have already claimed 67,000 acres of shrubs and 33,000 acres of farmland and pasture in the Tarim River valley. In addition, the Tarim River's flow is only one-third of what it was a decade ago. This has resulted in a much lower water table in the river valley. At the current pace of desertification, according to experts, the entire valley could vanish within 20 years (Chandra 1995). The Eb Nur Lake in western Xinjiang is also threatened. Its volume of water is shrinking dramatically, and the lake stands to dry up completely (Chandra 1995).

What are some of the other contributors to desertification besides natural causes? According to some experts, neglect and misuse of resources (e.g., water, pastures, and farmlands) and excessive cutting of trees for firewood are probable causes of the desert's unwelcome advances (Chandra 1995). Chinese officials have admitted that their government's agricultural policies, in effect, have been actively but unwittingly promoting the expansion of the deserts for much of the past 30 years (Chandra 1995). The late Chairman Mao's policies could also be held responsible for desertification. During the tumultuous years of the 1960s and 1970s, without regard to an area's capability, he ordered all parts of China to grow grain. In so doing, he was destroying the delicate ecological balance of much of the country (Chandra 1995).

About 2 years ago, Chinese ecologists began to issue warnings about the desert's expansion. Even China's officials decided to join the act. They realized that, with so much Chinese farmland already vulnerable to drought, further desertification could bring suffering to nearly 400 million people (Chandra 1995). Thus, Chinese Vice-Premier Jiang Chunyun stated that governments at all levels (e.g., provincial and local) in his country should be more attentive to desertification control and work in coordination with each other in establishing a more favorable environment (Chandra 1995). In China's case, a more desirable environment would need to include cleaner water. Currently, China is not only faced with a water shortage, but is also plagued by contaminated water in many areas.

Among Chinese freshwater lakes, Taihu Lake is the third largest. It also produces a quarter of China's freshwater fish. Its basin, with an area of 36,500 km^2, is a major source of Chinese industrial and agricultural products. It is inhabited by 33.5 million people in 38 cities, including Suzhou, Wuxi, and Changzhou (Yu and Yang 1996). The people now have to tolerate the stench from rotting algae in the lake. The algae grow and live for just a few days when the water has a certain amount of nitrates and phosphates. The two elements are introduced when the lake is contaminated by large amounts of fish food, tourist trash, sewage (e.g., human waste, detergents, etc.), chemical fertilizers, pesticides, and industrial wastewater (Yu and Yang 1996). When the algae die, they emit an offensive odor. The smell, however, is only one of the symptoms. The real problem is reflected by the poor quality of Taihu's water for drinking and other uses. However, the problem will continue to exist for as long as pollutants are introduced into the lake. It has been estimated that two to three million tons of chemical fertilizer (instead of organic fertilizer consisting of ingredients such as hay, lake-bed silt, manure, and human waste) and 70,000–80,000 tons of pesticides are applied annually to the 2.66

million hectares of farmland surrounding the lake (Yu and Yang 1996). Due to incompetence, the water resources of Taihu Lake are contaminated annually by about 1.5 million tons of chemical fertilizers and pesticides (Yu and Yang 1996; U.S. Embassy 1996). The chemicals ultimately encourage the growth of algae by increasing the content of nitrates and phosphates in the lake water. In addition, more than one billion tons a year of industrial wastewater is released into Taihu Lake. This volume accounts for more than a third of the water that flows into the lake (Yu and Yang 1996).

Taihu Lake is not the only victim of contamination in China. Many other areas of China are plagued by the same kind of problem. For example, according to an issue of the *Beijing Review*, "Serious pollution adversely affecting an area of 260,000 square km in the Huaihe River Valley has virtually destroyed sources of potable water for millions of people" (Zhao 1996: 19).

The health and well-being of the Chinese people are not only seriously endangered by the water they drink and use, they are also adversely affected physically and materially by the air that surrounds them. Global tests recently revealed that half of the cities that have the highest levels of dust pollution in the world are located in China (e.g., Beijing, Guangzhou, Shanghai, Shenyang, and Xian) (Zhao 1996). In addition, not even 1% of the more than 600 large Chinese cities can meet China's "first class" air quality standard (Zhao 1996). In 1989, it was established by a study that there was a direct link between air pollution and mortality rates in Beijing (Xu et al. 1994). Other findings concluded that environmental pollution was responsible for some malignant tumors and respiratory diseases (Pollution 1996).

The blame for China's poor air quality has been placed partly on exhaust fumes from automobiles. This source of pollution is especially serious in Beijing and Guangzhou in the winter. However, since China quickened the pace of industrialization, more and more pollutants are being discharged by factories, especially those using coal and oil (Pollution 1996). The increased burning of fossil fuels has contributed to a buildup of carbon dioxide (CO_2) in China's atmosphere. According to the Environmental Information Center, China was ranked number two (behind the United States) among top producers of CO_2 in 1994 (Gerstenzang 1997). The problem posed by carbon dioxide in China was further aggravated by the cannibalization of that country's forests, which convert carbon dioxide into oxygen.

Some amount of carbon dioxide is vital to keeping the world's average temperature at a proper level. However, when there is an inordinate amount of carbon dioxide in the atmosphere, the "greenhouse effect" occurs, increasing warmth by trapping it and, thereby, raising the world's temperature. One study, which was completed in 1995, concluded that the average global temperature had risen by about 1°F over the past century. It also predicted that, over the next 100 years, if emissions remain constant, the world's average temperature would increase even further (by an amount somewhere between 1.8° and 6.3°) (Gerstenzang 1997). Any major change in the world's temperature could increase the rate at which polar ice caps melt. As it is, the Bering Glacier in Alaska, North America's largest, is melting rapidly. Its length has been reduced by up to 7.4 miles during the past century (Earthwatch 1997). Scientists have said that the melting is probably caused by global warming, which has been linked to the use of fossil fuels (Rourke 1992). Eventually, as the polar ice caps melt, the world's weather patterns could change dramatically, and the ocean levels would rise. This could bring about the flooding of many coastal cities, including many in the United States. Droughts, torrential rains, floods, and mud slides could become common. Many of the currently prosperous agricul-

tural areas could become unsuitable for cultivation. Island nations in the Pacific could disappear beneath the crushing waves (Gerstenzang 1997). In view of these possibilities, it is probably not an exaggeration to suggest that the world's climatic conditions in the future depend to a large extent on whether China and India can develop without producing the same excessive levels of carbon dioxide that the now-industrialized countries were producing during periods of their own development (Rees and MacKenzie 1992). As it is, according to one estimate, over the past century, developed countries are responsible for three-fourths of the "greenhouse gases" discharged, and the other countries are responsible for the remaining one-fourth (Gerstenzang 1997). Many projections show that sometime between 2025 and 2045, as they continue to develop, the developing countries will be emitting more greenhouse gases than the industrialized countries (Gerstenzang 1997).

Besides their possible role relating to global warming, there are other potential problems associated with China's use of fossil fuels. For example, the fuels burnt by the factories can produce acid rain, which is highly destructive to forests, structures, and aquatic life. Fossil fuels, however, are not solely responsible for China's environmental ills. The use of chlorofluorocarbons (CFC), as coolants, solvents, or in making plastic foam, for example, can contribute to a thinning of the ozone layer of the earth's atmosphere (Rourke 1992). This can in turn lead to a rise in the number of people afflicted with cancer. Most frightening is the belief that, as advanced by Rees, "on the global scale, loss of the ozone layer alone [due to air pollution] could conceivably lead to the extinction of the human species" (Rees and Mackenzie 1992: 369). China's current target is to keep the total amount of pollutants released in the year 2000 at the same level as in 1995 (Pollution 1996).

Is it likely that this target will be met? The answer is probably no. What are some of the possible reasons for China's inability to put her environmental policies into effect? One reason most often given by officials is that there is a shortage of funds for implementing the badly needed pollution control projects (Zhao 1996). But in reality, some shortfalls are the result of conscious choices and are, therefore, possibly avoidable with different priorities. So, in the final analysis, the Chinese decision makers are the real culprits. If they truly valued environmental protection, they could have allocated more funds for environmental projects (even though they are costly). It should be noted, however, that money alone would not have cured all of the ills of China's environment. Some of the problems exist because of corruption in the Chinese government. As noted earlier, President Jiang has referred to corruption as one of the major problems facing China today. So instead of enforcing the rules, some officials simply allow the violators to escape punishment.

Another factor that might have prompted some of the decision makers to deemphasize China's ecological system is their preoccupation with economic prosperity. Obviously, this preoccupation is not unique. It can even be regarded as an accurate reflection of the preoccupation of most Chinese, which is mainly caused by their lengthy experience with impoverishment. Many Chinese ultimately organize their lives almost completely around the accomplishment of economic objectives. It can be argued that economics played a very important role in several of the major events and accomplishments in the past few decades.

Even though the Chinese population is already 1.2 billion, it could have been much higher if China had not pursued family planning energetically. It was reported that, in the last 20 years or so, "there have been a total of 300 million less births" (CCICED

1997: 7). China will try to keep its population below 1.3 billion by the end of the twentieth century. Even though the current Chinese birth rate of 1.25% is higher than the one-time low of 1.1%, it is still much lower than the rate before birth control measures were earnestly implemented. China has been pursuing family planning conscientiously, because it is the right thing to do from the economic standpoint. In the process, this policy also has had a positive impact on the Chinese environment.

The real motivation for many of the protesting Chinese in the 1989 demonstrations, which led to the deaths of many people in Beijing, probably was the desire for economic improvement through political reforms. Therefore, in this case, politics was the means to economic ends. One can also argue that future stability in Hong Kong depends more on the economic situation in the former British colony than on the political one. If these contentions are correct, then the Chinese attitude toward environmental protection is probably that if pollution is an unavoidable by-product of the struggle for prosperity, so be it. For many, it is better to die a slow death by inhaling polluted air than to die a quicker death through starvation.

Using reasoning of this kind, the government often ignores some of its environmental policies and regulations and does what it thinks is necessary for economic advancement. This kind of practice finds justification in the concept of "Soviet legality," which suggests that anything is legal as long as it serves the interest of the proletariat, a term Marx initially intended to refer exclusively to industrial workers, who he thought would be the majority in an industrialized capitalistic society. So in "Communist" states, anything is legal as long as it is perceived as being beneficial to the majority of the people. This can even include a violation of the Constitution. So from the Chinese standpoint, even while the government thinks it is protecting the environment, it is defensible to use coal and oil, without proper antipollution safeguards, to provide energy for two reasons: (1) China has a reasonably good supply of fossil fuels, and (2) Chinese industries are deemed vital to the people's economic interests.

Some people may find this Chinese obsession with economic growth objectionable. But one can respond by saying that one cannot truly empathize with the Chinese unless one has experienced extreme poverty. For the impoverished, the number one objective is survival, rather than luxuries like democracy, freedom, and human rights. Once a person is economically secure, then that person will be in a better position to consider the adoption of political values.

In view of China's priorities, what is the sensible approach for the more-developed countries to take in dealing with China in environmental matters? Should the more-developed countries encourage China to curtail the use of natural resources and to reduce industrial development to protect the environment? The answer is no. It would not be just and equitable to divert China from its goal of reducing the gap in living standards between itself and the more affluent countries. As ecologist William Rees (Rees and MacKenzie 1992) suggests, the wealthier countries (e.g., Japan and countries in North America and parts of Europe), with approximately 26% of the world's population, have already consumed a tremendous amount of natural resources for their own development. They are certainly not in any moral position to ask China or the other less-developed countries to abandon their plans for development. This is especially so, according to Rees, since the richer countries continue to abuse and defile nature by using more than three times their share of nonrenewable resources, consuming about 34–50% of global food supplies, and generating a large percentage of the world's waste products. Instead of preventing countries like China from achieving what they deserve, equity and justice

would demand that any future plans for allocating the earth's limited natural resources must be made in a more equitable manner. The majority of the world's population, which lives in the less developed countries, are entitled to an opportunity to narrow the wide gap in global economic development and in standards of living.

While China and the other less-developed countries should have primary access to the world's remaining natural resources for their economic development, they should be encouraged to use these resources responsibly. This means the Chinese should use the earth's wealth in ways that are the least damaging to our world and its inhabitants. One way is to be frugal in using resources to avoid the costly mistake of overconsumption that was committed by the more-developed and industrialized countries when they were advancing their own economies. We should all attempt to prolong the availability of our earth's natural resources. If we consume many of our resources without replenishing them, they will be exhausted one day. And the sad truth is that many of these resources are vital to our existence and cannot be replenished. The ones that can be renewed may not be able to do so fast enough to keep up with the rate of consumption. Humanity must alter its rate of harvesting renewable resources. We need to be sure that our rate of usage is compatible with the rate of reproduction. In brief, as Rees admonishes, we should avoid adopting "bottom-line economics," a practice that promotes the exhaustion of such ecological capital stock as fish, forests, soil, and so forth. This admonition is especially significant, according to Rees, because "all modern economies are dependent on fixed stocks of non-renewable material and energy resources" (Rees and MacKenzie 1992: 368). Therefore, when people use them, they are depleting the very resources that sustain them, and thereby contributing to a steady increase in "global net entropy" (Rees and MacKenzie 1992: 368).

The second way China can minimize damages to global health is to use the earth's resources in ways that are least offensive to the environment. In this respect, China is in dire need of the investment and assistance (e.g., technological, financial, etc.) of the more-developed countries in solving her pollution problems. Although China is rich with opportunities for investment in environmental protection industries, foreign investments currently represent only 10% of the total of such investments in China (Zhao 1996). Moreover, China has one of the world's largest markets for techniques and products that protect the environment, most of which are often expensive. China will probably need foreign aid to acquire them. The more-developed countries, with savings from reduced military expenditures because of changes in world politics, should be able to give more assistance to countries like China in developing, constructing, and implementing environmentally safe processes.

According to one study, just in the United States alone, reduced military expenditures can result in a possible saving of $800–$900 billion "real money" over the next decade (Wiesner et al. 1994). Therefore, if a more-developed country like the United States wants to contribute more to rehabilitating our planet, it would certainly be in a position to do so with its savings from military expenditures. Currently, the annual cost of armaments worldwide is half a trillion dollars, an amount that is greater than half of the total income of the poorest half of humanity (Rees and MacKenzie 1992). To many, there is no better way to spend this money than to assist countries like China to develop and implement environmentally friendly programs to rehabilitate their ecosystem. In helping China in environmental protection, the more-developed countries may in fact be helping themselves. This possibility can be realized in many ways. For example, clean air and filthy air are alike in one respect—both are capable of crossing national boundaries.

Moreover, unless all countries practice use of nonrenewable resources rationally, there soon may not be any natural resources to use. So practically and realistically, in the future, our world can only survive if humans are committed to "we-ism" instead of "I-ism." We need to be social-minded and work for the well-being of our global neighbors in order to protect our own self-interest.

REFERENCES

"Agenda and Corporate Participation for the China Environment Forum." 1997. [On-line]. Available: *http://www.ihei.com/agenda.htm*. Updated April 21.

"Biodiversity Research and Information Management (BRIM)." 1997. [On-line]. Available: *http://159.226.67.61/brim/brim.html*. June 8.

Chandra, R. 1995. "China—Environment: Desertification Threatens Shrinking Farmland." Inter Press Service [On-line]. Available: *http://www.lead.org/ips/demo/archive /08_02_95/1.html*. August 2.

China Council for International Cooperation on Environment and Development (CCICED). 1997. *Newsletter* (Vol. 1, No. 1) [On-line]. Available: *http://iisd1.iisd.ca/trade/cciced/ccnews.htm-#chinese*. August 20.

China Investment Center, Arthur Andersen. 1997. "Water" [On-line]. Available: *http://www.arth-urandersen.com/bus info/services/cic/water.htm*, August 20.

"Earthwatch: A Diary of a Planet." 1997. *Los Angeles Times* home ed., metro sec., August 7.

Gerstenzang, J. 1997. "Competing Views on Global Warming Are Worlds Apart." *Los Angeles Times* October 5.

"Pollution Getting Worse in China." 1996. *Beijing Review* June 24–30.

Rees, W.E. and D. MacKenzie. 1992. "Are Economic Development and Environmental Protection Incompatible?" In J.T. Rourke, ed., *Taking Sides*, 4th ed. Guilford, CT: Dushkin.

Rourke, J.T., ed. 1992. *Taking Sides*, 4th ed. Guilford, CT: Dushkin.

Tempest, R. 1997. "China Gets Down to Business at Party Congress." *Los Angeles Times* September 13.

Tseng, E.C. 1968. *Democratic and Authoritarian Elements in Twentieth-Century Chinese Political Thought*. Ann Arbor, MI: University Microfilm.

U.S. Embassy Beijing, Environment, Science and Technology Section. 1996. "Chemical Fertilizers—Blessing for Chinese Agriculture or Curse for China's Environment?" [On-line]. Available: *http://www.redfish.com/USEmbassy-China/sandt/mu3chfrt.htm*. June.

Wiesner, J.B., P. Morrison, and K. Tsipis. 1994. "Ending Overkill." In J.T. Rourke, ed., *Taking Sides*, 5th ed. Guilford, CT: Connecticut: Dushkin.

World Wildlife Fund. 1996. "Fact Sheet: Giant Pandas" [On-line]. Available: *http://www.panda.org/research/facts/fct_panda.htm*

Xu, X., J. Gao, et al. 1994. "Air Pollution and Daily Mortality in Residential Areas of Beijing, China." *Archives of Environmental Health* 49(4): 216.

Yu, J. and J. Yang. 1996. "National Efforts to Tackle Pollution in Taihu lake." *China Environment News* (Nr. 27 of Newsletter) [On-line]. Available: *http://www.comlink.apc.org/fic/newslett / eng/nl27/ taihu.htm*

Zhao, Y. 1996. "China Set to Battle Pollution." *Beijing Review* October 21–27.

20

Transition to a Free Market Economy in the Russian Far East

The Environmental and Social Consequences

Cathleen Rineer-Garber
Washington State University, Vancouver, Washington

INTRODUCTION

Even before the collapse of communism, environmental problems in the Soviet Union had reached disastrous levels. With the fall of communism, however, most observers predicted a better environmental future, where new market incentives would encourage efficient use of natural resources, resulting in reduced levels of pollution. It was predicted that decentralization would permit local authorities to respond to immediate environmental concerns, while the liberation of the media and formation of environmental organizations would force accountability on the government and industry (DeBardeleben and Hannigan 1995).

In reality, these optimistic hopes have not come to pass. The damage to the natural environment is largely unaltered in the post-Soviet era. In fact, in many ways, with the collapse of old regimes, the proliferation of new nations, and the end of effective state control, environmental problems may pose an even greater hazard than during the Cold War (DeBardeleben and Hannigan 1995.)

The political and economic changes that have swept across the former Soviet Union over the past 6 years have had an enormous impact on biodiversity conservation throughout the East. In Russia, newly autonomous and semiautonomous regions have regained political power and now exhibit a desire to maintain control of their lands, including the natural resources. Simultaneously a new entrepreneurial class has emerged, eager to exploit newly available natural resources with little regard for the environmental impact of unplanned development (Dogan 1995).

The opening of the former Soviet Union republics has also brought the international community clamoring to the Russian Far East (RFE)—primarily for its wealth of natural resources, including fish, forests, minerals, oil, and gas. As a resource colony for

the Soviet Union, the RFE has suffered environmental degradation at the hands of its own government for decades. Now, the threat is global and volatile. Foreign governments and aid agencies are demanding institutional reform and economic development; multinational companies are seeking abundant natural resources; and international environmental organizations are promoting the expansion of nature preserves in the face of economic crises (Newell and Wilson 1996).

In the 1990s the RFE has rapidly become an international focal point for the debate on environmentally sustainable development. The global community has realized that the RFE's forests may be as important as those of the Amazon in curbing global warming (Linden and Yar 1995). The RFE contains a rich biological diversity, including habitat for such rare and endangered species as the Siberian tiger and the Far East leopard.

The RFE is also home to Russians and indigenous peoples who rely on the natural environment for their livelihoods. In the new post-Soviet era, these people have been forced to take a closer look at their environment and natural resources, and rethink their relationship with them. They must heal the wounds caused during the Soviet period while adapting to entirely new kinds of threats to their land and resources (Newell and Wilson 1996).

Until recently, the isolated Far East has been thought of as a huge expanse with inexhaustible riches. However, intense human activities have changed the ecological conditions. The communists' rapid industrial development of the territory with no concern for ecological problems led to large-scale mechanical disturbance; alteration of the water and permafrost zones; and soil and water contamination by oil, heavy metals, phenols, and other substances. Twenty-three regions of Siberia are considered to have "very critical" environmental conditions; 17 of those are in East Siberia and the Far East (Pryde 1994). Poor air and water quality, severe health problems, and deterioration of natural ecosystems are characteristic features of these declining regions (Kiseleva 1997).

Each of the 10 regions making up the RFE differs in many ways: their culture, their people, their history and their life-styles—but they share a common threat to the health and survival of their people and the unique biodiversity that defines their regions and their livelihoods.

This chapter will examine the historical, environmental, social, and political conditions of this vast region, followed by an in-depth look at the individual administrative areas of the RFE. Although numerous environmental concerns threaten each of the areas and are often shared by several areas, a specific issue (environmental health, deforestation, habitat destruction, etc.) is identified and discussed in each section. With special emphasis on biodiversity, including indigenous groups and wildlife, this chapter will examine the economic conditions that have helped create the dire situation now facing the RFE and the impact of postcommunism development on the people, wildlife, and natural environment, in what many consider the last great wilderness on our planet.

GEOGRAPHY

Geographers disagree on the exact boundaries of what Russians call *Dal 'niy vostok*, the Far East. Some limit the RFE to areas affected by the monsoon climate and the Pacific Ocean (Primorskiy, Khabarovsk, Amur, Sakhalin, Magadan, Chukotka, and Kamchatka), while others define it by means of economic ties with the Pacific Rim, which would also encompass the Republic of Yakutia (Sakha) and Chita Oblast. Some even include Burya-

tia, which is on the eastern shore of Lake Baikal (Newell and Wilson 1996). For the purposes of this chapter, the broadest definition, which encompasses all 10 of these regions, has been used.

The RFE makes up the eastern third of the Russian Federation covering 6.63 million km^2. The RFE borders China to the south and North Korea to the southeast. Japan is less than 50 km from Sakhalin Island and 200 km from Primorskiy Krai. Moscow is more than 9000 km and seven time zones away from Vladivostok, the largest city on the eastern coast.

The frigid winters in northeastern Yakutia, the coldest point in the Northern Hemisphere, and sweltering summers along the Amur and Ussuri River basins in the south create a diverse range of climate zones, from Arctic to subtropical. Nearly 75% of the RFE is dominated by permafrost and although the surface melts in the summer, providing some moisture, agricultural activity is extremely limited.

In broad terms, there are four major vegetation zones in the RFE. Arctic tundra grows as a thin belt along the Arctic Ocean coastline in the far northern regions of Yakutia and Chukotka. Further south, covering most of Chukotka and northern Kamchatka, portions of Magadan Oblast, and Northern Khabarovsk Krai, is tundra. Taiga, the large mass of boreal forests that form the heart of the RFE, extends as a broad band between 70 and 50 degrees latitude. Korean pine/broad-leaved forests grow below the Taiga zone along the Sikhote-Alin mountain range, which extends along most of Primorskiy Krai and into southern Khabarovsk Krai.

Russians call these Korean pine/broad-leaved forests *Ussuri Taiga*, named after the Ussuri River, which flows from the Sikhote-Alin range to the Amur River. Having escaped the last glacial period, these forests have evolved into some of the richest collections of plant and animal species in temperate forests anywhere on the planet. With their diverse plant life, these forests are inhabited by the majority of the RFE's rare and endangered species. It is important to note that similar forests in China, Japan, and on the Korean peninsula have been largely destroyed (Krever et al. 1994).

This diverse climate and geography makes the RFE home to a multitude of flora and fauna; many of which are extremely endangered. The Siberian tiger, Far Eastern leopard, Stellar's sea eagle and numerous plants are among the most threatened species in the RFE.

THE SOCIAL CONTEXT

More than 11 million people also make their home in the RFE. With the influx of prisoners to the region's labor camps between 1928 and 1959, the population grew from 1.5 million to nearly five million (Channon 1995). Most of the people live in the southern region, where the weather is more conducive to agricultural activities and human habitation.

Paleo-Siberians, including Asiatic Eskimo, Chukchi, Kamchadal tribes, Koryak, Nifkhi tribes, Nanai, and Yukaghir, were the first indigenous peoples to inhabit the RFE. By the third century A.D., the Manchu-Tungus (Udege, Evenki, Ul'ta, Eveni, and Ainu) and Turkish tribes (primarily Yakuts) also began to settle in this region. Although Russians had colonized much of the Far East by the nineteenth century, in many regions indigenous people continued to live as hunters and fishers, speak their native tongue, and maintain their cultural traditions (Newell and Wilson 1996).

Under communism, beginning in the 1920s, collectivism was forced upon the Russian people—and the indigenous peoples were not exempt. By 1937 almost all cultivated land was in collective farms (*kolkohozes*) or state farms (*sovkhozes*) (Channon 1995). The state appropriated tribal land and began to cash in on its vast resources—including fish, timber, fur, and gold—through industrialization. State farms blocked rivers with fishing nets and violated seasonal fishing periods, thus depriving the indigenous people of their traditional food. Under Stalin's rule, the state dissolved tribal villages and herded the tribes together to form larger ones. The tragic result was similar to that of the American Indian. Tribal people were forced to live in the cities of Nogliki and Nekrasovka without suitable land to fish or hunt; their native languages were abandoned—alcoholism, unemployment, and other social problems soon followed (Newell and Wilson 1996).

Today, an estimated 450,000 indigenous people from 29 groups live in the RFE (*Gaia Forest Conservation Archives* May 1996). More than 250,000 of those live in the Republic of Buryatia. Socioeconomic conditions among indigenous people have declined dramatically in recent years and, although laws were passed in the early 1990s to protect the rights of indigenous people, they have not been enforced (*Gaia Forest Conservation Archives* May 1996).

Across the region, indigenous peoples have begun to acquire an increased sense of determination to demand fulfillment of promises to have control over their own territories, resources, and cultures. Indigenous peoples have come to realize that the crisis they now face may ultimately be as much a threat to their survival as any of the injustices they experienced under communism (Fondahl 1996). Throughout the history of the Soviet Union, indigenous peoples have protested the usurpation of control of their territories and resources through blockades, demonstrations, and other means of civil disobedience. It was only with Gorbachev's *glasnost* policy of the late 1980s that these people could protest policy without fear of retribution.

Recently the testimony of indigenous people before the UN's Working Group on Indigenous Peoples has revealed some of the dark accounts of the Soviet Union's ethnocidal and sometimes physically genocidal policy toward indigenous groups. It is now capitalistic Russia, rather than the socialistic Soviet Union, they fear may pillage their lands for minerals, timber, and other natural resources in exchange for the hard currency so desperately needed for economic stability (Fondahl 1996). Increased development and continued industrialization further threaten the future of the Far East's indigenous peoples.

INDUSTRY, RESOURCES, AND THE ECONOMIC OUTLOOK OF THE RFE

With the dissolution of the Soviet Union, Russia's economy was left without the guidance on which it relied so heavily for more than 70 years. The ruble was thrown into a state of intense fluctuation. Since 1991, the general trend has been toward massive inflation. In 1989, one U.S. dollar was worth about two-thirds of a ruble; in 1993, the dollar was equivalent to 1000 rubles; and in 1997, the exchange rate of the ruble hovers at nearly 6000 to one U.S. dollar (LoBue 1997).

The RFE is vital to the Federation's economic growth and stability. Russia still depends heavily on the Far East for its natural resources, which are increasingly exported (usually unprocessed) to Japan, China, and the West. Its primary resources include tim-

ber, coal, oil, gold, silver, and fish. The federal government developed RFE industries to supply raw materials, constructing entire cities [with such names as Uglegorsk (coal town) and Neftegorsk (oil town)] around the extraction of one or a few resources. Today, raw materials are exported (unprocessed) to European Russia and, increasingly, to foreign countries such as Japan, South Korea, and China (Newell and Wilson 1996). The Far East's largest industry is fishing, followed by the mining of precious metals, machine building, and forestry (Figure 1).

Although the Far East produces only 5% of Russia's total industrial output, it possesses a number of resources that are critical to Russia's economy: 58.5% of all fish and marine products, 7.9% of all forestry products, all of Russia's diamonds and tin, and more than 50% of Russia' gold (Newell and Wilson 1996).

Production in the Far East is declining, but exports are increasing. No longer supported by federal subsidies and a state-controlled economy, production levels in the Far East have plummeted since 1989. However, now that the RFE has opened its doors again to the rest of the world, international trade is booming. Direct foreign investment is also on the increase. Foreign oil and trading companies, such as Exxon, Texaco, Royal-Dutch Shell, Marathon Oil, Mitsubishi, and Mitsui, are already investing in the Far East's oil reserves (*RFE Update* June 1995). In addition to oil, foreign investors are actively pursuing ventures in the timber and mining industries.

The increase in trade and foreign investment in the RFE has been beneficial to the region's economy, but the costs, in some cases, have been severe. At risk in this desperate race for economic stability is the health and well-being of the region's inhabitants; the native peoples and their cultures; unique animal and plant species; and the rich history of this ancient land.

One of the greatest concerns, shared by all of the regions of the RFE—and most of Siberia—is the threat to the forests. The global importance of Siberian forests is evident. On a planetary scale, they play a significant role in maintaining the Earth's climate and atmospheric gas balances (Kiseleva 1997). With forests covering about 45% of the RFE (an area more than seven times larger than the landmass of Japan), estimates

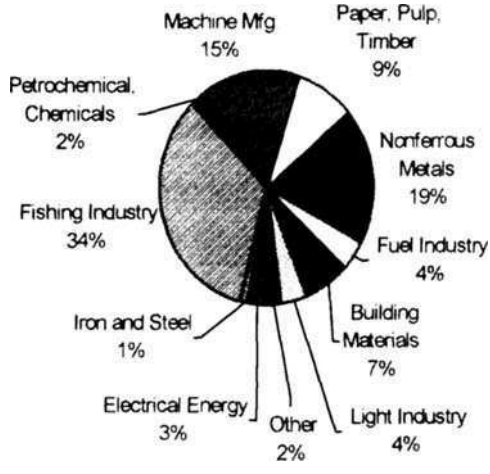

Figure 1 Russian Far East industries.

of uncut forests in the RFE range between 25–50% of the original forests. The vast RFE forests act as reservoirs for carbon dioxide gases, which scientists have identified as the major cause of global warming. It is estimated that the forests of the RFE and Siberia store approximately 40 billion tons of carbon, about half as much as the Amazon rainforests. However, deforestation is the second largest emitter of CO^2 gases after fossil fuels, and large-scale logging in Russian forests could release enormous amounts of carbon into the atmosphere, thereby accelerating global warming.

In addition to rapid deforestation, there are other threats to the Siberian taiga. Pollution, in the form of acid rain, is emitted from Russia's nickel, aluminum, and lead smelting plants. Many of the region's rivers are damaged when timber harvesters sink logs during transport (rivers are overloaded with logs floating down river to processing plants, resulting in the flooding of thousands of hectares of taiga). Because most of the region's natural resources such as diamonds, oil, natural gas, and coal are found underneath the forests, the taiga is depleted to mine these resources (*GAIA Forest Conservation Archives* May 1996).

THE REGIONS OF THE RFE

Primorskiy Krai

Primorskiy Krai, which covers approximately 166,000 km^2 (64,000 mi^2) is located in the southern part of the RFE, bordered by China to the west. In the most southern part, Japan, China, and North Korea all share a border with Primorskiy Krai, on the Tumen River Delta, in the Sea of Japan. Nearly 6000 miles from Moscow, Vladivostok, a major port and international trade center, is the largest city in the krai.

The Sikhote-Alin mountain range runs parallel with the coast, covering much of the region. The average elevation of the mountain range is 3280 ft, with the highest peak, Mt. Oblachnaya, at 6085 ft. Rivers on the western side of the range flow into the Ussuri River, a major tributary of the Amur River, which forms the border with China. Forest covers 80% of the krai. Intense settlement of Primorskiy Krai corresponds with large-scale industrial development, which began in the early nineteenth century. Most of the settlements—comprised of Ukrainians, Russians, Belorussians, Moldavians, Estonians, and Finns—were established in the 1860s. Today, the total population of Primorskiy is 2,312,000, which includes 2000 indigenous people. Most of the indigenous people are of the Tungus-Manchu group: Udege, Nanai, and Orochi. Another small group, the Taz, represents the intermarriage between Chinese men and native women in the mid-1800s. Traditional economic activities of the indigenous peoples include hunting, fishing, and gathering of nontimber forest products.

Primorskiy Krai was established as an individual administrative territory in 1958. Despite representing only 1.5% of the total Russian population and less than 1% of the Federation's total area, the Krai's fishing industry and raw materials are vital to the economic stability and future growth of the Federation. The Krai is the largest and most balanced economy in the RFE; it is responsible for 40% of the RFE's industrial output and 40% of its agricultural output (Newell and Wilson 1996).

INDUSTRIALISM AND THE ENVIRONMENT: FORESTRY

At the beginning of the century, old-growth Korean pine/broad-leaved forests covered 90% of the Krai. Since that time, heavy logging has greatly reduced the forest stock.

Primorskiy Krai, however, is still one of the more densely forested regions of the RFE, with an estimated 12.46 million hectares (almost 31 million acres) of forested territory. Approximately 90% of the forests are owned by the state, with the remaining 10% belonging to agricultural enterprises and other departments (Newell and Wilson 1996).

Timber production, second only to Khabarovsk Krai, peaked at about 6 million m^3/year in 1989—declining to 3.67 million m^3 in 1993. However, despite declining production, exports have remained relatively constant at about two million m^3/year, almost 90% of which are raw logs. Decentralization of the forest industry has led to a dramatic increase in the number of logging operations and has made monitoring more difficult. As of 1995, there were nearly 500 logging sites in the Krai (Newell and Wilson 1996).

Like other regions in the Far East, Primorskiy Krai has started a forest leasing program, issuing 25-year leases to logging companies; about 5 million of a total 11 million hectares were leased in 1995 (Newell and Wilson 1996). Approximately one-third of all logging is by clear cutting, the rest is selective cutting (at 30% of standing timber). Selective cutting is often simply high grading, where only the best trees within a given area are cut. This practice reduces the genetic diversity of the forest and can be as damaging as clear cutting (Gordon 1995).

One of the industry's major threats to this region (as well as the Khabarovsk Krai) is the proposed construction of a logging road from the town of Sukpai to Nel'ma on the eastern coast of Khabarovsk Krai. The road, if built, will open up one million hectares of roadless wilderness and spruce, fir, and larch forests in the Samarga and Sukpai River basins in the Sikhote-Alin mountain range. In the process, it could destroy traditional hunting grounds of the Samarga Udege and damage a key range in the northern habitat of the Amur Tiger.

One of the most well-known threats to the Krai's forests surfaced in 1991 in the form of a 30-year agreement signed by South Korea's Hyundai Corporation; two regional Russian timber enterprises Primorlesprom and Terneyles; and the Primorskiy Krai's government. The joint venture logged approximately 200,000 m^3/year near Svetlaya, selling raw logs, mainly to Japan. Because of the need for revenue in this region, the joint venture was allowed to log this area despite negative environmental impact statements (Newell and Wilson 1996).

Expectations that foreign investment would bring environmentally sound logging and economic benefits to the Svetlaya district have not come to pass. A Greenpeace team visiting in May 1994 reported that "mostly healthy trees (some with trunks as small as 6 cm [2.4 inches] in diameter) are being extensively clear cut (the contract requires preferential cutting of dry trees). There has been no successful replanting (the contract requires replanting with one year of logging)." The team also reported that logging in water protection zones and widespread pollution by oil used in logging machinery is commonplace. Oil washed into rivers with snowmelt has decimated salmon stocks, which are the traditional base of Svetlaya's economy (Blake 1994).

In 1992, the Hyundai joint venture called "Svetlaya" tried to gain access to the Upper Bikin basin. The Bikin River is the largest old-growth watershed in the Krai (Newell and Wilson 1996), containing large amounts of biodiversity, and is one of the prime habitats remaining for the rare and endangered Amur (Siberian) tiger. The Bikin is also home to the indigenous Udege people, who have inhabited the basin for hundreds of years and whose livelihoods are based on hunting and fishing (Gordon 1994).

In a letter to U.S. Vice President Al Gore in 1995, the Udege people explained that "indigenous people of the RFE and representatives of other nationalities, pursuing a

traditional way of life that has evolved over centuries, rely upon the natural riches of the Sikhote-Alin bioregion. We trap, fish and gather non-timber forest products in its watersheds, and these land-based activities are essential to our economic survival in the region" (*GAIA Forest Conservation Archives* December 1995).

Despite opposition from the Udege and environmentalists, the region's governor, Kuznetsov, gave the joint venture permission to log 500,000 m^3 annually (Newell and Wilson 1996). However, through joint efforts of the Udege and local and international environmental movements, Hyundai's efforts to log the upper Bikin were blocked, when the Russian Supreme Court ruled that the joint venture "Svetlaya" had not fulfilled its obligations to provide a positive environmental impact statement of their operations (Gordon 1994).

Pressure to log the Bikin decreased when former governor Kuznetsov left office in late spring of 1993. Kuznetsov had been one of the strongest supporters of Hyundai and clear cutting the Bikin. The new governor of the region, Yevgeny Nazdratenko, did not take a stand on logging until October 1994, when he publicly announced his support for logging the headwaters of the Bikin River basin on cable television (Gordon 1994). The governor stated that because the forests were dying (and represented a great fire danger) they must be logged immediately to restore ecological health to the forest. When the local press asked Kuznetsov if only dead trees would be logged, he stated that they would log everything (Gordon 1994).

The Svetlaya logging company continues to log old-growth forests in the Sikhote-Alin plateaus. According to a group of Russian ornithologists working during the summer of 1996, "the consequences of years of barbarous harvesting methods are dreadful, and the fragmentation of the White-bark spruce forest has obviously reached a critical point. If logging continues, irreversible shifts of the Bikin's hydrologic regime will be inevitable, leading to floods in the rich, broad-leaved forests of the middle and lower Bikin." (This happened, in fact, in 1994 and 1996.) The ornithologists fear that continued destruction will further threaten this important breeding area for at least 15 globally endangered bird species, including the hooded crane, Blakiston's fish owl, and Chinese merganser (Mikhailov 1997).

The Udege people fear for their own extinction. Of the eight Udege groups that once lived in the RFE, only three remain: the Bikin, Khor, and Samarga groups. Not long ago, the Iman group of Udege was forced to disperse as a result of inappropriate forest management policy that destroyed their traditional lands in the Iman River watershed. For the indigenous peoples of the RFE, the Sikhote-Alin is more than just a source of natural resources. "It is our spiritual homeland, a landscape that forms the traditional background for our culture and ways. Aggressive resource development in this bioregion, however, represents a direct threat to our existence and to the future of our children" (*GAIA Forest Conservation Archives* December 1995).

The threat of extinction for the Siberian (Amur) tiger has attracted international attention, yet another large cat, the Far Eastern (Amur) leopard is even more endangered. Scientists estimate that only about 30 leopards remain in the wild. They live primarily on the Borisovskoye Plateau in southern Primorskiy Krai, along the North Korean and Chinese borders. In the taiga, it takes on characteristics of its cousin the snow leopard. The Amur leopard has long fur and is able to conserve energy and heat in the fierce winters. Despite its adaptability, its range is shrinking, and people are less tolerant of its presence. Like the Florida panther, the leopard has been forced into a corner that is ever-shrinking (Quigley 1995). The plateau's proximity to Primorskiy Krai's major population

centers (Vladivostok, Nakhodka, and Ussuriysk) increases the threat of poaching, hunting, and uncontrolled tourism; while its timber value makes the leopard's dwindling habitat a future target for timber companies.

The forests of Primorskiy Krai support a variety of species and vegetation that is found nowhere else in Russia. Some of these, such as yew, aralia, and ginseng, are ancient—having originated in the Tertiary period. The collection of forest products, such as nuts, berries, mushrooms, fern, and medicinal plants, and beekeeping are profitable enterprises that should be considered as alternative means of economic development but are instead threatened by continued logging. Experts believe that the harvesting of Korean pine nuts is far more profitable than cutting down the trees. In 1994, 310 tons of eleuteracocus root, 160 tons of berries, 110 tons of fern, 210 tons of Korean pine nuts, 200 tons of birch juice, and 50 tons of mushrooms were collected. This is one-third of the allowable harvest, showing that nontimber forest products, traditionally in high demand on the domestic market, are not used to their full capacity (Newell and Wilson 1996).

PORT DEVELOPMENT

The forest is not the only ecosystem threatened by economic development in Primorskiy Krai. Commercial development, primarily in coastal areas, is a serious threat to wildlife and Primorskiy's environment. In 1991, the United Nations Development Program and the United Nations Industrial Development Organization began to formally develop the Tumen River, the natural border between Russia, China, and North Korea. The original plan was to create a huge international port at the delta, using timber, minerals, and other raw materials from Russia and Mongolia, labor forces in China and North Korea, and financing and technology from Japan and South Korea, to create a low-cost processing and transshipment zone for the export of raw materials from Siberia, China, and Mongolia to Japan and other Pacific Rim countries.

The Tumen River delta, however, is a region of international importance. It is a vast wetland complex with more than 30 freshwater lakes and brackish lagoons. About 200 species of bird nest or stop over in the area during migration; 47 are rare species including the hooded, Japanese, and Siberian white-naped cranes. Pos'yet Bay, just north of the delta, is an extremely rich marine ecosystem and one of the cleanest in the RFE. Large-scale industrial development along the Tumen watershed in the Chinese provinces will send pollution downstream and damage wetlands at the delta and nearby coastal ecosystems, where more than 700 species of living organisms inhabit the coastal waters of the Sea of Japan (Newell and Wilson 1996).

Russia already has well-developed ports at Nakhodka, Vostochniy, and Vladivostok—that are already polluted. The planned rail system could seriously affect already existing ports, which are currently operating at only 50% capacity. A proposed railway connecting the Tumen area with China and Central Asia could reduce use of the Trans-Siberian and Baikal Amur railways, which, when constructed, caused major environmental degradation to the region. An alternate system could prove economically and socially devastating to the cities and towns that have developed as a result of these railways (Newell and Wilson 1996). The biological diversity of Primorskiy Krai's forests, the wetlands, and the rich coastal waters is higher than almost anywhere else in Russia and rivals that of any temperate ecosystem on the planet.

Khabarovsk Krai

Khabarovsk Krai, the geographic center of the RFE, covers approximately 788,600 km^2 (489,721 mi^2) and is located just north of Primorskiy Krai in the southern region of the RFE. Khabarovsk extends 1800 km^2 (118 mi^2) along the Sea of Okhotsk and the Tatar Strait, sharing a border with China to the south. Because Khabarovsk extends a great distance north to south, it has a wide diversity of ecosystems, ranging from tundra and rocky mountain terrain in the north to humid, subtropical forests in the south.

Russian exploration of this region began with the Cossack expeditions of Ivan Moskvitin in the 1640s and with the Amur River surveys that were conducted from 1643 to 1689 (Newell and Wilson 1996). Expansion in the Amur Valley, however, was effectively checked by its proximity to China. Russian aggression led to appeals by native peoples for assistance to the Manchu Emperor. Fort Albazin on the upper Amur was witness to numerous bloody encounters for almost 30 years, largely because the cannon used by the Chinese constituted the most sophisticated resistance to the Cossacks throughout Siberia (Channon 1995). Eventually, a peace treaty was signed that established the boundary along the watershed of the Stanovoy Mountains, effectively excluding Russia from both banks of the Amur and from its tributaries east of the Argun River. Russian settlement of the region peaked in the midnineteenth century, when China returned the territory to Russia.

Today, the Krai's population is 1,600,000—comprising 23% of the RFE's population. More than 20,000 are indigenous people, from eight ethnic groups including Nanai, Chul'skiy, Nifkhi, Negidal'tsi, Orochi, Udege, Evenki, and Eveni. These people depend on fishing, hunting, and collection of nontimber forest products for their survival.

Russian settlers introduced gold mining, forestry, commercial transport, construction, agriculture, and manufacturing to the region. Completion of the Ussuriyskiy (1897) and Amurskiy (1916) railroads spurred economic development by providing Khabarovsk with access to the Sea of Japan and the Trans-Siberian Railroad. Following the Bolshevik Revolution (1917) and the Russian Civil War (1918), economic development was slow. By 1926, production levels in the region began to increase, and due to increased exports, rapid growth ensued. Economic growth continued into the 1940s and 1950s with increases in light and heavy industry, agriculture and food production, new machinery and construction plants, and ore refineries (Newell and Wilson 1996).

FORESTRY

Khabarovsk Krai is responsible for about 40% of the RFE's timber production, nearly twice as much as the second largest producer, Primorskiy Krai (Newell and Wilson 1996). The forests of Khabarovsk Krai range from boreal taiga (mostly larch and dwarf Siberian pine forests) in the north to temperate, mixed conifer and deciduous forests (spruce and fir, with oak, birch, ash, and others in low-lying areas) at its southern extremes. In 1993, Krai timber enterprises logged 7.026 million m^3 of timber from 57,433 hectares. The method of choice was clear cutting—which was employed on 41,446 hectares, accounting for six of the seven million m^3 that were harvested (Newell and Wilson 1996).

Logging is concentrated in two areas: one in the western part of the region, centered around the towns of Chegdomyn and Tyrma and the recently completed Baikal-

Amur Mainline railroad, and the other in the mixed forests between the Amur-Amgun' River basin and the coast, along the Sikhote-Alin range.

Four prominent joint venture timber organizations currently operate in Khabarovsk: Starma Holding, whose foreign partner is the Pioneer Group of the United States; Interprom, which is linked with a French firm; Forest Vanino, which operates in partnership with the Forest Finans holding company of Norway; and Eksprales, which has a new agreement with Global Forestry Management Group (GFMG) of the United States. The Global Forestry Management Group, a consortium formed by 10 independent forest product companies in Washington, Oregon, and Northern California, is the first U.S. timber company to venture into the RFE at this level. In the words of one environmental activist, GFMG will be the "first U.S. company to exploit these fragile forests on a large scale" (Gordon 1995). GFMG is investing $9 million in two joint ventures with Russian partners. Half of the U.S. investment money will be used to purchase equipment that will help Russians log more rapidly and on steep slopes. The goal of the venture, according to GFMG, is to bring lumber and logs to the U.S. Northwest to replace the traditional sources dramatically reduced by public policy decisions (Newell and Wilson 1996).

North Korea also has its hand in Khabarovsk's timber reserves. The North Koreans have been logging the forests around Chegdomyn since 1967, when the Soviet and North Korean governments signed a joint-venture agreement. According to the agreement, North Korean laborers are sent to cut trees, and their government receives a percentage (currently 38.5%) of the timber produced. This venture has been controversial for several reasons, primarily those concerned with the human rights of the North Korean workers. Reports from "defectors" of the labor camps claim physical abuse and near-starvation conditions of the camps' workers. Because the Russian and North Korean governments have been secretive about the camps, proof of these allegations has yet to be found (Newell and Wilson 1996).

In addition to the overharvesting of timber and destructive practices, the timber industry poses another threat in Khabarovsk Krai. The building of logging roads, such as the planned road from Nel'ma to Sukpai in the Sikhote-Alin range (see Primorskiy Krai), is a threat to wildlife habitat and local indigenous people.

NUCLEAR POWER

Another threat to the people and environment of Khabarovsk Krai is the regional government's plan to establish a nuclear power station near Lake Everon. Russian environmentalists are concerned that the planned plant near Komsomol'sk-on-Amur will present a serious threat to the biodiversity of the lake ecosystem. They also argue that the rights of the indigenous people who inhabit the area, the Nanai, have been violated. The Nanai, who moved into the region from China during the time of Ghenghis Khan, depend on the forest, animal, and fish resources for survival (Newell and Wilson 1996).

Four protected areas surround the site: two state nature preserves and two game preserves. Lake Everon, a shallow, 30-km^2 lake, migratory stopover point on the East Asian flyway, is the seasonal home to rare cranes, storks, and swans. One of the largest migrations of roe deer takes place not far from the lake's shores. Seventeen rare or endangered bird species migrate or nest around the lake, which is the largest remaining unpolluted lake near the Amur River.

AMUR TIGER

Of greatest concern in Khabarovsk Krai, however, is the logging and gold mining in the Khor River basin. This region of the RFE has gained much attention in recent years because of the plight of the Siberian (Amur) tiger. The Siberian tiger (*Panthera tigris altaica*), known to Russians as the "Ussuri" or "Amur" tiger, is the world's only temperate forest tiger and is the largest of all cats. The tiger once roamed throughout southern southeast Siberia from Lake Baikal to the Sea of Japan, as well as northeast China and the Korean Peninsula. Its range has shrunk to such an extent that the only remaining viable population is now found in Primorye and southern Khabarovsk Krai (Miquelle et al. 1996). Recent census data indicate that there are only 250–400 of the cats remaining in the wild. The Caspian tiger (*Panthera tigris vigrata*), the only other tiger species indigenous to Russia, was declared extinct in 1980 (*Dimensions* 1995). The remaining animals are under threat from both poaching and habitat destruction.

The combination of Russia's economic crisis and the high demand for tiger skins, bones, and organs in China, Taiwan, Korea, and Japan has resulted in a dramatic increase in poached tigers. In addition, now that Siberia's borders with China and North Korea are open, poachers have much easier access to the remaining tigers (Vogt 1995). Meanwhile, enforcement of antipoaching regulations has been spotty, at best (Gordon 1995), as budgets for ranger patrols disappeared and corruption flourished, driven by stagnant salaries and hyperinflation (Linden and Yar, 1995).

Poachers are able to fetch a high price due to the supposed medicinal and aphrodisiac properties of tiger parts; tiger bones, pulverized and used in "tiger wine," bring in about $100 a pound. The use of animal parts has been practiced in many Asian countries for centuries, and a belief in their efficiency (although not scientifically based) for treating illness is deeply rooted in the local culture. Tiger bones are used to cure joint and back pains; the tiger brain is used to cure acne. A tiger skin sells on the black market for $5000–10,000, while some tiger skins are sold abroad for $20,000–30,000. The Convention on International Trade in Endangered Species (CITES) banned all trade in tigers in 1977. Since that time, however, wholesale trade and consumption of tiger parts has continued unchecked in Taiwan and China, a member of CITES (Pacific Environmental Resource Center 1995).

While the Amur tiger is the symbol of the Ussuriland forests in the RFE, the pine tree—called *kedr* in Russian—is both ecologically and culturally vital to the region. The pine cones provide the food for many of the animals that inhabit the Ussuri taiga, including wild boar, elk, roe deer, musk deer, and Himalayan black bear. In turn, many of these animals serve as prey for the tiger. Poor logging practices—particularly highgrading—over the past 40 years have severely impacted the Ussuriland forests. The pine trees—the dominant species of the ecosystem—were logged first, seriously impacting the availability of food for deer and boar—the tiger's primary prey (Gordon 1995). Young tigers often wander into villages in search of food, where they are shot as a threat to humans and livestock (Pacific Environmental Resource Center 1995).

Timber-related activities, such as the development of logging roads in the region, also have a critical impact on the tiger. These roads provide easy access to loggers and poachers alike. Poachers have more opportunities to shoot tigers and their prey, and more prey will be legally harvested in areas that were formerly tiger "sanctuaries," in the absence of roads (Marcot 1995). Logging is not necessarily bad for tigers. Selective cutting, as it is practiced in many areas of the RFE, creates small openings that produce

food for elk, which in turn provide food for tigers. However, large clear cuts are detrimental to elk, boar, and tigers. Continued clear cutting will likely sever some of the tiger populations—leaving small, isolated pockets that are at far greater risk of local extinction (Marcot 1995).

Sakhalin Oblast

Sakhalin Island lies east of Khabarovsk Krai and forms part of the noose of islands that enclose the Sea of Okhotsk. Bordering waterways include the Tatar Strait, the Sea of Japan, and the Pacific Ocean. The Oblast, which includes the Kuril Island chain, is 87,100 km^2 (33,630 mi^2). Mountains cover 75% of Sakhalin Island—and 60% is covered with forests. Larch forests cover the northern mountain valleys. The widest stretch of forests—made up primarily of spruce and fir, with some bamboo undergrowth—are on the central part of the island. Although most of the southern part of the island was clear-cut by the Japanese during occupation between World War I and II, some old-growth fir forests remain.

Rich wetlands stretch along the northern coasts, along the shores of the Bay of Endurance and in the south, near Aniva Bay. High precipitation, low evaporation and the mountainous terrain have created more than 16,000 lakes and 65,000 rivers—making the island a vital spawning area for salmon.

The Kuril Island chain is a volcanic chain in the process of being formed. Forests, primarily deciduous (Korean pine/broad-leaved), cover the southern Kurils; the northern islands are dominated by bush vegetation; dwarf Siberian pine grow at higher elevations on all of the islands.

Sakhalin was first settled between 20,000 and 50,000 years ago, when it was connected to Hokkaido. About 10,000 years ago, the rise in sea level made Sakhalin an island. Throughout its history, the Island has attracted a variety of settlers, including Mongols, Manchurians, Chinese, Russians, and Japanese. Indigenous people of the islands include the Nifkhi, Ul'ta, and a few small groups of Evenki and Nanai (Newell and Wilson 1996).

Although the island was first opened by Russian explorers in the mid-1700s, Russians did not begin to settle there until the midnineteenth century. It was for strategic reasons that the Russian government decided to occupy Sakhalin in 1853. In 1855, Russia and Japan agreed to split the Kuril Islands—Russia took the northern islands; Japan took the southern. As part of the Treaty of Shimoda, the two nations agreed to share Sakhalin Island, which served as a penal colony from 1859 until 1906. In 1875, however, after years of pressure from Russia, the Japanese agreed to trade their claim to Sakhalin Island for Russia's share of the Kurils (Newell and Wilson 1996; Forsyth 1992).

This was the beginning of a 40-year struggle for ownership between the two countries. In 1905 Japan invaded Sakhalin Island, forcing the Russians to hand over half of Sakhalin and all of the Kurils. In 1920, the Russians reoccupied northern Sakhalin. Then, near the end of World War II, the Soviet Union invaded the Kurils and southern Sakhalin, reestablishing their claim to the islands. During the Japanese occupation, however, much of southern Sakhalin and the Kurils were deforested. The Japanese also constructed seven pulp and paper combines and the island's major railway.

Today, Sakhalin Island and the Kurils belong to the Russian Federation, although Japan still lays claim to the southern Kurils (Linden and Yar 1995). The population of the Oblast is approximately 673,100, with about 2700 indigenous people representing

seven groups. Most of the indigenous people work in factories and industries rather than their traditional occupations—fishing, hunting (marine mammals), and collecting non-timber forest products.

INDUSTRIALISM AND THE ENVIRONMENT

Fishing and fish processing represent about 30% of the region's total industrial activity. The Kuril Basin and Sea of Okhotsk are some of the richest fisheries in the world, providing nearly half of the total seafood supply for the entire federation. The fishing industry employs about 50,000 people (Newell and Wilson 1996).

Forestry is the second largest industry in the Oblast. Although most logging takes place on slopes in mountainous Sakhalin, about 98% of the logging is done by clear cutting. With the seven pulp and paper combines built by the Japanese in the 1920s and 1930s, the Oblast's timber industry became a vital part of the economy in this region. With the fall of communism, Sakhalin's timber industry faces high transport costs and inflation, and few federal subsidies—making it unable to compete for Europe's pulp and paper product export market. Since introduction of the market economy, domestic demand for paper products has decreased by 25%, leaving the combines at a virtual standstill, while most of the timber is exported (unprocessed) to Japan (Newell and Wilson 1996).

A well-functioning timber industry is critical to the economic and social health of the region. The combines supply heat and electricity to a large portion of island residents. Since the early 1990s, industrial output in Sakhalin Oblast has declined by more than 30% due to the high cost of transportation, loss of federal subsidies, outdated machinery, and intensive resource exploitation (Newell and Wilson 1996). But because of the economic potential of the Oblast's oil and gas reserves, plans to improve transportation and develop the island as a raw materials base are already underway in Moscow (*RFE Update* January 1997). Western companies involved in off-shore drilling are expected to form joint ventures with timber and coal companies (Krell 1996), further contributing to the loss of remaining forests and the continued environmental degradation of the oblast. To date, 40% of Sakhalin's mainland is being used for oil and gas industries (FIAN 1997).

Off-shore drilling for oil and gas in the Oblast is drawing the attention of foreign investors in Asia and the West. The oil fields are expected to contain as much as eight billion barrels of oil, possibly the biggest oil field discovery in the past two decades. The oil available could more than double the output of Alaska's North Slope, according to some observers (*Puget Sound Business Journal* 1997).

The economic benefits of development in Sakhalin Oblast are not limited to the Russian Federation and multinational corporations. Many businesses and workers in the U.S. Pacific Northwest will also benefit from the increased production and transportation. The ports of Seattle and Tacoma are in the forefront of the cargo transportation business.- Already Seattle-area carriers and forwarders are positioning themselves for the coming boom. Alaska Airlines has established weekly service to Sakhalin in preparation for transporting material and equipment for new exploratory oil wells and a new gold mine in the region (*Puget Sound Business Journal* 1997).

Although a boost to the local economy is important to Sakhalin, the price, according to many residents and environmentalists, is too high. They believe that the projects will not create a significant number of jobs for local people, and most will not enjoy the

economic and social benefits expected. Environmentalists and the fishing industry, so vital to the region's economy, are concerned that the fishing exploitation of oil and gas reserves on the northeastern shelf will threaten ecosystems all around the Sea of Okhotsk (Newell and Wilson 1996).

The sea, one of the most productive in the world, provides more than 50% of the federation's annual catch and is a major source of fish for Japanese markets as well. Fishing industry representatives fear that oil exploration, platform and pipeline construction, and transportation will damage marine and riparian ecosystems that are vital spawning grounds for salmon and other economically essential fish (Newell and Wilson 1996).

The northeastern wetlands are of particular natural value and are an important migration point for birds. Ecologists are concerned that the industrial projects will damage these areas that are critical habitat for rare, migrating birds and that pollution will affect off-shore feeding grounds for whales, dolphins, and other species of marine mammals (Newell and Wilson 1996).

The projects also pose a threat to the life-styles of several of Sakhalin's indigenous peoples. The Nifkhi and Ul'ta who inhabit northern Sakhalin were not consulted before the federal government approved the projects, even though their tribal lands will be affected. These new oil developments may be the final blow to some of these ethnic communities who have inhabited this area for thousands of years and whose cultural beliefs and traditions are an integral part of the history and culture of the Sakhalin Oblast.

The Nifkhi, who were the largest early settlers to the island, remain the largest ethnic group today. About 50% of the Nifkhi population (approximately 2000) live in northern towns and villages—working in factories and industry. The other 50% live in settlements on the northwestern coast, where most of them work in their traditional occupations of hunting, fishing, and collecting. The government has long neglected the Nifkhi villages—none have hospitals, electricity, or shops (Newell and Wilson 1996).

The village of Nogliki, as well as surrounding territory in North Sakhalin, is mostly inhabited by Nivkhi. In 1995, Rybookhrana fishing authority fixed the fishing quota for private consumption at 45 kg/person. Although the amount was already far too low to meet the nutritional needs of the people, it was cut again—by two-thirds—in 1996. Because the quota is not enough to sustain the indigenous people, and few opportunities for other employment exist, many of the Nifkhi have asked permission to return to their former habitat to continue living in their traditional life-styles. However, their former territory now belongs to the *kolkhoz* (FIAN 1997).

The Ul'ta (or Orochi), the smallest ethnic group in the Federation (320), live primarily in Sakhalin. In the course of the twentieth century, the Ul'ta's population has declined and they are now on the verge of extinction. A major reason was the communist administration's break up of the Ul'ta reindeer herding in northern Sakhalin. The government forced the people into "villages" and took their land to develop oil reserves. From the 1950s to the 1980s, most of the richest reindeer pasture was burned by the oil industry—about 70% of the lands belonging to the Ul'ta's "Val" reindeer herding collective farm. The Ul'ta see reindeer herding as their only chance at survival, while continued development and environmental degradation further threaten remaining pastures (Newell and Wilson 1996).

During the struggle for possession of Sakhalin and the Kuril Islands, the Ainu were moved a number of times by the Japanese and Russian governments. Following the Russian repossession after World War II, the Ainu were again uprooted and sent to the island of Hokkaido. Traditionally, the Ainu fished in rivers and hunted on land and sea.

Agriculture and gathering of wild plants were secondary activities. One distinctive feature of the Ainu hunters was the use of poisoned arrows—they were the only indigenous people of the region to use this method. At the beginning of the nineteenth century, the Ainu on Sakhalin and Hokkaido numbered about 24,000. At the beginning of the twentieth century, their number had declined to 17,000, with about 5% intermarriage with Japanese. By the mid-1930s, more than 35% were intermarried. Today, less than 200 "pure" Ainu remain (Newell and Wilson 1996).

Amur Oblast

Amur Oblast, with an area of about 364,000 km^2 (140,540 mi^2), is situated in the middle and upper Amur River basin. It is bordered by Yakutia (Sakha) to the north, Chita Oblast to the west, and Khabarovsk Krai to the east.

In 1856, the rich soils of Amur Oblast attracted the first large-scale influx of Russian settlers—primarily cossacks and peasant farmers. Further settlement occurred toward the end of the nineteenth century, when gold deposits brought tens of thousands of prospectors to the area. Another population wave occurred in 1913 with the completion of the Trans-Siberian Railroad. The population today is approximately 1,062,500 of whom 1502 are of the indigenous Evenki group.

The major industries in Amur Oblast include gold mining, food production (primarily agricultural), hydroelectric power production, coal mining, and timber, pulp, and paper. The Oblast is of particular importance to the RFE because it contains nearly 55% of the RFE's arable land, producing one-third of all milk and meat, 70% of the soybeans, and 60% of the grain. Amur Oblast has more than half of all known Russian gold reserves. The majority of the Oblast's exports (machinery and raw materials) go to China (91%) in exchange for canned foods, clothing, and shoes (Newell and Wilson 1996).

Mining, agricultural development, logging, and the construction of dams have caused severe environmental damage to Amur Oblast. Open-cast mining has altered the landscape in many areas, while coal and gold mining pollute the local streams and rivers—damaging fishing and spawning areas.

Agricultural production is geared toward grain, fruit, and potatoes, as well as dairy and beef cattle. Severe erosion, caused by extensive farming and the absence of protective forests, plagues much of the region. Poor logging practices and human-caused forest fires (usually started by logging ventures) have taken their toll on the Oblast's forests. Although forestry has declined in recent years, experts predict that if current trends continue, there will be nothing left to log in 10–15 years (Newell and Wilson 1996). Regeneration, which is often limited by permafrost, is a problem for many of the Oblast's forests, which often become bogs and marshes.

HYDROELECTRIC POWER

The problem of forests was further exacerbated by the government's construction of the Zeyskaya hydroelectric power station on the Zeya River. Several million hectares of timber have been lost to the reservoir—while rotting logs now poison the water. Since 1990, ecologists have been fighting the Russian and Chinese governments' plan to build seven hydroelectric power stations on the Amur River. Ecologist Vladimir Desyatov warns that the construction of these dams would further aggravate the region's water

pollution problems by increasing the concentrations of harmful industrial discharge. Desyatov suggests smaller power stations that are built in mountainous areas and tributaries that do not contain salmon spawning grounds, and the construction of tidal and thermal power stations and gas power stations using nearby Sakhalin Oblast's abundant gas reserves (Newell and Wilson 1996).

One of the most controversial construction projects in the Oblast is the proposed Khinganskiy Dam, a large hydropower project on the Amur River that China and Russia would build jointly with international aid. Russia would benefit form the increased energy and irrigation capabilities, but China has far more to gain. The Chinese government would like to move 100 million people into the nation's sparsely populated northern region along the Amur (Dogan 1995).

The Amur River, which is a vital source of water, fish, and transportation to the people of the area, is also one of the most important migratory stopping points for the endangered Siberian crane. Cranes, which are the world's oldest group of living birds (about 60 million years old), are facing extinction throughout the world. Seven of the 15 species of cranes that exist today are threatened; the Siberian is in the most danger. In winter, the Siberian cranes feed almost exclusively on aquatic roots and sedge tubers found in wetlands—many of these vital feeding grounds are threatened by current development and pollution.

Primarily three Siberian crane populations are identified. The largest, known as the Eastern Population, summers in Yakutia (north of Amur) and migrates to China's Poyang Lake in the winter. The Central Population summers east of the Urals (near Gorki Park) and migrates to the Keoladeo National Park in India. This population is nearly extinct because of domestic developments in Afghanistan, Pakistan, and Russia. In 1964–65, a study revealed that there were approximately 200 cranes in the Park. By 1990–91, the number had dropped to 10. A U.S.-Russian joint effort in 1992–93 reported that no cranes had returned to Gorki. The final group, the Western Population, summers near the Volga River in the Southwest Urals, migrating to Iran in the winter. Although these cranes had not been sighted in many years, Iranian experts reported two at the Iran-Afghan border in 1995 (Dogan 1995).

It is obvious that the Siberian cranes have suffered enormous losses due to human activity, including domestic turmoil in Russia, the Afghan civil war, and the subordination of nature to economic imperatives. The cranes have been impacted by significant habitat destruction, pollution, and hunting and poaching. Fortunately, the Siberian crane has become a symbol for international efforts to preserve endangered birds and their habitats, much like the whooping crane in the United States did during the 1970s. The whooping crane, a victim of industrial pollution, pesticide use, and habitat destruction, barely survived.

Chita Oblast

Chita Oblast, which covers 431,500 km^2 (166,602 mi^2), is bordered on the west by the Republic of Buryatia, on the north by Irkutsk Oblast, on the east by Yakutia (Sakha) and Amur Oblast, and on the south by Mongolia and China.

Chita Oblast has a harsh continental climate, with long, severe winters. The temperature fluctuates greatly throughout the year with an average January temperature of −15°F and July temperatures of about 65°F. There are, however, more than 300 sunny days in each year. Over half the Oblast is forested, and most of it is mountainous.

Most of the industrial production takes place in the southern half of the Oblast, along the Trans-Siberian Railroad, with more isolated activity, primarily mining, along the newer Baikal-Amur Mainline. Despite a decline in recent years, the extraction of coal, molybdenum, tungsten, lead ore, iron, and gold continues to make mining the major industry (Newell and Wilson 1996).

Timber production peaked at 5.7 million m^3 in 1989 and has steadily declined since. Less than 40% of the Oblast's lumber is exported outside of the region, primarily to China (35%), which is also a major importer of the Oblast's gold and coal.

More than 1.3 million people inhabit Chita Oblast, with the majority of the population concentrated in the industrial southeast. Population distribution in the southeast region of the Oblast is 16.1/km^2, compared to 0.3/km^2 in the north. Indigenous people from the Buryat group inhabit the southern part of the region. The Evenki group comprises 4% of the north's population, or nearly 1200 people.

The Evenki have inhabited the northern part of the Oblast for thousands of years, and many continue to practice traditional economic activities including reindeer herding. Recently the Chita administration, in compliance with a federal decree from President Boris Yeltsin, allocated nearly 27% of each of the Oblast's northern regions as Territories of Traditional Nature Use (TTPs). However, throughout much of Siberia and the RFE, provincial leaders have ignored Yeltin's decree. In the few areas where TTPs have been created, there is much controversy over the process of delineation and the amount of land appropriated (Fondahl 1996).

In Chita, the Evenkis argue that they were not adequately consulted concerning the boundaries of the TTP. They claim that the officials did not include enough land to protect traditional activities and the ecosystems on which they depend. The TTPs incorporate only alpine tundra, which is marginally useful for hunting and only seasonally useful for reindeer herding. Much of the most culturally valuable land, including Evenki spiritual sites, lies outside the TTP boundaries (Fondahl 1996).

In addition to these issues, there is also conflict concerning the alienation clause in the presidential edict. The provincial leaders of Chita Oblast have interpreted the clause to involve a referendum of all inhabitants, not just the indigenous peoples. If a mineral deposit within a region's TTP is determined to be economically beneficial, every inhabitant of the region may vote on whether to sequester the tract of land from the TTP. With the population of the Evenkis in the three northern regions of Chita Oblast ranging from 1 to 15% of the total population, and considering a significant portion of the nonindigenous population is involved in mining, the odds that the Evenkis will have any "real" control over their traditional lands are fairly low (Fondahl 1996).

Although the Evenkis are in a far better situation concerning their traditional lands than they were under communism, there is little reason for them to be optimistic. The initial action by the Russian government to protect their rights has been overshadowed by the more recent lack of progress in enforcing these laws. Even more disturbing is the apparent ability of regional administrators to interpret the laws as they see fit (Fondahl 1996). Adding to the Evenkis concerns, geologists recently located some of Russia's largest copper deposits and potentially productive gold fields just upstream from the Evenki's land. Although no official plans have been made to develop the area, the Evenkis are justifiably concerned about their rights to the "now profitable" land (Newell and Wilson 1996).

In May 1997, the United Nations Committee on Human Rights expressed its concern at the situation of the indigenous peoples of Russia, many of whom live in poverty

and malnutrition and have inadequate access to food supplies. The committee stated that it was most concerned for those whose food supply is based on fishing and an adequate stock of reindeer, and who are witnessing the destruction of their environment by widespread pollution and continued degradation. The committee reported that it is particularly alarmed at reports that the economic rights of indigenous peoples are exploited with impunity by oil and gas companies that sign agreements under circumstances that are clearly illegal, and that the state party has not taken adequate steps to protect the indigenous peoples from this exploitation. The committee recommended in its report that the state party take immediate action to ensure that indigenous peoples have access to traditional and other sources of food (UN Commission on Human Rights 1997).

For all of the inhabitants of Chita, one of the major concerns is the region's pollution. Coal-fired power plants generate most of the Oblast's electricity and cause significant pollution. The power plants, open-cast coal mining operations and 1000 other individual enterprises, release more than 200,000 tons of pollutants (sulfur anhydride, nitrogen dioxide, and carbon dioxide) into the atmosphere each year (Newell and Wilson 1996).

Chita's power plants consume tremendous amounts of water yearly and pump the waste, much of it untreated, into the Oblast's waterways. In 1993, the Chita-1 pumped 487.73 million m^3 of wastewater (with pollutants 500% higher than the allowable level) into Lake Kenon—one of the few recreational areas available to the region's people (Newell and Wilson 1996).

Like most of the regions in the RFE, Chita Oblast is highly dependent on fossil fuels, especially coal, for its energy. However, Chita has an alternative source of power that is not available to other regions. With more than 300 days of sunlight each year, one of the world's highest, the Oblast is a prime area for the implementation of solar energy.

URANIUM

A more serious pollution problem exists for many of the inhabitants of the RFE. Uranium mining and extensive nuclear testing have left permanent scars on many of the people. Baley, a town of about 23,000 people in the central part of the Oblast, illustrates the serious environmental health risks in the RFE. In the years following World War II, Baley was the hub of an intensive uranium mining industry. Prior to Perestroika, the industry was one of the Soviet Union's greatest secrets. However, as public concern about radiation (especially following Chernobyl) increased, the past and present negligence of authorities has become a prominent issue.

During the most productive years of Baley's mining industry, the local population grew dramatically, and the need for housing in the area increased. Using concrete mixed with sand taken from tailings at the uranium mines, building panels, several new schools, a hospital, and a kindergarten were built. At the time, no one was aware of the uranium in the sand. Now, it explains why 40% of the residents live in contaminated homes; why a high percentage of Baley's women have reproductive defects; and why Down syndrome and cerebral palsy are widespread among Baley's children (Table 1) (Newell and Wilson 1996)

Although uranium mining ceased during the 1960s, gold mining continued in the region. Recent lack of funding virtually closed down the gold mines, but not before the

Table 1 Standard Medical Indicators of Radioactive Contamination in Baley (Chita Oblast)

Indicator	Percent of norm	Designation
Stillbirths	500	Disaster area
Child mortality (0–4 years)	140	Emergency area
Genetic indicators		
Miscarriages and congenital defects in newborns	140	Emergency area
Down syndrome	400	Disaster area
Illnesses in children and adults		
Respiratory	190	Emergency area
Gynecological	220	Disaster area
Complications during pregnancy	180	Emergency area
Deficiencies in mental development	95.4% of children in Baley	
Immune deficiencies	81–100% of children in Baley	

Source: East Siberian Branch of the Russian Academy of Medical Sciences, 1995.

refining process added high concentrations of mercury into Baley's groundwater, which was already polluted with uranium by-products and radon (Newell and Wilson 1996).

The East Siberian branch of the Russian Academy of Medical Sciences launched an environmental assessment program and lobbying efforts aimed at having Baley declared an ecological disaster. The declaration would entitle the people of Baley to financial aid for health compensation and relocation.

Yakutia

The Republic of Yakutia (Sakha) is the largest region in the RFE. Covering more than one-fifth of the Russian Federation—3,103, 200 km^2 (1,198,145 mi^2), the Republic is larger than the combined areas of France, Germany, Austria, Italy, Sweden, England, Greece, and Finland. The region, which stretches to the Henrietta Islands in the far north, has the coldest and iciest seas in the Northern Hemisphere. The seas are covered with ice for 9–10 months a year. The town of Verekhoyansk reaches temperatures of –83°F and is considered the coldest inhabited place on Earth. Forty percent of Yakutia lies within the Arctic Circle and is covered by permafrost. Forests are limited, then, to the southern region of the Republic. Taiga, primarily larch, covers about 47% of Yakutia.

Because of the severe climate of the north, the major cities and industrial areas are located in the southern part of the Republic. The major industries include the mining of diamonds, gold, tin, and coal. The region also relies on the production of natural gas and the forestry industry. Because of its vast resources, the Republic of Yakutia is of major importance to the RFE, as well as the Federation in general. In 1994, the region produced 99% of Russia's diamonds; 23% of Russia's gold; 11% of the RFE's timber; and 20% of Russia's fur. The region contains 43% of RFE's tin reserves; 42% of Russia's coal reserves; 38% of the RFE's oil reserves; 59% of the RFE's natural gas reserves; 79% of the RFE's iron reserves; and 49% of the total land area of the RFE. With more than nine billion m^3 of timber, Yakutia has over 44% of the RFE's total timber stock (Newell and Wilson 1996).

The region is inhabited by more than one million people, most of Russian, Ukrai-

nian, and Yakut descent. When the Russians arrived in the region in the sixteenth century, the Yakuts (who had fled north during the upheavals accompanying the rise of Ghenghis Khan) had already settled the Lena River valley. Although originally nomadic reindeer herders and cattle and horse breeders (Yakut translates as "horse people"), most Yakuts are now urban dwellers and live much like other Russians (Newell and Wilson 1996). The northern Yakuts, however, including the Yukaghirs and Dolgan, continue to live in the north, retaining their traditional ways of life (Linden and Yar 1995).

The indigenous peoples of the Republic of Yakutia include Evenki, Eveni, and Chukchi. At least eight of the major indigenous villages in southern Yakutia maintain their traditional way of life. Most Eveni have retained their native language and culture, continuing to herd reindeer in the traditional manner.

Yakutia, which suffered horribly from radioactive fallout from nuclear testing and chemical pollution during the Soviet era, has shown itself to be farsighted in dealing with some environmental issues. Rich deposits of oil and gas lie beneath the delta of the Lena River. Mindful of Siberia's sorry record of leaky oil pipelines and catastrophic spills, the Republic was hesitant to open the area to drilling. The Minister of Ecology, Vasisli Alekseev, said that "since there is no truly clean technology to extract those reserves, we felt it better to create the Lena Delta Biosphere Reserve and protect the area. Perhaps in 50 or 100 years, there will be a new technology for extraction . . . and future generations can decide whether to review the reserve's status" (Linden and Yar 1995).

In these economically strained times for the RFE, the Republic is able to resist the pressure of oil and gas profits largely because of the wealth derived from diamond and coal mining. Unfortunately, ecological problems, including further mine developments by the government and joint ventures, hydroelectric power station construction, and water pollution continue to threaten the health of the region and its people. The toxic fuel used by the Soviet's underground nuclear testing facilities in the area continues to leak into the groundwater (Newell and Wilson 1996).

Magadan Oblast and Chukotka Autonomous Okrug

Magadan Oblast and the Chukotka Autonomous Okrug cover 199,100 km^2 (76,873 mi^2). Chukotka, which formally separated from Magadan in 1992, still remains politically and economically connected to Magadan. An okrug is an administrative division within an oblast that is specifically set up for indigenous peoples.

The total population of the region is more than 550,000; most of those (about 427,000) reside in Magadan. About 124,000 people make their home in the Autonomous Okrug, and of those about 13% are indigenous. The local indigenous groups include Chukchi, Eskimo, Eveni, Chuvantsi, and Yukaghir.

The major industry of this region is mining, which makes up about 60% of the industrial output of the Oblast and Okrug. Energy production is the second major industry with Bilibino as the RFE's only nuclear power station. Food production, forestry, and coal mining are also important industries (Newell and Wilson 1996).

KOLYMA'S LEGACY

Together Magadan and Chukotka are traditionally among Russia's leading producers of gold, silver, tin, and tungsten. Historically, most of the mining in the region has occurred

in the Kolyma River valley, a region as famous for its resources as its atrocities. Kolyma basin was the location of the Dalstroy Camps of the Far Eastern Construction Trust, which governed more than 160 camps, including gold mining camps in the basin. In 1929, work began at the gold field of Srednekan and soon the number of miners swelled to 4000, as expropriated peasants from other regions of Siberia were brought in to serve their terms in "collective labor" (Forsyth 1992).

Until this time, the Soviet exploitation of the RFE had been carried out by various agencies, in a relatively uncoordinated manner. However, with the establishment of the State Trust for the Development of Industry in 1931, gulag prisoners worked the mines for gold dust that was sent to Moscow (Forsyth 1992). As year succeeded year, the inhumanity of the camp regime became fixed, and it is estimated that every kilogram of Kolyma gold cost one human life. Starvation and abuse were the norm; prisoners working in temperatures of −50F were forbidden to warm themselves by the fire. By 1938, the prison population had reached half a million. With a death rate of 25%, this level was maintained only by a constant influx of new arrivals. Of the 12–15 million who died in the Russian labor camps, Kolyma was responsible for about one-fifth (Newell and Wilson 1996).

In addition to the unimaginable number of deaths caused by Stalin's greed for gold and other minerals, the mining industry has also caused permanent, severe damage to the Russian landscape. Mining operations in the former Soviet Union are responsible for the destruction of more than 3.5 billion hectares of land. The Northeastern Gold (Severovostokzoloto) mining company alone has destroyed more than 120,000 hectares in Magadan Oblast. Each year this number increases by 2000–4000 hectares (Newell and Wilson 1996).

The now exhausted mines in Magadan, including the Kolyma basin, which exceeds 12,600 hectares, has shifted the focus of the mining industry from Magadan to Chukotka, where already much of its unique nature has been affected. Chukotka, which is part of the ancient Beringia region (land and aquatic ecosystems on both the U.S. and Russian sides of the Bering Strait), is home to more than 15,000 indigenous peoples—most who have tried, despite the odds, to maintain their traditional ways of life.

INDIGENOUS STRUGGLE

During the 1940s and 1950s, determining that the smaller reindeer and fishing villages had "no economic future," communists began resettling the inhabitants into larger villages to increase production.Relocation divided communities and destroyed cultural traditions and beliefs.Indigenous children were made to attend Soviet school—this was intended to destroy native traditions and languages. Most of Chukotka's indigenous people were forced into collective reindeer herding and fishing cooperatives and were required to meet Stalin's quotas (Ivanov 1997).

Today, of the 45,000 Chukchi who lived in Chukotka before 1917, less than 15,000 remain. They now reside in villages throughout Chukotka, where reindeer herding remains their primary means for survival. Continued environmental degradation, primarily from mining, has limited the availability of grazing pastures for reindeer. During the winter of 1997, the Chukchi reindeer herders suffered great losses due to severe weather and lack of food for their herds. A lack of supplies and equipment and difficult transportation in the face of severe winter conditions and the region's economic crisis were

responsible for an estimated 30,000 dead reindeer. The impact on the indigenous herders, who depend on the reindeer for their main source of food and sole livelihood, is yet to be determined (Ivanov 1997).

This is just another blow to the ethnic minorities of the Russian far north who have seen their traditional life-styles destroyed over the past decades by forced resettlement and ill-considered industrialization. A member of the Russian Academy of Medical Sciences says that the Chukchi have "already paid too high a price for 'civilization"' (Ivanov 1997).

The northern ethnic groups in general are facing serious threats to their development and their health, as the effects of disease and assimilation continue to deplete the population. Respiratory disease is predominant among the indigenous people of Chukotka because they have no natural immunity to diseases brought to the peninsula. And in recent years, the situation has been compounded by the overall economic difficulties facing the country. Some areas have received only 40% of the required coal, and 47% of furnace fuel (Ivanov 1997).

Other indigenous peoples of the Chukotka Peninsula, such as the Eskimos, are in no better situation. The Eskimos, who live almost exclusively as marine mammal hunters and fishermen, see their livelihoods threatened by oil exploration and continued mining that causes severe water pollution in the region. The remaining Eskimo population of about 1400 has already suffered great losses to their native culture. For the most part, they reside in mixed communities with Russians, Ukrainians, and Chukchi, and maintain very few aspects of their traditional life-styles. The Eskimos speak the Central Siberian language, which is the same language spoken by the Alaskan Eskimos of St. Lawrence Island.

For a number of years, anthropologists have studied the connection between the people of northern Siberia and Alaska. Striking degrees of similarity exist in salmon and bear ceremonialism between the cultures of the Northwest Coast and the Chukotka Peninsula, and in the folklore and mythological features of the Chukchi, Koryak, and other Siberian cultures and those of Alaskan cultures. Siberian and Alaskan groups shared a similar geographical and ecological region and employed technologies and economies that emphasized sea mammal hunting. Their cultural, biological, and linguistic relationships can be explained more readily by a common origin and historical contact, rather than a similar adaptation to resources and subsistence strategies (Fitzhugh and Chaussonet 1994).

Since relations have improved with Alaska since the late 1980s, and even more so with the fall of communism, many Chukotka native peoples are beginning to make contact with native communities across the Bering Strait to help them revitalize their cultures. The reopening of borders and communication between these groups may be the only way that many of the native groups of the RFE are able to survive (Newell and Wilson 1996).

Kamchatka Oblast and Koryak Autonomous Okrug

Kamchatka Peninsula, which covers 472,300 km^2 (182,355 mi^2), lies in the northeastern part of the RFE. The Koryak Autonomous Okrug covers the northern half of the Oblast. Washed by the Sea of Okhotsk, the Pacific Ocean, and the Bering Strait, the peninsula's climate is milder than those of the inland territories.

Located in the Pacific Ring of Fire, Kamchatka Oblast has 29 active volcanoes.

The region's Valley of the Geysers, with over 200 geysers, is second only to Yellowstone National Park in the United States. Permafrost covers the northern part of the Oblast, while 160 hot springs can be found throughout Kamchatka.

The natural wonders of Kamchatka offer a glimpse of a paradise lost—one that exists nowhere else on Earth (Linden and Yar 1995). Kamchatka is home to one of the highest populations of grizzly bears, at least 10,000, and to one of the most productive salmon spawning grounds in the world. More than 50% of the world's Stellar sea eagles nest on the shoreline, while blue whales, thought to be extinct in the 1970s, have recovered and now feed along the shoreline (Newell and Wilson 1996).

Approximately 472,000 people make their home in Kamchatka, with 75% of those living around the region's two largest cities, Petropavlovsk and Avachinskaya Bay. About 12% of Koryak Autonomous Okrug's population (38,000) is comprised of the indigenous Koryaks. The total population of indigenous people in Kamchatka and the Okrug is about 12,000—less than 3% of the total population. Indigenous lands, which once stretched throughout the peninsula, have been reduced to 35 settlements in the central and northern regions.No land has been set aside for traditional nature use by indigenous people.

Kamchatka's economy is dominated by the fishing industry, but increasingly relies more and more on foreign trade. Nearly all of Kamchatka's exports (94%) are fish and fish products, making it a one-industry economy at this time (Figure 2). The region exports a minimal amount of timber, fuels, metals, and minerals, which account for only 6% of the economy, but may be expected to increase as a result of the fishing industry's decline (Newell and Wilson 1996).

The one-industry economy of Kamchatka has made it almost completely dependent on other regions of the RFE. A poorly developed processing industry forces Kamchatka to export its fish and fish products unprocessed to other regions and foreign countries, drastically reducing the income from these products. Illegal fishing has increased as well, as fishermen often take more than their quotas. The drastic decline in funding has left the government regulating agencies unable to enforce the law, and, in a nation riddled

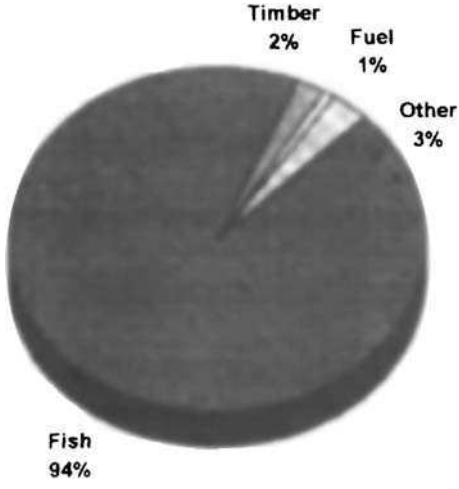

Figure 2 Kamchatka's one-industry economy.

with corruption, there are reports that the regulating agency is involved in illegal trading (*RFE Update* September 1994).

The Peninsula, so dependent on the fishing industry, already suffers from a highly unstable economy. The further exploitation of fish resources will take a heavy toll on future resources, as well as Kamchatka's inhabitants.

The Kamchadals are Russian-speaking people who live in the southern part of Kamchatka Peninsula. The 15–20,000 membership of this group is a mixture of the descendants of indigenous peoples and Russian immigrants. In several of the Kamchadal villages, large numbers of the inhabitants—especially children—are threatened with malnutrition and poverty. With the recent implementation of decreased fishing quotas in this region, the local people are unable to provide for themselves (FIAN 1997.)

In recent years, a new industry has surfaced in Kamchatka. With the Russian economy so heavily dependent on the extraction of resources, new reserves of minerals, oil, timber, and so forth were needed to replace those that were lost in the breakup of the former Soviet Union. With much of the former Soviet Union's gold being found in Kazakhstan and Uzbekistan, the Russian government set out to find new gold reserves—and found huge amounts in Kamchatka. In the summer of 1994, large-scale development of Kamchatka's mining industry began. It is estimated that Kamchatka's reserves could produce 1000 tons of gold and 5000 tons of silver. In the north, titanium reserves are estimated at about 30,000 tons. Experts also believe that one of Russia's largest nickel and copper reserves is in Kamchatka. Foreign countries have already applied for licenses and have invested in joint ventures (Newell and Wilson 1996).

One of the largest gold mining joint ventures in the region is Kamgold—in which an American and Canadian firm each own 25% and a Russian venture owns the other 50%. This project is highly controversial because the reserves are located on lands legally protected as a zoological reserve. The local government, however, decided to exclude more than 50,000 hectares from the refuge after the gold was located. The area protects brown bears, black-capped marmots, mountain goats, and sable. Environmentalists say that the legality of the government's actions is highly questionable, and they fear that this decision will set a precedent in Kamchatka and possibly in other areas of the RFE (Newell and Wilson 1996). In 1995, world-renowned wildlife biologist George Schaller visited Kamchatka to study brown bears. As he looked out over the bounty of Lake Kurilskoye meadow, he smiled and said: "Bears never had it so good. Isn't it nice to go somewhere and find good news?" (Linden and Yar 1995).

Environmentalists fear that the news is no longer good. They are justifiably concerned that the mining industry will do what it has done in so many other regions of the RFE, and the pristine ecosystems of Kamchatka will be destroyed. Much of the pollution caused by mining ends up in the local waterways, and eventually the surrounding seas (Global Response 1995). With a population so dependent on the wealth of marine resources, it is vital to the people of Kamchatka that the rivers, lakes, streams, and oceans remain unpolluted. As a region that is inhabited by species unable to survive in other parts of the world, it is vital that the region and its unique biodiversity is protected.

Republic of Buryatia

The Republic of Buryatia (also called Buryat), which covers 351,300 km^2 (135,636 mi^2), is in the southern part of eastern Siberia, sometimes considered the westernmost section

of the RFE. The Republic of Buryatia borders the Chita Oblast to the east, Mongolia to the south, and Lake Baikal to the west.

Lake Baikal is the world's oldest and deepest lake. Clay samples taken in 1990 show that the lake is at least 30 million years old. The lake is located 1000 km inland and is nearly 700 km in length (*GAIA Forest Conservation Archives* August 1996). While Lake Baikal is only the seventh largest lake in the world by surface area, it holds as much water as all five of the U.S. Great Lakes combined—20% of the world's freshwater (23,000 km^3) is contained within the lake (Harris et al. 1996). Of the more than 2000 species of plants and animals that live in the lake, more than 60% are endemic. Lake Baikal is the most biologically diverse freshwater ecosystem in the world (Harris et al. 1996). The local people call it the "Pearl of Siberia" or the "Sacred Sea," and it is a vital part of the local culture.

The total population of Buryatia is 1,059,400, with the majority (726,200) being Russian. The Russians who inhabit this area are descendants of exiled Westerners and recent immigrants to this region. The other significant ethnic group in Buryatia is the Buryats (249,500), a northern Mongolian people who may be distantly related to the indigenous Evenkis. Other populations in the region include Ukrainians, Tatars, Belorussians, Soyats, and Evenkis (Harris et al. 1996).

The major industry in Buryatia is forestry and forest products, followed by heavy machinery. Forest reserves in the Lake Baikal watershed make up some of the largest remaining stands in the world. Because of the significance of Lake Baikal as a world resource, a great deal of global interest has been dedicated to sustainable logging practices in the Baikal watershed (Harris et al. 1996).

With so much effort going into developing a sustainable forestry industry in the Lake Baikal area, environmentalists are not so concerned about the extraction of timber as they are with the local processing of it. The real problem at Lake Baikal, according to most ecologists, is the release of toxic waste into the lake. More than 200 m^3 of chlorinated organics (used in the bleaching of pulp) from the wastewater at Baikalsk pulp and paper plant are dumped into the lake each day. These are of particular concern since they take centuries to biodegrade (Burstein 1995).

Further complicating the issue is the fact that Lake Baikal is a self-contained aquatic system—an isolated ecosystem. It is home to a number of unique flora and fauna, including the Baikal seal (believed to be a relative of the Arctic ringed seal) and the golomyanka (oil fish), which has been found nowhere else on Earth.

The current debate over the Lake rages between those anxious to continue bleached cellulose production at Baikalsk and those concerned with the ecological health and future of the Lake. In these economic hard times, the people of the RFE are forced to make difficult decisions. The pulp and paper plant provides 3500 jobs (Burstein 1995).

Proponents for the protection of the lake achieved an important goal in June 1997, when the State Duma of the Russian Federation passed the first law to effectively protect Lake Baikal. The law is unprecedented in Russia. It is the first time a law has been passed introducing principles of ecologocal zones; industrial activities will be restricted or prohibited in certain zones around the lake (Worldwide Biodiversity/Rainforest Campaign 1997). Almost everyone agrees that the Lake must be protected. However, given the current economic and political conditions of the Russian government, it is important that the international community shoulder some of the financial burden to ensure the protection of this ancient and irreplaceable treasure.

FROM COMMUNISM TO CAPITALISM

Under 70 years of Communist rule, the RFE became not only a place of punishment but also a punished place. In a region as rich in natural resources as the RFE, Stalin and his successors found the financial backing necessary to fund the military and nuclear development of a superpower. Massive mining operations, nuclear testing, forced collective farming, and labor camps left deep scars not only on the people, but also on the natural environment of the RFE.

When communism collapsed in 1989, and Russia entered into a free market economy, the question posed by many environmentalists was whether the capitalism of the new Russia would save the region and its reeling ecosystems or finish them off (Linden and Yar 1995). Less than a decade later, it seems that communism's legacy of human and resource exploitation in the RFE has outlived the ideology itself. In a desperate race against a spiraling economy, the regional governments of the RFE have encouraged the continued abuse of their land with little regard for its people or the future.

The progress of reform in the Russian Federation has been accompanied by a deepening of economic problems in the RFE. During the former Soviet period, because of financial assistance from the government in the form of subsidies, primarily policies that kept transportation costs low under the centrally planned economy, economic linkages were created with other distant domestic regions, incorporating the RFE as the easternmost extremity of the domestic distribution of industry (Hoshino Committee 1996).

With economic reforms, however, assistance has decreased and price deregulation has led to soaring transportation costs. As a result, the economic linkages of the former Soviet period have collapsed—sending the RFE into an economic crisis more severe than most others in the new Federation (Hoshino Committee 1996).

In response to this crisis, the governments of the RFE territories have taken advantage of the new open door policy of the federation and have actively pursued foreign investment and joint ventures with China, Japan, and the United States. The wealth of natural resources, including millions of hectares of forest, billions of barrels of oil and gas, and incredible amounts of diamonds, gold, silver, and other precious minerals, have made that pursuit relatively easy. The world looks upon all of these resources and salivates. In an era when most other regions of the world have destroyed the bulk of their natural resources, the RFE must seem like a modern-day El Dorado.

GLOBAL INVOLVEMENT

Foreign investors and the establishment of joint ventures between Russian and other countries (government and private industry) have further increased the rate of destruction, while little profit is enjoyed by local people. Development banks including the World Bank, the European Bank for Reconstruction and Development, and the International Finance Corporation have all provided funding for foreign and domestic investment projects geared toward timber, oil, and mineral extraction. Foreign governments, such as Japan, China, and Finland have also entered the picture to provide "aid" to the RFE. The U.S. government, however, is more involved in the RFE than any other country.

U.S. GOVERNMENT

The Clinton administration has made a commitment to promoting free market growth as well as environmental protection in Russia. On the one hand, the administration has pledged to assist the Russian government in cleaning up the environmental destruction created during the Soviet period and improving protection for unique biodiversity and forests in all of Russia, but particularly in Siberia and the RFE. However, the Clinton administration is also trying to pave the way for U.S. businesses in the Russian economy—especially in the area of resource exploitation. U.S. businesses have targeted the RFE for obvious reasons (Newell and Wilson 1996).

These contradictory goals have created a quagmire of uncoordinated, contradictory U.S. programs in the RFE, all at taxpayers' expense (Newell and Wilson 1996). The contradictions were clearly illustrated by two Memorandums of Understanding (MOU) issued in June of 1994. One MOU outlined a series of environmental cleanup and biodiversity protection initiatives supported by the Environmental Protection Agency, the U.S. Forest Service, and others. The following year, the goals of the MOU were reiterated in a joint statement by Vice President Al Gore and Russian Prime Minister Viktor Chernomydrin (Gordon 1996). Meanwhile, a second MOU, signed (in June 1994) by then Secretary of Commerce Ron Brown and Russian Minister of Foreign Economic Relations Oleg Davydov, called for millions of dollars in increased U.S.-Russian trade of wood, pulp, and paper products.

Perhaps the most striking contradiction in U.S. policy is evident in the debate over the protection of the Khor River watershed in Khabarovsk Krai. The watershed has been the focus of numerous studies into the conservation of the unique forests found in the RFE. In 1995, with support from the World Wildlife Fund and the U.S. Agency for International Development, the Russian Wildlife Foundation initiated a project to conduct a wildlife census on the Udege's traditional lands to develop a wildlife management plan to support the indigenous peoples' hunting activities while protecting wildlife populations. A program for promoting sustainable community development—with an economy based on harvesting nontimber forest products—is also sponsored by the groups (Gordon 1996).

At the same time, the U.S. government's Trade and Development Agency awarded $500,000 to the Global Forestry Management Group (GFMG) to conduct a feasibility study of logging in Khabarovsk Krai, particularly in the Khor River watershed. According to GFMG's president, Jeff Fantazia, the feasibility study would help the GFMG determine how the company could most effectively log up to 1.5 million m^3 of forests from the area annually (Gordon 1996).

U.S. government involvement does not stop there. In an effort to prevent an economic collapse that might once again bring to power a hostile, nuclear-armed totalitarian regime, the United States is trying to promote the "responsible exploitation" of the region's resources.In 1995, Vice President Gore's solution was to send American "experts" to assist the Russian's in the implementation of sound environmental practices. Were U.S. involvement confined to providing sound advice, the expertise might help. But U.S. initiatives are a tangle of contradictory programs. Moreover, critics point out that the United States has had a less than impressive record of managing its own resources—especially its forests. The United States has less than 5% of its ancient forests and is suffering from a severe timber shortage, while 25% of Russia's original forests are still intact (Linden and Yar 1995).

A consequence of these varying forest initiatives may be a surge in anti-Western sentiment, the very thing that the U.S. government, especially Gore, was hoping to avoid. If the Russian people were left with nothing else from their former leaders and ideology, it was the belief that the nation's resources, including the forests, belonged to all Russians and not some favored elite. The global raid on the RFE's resources is viewed by many Russians as a result of the new order. When asked to name the greatest threat to Russia's wildlife, Vladimir Shetinin, the head of the Amba tiger poaching patrols, answers in one word: "Democracy." It is a widely shared opinion (Linden and Yar 1995).

CONCLUSION

It is the dire economic conditions of the RFE that precipitates the poaching of endangered tigers and leopards; threatens the existence of indigenous nations; and jeopardizes the health, livelihoods, and futures of millions of citizens of the RFE. The region desperately needs an economic boost—one that many see in recent foreign trade and investment. But in reality, the RFE may he setting itself up as a natural resource colony for the Pacific Rim economies. With pipelines carrying crude oil down the entire length of Sakhalin to supply refineries in Japan, South Korea, and the United States; raw logs being exported to supply sawmills abroad; coking coal exported to make steel in Japan; and king crab and salmon sent to canneries in the United States and Japan—the RFE has become, in the words of analyst Brenton Barr, "a truncated regional economy, dependent on external sources of capital and equipment, specializing in the production of a limited number of resources with the bulk of economic activity concentrated in urban settlements in the southern part of the region" (Barr and Braden 1988).

Industries in the RFE need to develop the capabilities of processing raw materials, in order to develop regional value-added industries to improve the economic conditions of their people and to make them less dependent on others. Until this happens, the region will continue to have a boom-and-bust economy that focuses on short-term profits through exportation of raw materials. This will further exacerbate the environmental degradation that plagues this region already so dependent on resource exploitation.

The timber industry is an ideal place to explore the possibilities of developing localized, value-added industries. The creation of industries such as furniture and plywood manufacturing would provide more income per tree, make better use of wood by-products (reducing much of the industry's current waste), reduce the extent of logging necessary, and benefit local communities through the creation of jobs. This new value-added industry should gear its processing from old-growth softwoods to second-growth hardwoods.

Another alternative to boost local economies is ecotourism. The RFE should take the lead from numerous areas in Africa and Latin America that have established successful local economies based on ecotourism. With the world's largest remaining wilderness, this land of volcanoes, wild reindeer, rare tigers, and untouched forests has great potential.

In many regions of the RFE, there is tremendous potential for developing nontimber forest product industries. The gathering of various medicinal plants such as ginseng, wild rosemary, and yew and the harvesting of berries, mushrooms, and ferns have long been a part of the local culture. The Udege peoples see these products as a viable economic alternative to commercial forestry, as they can provide a significant financial

return and are a sustainable use of the forest. They need assistance, however, in marketing and packaging to make this endeavor successful.

Developing a sustainable economy in the RFE will take time, and unfortunately, as time passes more and more of the region's forests and other resources are being diminished, while the people suffer grave shortages in food, energy, and money, and see little hope for improvement. Government corruption and foreign greed seem to have priority over the needs of the people.

The international community—especially the United States, so eager to help Russia succeed in capitalism where it failed in communism—needs to provide funding that will help the region establish a self-sufficient economy rather than a resource bank for the industrialized world. Sustainable development to the benefit of all of the people of the RFE, rather than an increased profit margin for U.S. and multinational corporations, should be the paramount goal of all U.S. and global involvement.

There is much at risk in the RFE. As the last remaining wilderness on this planet, the RFE contains biodiversity unmatched anywhere else on Earth. The rare and endangered species of plants and wildlife, the effects of the forests on global warming, and the ancient cultures that inhabit this region are of international value—treasures that we must all take responsibility for. In the end, neither the problems nor the solutions will be Russia's alone. Those who are driving the industrial machines that are plowing the Russian landscape and those who will profit from the rape of the RFE need to be responsible or restrained. The technology and efficiency of the West can help reduce the rampant waste and pollution, or they can speed the destruction.

Of greater concern should be the undeniable link between the ecological legacies of the Cold War and the future well-being of both the East and West. If the world is truly to determined to help the newly independent states of the former Soviet Union develop successful free market economies to avoid the recurrence of a second Cold War, then an investment in sustainability—in the future of the people and resources of the RFE—is the only possible course.

REFERENCES

Barr, Brenton and Kathleen Braden. 1988. *The Disappearing Russian Forest.* New Jersey: Rowman and Littlefield.

Blake, Mary. 1994. *Greenpeace International.* WWW. Http://gaia.ies.wisc.edu/research/png forest.

Burstein, Jonathan. 1995. "Facts and Figures on the BPPP." *Baikal Currents* October.

Channon, John. 1995. *Historical Atlas of Russia.* London: Penguin Group.

DeBardeleben, Joan and John Hannigan. 1995. *Environmental Security and Quality After Communism: Eastern Europe and the Soviet Successor States.* Boulder, CO: Westview Press.

Dimensions: A Report on Exxon 1995 Contributions in the Public Interest. 1995. Exxon Corporation.

Dogan, Nejat. 1995. WWW. gurukul.ucc.american.edu/ted/crane.htm.

FIAN International. 1997. WWW. http://www.koeln-online.de/infoe/report.html.

Fitzhugh, William and Verlie Chaussonnet. 1994. *Anthropology of the North Pacific Rim.* Washington, DC and London: Smithsonian Institution Press.

Fondahl, Gail. 1996. "Territories of Traditonal Nature Use." *Fourth World Bulletin* 5(1&2): 38–42.

Forsyth, James. 1992. *A History of the Peoples of Siberia.* Cambridge, UK: Cambridge University Press.

GAIA Forest Conservation Archives. 1994. WWW. http://forests.org/gaia.html.

GAIA Forest Conservation Archives. 1995. WWW. http://forests.org/gaia.html.

Global Response. 1995. *Gold Mining in Kamchatka.* WWW. http://forests.lic.wisc.edu/forests/russia.htm.

Gordon, David. 1994. "RFE: Bikin River Basin Under Threat—Again." *Worldwide Biodiversity/Rainforest Campaign.* WWW. http://forests.lic.wisc.edu/gopher/america/foractup.txt.

Gordon, David. 1995. "Roar of the Taiga." *Common Future* Autumn: 13–17.

Gordon, David. 1996. "The Fate of Russian Forests." *Multinational Monitor* 17(1&2).

Harris, Darin, Gerald Vande Hei, and William Volkert. 1996. "Forest Investment Opportunities in the Lake Baikal Region." Madison: Wisconsin Department of Natural Resources.

Hoshino Committee on Economic Reform. 1996. "The Russian Economy: From Stability to Growth," WWW. http://entrance.epa.go.jp:70/0h/doc/russial-e-e.html.

Ivanov, Andrei. 1997. "Russia: Loss of Reindeer Herds Threaten Indigenous Communities." *Interpress Service.* Moscow: Third World News Agency. WWW. Gopher://forests.org:70/00/russia/reindeer.txt.

Kiseleva, V. 1997. "Environmental Stress to the Siberian Forest: An Overview." Working paper, International Institute of Applied Systems Analysis, Austria, 1997.

Krell, Eric. 1996. *Oil and Gas Joint Ventures in the Former Soviet Union.* Washington, DC: Energy Information Administration, Department of Energy.

Krever, Vladimir, E. Dinerstein, D.M. Olson, and L. Williams, eds. 1994. *Conserving Russia's Biological Diversity—An Analytical Framework and Initial Investment Portfolio.* Washington, DC: World Wildlife Fund.

Linden, Eugene and Krasny Yar. 1995. "The Tortured Land." *Time* Sept. 4: 42–53.

LoBue, Christopher M. 1997. "Capitalism in Russia: An Economy in Transition." *USA Onramp.* WWW. http://www.usaor.net/users/xlobue/trans.htm.

Marcot, Bruce. 1995. "Tiger Habitat Corridors in Far East Russia, Northeast China and Northern North Korea: Need for a Conservation Strategy." Portland, OR: USDA Forests Service.

Mikhailov, Konstatin. 1997. "Logging Goes on in the Ussuri Taiga." *Taiga News* 20: 11.

Minakir, Pavel, ed. 1994. *The RFE: An Economic Handbook.* New York: Sharpe.

Miquelle, Dale, Howard Quigley, and Maurice Hornocker. 1996. "A Habitat Protection Plan for Amur Tiger Conservation." A proposal outlining habitat protection measures for the Amur Tiger. Moscow, ID: Hornocker Wildlife Institute.

Newell, Josh and Emma Wilson. 1996. *The RFE: Forests, Biodiversity Hotspots and Industrial Developments.* Tokyo: Friends of the Earth.

Pacific Environmental Resource Center. 1995. *Siberian Forests Protection Project.* Sausalito, CA: PERC.

Pryde, P. 1994. "Observations on Mapping of Critical Environmental Zones in the Former Soviet Union." *Post-Soviet Geography* 35(1): 38–49.

Quigley, Howard. 1995. "On the Trail of Russia's Leopards." *International Wildlife* 25: 38–43.

RFE Update. 1994a. 4 (2). WWW. http://www.russianfareast.com.

RFE Update. 1994b. 4 (9). WWW. http://www.russianfareast.com.

RFE Update. 1995. 5 (6). WWW. http://www.russianfareast.com.

RFE Update. 1997. 7 (1). WWW. http://www.russianfareast.com.

Vogt, Andrea. 1995. "They Stand with The Tigers: Idaho Couple Join with Russians to Protect the Endangered Siberian Tiger," Lewiston, ID: *Lewiston Morning Tribune* Dec. 26: 14.

Wilhelm, Steve. 1997. "Russian Oil and Gold Mean Work for Local Firms," *Puget Sound Business Journal* 69(1). WWW. http://www.amcity.com/seattle/stories/021797/story8.html.

Worldwide Biodiversity/Rainforest Campaign. 1997. WWW. http://forests.org.

This page intentionally left blank

21

Problems, Progress, and Possibilities

A Needs Assessment of Environmental Nongovernmental Organizations in Central and Eastern Europe[1]

Curtis Durrant
Washington State Department of Ecology, Spokane, Washington

Laszlo Perneczky
Regional Environmental Center for Central and Eastern Europe (REC), Budapest, Hungary

INTRODUCTION

During 1996, the Regional Environmental Center for Central and Eastern Europe (REC)[2] conducted a major evaluation of environmental organizations in Central and Eastern Europe (CEE). While a record of names and numbers is an important resource, this REC research project digs a little deeper to determine who they are and what they are doing. Lack of funding, lack of paid staff and volunteers, lack of office space, negative relations with government representatives, limited access to means of communication, and the general weakness of the environmental movement are just some of the common complaints heard from the more than 1800 environmental nongovernmental organizations (NGOs) in CEE. While the REC has been working with NGOs as well as business and governments in CEE for 7 years now, this is the first comprehensive analysis of the status of NGOs in the region.

The goals of the project include determining the needs and problems of CEE NGOs as well as identifying what the REC can do to assist them in the future. The specific results of the study provide core data regarding the organizational characteristics and needs and problems of environmental NGOs in CEE. Second, they serve as a baseline from which the REC can judge its impact in the coming years and thus monitor changes in the CEE environmental movement. Third, this information will be used to answer specific questions about NGOs in the CEE region as a whole, in subregions, such as the Balkans or Baltics, or in any of the 15 individual countries involved in this research.

Fourth, and perhaps most important, this information will assist more than 100 international environmental NGO support organizations, including the REC, to identify future funding and policy priorities for environmental projects in CEE. Finally, this information will also be of value to CEE ministries of environment, members of parliament, businesses, local governments, the media, and the NGO community.

THE RESEARCH

According to the REC's NGO directory and local office mailing lists, there are approximately 3000 environmental NGOs in CEE. The REC sent out 3020 mail questionnaires to all NGOs on the REC local offices' mailing lists in 13 countries. Additionally, a total of 128 questionnaires were sent to the Federal Republic of Yugoslavia and Bosnia-Herzegovina. Sixty-two percent, or 1872 NGOs, responded to the questionnaire. This high response rate indicates that the data collected are strongly representative of all environmental NGOs in CEE. Additionally, 71 face-to-face interviews with leaders of environmental NGOs from nine CEE countries supplemented the survey data. The research was organized into the following major categories: organizational characteristics, activities, successes, financial status, needs and problems, cooperation, experience with the REC, and experience with other international organizations. Some of the main results are presented below.

ORGANIZATIONAL CHARACTERISTICS

It was hypothesized that environmental NGOs in CEE not only work to improve the quality of the environment but also spend a significant amount of time and effort obtaining the funding and organizational development necessary to complete their missions. These two distinct categories can be described as environmental project implementation and internal organizational capacity building. The results of the study showed this hypothesis to be correct. While the mission of most environmental NGOs includes improving the quality of the environment in some manner, many NGOs spend a great deal of time and effort searching for funding, hiring and training staff and volunteers, and obtaining adequate office space and equipment. To improve the environment, most NGOs focus on three important activities: environmental education, fieldwork, and dissemination of environmental information. However, the most frequently mentioned challenges are problems internal to the organization such as insufficient funding, limited access to communication means, and lack of volunteers. Thus the NGOs' ability to achieve their environmental goals is directly limited by their ability to administer the internal organizational aspects of the group.

A TYPICAL CEE NGO

The first thing that many CEE environmental NGOs share is their nascency. The overwhelming majority have been established in the 1990s. They are organizations born of the political transition. Contrary to the popular belief that most NGOs are located in the larger capital cities of the region, the study shows that over half of all CEE NGOs are

operating in smaller towns. As expected, these are mostly voluntary organizations—the vast majority do not have any paid staff members. Over half of the NGOs have less than 25 active members within their organization. The NGO comments revealed their sense of frustration with the staffing capacity. "I can't see any possibility to do these things if there is not a paid staff person," responded the VAK Environmental Protection Club, Latvia.

The hypothesis that organizational profiles of CEE environmental NGOs can be defined by the four distinct subregions (Baltics, Balkans, Visegrad, and former Yugoslavia) was not supported by the study data. On the contrary, the results suggest that CEE should be divided into only two parts, the first consisting of the Visegrad countries and Romania, and the second containing the remaining countries of CEE. NGOs from the Czech Republic, Hungary, Poland, Romania, and Slovakia typically have larger budgets, more employees, members, and volunteers, better contacts with international funding organizations, and higher levels of cooperation, both with organizations and agencies in their own country and with those in other countries. They also report a higher level of success. Additionally, the Visegrad countries are experiencing a higher level of economic development and much larger growth of environmental NGOs.

FINANCIAL STATUS

As many might expect, the financial status of CEE environmental NGOs is tenuous. The vast majority of NGOs (approximately 75%) stated they are in an unstable, poor, or very poor financial state. Less than 2% reported they were in a very good financial situation. Roughly half of them operate on budgets of less than 1000 USD per year and about two-thirds of the NGOs operate on budgets of less than 5000 USD per year. Further, most of the funding comes from external sources—42.5% of the NGOs stated that external support is critical to the very existence of the organization.

These figures indicate a serious need for active fund raising and income generation by NGOs to lessen their dependency on external sources. The largest sources of funding for most NGOs are grants from private domestic foundations, membership dues, and foreign grants. Therefore, the most serious problem is figuring out how to make their groups self-sustainable. The Section of City Cyclists in Poland sums up the priority need of many smaller NGOs: "In Poland there are many NGOs that have existed for three to four years, but they still can't jump to the next level where they have office space and funding."

There is a direct correlation between a NGO's financial status and its other organizational characteristics. The profiles of NGOs that designated themselves as poor or very poor most often contain some or all of the following characteristics. They are unregistered, grass-roots organizations with low active memberships (0–10 members) that operate in small towns on the local level and identify ecological protest as their major activity. Poor organizations are also characterized by the absence of working relationships with national governments and tense relationships with local governments.

SUCCESS OR FAILURE?

Despite their financial shortages and organizational problems, most of the NGOs still believe they are making a difference and continue to have a positive attitude about the

work that they are doing. About two-thirds of the CEE NGOs rated themselves as either "fully successful" (16%) or "partially successful" (47%). The exact criteria by which CEE NGOs measured their own success are unknown, and the idea of what constitutes success can vary widely among NGOs, making it difficult to understand the level of success with any certainty. However, certain generalizations can be made. For example, the more successful NGOs typically have larger budgets, more members, and a greater level of cooperation with government authorities. The commitment and positive attitude of the NGO representatives was clearly reflected in their comments as expressed by Clean Up the World of Poland: "We passionately believe we can make a change."

NEEDS AND PROBLEMS

The majority of CEE environmental NGOs do have common needs and problems. These can be divided into three general categories: financial (direct financial support), capacity building (equipment, training information and supplies), and technical assistance (personal contacts and advice). Among the most frequently mentioned challenges are insufficient funding, limited communication access, lack of volunteers, and a general weakness of the environmental movement. The Inter-academic Ecological Lobby of Poland describes how many groups see their situation: "First and foremost is the lack of money. Second is the motivation of members and third is the problems internal to the organization." Additionally, many NGOs identified support for the implementation of a particular environmental project and assistance in the capacity building of the NGO as the two most important kinds of support requested. "We don't have any equipment at all, what we need is a local office . . . office equipment, this is the beginning," says PEARL of Albania. Finally, training in all area stands at the top of the needs of many NGOs. Fund raising, project management, and proposal writing were the top three training courses requested.

COOPERATION IS KEY

While it is the mission of the REC to promote cooperation among diverse interest groups, according to this study, the level of cooperation between NGOs and government is mixed. CEE NGOs cooperate mostly on the local level, with a declining amount of cooperation at the national and international level. The same relationship exists regarding relations with government authorities. Cooperation is greater with specific local governments than with national governments. Overall, NGOs realize that cooperation with government is one of the best ways to make a change in the quality of the environment, but many are unsure how to establish partnerships and are frustrated by a prevailing lack of trust. "The connection between government bodies and NGOs should change—we should work together towards common goals as partners. Often, the goals are the same, but blocked by mistrust and non-cooperation," says Ecoservice, Hungary.

EXPERIENCE WITH THE REC AND OTHERS

As noted earlier, another goal of the study is to determine REC's own effectiveness and gauge the NGOs' experiences with the REC. These results were mixed as well. About

half of the NGOs surveyed responded that they have "occasional contact" with or consider themselves as a 'traditional partner" of the REC. Conversely, half of the NGO community has either "never heard of the REC" or has "never used REC services or programs." It is important to note that the REC Local Office staff in each of the 15 countries enjoy about twice as much communication and cooperation with CEE NGOs as does the REC headquarters office in Szentendre, Hungary, confirming the importance of having a local presence in each of the countries.

Overall, the REC is seen as one of the major international environmental support organizations in CEE. The REC was cited as "very helpful" more frequently than any other organization in the categories of grant giving, technical assistance, environmental campaigning, information dissemination, training, and networking. In general, there is a high demand for REC grants, information, fellowships, and other programs.

EXPERIENCE WITH OTHER INTERNATIONAL FUNDING ORGANIZATIONS

But the REC is just one example of an organization aimed at assisting CEE NGOs. The surveyed NGOs produced a list of over 150 possible sources of funding and technical assistance. About 10 of these organizations were mentioned frequently as "very helpful." In descending order these include the Environmental Partnership for Central and Eastern Europe, World Wildlife Fund, MilieuKontakt Oost-Europa, SOROS, GreenPeace, PHARE (Poland and Hungary Assistance to Restructure the Economy), Friends of the Earth, and World Learning. These organizations' continued financial support is critical to the success of CEE environmental NGOs, active public participation, and new environmental legislation. Without the efforts of these environmental NGOs, public access to information, citizen activism, national environmental legislation, and environmental quality will most likely decline.

THE ENVIRONMENTAL MOVEMENT IN HUNGARY

The following country report discusses the history of the environmental movement in Hungary. This discussion is provided in an effort to show how CEE environmental NGOs' internal attributes of organizational characteristics, financial status, cooperation, success, and needs and problems interact with various external forces such as political, social, and economic realities, to shape a country's environmental movement.

Environmental protection and public involvement in nature-related issues have a long history in Hungary. The Magyar Kárpát Egyesüet (Hungarian Carpathian Association) was founded at the beginning of the twentieth century. Later, hiking associations were established, contributing to the foundation of environmental awareness by creating hiking rules and raising public understanding of environmentally malignant activities. Some green and environment-driven movements also arose from the Hazafias Napfront (Patriotic People's Front). One of these was the Movement for the Environmentalism of University and College Students; however, because it was part of the Communist Party apparatus it could not reach its goals, and its only effect was to increase environmental awareness among its members.

The environmental movement moved in a more serious direction when the Magyar Madártani Egyesüet (MME, or Hungarian Ornithological and Nature Conservation Society) was founded. This group emphasized practical nature protection and played an important role in the creation of other groups dealing with nature and environment issues all over the country. The role of the MME should not be exaggerated, but one cannot deny that many of the green organizations that came later grew up in its shadow. There were other, more holistic groups too. Bokor was a religious movement founded in 1945. It dealt with environmental issues, and preached a nonconsumption, alternative life-style that was later adopted by the Interdiszciplináris Tudományos Diákkör (ITDK, or Interdisciplinary Scientific Student Circle), founded in 1981. Its members organized and participated in lectures and workshops.

What we now call the Hungarian Green Movement started around the mid-1980s and involved two very distinct movements. The Danube movement, which was composed of Duna Kör (Danube Circle), A Dunáért Alapítvány (Foundation for the Danube), and Kékek (Blues), among others, involved itself in problems associated with the construction of the Gabcikova-Nagymaros dam. The other movement was formed around colleges and universities, or as county environmental movements, such as Göncöl Alapítvány in Vác, Holocén in Miskolc, ELTE Természetvédelmi Klub in Budapest, BME Zöld Kör in Budapest, E-MISSZIO in Nyíregyháza, REFLEX in Gyôr, and Mosonmagyaróvári Környezetvédôk in Mosonmagyaróvár. While members of the Danube movement directly confronted the one-party system, sometimes resulting in punitive retaliation such as job loss, the latter groups used milder forms of civil disobedience. There was a broad overlap between the two lines and they often cooperated with each other.

The Danube movement worked on one very broad and important issue—the issue of the dams. It played a decisive role in the political changes in Hungary, and its activists often faced the violence of the ruling party. For its efforts, Danube Circle received the alternative Nobel Prize in 1985. The other movement, besides fighting to solve numerous local environmental problems, was busy acquiring and disseminating environmental information. There were several possible ways to accomplish this, such as approaching schools or distributing publications. ELTE Klub, with the cooperation of Czech, Slovak, and Polish activists, set up an Eastern European environmental network called Greenway.

The development of the Hungarian movement changed its course in an interesting way when the KISZ KB (the Central Committee of the Communist Youth Alliance) created the Ifjúsági Környezetvédelmi Tanács (Youth Environmental Council, or YEC). YEC helped environmental activities in some cases, but at other times hindered them. The hierarchical power structure of the Council destroyed the development of horizontal, networking cooperation between groups because it operated under the principle of centralized authority. At this point, a power struggle erupted in the movement. The centralizing efforts of YEC led to the creation of Magyar Természetvédôk Szövetsége (National Society of Conservationists) and the Magyar Zöld Párt (Hungarian Green Party1). The number of groups increased significantly as political changes neared, and YEC's centralizing efforts became considerably milder. It was even ready to take a position on such formerly taboo issues as the Danube dams and was willing to organize an open forum on the planned nuclear waste disposal site in Ofalu.

Political changes had a distinct effect on the movement. First, discussion over the creation of the Green Party resulted in fierce debate within the movement, and because of the resulting internal conflict the party didn't obtain enough votes to have a member of parliament. Later, when the new political system was established, most of those who

used the movement as a vehicle to get into Parliament suddenly forgot the importance of environmentalism. It took the green movement a while to adjust to this revelation.

In the parliamentary elections held in Hungary, in May 1994, the issue of political representation confronted the green movement once again. Z{{odieresis}}ld Alternativa (Green Alternative) was founded during the summer of 1993. This alliance, backed by a few members of the movement, fought for seats in the Hungarian Parliament in cooperation with other parties, but most of the movement did not join this political party. It soon became clear that the environmental movement could not be successful in a governmental position; it had to be in opposition. Activists realized that they didn't have to fight against a central political power any longer, but against profit-oriented (and very often Western) capitalist groups and concerns.

Groups embarked on a mission of institutionalization. They began to arrange their legal status and were registered by the state. Previously, work had been done at state-owned companies and on a fully volunteer basis. Now they sought financial support and with this money were able to cover costs like copying and telephones. While securing operational costs, some of the groups moved toward a more professional, research-oriented focus. Others continued their environmental education projects or tried to apply the tools typical of pressure groups, first on local and later on national authorities and governments.

Soon after the political changes, the movement tried to find ways to cooperate internally. After all, 3 years had passed before the Hungarian green movement was able to cope with the aversion caused by its more recent "second" past, and now it was ready for broader cooperation. This change is due to the importance of environmental issues. Several action groups were formed during this process and organizations tried to join forces to become more effective. Examples include the air, energy, and waste action groups, a group protesting the construction of the south freeway, and a group that participated in the development of the draft environmental law. Groups realized that instead of competing with each other, they should cooperate, and that the best way to cooperate was not by creating a central body but by forming networks. Networking continues to exist in several forms, and newsletters and information booklets are distributed on mailing lists. Since 1994, the Hungarian environmental movement has had its own "Green Spider" computer network. A new tradition, the Annual Meeting of Environmental and Nature Conservation Organizations, has grown to be the biggest green gathering and top-level decision-making forum in the movement.

Unfortunately, such cooperation has not yet developed between the Hungarian Ministry of Environment and Regional Planning and the green movement, a shortcoming noticed by both sides. At the green movement's annual meetings, activists are being delegated to several committees and bodies because the governmental sector needs civil control and cooperation at all levels. In late 1996, the pressure drove NGOs to begin meeting monthly to discuss burning issues and common problems.

The new market economy and democratic political system have had a profound effect on Hungary's green movement. Many organizations have become more professional, in either their environmental work, fund raising, or public relations. Fortunately, despite the daily struggle for survival, the overwhelming pressure of environmental problems, and the need to professionalize to address these problems more effectively and on a full-time basis, most NGOs still retain their dedication to volunteerism and civil values, for this is the only basis on which a real, operational, and colorful green movement can exist in Hungary.

CONCLUSION

In most CEE countries the environmental NGO movement is growing steadily stronger. The Czech Republic, Slovakia, Poland, Hungary, and Romania have the greatest number of well-organized groups in the CEE region. Nonetheless, the vast majority of NGOs in the region encounter a wide variety of administrative problems and are constantly seeking to improve their effectiveness and overall sustainability. Because CEE environmental NGOs are a key forum for public participation in environmental decision making, their success is critical to the long-term health of the natural environment, and by extension, the strength of civil society. By understanding their problems and improving their organizational capacities, these groups can continue to play an important role in defining CEE environmental protection policies.

One way to ensure this outcome is to make potential donors aware of the needs and problems of the region's NGOs. Minor changes to donor programs can help focus CEE assistance efforts in a more effective manner. First, donors should place more emphasis on helping NGOs develop working relationships with government officials at all levels. Second, donors should also help NGOs cooperate more closely with each other, regardless of the geographical distance between them. This could be accomplished by structuring grants that require cooperation with at least one other NGO. Third, since local offices have the most direct contact and best relationships with the NGO community, donors should utilize the concept of local offices more fully. Providing publications and information in the local language will also increase the dissemination of environmental information. Fourth, donors should continue to provide financial support to NGOs, including grants for implementing environmental projects, building capacity, hiring staff, purchasing equipment, and renting office space. Fifth, donors should also teach NGOs fund-raising skills so that they can become more self-sustainable in the future. Finally, donors should continue to offer training courses on such topics as fund raising, project management, proposal writing, and managing volunteers.

ENDNOTES

1. The final report, "Problems, Progress and Possibilities: A Needs Assessment of Environmental NGOs in Central and Eastern Europe," was published in April 1997. To order a copy of the final report contact REC, Ady Endre ut 9–11, 2000 Szentendre, Hungary, tel: (36–26) 311–199, fax: (36–26) 311–294. The REC home page can be accessed at *http://www.rec.org/*. For more information contact Alexander Juras, Deputy Director, Grants and Local Office and Outreach Program, e-mail: *ajuras@rec.org*. or the Project Coordinator, Curtis Durrant, (509) 456–6370, e-mail: *CDUR461@ecy.wa.gov*.

2. The Regional Environmental Center for Central and Eastern Europe (REC) is an independent, not-for-profit, regional organization devoted to the improvement of the environment in Central and Eastern Europe. The United States, Hungary, and the Commission of the European Communities established the REC in 1990. Today, 20 countries and the European Commission are signatories of the REC charter. Donor countries include: Austria, Canada, Czech Republic, Denmark, European Union, Finland, France, Germany, Hungary, Japan, The Netherlands, New Zealand, Norway, Switzerland, and the United States. The REC's mission is to assist in solving the environmental problems in Central and Eastern Europe by encouraging cooperation among environmental organizations, governments, businesses, and other environmental stakeholders, by supporting the free exchange of information, and by promoting public participation in environmental decision making. Beneficiary countries include Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, FYR Macedonia, Poland, Romania, the Slovak Republic, Slovenia, and FR Yugoslavia.

22

If the Truth Hurts, Consider the Source

Public Trust of Environmental Information About Nuclear Facilities in Russia and the United States

John C. Pierce
University of Colorado at Colorado Springs, Colorado Springs, Colorado

Nicholas P. Lovrich
Washington State University, Pullman, Washington

Russell J. Dalton
University of California, Irvine, Irvine, California

INTRODUCTION

The free flow of public policy information is at the heart of most conceptions of democratic political systems (Ferejohn 1990; Converse 1990; Carpini and Keefer 1996). Indeed, the public's dependence on reliable information seems especially crucial in those substantive domains that appear difficult to understand, feature risk to the environment, or are remote to everyday experiences (Nelkin 1979; Orr 1992). Yet, the "truth" can hurt. Under conditions of policy complexity and unfamiliarity, citizens may become particularly dependent on those information sources to which they give disproportionate credibility (Pierce et al. 1989).

Especially in remote and unfamiliar policy areas, such as that concerning the environment, citizens' levels of trust in sources of information may limit the degree to which they avail themselves of that knowledge seen as crucial to informed opinions. The levels and correlates of public trust in various sources of policy-relevant information may thus reveal a great deal about the accessibility of the environmental policy area, the independence and acuity of publics, and the openness of a nation's politics (Miller 1993). Moreover, the absence of public trust in particular sources of policy-relevant information may lead to negative orientations toward the policy proposals themselves (Rosa and Freudenberg 1993: 57). Indeed, how can publics offer up their support for controversial policy when they have little or no trust in the sources of information provided to them about that policy? Or, at the same time, how are citizens to effectively evaluate information relative to their self-interest when processed through the filters of distrust?

This chapter examines public perceptions of information sources in a pair of contrasting settings, which nevertheless share basic parallels in the nature of the policy problems they represent. This study employs surveys of public attitudes toward nuclear production facilities in the United States (Hanford) and in Russia (Mayak). These surveys

enable us to compare citizen perceptions of sources of information about a similar set of severe environmental concerns across two quite different social and political systems. The results yield evidence about the process by which information sources are evaluated and utilized by contemporary publics in making their policy choices.

INFORMATION SOURCES AND ENVIRONMENTAL POLICY

In recent decades, the environmental policy arena has most acutely felt the impact of highly difficult scientific and technical policy discussions where many citizens operate under knowledge deficits (Waller 1995:153). Estimates of the condition of the natural environment, the causes of environmental degradation, and the appropriate means of remediation are all fraught with scientific and technical content that is understood by few in the policymaking arena, much less members of the mass public (Nelkin 1979). Moreover, in certain environmental policy disputes much of the information relevant to alternative positions has been systematically unavailable to many, who are affected by the policy and asked to form preferences about it (Ratchford 1980). When seeking technical or scientific information about a complex issue of public policy, to whom does the citizen turn and what governs that choice for the individual?

The question of trust in sources of information about complex policy issues is confounded by the value implications embedded in the policy options themselves. That is, the stakes in obtaining information from trustworthy sources are raised substantially when the alternative outcomes are seen to involve significant personal and public risks, and are seen to go to the heart of core values over which the policy area conflict is fought (Dake and Wildavsksy 1990).

Previous research suggests that the citizen's trust in various sources of policy relevant information is dependent on a number of causal factors (Culbertson and Stempel 1986; Chaffee and Schleuder 1986; Pierce et al. 1987). Those causes include the unique substantive content of the particular policy area, the particular information medium, and the personal (e.g., education), cognitive (e.g., knowledge), and affective (e.g., political value orientation) attributes of the individual.

Surprisingly, though, in only a few studies has public trust in policy relevant information sources been examined in a cross-national context, namely comparing trust patterns among Americans to those of citizens in such countries as Canada and Japan (Steel et al. 1992–1993; Pierce et al. 1987). And, to our knowledge, no study addresses the questions of which sources the citizen trusts for information and for what reasons in the context of a newly and incompletely democratized political system and whether those answers differ from ones found in a more historic and traditional democracy.

Thus, the study reported in this chapter examines public trust in various information sources in one region of Russia and one region in the United States. The geographic locations are the Chelyabinsk area in the southern Urals of Russia and the Hanford area in the Columbia River basin of eastern Washington State. The policy context involves highly visible, contentious, and recently quite public disputes over past excesses and future problems at government facilities that produced plutonium for nuclear weapons: the Mayak facility in Russia and the Hanford Nuclear Reservation in Washington State (Feshbach and Friendly 1992; Gerber 1992). In both locations, only recently have the respective governments allowed the public to have access to information about past activities. Those activities have endangered the natural environment and the health of people

in the vicinity of the facilities (Gerber 1992; D'Antonio 1993). Moreover, under considerable political pressure, both American and Russian governments reluctantly have confessed to systematic patterns of secrecy, deception, misrepresentation, and falsehood with regard to both the character of the activity in the nuclear sites and the effects of that activity on the surrounding peoples and environments. Nonetheless, in spite of those revelations, or perhaps because of them, there remains significant public distrust of what they are told both about the history of the nuclear facilities and sites, as well as their current conditions (Dunlap et al. 1993).

In this common policy context—highly technical and secret policy histories in an area of potentially great harm to people and to the environment, along with multiple and frequent revelations of government misdeeds and deception—it becomes especially important to assess the similarities and differences between the publics of a country with 200 years of democratic government and those of one just beginning its democratic experience. The opportunity for contrast between the two locations is clearly articulated in recent writing about Hanford and Chelyabinsk. Indeed, in regard to the American site at Hanford, Gerber has written:

> While going about the business of containing communism, the Hanford site was spreading millions of curies of radio-activity into the air and soil of the Columbia basin. Furthermore, until recent years, area residents were not informed of the discharges nor warned of any potential dangers, even when releases far exceeded the tolerable limits and "maximum permissible concentrations" (MPCs) defined as safe at the time. In fact, Hanford scientists and managers, on numerous occasions throughout the first four decades of operation, specifically told the public that the plant's workings and wastes were well controlled and harmless (1992: 3).

On the surface, at least, a remarkably parallel sequence of events occurred in the Mayak region near Chelyabinsk in the southern Urals of Russia. A recent study of environmental degradation in the former USSR contains the following text:

> Soviet authorities also failed to quiet the anxieties of people living near Lake Karachay, a Chelyabinsk region nuclear waste storage area called a "slow-motion Chernobyl." Starting in 1951 and continuing for at least ten years, the Mayak bomb-making enterprise based in a town so secret that it appeared only on military maps pumped 1.2 billion curies worth of cesium- and strontium-laced nuclear waste into the bottom of the 100-acre lake. The result was a reservoir holding (and leaking into adjacent groundwater) nearly twenty-four times the radioactive content of the debris released by the Chernobyl reactor failure (Feshbach and Friendly 1992: 175).

The authors continue by quoting Boris Yeltsin, who is said to have commented: "There is a guilty party somewhere, however, is there not? They have been concealing the truth about this radiation pollution from the people for thirty years. There has been silence. How many people have suffered? I hope that we know better now" (Feshbach and Friendly 1992: 175).

These issues of both environmental contamination and public distrust of authorities responsible for the contamination remain high on the contemporary public agenda in both countries. A recent (1994) editorial in eastern Washington's largest circulation daily newspaper contained the following plea: "Hanford's contracting system must change profoundly . . . eventually, Hanford's corrupt culture must be replaced as well. It underlies the nuclear reservation's accidents and technical failures, as well as blatant financial waste and fraud. Before the culture can change, before Hanford's workers can flourish

in an open atmosphere and accountability, federal policy makers must abandon the machine that built this monster in the desert" (*Spokesman-Review* 11/20/94: A18).

Similarly, a September 1994 incident at the Chelyabinsk nuclear site resulted in the following headline: "Fire Erupts at Troubled N-Plant: Russians Dispute Gravity of Accident, a Mark of Industry's Disarray" (*Spokesman-Review* 9/24/94: A6). The story concludes with the statement that "hundreds of people have suffered radiation illness as a result of these accidents, kept secret by the Soviet authorities, and thousands have been evacuated" (A6).

It is important to understand whether these apparently similar contexts resulted in a common response from the publics, or whether the political contexts of the two countries are sufficiently different in their content and their history to produce very different patterns of public trust in information sources. Moreover, there is reason to believe that in both countries the level of trust may have significant effects on the attitudes individuals hold about the nuclear facilities themselves. Rosa and Freudenberg, in their analysis of public attitudes about the disposal of nuclear waste in the United States, wrote that "public opposition is apparently due, in no small part, to the lack of trust in the federal government and its lead agencies, especially the DOE" (1993: 57). The effects of disaffection and distrust toward government and public officials are also a dominant theme in recent studies of Russian publics. Indeed, Miller concluded that "while Americans have on occasion distrusted their political leaders as much as have Soviets, they never expressed the extent of political powerlessness that Soviet citizens feel" (1993: 99). This feeling of distrust and powerlessness may have profound consequences for the perceived legitimacy of the political regime and for the support given to the policies that are identified with that regime.

The study reported here examines the level of public trust in various sources of information about the nuclear facilities at Mayak and Hanford, the contextual, personal, cognitive, and affective predictors of that trust, and the impact of that trust on policy attitudes about the facilities. The study is based on surveys of general publics in four cities in each country, with rough attempts to match the cities across countries in terms of their geographic and political relationship to the respective nuclear facilities. In each location, samples are taken from a city economically dependent on the facility (Richland and Chelyabinsk-70). We included a "downwinder" city whose residents are more likely to see themselves as being negatively affected by activities at the facility (Spokane and Chelyabinsk). We also surveyed in cities with disproportionate minority populations who were also affected negatively by the activities at the facilities (White Swan, Toppenish, and Wapato, and Kyshtym and Muslyumovo). Finally, we included a control city within the same region but with no direct or historical economic or environmental dependence on the nuclear facility itself (Wenatchee and Chebarkul).

THE STUDY

To assess trust in information sources, parallel public opinion surveys were collected from residents in the comparable regions in Russia and the United States. With the assistance of the Kaluga Institute of Sociology in Russia, a survey was conducted in the Chelyabinsk area during the winter of 1992–93. The Chelyabinsk survey focused on the public's environmental attitudes, their perceptions of the nuclear facilities, and their views of the environmental movement. The interviewers conducted personal interviews

with 1187 randomly sampled respondents in the region; the interviews lasted approximately 1 hr. A total of 503 interviews were conducted in the city of Chelyabinsk, 318 interviews were completed in two villages near the nuclear facilities (Muslyumovo and Kyshtym), 163 interviews were collected in Chebarkul, a town in a distant part of the Oblast, to act as a control site, and 203 interviews with residents of Chelyabinsk-70. In the Russian city of Chelyabinsk-70, some questions were omitted because of their perceived political sensitivity. Unfortunately, some of those questions were central to this particular study. On the other hand, in a subset of the Chelyabinsk-70 interviews, the interviewers failed to omit the sensitive questions and a small, nonreliable subsample is available for heuristic purposes.

In the Hanford region, with one exception, the respondents were identified via a random sample of local telephone listings within areas comparable to the four types of sites studied in the Chelyabinsk region analysis. The exception is the set of towns on the Yakama Indian Reservation, which includes the small municipalities of White Swan, Toppenish, and Wapato. In this group, the rate of return from mail survey contacts was very small. The sample was therefore augmented through personal contact and distribution by individuals indigenous to the communities.

With a few exceptions, the questionnaire content in the Hanford study was identical to that of the Chelyabinsk study. To be sure, translation issues obtained during the study, but pilot drafts of the questionnaires were field-tested and a double-back translation process was employed. In addition, a smattering of respondents were contacted via telephone. In Richland, we collected 548 successful interviews; in Spokane, 527 surveys; in Wenatchee, 178 respondents; and in the Yakama towns, 149 respondents.

TRUST IN INFORMATION SOURCES

The level of public trust in various information sources was obtained in response to the following question: "Please indicate how trustworthy you believe each of the following sources are in terms of providing honest and accurate information about Hanford (Chelyabinsk)." The response alternatives include "complete trust, somewhat trust, somewhat distrust, completely distrust." The lower the score the greater the trust level, or the lesser the distrust level. The information sources included in the question were both governmental and nongovernmental, as well as mass media and personnel specifically connected to the nuclear sites themselves. The specific sources are (with the Russian version in parentheses, when different): Environmental Protection Agency (EPA) (Ministry of Ecology), environmental groups, Hanford scientists (Chelyabinsk scientists), newspapers, local government, state legislators (local deputies), Department of Energy (Ministry of Atomic Power), television/radio, Hanford officials (Chelyabinsk officials), International Atomic Energy Commission (IAEC).

In the Chelyabinsk-70 sample, for reasons of political sensitivity—which itself underscores some of the contextual differences—the trust questions were not supposed to be asked. However, in a small portion of the sample that prohibition was ignored, resulting in a sample of 32 respondents in the Chelyabinsk-70 area. We include those 32 for comparative purposes. While the results from those 32 respondents seem reasonable, our lack of confidence in their reliability must be underscored.

Trust levels for each information source for each city are shown in Figure 1 in the form of the percentage that completely or mostly trusts each information source. In the

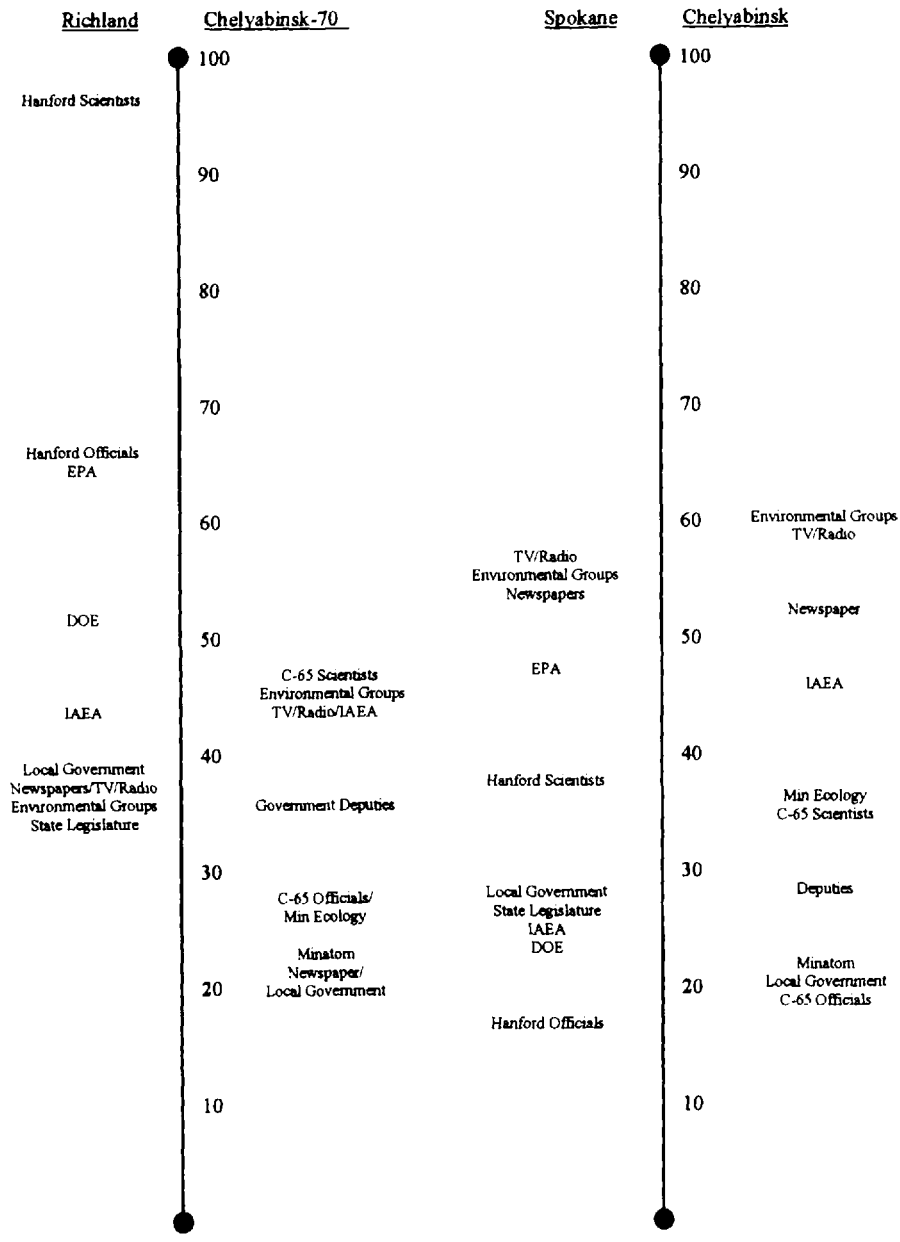

Figure 1 Trust in various sources of information about the facilities. Figure entities are the percentage who completely or mostly trust each information source.

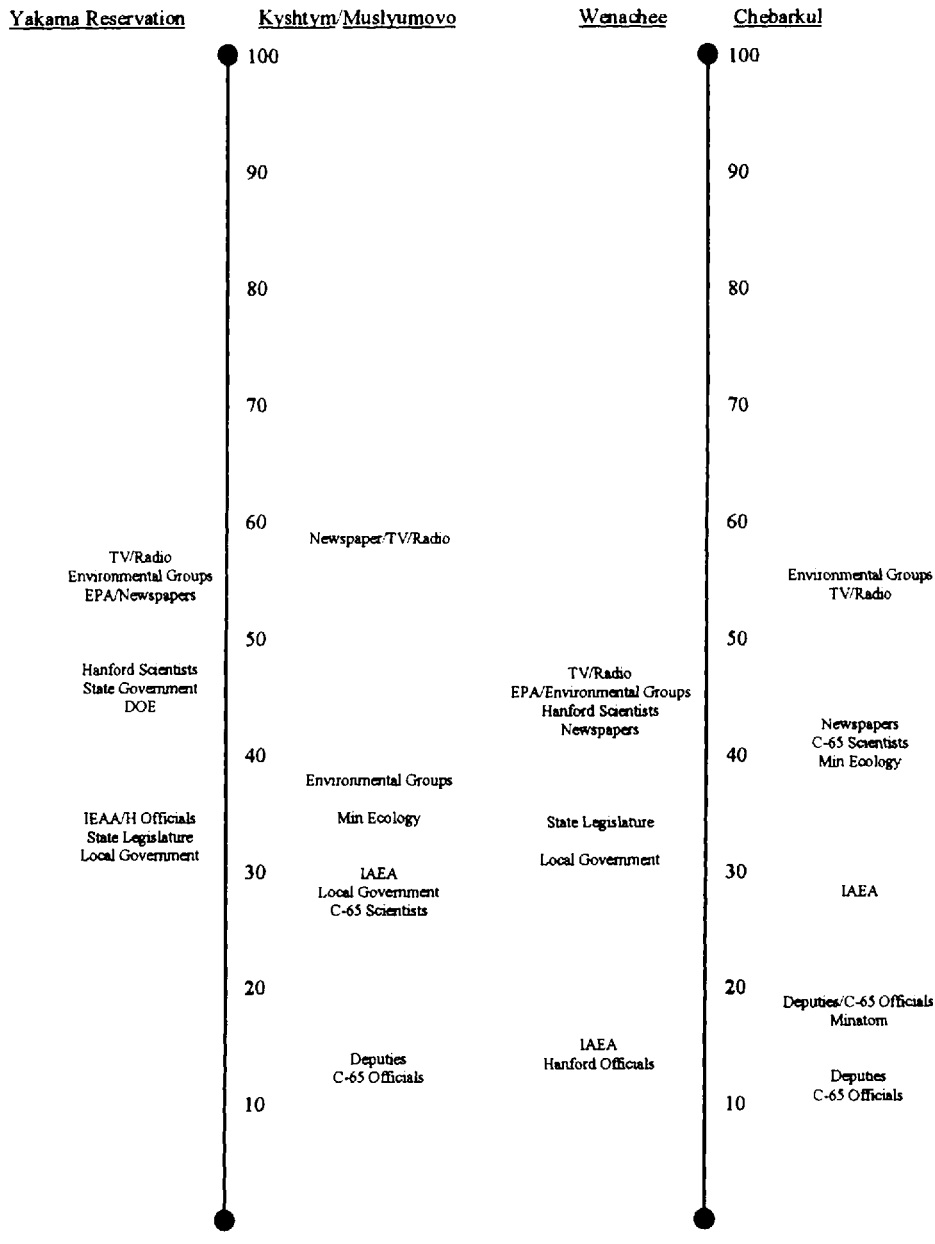

Figure 1 Continued.

Russian cities, the Kyshtym group stands out as a little less trusting than the other three, among which there is little difference. In the U.S. cities, Richland clearly is the most trusting. Residents of the other three American cities seem quite untrusting of most of the information sources.

In the two major downwind cities (Spokane and Chelyabinsk), there is a striking similarity in trust ascribed to environmental groups and most other political actors. Residents of these two cities consider environmental groups and the media as the most trustworthy sources of information about the facilities. At the other end of the continuum, officials from the facilities and the government agencies responsible for both facilities (U.S. Department of Energy and the Russian Ministry of Atomic Power) are given little credibility by the residents of both cities; both downwinder publics are also generally skeptical of local government. The greatest discrepancy between these downwind cities is in their evaluation of certain national and international agencies. Spokane residents are relatively trustful of the EPA, while Chelyabinsk residents have distinctly less trust in the counterpart agency—the Russian Ministry of the Environment. Conversely, people in the city of Chelyabinsk have more confidence in the IAEC than do Spokane residents.

A markedly different pattern occurs when we compare the results from the two areas where plant employees are concentrated: the host cities of Richland and Chelyabinsk-70. Richland residents are highly trustful of the scientists from Hanford, giving them the highest trust scores in the study (87%), officials at Hanford (66%), and the EPA (62%); in contrast, Richland citizens are openly skeptical about environmentalists (32%) and the media (38%).

Many residents of Chelyabinsk-70 are scientists and technicians whose careers are closely interwoven with the nuclear operations at Chelyabinsk-65. Even so, residents of Chelyabinsk-70 display considerable ambivalence about the representatives of those facilities. They trust the scientists at Chelyabinsk-65, but they are quite skeptical of plant officials and representatives of the Ministry of Ecology and the Ministry of Atomic Power (Minatom). Perhaps the most striking evidence of these doubts is the equal levels of trust they place in environmentalists and Chelyabinsk-65 scientists, although the trust of none of those sources reaches the level of almost half of the information sources in Richland.

The comparisons between the downwind communities on the Yakama Reservation and the communities of Kyshtym and Muslyumovo are more complex. Trust in environmental groups is relatively high in the American downwinder and indigenous people communities—possibly reflecting a view that environmental groups are their advocates, representing them as victims of environmental degradation. Residents from the three towns on the reservation are also relatively trustful of the media, but more skeptical of local government and the Department of Energy. In the Kyshtym/Muslyumovo region trust in environmental group as an information source appears low when compared to Yakama, but is higher than trust in the formal Russian governmental sources. However, the combined Kyshtym/Muslyumovo statistic blends two divergent patterns; while not shown in Figure 1, only 22% of Kyshtym residents say they trust environmental groups as compared to 55% in Muslyumovo. The media is a source that is relatively trusted by residents of both sites, just as they share a skepticism for information provided by Chelyabinsk officials and the Ministry of Atomic Power.

THE STRUCTURE OF TRUST

A second question concerns the degree to which citizens in the two countries organize their trust of information sources in comparable patterns. Are the information source

trust perceptions organized along a single, two, or three dimensions? To help answer this question, we conducted a factor analysis of the patterns of trust of information sources in Russia and the United States, pooling the four subsamples in each country. The results are shown in Table 1. In this case, the two factor solutions are quite similar. Two information sources produce unclear factor loadings and are excluded from subsequent analyses (state legislators/deputies and the Atomic Energy Commission). The first factor appears to reflect an official or governmental dimension, containing the ministry of the environment, official scientists, local government officials, the ministry of atomic power, and officials from the Chelyabinsk site. The second factor contains nongovernmental information sources—environmental groups, newspapers, and television or radio. Thus, while some differences across countries are present in the absolute trust levels, striking similarities emerge in the way information sources are seen to fall along the same or different dimensions.

To differentiate among these sources of information according to the factor analysis results, we constructed two separate indexes of overall trust levels. The two indexes reflect the two factors. The two indexes are simply the cumulative trust score across the items in each index. What we have labeled the "governmental" sources index contains trust expressed about the Environmental Protection Agency, Hanford scientists, local government, the Department of Energy, and Hanford officials. The trust measure runs from 1 to 4, with 1 representing high trust. Thus the government index ranges from 5 to 20, with 5 being the high-trust end. Likewise, the second, "political" index is the sum of trust scores expressed with regard to environmental groups, newspapers, state legislators (deputies), and television/radio. This index ranges from 3 to 12. Then we conducted an analysis of variance among the city sample means for each index within each country. The results are shown in Table 2.

There are several significant patterns in Table 2. First, in both countries, as one might expect given the obvious connection, the homesite cities (Richland and Chelyabinsk-70) are more trustful of governmental and less trustful of nongovernmental sources of information than are the other cities. Second, in results not shown here (based on average individual trust scores rather than average index scores) the downwinder city

Table 1 Factor Analysis of Information Source Trust[a]

	U.S.		Russia	
	Factor 1	Factor 2	Factor 1	Factor 2
Ministry of Ecology	0.58	0.39	0.58	0.48
Environmental groups	–0.09	0.70	0.39	0.58
Scientists	0.82	–0.14	0.81	0.16
Newspaper	0.19	0.84	0.13	0.84
Local government	0.72	0.37	0.60	0.49
State legislators	0.67	0.45	0.36	0.62
Department of Energy	0.84	0.11	0.80	0.23
Television/radio	0.12	0.86	0.13	0.84
Hanford	0.89	–0.08	0.86	0.12
Atomic Energy Commission	0.83	0.10	0.43	0.29

[a]Factor loadings are derived from varimax rotation. Only the American form of the information trust object is presented.

Table 2 Trust Index Means in Russia and the United States[a]

	Russia					
Trust Index	Chel-70	Chel	Kyshtym	Cherbarkul	F	P
Government	13.98	14.91	14.96	14.57	0.67	0.57
Political	8.28	7.09	7.70	7.65	4.1	0.007
	United States					
	Richland	Spokane	Yakama	Wenatchee	F	P
Government	12.31	15.63	15.16	16.23	63.2	0.000
Political	8.53	8.64	8.96	9.31	3.5	0.01

[a]The trust index scores are the sums of the trust scores for the individual sources within each category (government, political). With five sources in the government index, the score ranges from 5 (high trust) to 20 (low trust); with three sources in the political index, the sources range from 3 (high trust) to 12 (low trust).

citizens are less trustful of governmental sources than they are of political or nongovernmental sources. Third, again from data not shown, only in Chelyabinsk-70 is there no difference in the mean trust scores between governmental and nongovernmental sources of information (recall the attenuated sample in this case). Fourth, in a paired comparison of cities, the Richland residents are more trustful of governmental sources than are residents of Chelyabinsk-70, the Russian comparator, while the Russian city is more trustful of nongovernmental sources than is its American counterpart. In the other cities, while the two countries share the lower trust in governmental sources, Russians in each pair of the three communities show greater trust in both governmental and nongovernmental sources than do the Americans in the matched city.

Thus, the kind of information source itself makes a difference in the degree to which the citizens of the two countries are willing to give it their trust. Moreover, where the respondents live also affects the trust they express.

SOURCES OF VARIATION IN TRUST

The next question is: "What characteristics of the individual may account for variations in the amount of trust accorded to governmental and nongovernmental sources?" We organize the potential sources of trust in four categories: personal attributes, cognitive attributes, values or affective attributes, and contextual variables.

Personal/Background Attributes

Individuals may exhibit certain patterns of trust because of their own characteristics. Some personal attributes may structure the individual's capacity for access to the information sources and capacity to process with credibility the information delivered via those sources. Other personal attributes may be surrogates for the representation of cer-

tain political interests, which themselves may translate into preferences among the sources of policy-relevant information.

Four personal attributes are examined: years of formal schooling, family income level, sex, and age. Educational achievement is included because of the possibility that more years of schooling provide the individual with informational resources and analytical skills for evaluating the credibility of information sources, as well as for determining the political positions of the information they disseminate (Sigelman and Yanarella 1986). Income level identifies higher-status positions in the social structure and thus potential support for established sources of authority. Sex is included because some Western feminist theory links women to a more risk-aversive, nurturing, caring, proenvironmental orientation, and possibly a distrust of official information sources (Steger and Witt 1989; Mohai 1992). Age is used because of the often-alleged proenvironmental, antiauthority orientations of younger cohorts in postindustrial democracies (Sussman and Steel 1991).

Cognitive Attributes

Cognitive variables reflect the individual's knowledge about, perceptions of, and active engagement in the substance of the policy area. We employ six indicators of cognitive attributes. The first is an index of self-assessed knowledge, indicated by the individual's self-reported familiarity with six terms (radioactive waste, spent fuel, plutonium separation, fuel fractionalization, strontium, purex process).[1]

The second cognitive indicator is a measure of perceived risk that is constructed from a series of questions asking individuals their perception of the likelihood of certain negative consequences from the nuclear site.[2] We include two measures of perceptions of the presence of environmental problems. The first measure is more general in terms of the local community and its environmental state. The second is more specific to problems that are seen to be a function of the kinds of activities conducted at the nuclear sites. In many ways, at a more general level these perceived problems measures may be related to a sense of risks, or the perceptions of these problems may produce the view that significant risk obtains. The measure of perceptions of environmental problems is a count of the number of problems (10 possible) the individual believes to be very serious in the local community (e.g., radiation pollution, poor air quality).[3] The index of site problems is a more specific measure of perceptions of the Hanford facility and the leakage of radioactive gases and water as well as problems associated with the storage of nuclear wastes.[4] In addition, two measures of cognitive engagement are employed—the frequency with which one discusses politics with others, and the frequency with which one attempts to persuade others in those political discussions.

One might expect that individuals with greater levels of risk perception would be less likely to trust sources of information because of a jaundiced view of the environment (Douglas and Wildavsky 1982; Jasanoff 1986). One might also expect the more knowledgeable to be less trustful of particular information sources because they are better able to evaluate the validity of information and to understand the policy implications of the information for the source of it (Steel et al. 1990).

Affective Attributes

Affective attributes refer to the value orientations held by the respondents, those orientations reflecting positive or negative, pro-con postures toward central political and social

dimensions. The effect of affect on trust of sources may depend on several conditions. The first condition is the degree to which the affective values themselves are relevant to the policy area such that there is some reason to engage the values in the evaluation of political alternatives. The second condition is whether the information sources themselves can be systematically identified with particular value-relevant policy positions.

The first measure of values reflects Inglehart's concept of postmaterial values. Postmaterial values reflect a concern with personal freedoms, social welfare issues, and an emphasis on ideals and participation in the political process. Materialist values, on the other hand, denote a preference for economic security and personal safety. A variation of the original measure of postmaterialism is employed here—the respondent is asked to pick the two most preferred conditions of the following set of four: stable prices, personal security, a more human society, and a society in which ideas count more (Inglehart, 1971, 1977). The three categories in Inglehart's index are postmaterialist, mixed, and materialist.[5]

Three affective indices are employed from subsets of the items in the measure of what is called the "new environmental paradigm" (NEP). The NEP was developed by Dunlap and Van Liere (1977) to represent the environmental worldview that suggests that humans and plants/animals are equal, that the environment is a closed system in the spaceship earth analogy. Ten Likert-style items were included in the full measure, the responses to which were subjected to factor analysis.[6] The factor analysis produced three subscales. The first dimension (biocentrism) reflects the relative degree to which the individual believes the world to be human centered or whether humans and nonhumans (plants and animals) are coequal. The second NEP index reflects the absolute value placed on nature (nature centrism), independent of its relative worth compared to humans. In principle, at least, one could value nature highly, but still conceive of the universe as being human centered. The third NEP index contains the core concept of whether separate individuals or a larger collectivity has the right to control what happens to the individual's independent piece of the environment (collective).

The fifth affect measure (reform) is the individual's ideological identification. In the United States, the 10-position identification scale ranges from "liberal" to "conservative." In Russia, the measure ranges from "reformer" on one end of the scale to "conservative" on the other end. The sixth affect index (sociotropism) is an indicator of concern for the environment outside of one's own immediate community; it is a combination of concern for the environment of the rest of the world and for the rest of the nation.

Contextual Attributes

Contextual attributes refer to the social/economic and spatial environment within which one lives. As Huckfeldt has argued, "Political behavior must be understood in terms of the actor's relationship to the environment, and the environmental factors that impinge on one's choice" (1986: 1). The task of the researcher is to identify those circumstances in which environmental factors are likely to have an effect on individual attitudes and behavior over and above the individual personal, cognitive, and affective characteristics that are shared with individuals across environmental contexts. The relevance of the spatial environmental context to the response of our samples to the issue of trust of information sources seems evident. The contrasting contexts of the subsamples in both countries were a significant rationale for their designation as study locations. Obviously, the focal point for the contextual analysis is the connection between the particular spatial

environment and the two nuclear sites. The contexts are environments of economic dependence and employment (Richland and Chelyabinsk-70), locations of alleged negative health and environmental consequences (the "downwinder" cities of Spokane and Chelyabinsk), locations with heavy concentrations of minority populations and that receive adverse environmental consequences (Kyshtym and Muslyumovo; White Swan, Toppenish, and Wapato), and the locations with no direct connection to the nuclear weapons complexes (the control cities of Wenatchee and Chebarkul).

Findings

Tables 3 and 4 present the results of a regression analysis, predicting respondents' trust levels for governmental and political sources of information. In each case, the regression analyses were conducted separately for the Russian sample and for the American sample. The regressions were conducted both without dummy variables for context and with dummy variables for context. In the contextual analysis, the variables omitted were Wenatchee and Chebarkul.

First, with regard to trust of governmental sources, the independent variables explain a greater amount of variance among the American sample than among their Russian counterparts. On the other hand, the reverse is true for the trust of political sources of

Table 3 Regression of Governmental Source Trust Index on Background, Cognitions, and Values: With and Without Context

	Russia		U.S.	
	With context	Without context	With context	Without context
R^2	0.12	0.12	0.23	0.19
F	2.82+++	3.32+++	10.08+++	9.26+++
Education		−0.05	0.02	0.03
Income	−0.08	−0.08	−0.05	−0.07
Age	0.01	0.01	−0.01	−0.01
Gender	−0.07	−0.06	0.02	0.02
Risk	0.20+++	0.21+++	0.22+++	0.31+++
Knowledge	0.01	0.01	−0.14+	−0.30+++
Env. problems	−0.02	−0.02	0.05	0.05
Problems	0.02	0.02	−0.11	−0.16
Discuss	0.05	0.05	−0.01	0.02
Persuade	0.01	0.01	−0.02	−0.03
Postmaterialism	0.03	0.03	0.00	0.00
Collective	−0.06	−0.06	−0.03	−0.04
Reform	−0.08	−0.08	−0.09+	0.10+
Natured-centered	−0.06	−0.06	−0.04	−0.02
Biocentered	0.20+++	0.20+++	0.09+	0.09+
Sociotropism	−0.04	−0.04	0.05	0.03
Chel-70/Richland	−0.02		−0.37+++	
Chel/Spokane	0.01		−0.12	
Kyshtym/Yakama	0.03		−0.11+	

Table 4 Regression of Political Source Trust Index on Background, Cognitions and Values: With and Without Context

	Russia		U.S.	
	With context	Without context	With context	Without context
R^2	0.07	0.04	0.03	0.03
F	1.96+++	1.5	1.12	1.11
Education	−0.05	−0.05	0.00	0.00
Income	0.09+	0.09+	0.00	−0.01
Age	0.06	−0.06	0.01	0.01
Gender	0.03	0.02	0.04	0.01
Risk	0.00	−0.01	−0.06	−0.07
Knowledge	−0.05	−0.03	−0.07	−0.07
Env. problems	−0.04	−0.04	0.02	0.02
Problems	0.00	0.00	0.02	0.02
Discuss	−0.02	−0.01	−0.02	−0.01
Persuade	−0.02	−0.01	−0.01	−0.01
Postmaterialism	0.02	0.02	−0.01	−0.01
Collective	−0.05	−0.05	−0.05	−0.05
Reform	0.00	−0.01	0.09+	0.09+
Natured-centered	−0.13++	−0.13+	−0.08	−0.08
Biocentered	0.02	0.02	0.03	0.03
Sociotropism	−0.08	−0.08	0.03	0.04
Chel-70/Richland	0.15+++		−0.11	
Chel/Spokane	0.06		−0.14	
Kyshtym/Yakama	0.07		−0.06	

information. Second, in both the Russian and the American samples, more variance is explained in the trust of government sources than in the trust of political sources of information. Third, context has a significant effect on trust of political sources in Russia, but it has a significant effect on trust of governmental sources in the United States. In both locations it is the host city context with the significant impact on trust of sources. In Russia, living in Chelyabinsk-70 contributes to lower trust levels when the sources are political (the sources of information challenging the livelihood of those in the Russian host city). In the United States, living in Richland contributes to higher trust levels of governmental sources, the information sources to which the Richland citizens' expertise and economy are connected.

Fourth, risk perception is a powerful predictor of trust of governmental sources of information in both Russia and the United States. The greater the perception of risk, the less the individual trusts his government's sources of information, even when controlling for context. On the other hand, the perception of risk has no significant effect on a citizen's level of trust in political sources of information. It seems clear, then, that in both countries and regardless of the context, the perception of heightened levels of risk attached to the nuclear sites is directly tied to the individual's perceptions of the trustworthiness of government, and to the fact that government is formally responsible for the operation of those sites.

Knowledge levels are significantly related to the trust of governmental information sources in the United States. Trust is greater among those respondents who exhibit more knowledge about nuclear weapons production. Obviously, those who are closer to that production would be more knowledgeable, and they would also be more trustful to the governmental sources of information. Importantly, though, while the control for context does reduce this positive effect of knowledge on trust, it does not erase its significant impact. This suggests that the linkage between knowledge and trust is not simply a surrogate for self-interest in the host city, at least in the American situation.

The impact of affect/values on trust is itself highly variable. In the U.S. sample, liberal political identification is associated with distrust of both political and governmental information sources, and is unaffected by the context control. Reform orientations do not have any impact on information source trust levels in Russia. The clearest value base for trust is found in the subdimensions of the NEP. In both Russia and the United States, biocentered views of the environment are associated with lower levels of trust of governmental information sources. In Russia, nature-centered views of the environment are associated with higher levels of trust of the political sources of information.

The contextual variables are important in both Russia and the United States. Living in the host city of Richland leads to greater trust of governmental sources. Including context in the American regression equation increases the amount of variance explained by 4%. In Russia, living in Chelyabinsk-70 is connected with lower trust of political sources. Including context in the Russian regression equation increases the amount of variance explained by 3%. Thus, over and above the individual level background, cognitive and value attributes, the unique character of the local context structures how people feel about politics, especially when the objects of those feelings are themselves clearly linked to that unique character.

THE IMPACT OF TRUST

Our final question is whether trust in information sources makes a difference in the individual's support for a particular policy proposal. To answer that question, we asked the respondents in this study to indicate their support for the proposition that the nuclear sites at Hanford and Chelyabinsk (respectively) should be closed. Table 5 shows the results of a regression analysis predicting that policy position. To simplify the analysis, we limited the number of independent variables in that regression (including, for example, only the host city contextual measure).

Several significant patterns emerge in Table 4. First, in both samples the regressions explain a significant amount of the variation in the position that the facilities should be closed. There are very significant cross-national similarities and differences in those results. In the United States, even with trust of information sources included, context is a significant predictor of support for closure. Or, to put it differently, including context in the American analysis completely suppresses trust's effect on support for closure (recall the importance of living in Richland for explaining trust of governmental sources of information). Age is an important predictor of closure support in the United States, while sex has a similar role in Russia. Younger Americans and Russian women are more likely to support facility closure.

The most powerful predictor of support for facility closure in both countries is the perception of risk. Even when controlling for context and for trust in information sources,

Table 5 Predicting Support for Facility Closure: With and Without Trust as an Independent Variable

	U.S.		Russia	
	No trust	Trust	No trust	Trust
R^2	0.17	0.17	0.10	0.16
F	25.4+++	18.82+++	12.7+++	9.3+++
Richland/Chel	0.11++	0.11++	0.10+	0.07
Collective	−0.04	−0.03	0.01	0.03
Sex	0.01	0.01	−0.09+++	−0.13+++
Age	−0.12+++	−0.10++	−0.06	−0.06
Risk	−0.32+++	−0.33+++	−0.23+++	−0.17+++
Biocentrism	−0.10++	−0.09++	0.04	0.05
Nature centrism	0.03	0.04	−0.05	−0.05
Knowledge	−0.12++	−0.09+	0.11++	0.10+
Trust govt.		0.01		−0.20+++
Trust pol.		0.06		0.06

risk perceptions retain their very large impact on the policy preference. Knowledge likewise is significant in both countries even under the contextual and trust controls. However, in the American case greater knowledge leads to lower support for closure, while in Russia greater knowledge leads to greater support for closure. Finally, trust in government has an independent effect on the policy preference only in Russia. Greater Russian trust in government leads to greater opposition to closure. As noted above, in the American case, neither trust variable has an independent impact on the closure preference.

CONCLUSION

This study has compared patterns of trust in information sources about nuclear facilities in Russia and the United States. The comparison has considered both similarities and differences in the context of the policy environments. In both locations, the facilities and their activities have had a history of secrecy and of significant harmful effects on humans and the natural environment. On the other hand, the facilities exist in sharply contrasting political environments, with the very recent democratization of Russian standing in stark juxtaposition to the American tradition.

It is clear that both source and context are important in the trust of environmental information. One's relationship to the substantive content of the information has a major impact on the veracity one perceives in various sources—especially when those sources themselves seem connected to important disputes about environmental policy. In addition to context, trust grows out of perceptions of the potential risk to individuals, knowledge about the policy area, and the kinds of values that one brings to the policy table.

The patterns are complex, but interpretable within a view of citizens who try to make sense out of a difficult but potentially dangerous policy area. In democratic political systems, the flow of unfettered information and trust in its sources are both essential to confidence in individual decisions and in governmental policy. That trust is partially a consequence of the information source in question and the perceived message of that

source. But that expression of trust also derives from a country's larger political culture and history, from the context within which the individual lives, and from the policy perceptions the individual brings to both the context and the culture. If the truth hurts, then consider the source . . . and a lot more.

ENDNOTES

1. The knowledge index is constructed in the following manner. Each respondent is asked to indicate whether he/she knows, has heard of, or has never heard of each of the six terms listed in the text. The respondent then is given one point for each term he or she claims to know. Then the scores for each individual are summed across the six terms. The result is a knowledge familiarity index that ranges from 0 (where the individual claims knowledge of no terms) to 6 (where the individual claims knowledge of all 6 terms).

2. The perceived risk index was produced by asking respondents about the nuclear facility's potential for environmental or health damage with regard to five separate possibilities: personal or family safety, leakage of radioactive gases, leakage of radioactive liquids, the storage of nuclear wastes, and the likelihood that future generations will be harmed. We counted the number of items that each respondent rated a "very great risk." This index thus ranges from 0 to 5.

3. The index of perceived environmental problems was constructed from a series of questions asking the respondents to rate the seriousness of 10 specific local environmental problems: water quality, air quality, contaminated soil, inadequate sewage, overpopulation, noise pollution, radiation pollution, toxic wastes, industrial wastes, and the destruction of natural areas. We counted the number of items the respondent rated as "very serious." The resulting index ranges from 0 to 10.

4. The measure of perceived local problems emerged from questions asking respondents the degree to which they felt problems had resulted from the following four conditions: off-site leakage of radioactive gases, leakage of liquid wastes, long-term storage of nuclear wastes, and past health or safety problems for the respondent's family. We counted the number of items the respondent felt constituted a "major problem."

5. The three value types resulted from the following combination of choices: the postmaterialists are defined as choosing both "progress toward a less impersonal and more human society" and "progress toward a society in which ideas count more than money." Materialists comprise those individuals who choose "a stable economy" and "the fight against crime." Mixed value types are those choosing any other combination.

6. The 10 items in the NEP measure are the following: plants and animals exist for mankind; humans were created to rule the world; the benefits of technology outweigh the costs; we are using up resources too quickly; we must live in harmony with nature; wildlife and humans have equal rights; we must leave natural resources for future generations; society needs must take precedent over those of individuals; we are approaching population limits; and, we are losing control over technology.

REFERENCES

Carpini, M., X. D., and S. Keefer. 1991. "Stability and Change in the U.S. Public's Knowledge of Politics." *Public Opinion Quarterly* 55: 583–612.

Chaffee, S.H. and J. Schleuder. 1986. "Measurement and Effects of Attention to Media News." *Human Communication* 13: 76–107.

Converse, P.E. 1990. "Popular Representation and the Distribution of Information." In J.A. Ferejohn and J.H. Kuklinski, eds., *Information and Democratic Processes*. Urbana: University of Illinois Press.

Culbertson, H.M. and G. Stempel. 1986. "How Media Use andReliance Affect Knowledge Level." *Communication Research* 13: 579–602.

Dake, K. and A. Wildavsky. 1990. "Theories of Risk Perception: Who Fears What and Why." *Daedalus* 119(4): 41–60.

D'Antonio, M. 1993. *Atomic Harvest: Hanford and the Lethal Toll of America's Nuclear Arsenal.* New York: Crown.

Douglas, M. and A. Wildavsky. 1982. *Risk and Culture: An Essay on the Selection of Technical and Environmental Dangers.* Berkeley: University of California Press.

Dunlap, R.E. and K. Van Liene. 1977. "The New Environmental Paradigm." *Journal of Environmental Education* 9: 10–19.

Dunlap, R.E., K. Michael, and R. Eugene, eds. 1993. *Public Reactions to Nuclear Waste.* Durham: Duke University Press.

Ferejohn, J.A. 1990. "Information and the Electoral Process." In J.A. Ferejohn and J.H. Kuklinski, eds., *Information and Democratic Processes.* Urbana: University of Illinois Press.

Feshbach, M. and A. Friendly. 1992. *Ecocide in the USSR.* New York: Basic Books.

"Fire Erupts at Troubled N-Plant." *Spokesman-Review.* September 24, 1994: A6.

Gerber, M.S. 1992. *On the Home Front: The Cold War Legacy of the Hanford Nuclear Site.* Lincoln: University of Nebraska Press.

Huckfeldt, R. 1986. *Politics in Context.* New York: Agathon Press.

Inglehart, R. 1971. "The Silent Revolution in Europe: Intergenerational Change in Post-Industrial Societies." *American Political Science Review* 65: 991–1017.

Inglehart, R. 1977. *The Silent Revolution: Changing Values and Political Styles Among Western Publics.* Princeton: Princeton University Press.

Jasanoff, S. 1986. *Risk Management and Political Culture: A Comparative Study of Science and the Policy Context.* New York: Russell Sage Foundation.

Miller, A.H. 1993. "In Search of Regime Legitimacy." In A.H. Miller, R. William, and V.L Hesli, eds., *Public Opinion and Regime Change: The New Politics of Post-Soviet Societies.* Boulder, CO: Westview Press.

Mohai, P. 1992. "Men, Women and the Environment: An Examinationof the Gender Gap in Environmental Concern and Activism." *Society and Natural Resources* 5:1–19.

Nelkin, D. 1979. "Scientific Knowledge, Public Policy and Democracy: A Review Essay. *"Knowledge: Creation Diffusion." Utilization* 1: 106–122.

Orr, D.W. 1992. *Ecological Literacy: Education and the Transition to a Postmodern World.* Albany: SUNY Press.

Pierce, J.C., N. Lovrich, T. Tsurutani, and T. Abe. 1987. "Environmental Policy Elites. Trust of Information Sources." *American Behavioral Scientist* 30: 578–596.

Pierce, J.C., N. Lovrich, T. Tsurutani, and T. Abe. 1989. *Public Knowledge and Environmental Politics in Japan and the United States.* Boulder, CO: Westview Press.

Ratchford, T.J. 1980. "Foreword." In J.D. Miller, R.W. Suchner, and A.M. Voekler, ed., *Citizenship in an Age of Science: Changing Attitudes Among Young Adults.* New York: Pergamon Press.

Rosa, E.A. and W. Freudenberg. 1993. "The Historical Development of Public Reactions to Nuclear Power: Implications for Nuclear Waste Policy." In R. Dunlap, M. Kraft, and R. Eugene, eds., *Public Reactions to Nuclear Waste.* Durham: Duke University Press.

Sigelman, L. and E. Yanarella. 1986. "Public Information and Public Issues: A Multivariate Analysis." *Social Science Quarterly* 67: 402–410.

Spokesman-Review. November 20, 1994: A18.

Steel, B., D. Soden, and R. Warner. 1990. "The Impact of Knowledge and Values on Perceptions of Environmental Risk to the Great Lakes." *Society and Natural Resources* 3: 331–348.

Steel, B.S., N. Lovrich, and J. Pierce. 1992–1993. "Natural Resources Information Sources and Postmaterial Values: A Comparative Study of U.S. and Canadian Citizens in the Great Lakes Area." *Journal of Environmental Systems* 22: 123–136.

Steger, M.A. and S. Witt. 1989. "Gender Differences in Environmental Orientations: A Comparison of Publics and Activists in Canada and the U.S." *Western Political Quarterly* 44: 519–540.

Sussman, G. and B. Steel. 1991. "Support for Protest Methods and Political Strategies Among Peace Movement Activists: Comparing the United States, Great Britain and the Federal Republic of Germany." *Western Political Quarterly* 44: 519–540.

Waller, T. 1995. "Knowledge, Power, and Environmental Policy: Expertise, The Lay Public, and Water Management in the Western United States." *Environmental Professional* 17: 153–166.

Yanitsky, O. 1993. *Russian Environmentism: Leading Figures, Facts, and Opinions.* Moscow: Mezhdunarodnyje Otnoshenija Publishing House.

This page intentionally left blank

III

Environmental Policy and Administration in Advanced Industrial Countries

In the decades following the World War II, a number of fundamental changes transpired in the industrial nations, especially those usually identified as the "Western democracies." In contrast to the prewar period, economic growth in the 1950s and 1960s was so rapid that fundamental structures of society were altered, and social commentators began to note a new stage of development. This new stage of socioeconomic development in advanced industrial society has been labeled "postindustrial" or "postmodern."

A substantial number of studies have been conducted that examine the social, economic, and political implications of postindustrialism (Bell 1973; Heisler 1974; Huntington 1974; Touraine 1971). While some definitional disagreement is present, a few central features of this new type of society can be identified. Postindustrial societies are characterized by: economic dominance of the service sector over that of manufacturing and agriculture, complex nationwide communication networks, a high degree of economic activity based upon an educated workforce employing scientific knowledge and technology in their work, a high level of public mobilization in society (including the rise of new social movements such as the environmental movement), increasing population growth and employment in urban areas and subsequent decline in rural areas, and historically unprecedented societal affluence (Bell 1973; Galston 1992; Inglehart 1997, 1991; Tsurutani 1977).

It has been argued by many that the advent of postindustrial society has altered individual value structures among citizens (particularly younger cohorts) such that "higher order" needs (e.g., quality of life) have begun to supplant more fundamental subsistence needs (e.g., material acquisition) as the motivation for much societal behavior (Inglehart 1997, 1991; Dalton 1988; Yankelovich 1981). Value changes entailing greater attention to "postmaterialist" needs are thought to have brought about changes in many types of personal attitudes—including those related to natural resources and the environment (Catton and Dunlap 1980; Steger et al. 1989).

In fact, some observers have suggested that the development of the environmental movement in advanced industrial countries was, in great measure, a product of the vast socioeconomic changes evident in postwar advanced industrial societies (Milbrath 1984; Van Liere and Dunlap 1980). The development of environmental consciousness and the environmental movement in these societies challenges many traditional political and economic institutions (Habermas 1981; Offe 1985).

Concomitant with changing values toward the environment and the growth of envi-

ronmental organizations in advanced industrial countries are certain behaviors that have worldwide environmental consequences. For example, while the United States has only 5% of the world's population, it produces 23% of the world's carbon emissions (Worldwatch Institute 1997: 9). Such consumption patterns in advanced industrial countries have led many environmental activists to call for "thinking globally and acting locally" (Steel 1996). The chapters in this part of the book examine such complexities of environmental policy and administration in advanced industrial countries.

The first chapter, by Bruce Shindler and Mark Brunson, examines the shift in public values concerning natural resource and environmental management in the United States from a traditional "anthropocentric" paradigm to a new more "biocentered" paradigm. They argue that this shift has drastic implications for not only how we manage our forests, rivers, and rangelands, but how we design and implement environmental policies. Citizens and their preferences must now be incorporated in decision-making processes in contrast to previous policy models where "experts" (e.g., U.S. Department of Agriculture Forest Service, Bureau of Land Management) made and implemented environmental policy. Shindler and Brunson suggest that government agencies are not experienced with such decentralized management approaches and that we are lacking in scientific knowledge concerning appropriate management techniques. They conclude that social scientists must work with biological and ecological scientists and natural resource managers to develop new innovative ways of incorporating these values for meaningful environmental policy in postindustrial America.

The countries of the European Union (EU) also are struggling with the process of protecting the environment while pursuing economic development objectives. Glen Sussman's chapter on environmental policy in the European context suggests that while environmental protection is one of the most salient policy issues in Europe, economic issues—such as unemployment and economic development—often are the top priority for many member states. For some countries such as the "green trio" of Germany, Denmark, and the Netherlands, environmental issues are near the top of the policy agenda. However, for other less affluent states such as Portugal and Spain, economic issues tend to dominate the policy agenda. Sussman concludes that over the last 40 years there has been much progress in the EU for protecting the environment and that the institutional framework is now in place for much more improvement. With the demise of the Soviet Union and the increasing integration of the heavily polluted central and eastern European countries with western Europe, there will need to be much regional cooperation to resolve problems across the European continent.

Environmental problems following the reunification of Germany are a good example of some of the problems facing both western European and former communist bloc countries as examined by Pia Wood. Wood describes the former German Democratic Republic (GDR) as an ecological disaster with "astronomical" levels of air, water, and soil contamination. She argues that the unification of Germany has brought the Federal Republic's environmental laws and regulations to the East along with enormous sums of money and that there have been measurable improvements. However, Wood suggests that there is much progress to be made and that continuing economic and social problems in the former GDR will require a long-term commitment from the federal government to continue progress in environmental conditions.

The next chapter examines environmental policy and administration in a Western-style political system in an Asian setting—Australia. While Australia is considered an advanced industrial society and economy, Meredith Newman and Aynsley Kellow argue

that its heavy reliance on natural resource extraction and exportation creates obstacles for environmental protection that are consistent with many developing countries. A high level of economic dependency on economic exports of natural resources concomitant with a highly urbanized population desiring environmental protection has led to many conflicts concerning policy. This situation is further complicated by the federal structure of Australia with both federal and state governments involved in the policy and implementation process. Newman and Kellow conclude, however, that state governments have been very innovative in their efforts to balance environmental protection with economic development needs.

We include two chapters on environmental policy and the nation of Japan. First, Tsuneo Akaha illustrates many of the common problems facing advanced industrial nations today using Japan as a case in point. In the early postwar period Japan embarked on an ambitious economic development plan which resulted in devastating environmental problems such as air, water, and soil pollution. By the 1970s the government became painfully aware of these problems and the public started demanding action. However, Akaha suggests that the Japanese people and government believe that they can still aggressively pursue economic growth while protecting the environment, but are unsure what policies should be used for "sustainable development." With the serious economic crisis of the late 1990s—i.e., devaluing of the yen, crash of the Japanese stock market, etc.—it is likely that environmental policy may continue to be sacrificed in the short run to bolster the economy.

Masahiko Matsuoka and Taketsugu Tsurutani reinforce Akaha's chapter by discussing the many domestic constraints affecting Japan's position on the global environment. While Matsuoka and Tsurutani argue that Japan is sincerely concerned about global environmental problems such as climate change and atmospheric ozone depletion, there are many political and economic impediments that make long-term policy concerning the environment very difficult, if not impossible. Because Japan is almost entirely lacking in natural resources to sustain her highly developed economy, external policies and arrangements with the international community are almost entirely economic (or commercial) in nature. Therefore, according to Matsuoka and Tsurutani, it is highly unlikely that Japan would ever take a leadership role in global environmental policy.

The struggle to preserve agricultural lands and open spaces in the midst of increasing population growth and urbanization is a worldwide phenomenon. Irving Schiffman's chapter on the fight to save open spaces in Israel is an excellent example of this conflict in a unique setting. For decades Israel has aggressively protected agricultural lands and encouraged people to live in urban areas—resulting in approximately 85% of its population living in cities. This policy was part of the pioneer-agrarian orientation of Zionist ideology. In recent years, however, there are increasing pressures to develop these lands along with a concomitant decline in support for the agrarian basis of Zionist ideology. Schiffman argues that unless open-space advocates can renew the cultural attachment to the land, Israel's open spaces are doomed to development.

The last two chapters in this section examine transboundary environmental issues in North America. The chapter by Leslie Alm investigates the role of science in establishing policy in the U.S.-Canada acid rain debate. As environmental policy becomes increasingly complex, the role of science and scientists becomes important to the understanding and proper design of effective environmental policy. Alm finds, however, that there is little consensus among scientists on each side of the border concerning the seriousness of acid rain—Canadian scientists believing it is a much more serious problem than their

U.S. counterparts. What scientists do agree upon in both countries are the inadequacies in the policymaking process and policymakers themselves.

Fisheries management in North America also has shown the limitations of scientific expertise in the environmental policy process. Michael Healey and Timothy Hennessey discuss the continuing demise of Atlantic and Pacific fisheries in Canada and the United States as a process of short-run political and economic policies over long-term—yet uncertain—scientific information. To counteract this trend the authors suggest an ecosystem management approach, although they concede this approach may be difficult to apply to fisheries management.

The chapters in Part III illustrate some positive and negative trends concerning environmental policy in advanced industrial countries. On the positive side, there is awareness among citizens and some policymakers that current policies are not sustainable in the long run. However, on the negative side there are domestic economic and political pressures in these countries that lead to short-term policies. As global warming, dwindling fisheries, pollution, loss of agricultural lands, and other environmental trends continue, the advanced industrial nations with their enormous economic wealth, scientific expertise, and disproportionate consumption of natural resources will have to play a leadership role to reverse these trends. The question is and will be, however, will domestic politics in these countries impede a truly global environmental policy?

REFERENCES

Bell, Daniel. 1973. *The Coming of Postindustrial Society*. New York: Basic Books.

Catton, William and Riley Dunlap. 1980. "A New Ecological Paradigm for Post-Exuberant Sociology." *American Behavioral Scientist* 24: 15–47.

Dalton, Russell. 1988. *Citizen Politics in Western Democracies: Public Opinion and Political Parties in the United States, Great Britain, West Germany and France*. Chatham, NJ: Chatham House.

Galston, William. 1992. "Rural America in the 1990s: Trends and Choices." *Policy Studies Journal* 20: 202–211.

Habermas, Jurgen. 1981. "New Social Movements." *Telos* 49: 33–37.

Heisler, Martin, ed. 1974. *Politics in Europe: Structures and Processes in Some Postindustrial Democracies*. New York: McKay.

Huntington, Samuel. 1974. "Postindustrial Politics: How Benign Will It Be?" *Comparative Politics* 6: 147–177.

Inglehart, Ronald. 1991. *Culture Shift in Advanced Industrial Society*. Princeton: Princeton University Press.

_____. 1997. *Modernization and Postmodernization: Cultural, Economic, and Political Change in 43 Societies*. Princeton: Princeton University Press.

Milbrath, Lester. 1984. *Environmentalists: Vanguard for a New Society*. Albany: State University of New York Press.

Offe, Claus. 1985. "New Social Movements: Challenging the Boundaries of Institutional Politics." *Social Research* 52: 817–868.

Steel, Brent S. 1996. "Thinking Globally and Acting Locally? Environmental Attitudes, Behavior and Activism." *Journal of Environmental Management* 47: 27–46.

Steger, Mary Ann, John Pierce, Brent S. Steel, and Nicholas Lovrich. 1989. "Political Culture, Postmaterial Values, and the New Environmental Paradigm: A Comparative Analysis of Canada and the United States." *Political Behavior* 11: 233–254.

Tsurutani, Taketsugu. 1977. *Political Change in Japan*. New York: McKay.

Van Liere, Ken and Riley Dunlap. 1980. "The Social Bases of Environmental Concern: A Review of Hypotheses, Explanations, and Empirical Evidence." *Public Opinion Quarterly* 44: 43–59.

Worldwatch Institute. 1997. *State of the World*—1997. New York: W.W. Norton.

Yankelovich, Daniel. 1981. *New Rules: Searching for Self-Fulfillment in a World Turned Upside Down*. New York: Bantam Books.

This page intentionally left blank

23

Changing Natural Resource Paradigms in the United States

Finding Political Reality in Academic Theory

Bruce Shindler
Oregon State University, Corvallis, Oregon

Mark Brunson
Utah State University, Logan, Utah

INTRODUCTION

Some of the most controversial and politicized environmental debates in the United States today concern the proper management of natural resources, especially on public forests and rangelands. Historically, resource extraction has been the focus of most natural resource policy and management on federal lands. However, public concern for wildlife, fish, wilderness, recreation, and other values associated with these sites has increased substantially since the 1960s. At the heart of this debate are differing value orientations about the environment and about human relationships to natural systems (Dunlap 1992). Conflicts that result from these value clashes are among the most intractable problems facing natural resource decision makers.

Many scholars have argued that the public's concern for the use and well-being of public lands is the product of value change accompanying the transition to a postindustrial society. Concern for the natural environment is said to be among the "higher order" postmaterialist needs that tend to supplant more fundamental subsistence requirements (Inglehart 1990; Yankelovich 1981). Value changes involving greater attention to postmaterialist needs are thought to have brought about shifts in personal attitudes related to natural resources (Pierce et al. 1992; Steger et al. 1989), and consequently have become important motivational bases for social and political behaviors among important sectors of society.

Substantial evidence suggests that social values with respect to nature are evolving from a traditional anthropocentric, or utilitarian, perspective toward a more biocentric orientation, which assumes that the natural environment has inherent as well as instru-

mental value. This shift has been observed in North America (Robinson et al. 1997; Shindler et al. 1993; Dunlap 1992) and other postindustrial nations worldwide (Dunlap et al. 1993; Caldwell 1991). In the United States, Brown and Harris (1992) have termed this evolutionary shift as moving from the dominant resource management paradigm to a new resource management paradigm (Table 1). Research suggests that attitudes consistent with the new resource management paradigm are associated with sociodemographic factors characteristic of postindustrial societies. For example, scores on scales measuring environmental concern tend to be higher among more highly educated persons (Steel et al. 1990), those born into a postindustrial society (Blaikie 1992), and those who work outside the primary production sector (Brunson et al. 1997).

Given its position of influence upon the world economy and international politics, the United States will play a pivotal role in guiding global environmental policy in the next decade. Policy considerations in the United States will be determined by the ways in which important social and political institutions—including public land management agencies as well as constituency groups for the various commodities and services provided from public lands—respond to these shifts in values and to any potential consequences for their interests. Although social scientists have done a relatively good job of assessing public values concerning the environment and associated attitudes toward natural resource management, this information has not necessarily led to solutions for the nation's large-scale natural resource management dilemma, either within institutions or among the general public. Thus far, findings and conclusions have largely come from opinion research; but given the stakes involved, researchers may not be collecting all the most relevant types of information. We typically ask citizens about what they want, rather than asking them to make more specific judgments about today's tough choices. Consequently, our policy systems, which are supposed to be inclusive of public values,

Table 1 Contrasting Natural Resource Paradigms

New resource management paradigm	Dominant resource management paradigm
Amenity outputs have primary importance.	Amenities are coincident to commodity production.
Nature for its own sake (biocentric perspective).	Nature to produce goods and services (anthropocentric perspective).
Environmental protection over commodity outputs.	Commodity outputs over environmental protection.
Generalized compassion toward other generations (long term).	Concern for this generation (short term).
Less intensive forest management, such as "new forestry" and selective cutting.	Intensive forest management—clear cutting, herbicides, and slash burning.
Less intensive rangeland management, stream protection, less grazing, etc.	Intensive rangeland management—maintain traditional grazing patterns, etc.
Limits to resource growth, conservation—earth has a limited "carrying capacity."	No resource shortages, production and consumption—science and technology will resolve shortages.
New politics—consultive and participatory.	Old politics—determination by experts.
Decentralized/"devolved" decision making.	Centralized/hierarchical decision making.

Source: Revised from Brown and Harris (1992).

have been only partially successful in using information about environmental values and attitudes to evaluate conditions and make decisions about difficult trade-offs.

This chapter discusses some of these shortcomings, focusing not only on how natural resource management institutions have responded to environmental value shifts, but also on how social science might inform the process. As the topic is quite a bit larger than the space allows, we focus on three pertinent issues:

The connection between public understanding of complex environmental questions and the behaviors of people and institutions
Problems inherent in the institutional structure of natural resource agencies
Difficulties of matching the appropriate scale for problem solving with the scales at which natural resource policies are made

NATURAL RESOURCE POLICY RESPONSES TO SHIFTING VALUES

Before discussing the dilemmas facing natural resource institutions, it is useful to first describe briefly how natural resource institutions, particularly public land agencies, have responded to postindustrial shifts in environmental values. As noted previously, resource extraction had been the traditional focus of natural resource policy and management on public lands. Beginning in the late 1960s, however, public concern about human transformation of the natural environment brought critical scrutiny to the management of public lands, especially national forests.[1] New laws required federal agencies to pay greater attention to environmental amenities, e.g., the National Environmental Policy Act (1969), Endangered Species Act (1973), National Forest Management Act (1976), and Federal Land Policy and Management Act (1976). The principal public land agencies (Bureau of Land Management, U.S. Department of Agriculture Forest Service, National Park Service, U.S. Fish and Wildlife Service) began to hire specialists in noncommodity resources: wildlife biologists, hydrologists, outdoor recreation planners, archaeologists, and so on. Agencies also undertook new programs to incorporate public opinion more fully into management decisions, although those efforts frequently have been criticized for being focused more on the letter of the law than on substantive incorporation of public concerns and values (e.g., Blahna and Yonts-Shepard 1989; Shepard 1992).

These changes came in response to both external and internal pressures. Membership in environmental advocacy groups—many of which focus primarily on public land and natural resource issues—expanded greatly during periods of environmental concern in the late 1960s, early 1970s, and again in the 1980s. These organizations became a powerful constituency whose influence rivaled that of industrial commodity groups, which also remained strong. At the same time, a new generation of natural resource professionals brought postindustrial values into the agencies themselves (Brown and Harris 1992; Cramer et al. 1993)—a process that was enhanced as the traditionally white male organizations began to hire more women, minorities, and members of nontraditional occupations (Kennedy 1991).

Most recently, federal land agencies have adopted an "ecosystem-based management" approach to managing natural resources. Ecosystem management, frequently touted as a new paradigm in natural resource management, involves a blending of social, economic, and ecological principles to focus greater attention on maintaining ecological

health and biological diversity over long periods of time, while simultaneously allowing production of the wide range of products and services that society demands from its public lands.[2] While environmental advocacy groups and others question whether this is truly a new paradigm or merely a new package for the old paradigm (e.g., McCloskey 1996; Stanley 1995), there is clear evidence that the agencies seek new and better ways to sustain ecosystems, inform and respond to public opinion, and share management decisions with other landowners across ecologically relevant boundaries. What is not clear is whether existing institutions are structured in ways that will let them accomplish those goals. We characterize the nature of the problem in the following examination of three related factors.

HUMAN BEHAVIOR AND PUBLIC UNDERSTANDING

Most professionals studying large-scale environmental change will quickly cite difficulties in getting citizens to understand, let alone embrace, this complex topic. We have observed that environmental crises can be temporary or chronic. The kinds of issues that confront natural resource agencies generally fall into the latter category: reduced water quality, fragmentation of habitats, loss of species, and so on. However, public attention to the environment seems to be greatest after well-publicized crises such as occurred at Bhopal, Chernobyl, or Prince William Sound, which are typically incidental rather than continuing and involve industrial accidents and/or hazardous materials rather than gradual changes in natural resource systems. Still, because of a general knowledge base that begins to accrue, there is some evidence that this media attention to acute environmental problems can be associated with public concern over chronic conditions (Arcury and Christianson 1990).

Nevertheless, there is great consternation over what to do about chronic environmental problems. For most citizens, environmental change—especially large-scale changes like global warming, ozone depletion, or worldwide deforestation—represents a problem that is highly complex and largely beyond the average individual's ability to do anything about. Conceptual units of ecological space and time are problematic for most ordinary citizens. Regardless of our shallow understanding of these issues, environmental change issues in the United States will be addressed (or fail to be addressed) based on our human values, perceptions, and understanding of their relevance. By recognizing three shortcomings below, we enhance our ability to do something about the issues.

Incomplete Understanding of Problems

Certainly one problem facing the political institutions charged with addressing environmental change is that public understanding of these issues is often incomplete or confused. For example, Kempton (1991) found that citizens tended to lump together concerns about global warming, ozone layer depletion, and annual temperature variation. Although the causes and potential solutions for each can be quite different, to the average layperson they may simply be different ways to describe the general impact of industrial and consumer technologies on the atmosphere. Misunderstanding the complexities of natural systems can affect attitudes toward natural resource management as well. Brunson and Steel (1994) found that attitudes toward federal rangeland management were associated with unfounded beliefs about the condition of America's rangelands, and also were

closely associated with beliefs about the general condition of the environment. If discarded syringes are washing up on Atlantic beaches, and timber harvesting threatens birds in the Pacific Northwest, then to a layperson it may be reasonable to assume that overgrazing of federal rangelands is getting worse, even though that particular problem actually has been growing less severe over most of this century.[3]

Because change implies uncertainty and unpredictability, public perceptions of environmental conditions invoke questions about the risks of instability. For years, the dominant resource management paradigm—with its exuberant view of nature's role in a competitive market system—has urged humans to accept risk in order to maximize wealth (Milbrath 1984). However, in a relatively short span of about 20 years, confidence about the physical environment has turned to doubt over the food we eat, the water we drink, the air we breathe, and the energy we use (Douglas and Wildavsky 1982). Yet, we live in a society competing for resources, and conclusive answers about these risks are not easy to agree on. When scientists cannot agree on definitive answers, it is unlikely those ordinary citizens will sort through the preponderance of information and reach concrete explanations.

Unfortunately, it is often in the interests of political institutions to promote oversimplified models of environmental issues. Simple problems can seem to require simple, easily legislated solutions. These are attractive to interest groups and to politicians because they count as "accomplishments" that can garner votes or financial support. Simply defined problems also may be more likely to hold public attention. To be relevant to society, environmental issues need to be serious, certain, and soon. Put another way, people are interested in knowing what changes to the environment will affect them, how bad they will be, and when they will happen. Important issues whose effects cannot be easily predicted tend not to hold public attention.

The Need for Informed Choice

Because people are most interested in knowing how environmental change will affect them personally, environmental issues become questions of social vulnerability—which segments of society will be most vulnerable to the impacts of change. Just as biophysical research and policy solutions concentrate on threatened or endangered species, social policy questions need to focus on the distribution of impacts across human populations. This includes understanding shifts in human values, levels of public awareness, and our willingness to make trade-offs in the face of diminishing resources. Thus far, social scientists have made a good start at assessing public values and have begun to understand the importance of citizen awareness, but we know virtually nothing about society's willingness (or ability) to come to terms with the difficult choices that lie ahead. In the absence of practical guidance for tough social decisions, natural resource agency officials—who typically are unfamiliar with the methods and strengths of social science—may tend to discount even the good information social scientists can provide.

Moreover, we have few (if any) effective—and widely supported—mechanisms to help people make decisions that eventually result in long-term policy decisions about the future of our environment. Environmental attitudes at some point translate to the decisions individuals and nations make about the use, protection, and allocation of their natural resources. At a very basic level, we need to recognize that people face small dilemmas every day—whether to use paper towels or air hand dryers in restrooms, or to ask for paper bags instead of plastic at the supermarket. Most of us need information to

help make informed, responsible choices. This is where understanding of scientific issues becomes important. For example, if average Americans cannot distinguish between problems of ozone depletion and global warming, they may believe that global climate change can be averted simply by not using aerosol sprays, and therefore reject further (and more expensive) efforts necessary to reduce accumulation of greenhouse gases. This is less likely to occur if the issues' complexity is more widely understood.

Science and Education Are Not Enough

The need for public understanding of the environment and decision alternatives is central to long-term policy solutions. Strong evidence exists for a positive link between environmental knowledge and concern for natural resources (Arcury 1990). Moreover, we know that concern about the environment is correlated with environmental behavior and political activism. As Steel (1996) put it, "[Citizens] with environmentally protective attitudes report they are indeed 'thinking globally and acting locally.'" But, neither scientific solutions nor educational programs alone are sufficient for changing human behavior.

For example, we know that at this very minute we have the proper technology for controlling the world's ever-increasing population as well as communication systems for getting the message out. Certainly this is neither a science problem nor an information dissemination issue, but instead a cultural question that will require other forms of debate in many developing nations. If we look at the United States as another example, behavioral change is often difficult because of dissociation between cause and effects. Causes often appear as innocent actions, although their effects are undesirable (Jamieson 1994). People do not think of themselves as bringing about environmental degradation, but rather picking their kids up from school, staying warm in winter, and generally trying to live the good life that we have come to expect.

These examples suggest there are limitations to the point of view that technical information and scientific knowledge are the critical elements for making decisions about complex public policies (e.g., Steel and Steger 1996). Even in modern postindustrial societies, well-educated people can possess considerable amounts of policy-relevant information and still not act on it. As Jamieson (1994) points out, natural resource professionals often

> . . . feel their job is to develop information and deliver it to policymakers and the public, but facts do not speak for themselves. They must be appreciated and interpreted. Generally, programs that provide information are not very successful in improving understanding or changing behavior. Serious thought must be given to what it means to educate both the public and the policymaking community. As opposed to delivering brochures or reports, people tend to respond to stories, analogies, examples, and so on. Education is more likely to occur in the context of a personal relationship than in anonymous information provision (26).

Public understanding of environmental problems is increased by helping people sort through the ambiguities. In addition to improving our science and providing basic public information, there is a need for more interactive exchanges where people can discuss, understand one another, and learn about the future based on what they see today. Yankelovich (1991) confirms this view in his text about making democracy work in a complex world. He asserts that the major constraint to achieving better public understanding of, and appreciation for, the complex issues facing society today is the lack of forums in which deliberate, thoughtful, and reflective thinking and discussion take place.

Such forums, he argues, facilitate efforts by citizens to "work through" difficult problems. Discussions could include defining the problem, identifying existing alternatives, and examining the consequences and implications associated with these various alternatives. In these forums, people can come to an understanding of, if not agreement on, the problems and choices that most certainly lie ahead. Unfortunately, in research on adaptive approaches to resource management, Stankey and Shindler (1997) conclude that in our society today such forums are most notable by their scarcity.

POLICY PROCESSES AND INSTITUTIONS

For policies that address environmental change to be successful over the long term, participants (legislators, resource managers, scientists, and citizens) will need to see direct linkages from intent through implementation. This suggests a need for comprehensive programs that will be championed at the national level, supported as policy through resource agencies, and implemented at the local level. As yet, however, people from each of these sectors have legitimate concerns about the ability of our governance system to devise and carry out publicly supported plans on any grand scale.

In recent years, a number of institutional shortcomings have been recognized as barriers to accomplishing environmental management goals on a national level (e.g., Meidinger 1997; Cortner et al. 1996). Several examples are particularly descriptive, and largely depict our existing institutions as continuing to operate under the dominant natural resource management paradigm. That is, we still live in an era in which agencies maintain a boundary mentality, compete over resources, make decisions without public consultation, and continue management practices that are slow to integrate social and biophysical components of ecosystems. Such institutions are ill-equipped to engage the natural resource policy debate and achieve meaningful, well-supported solutions.

In one example, natural resource agency jurisdictions in the United States are set up along arbitrary boundaries that usually have little to do with the environmental integrity of natural ecosystems (Keiter 1994; Knight and Landres 1998). In the real world, ecosystems often cross political and geographic boundaries where various land managers (federal, state, and local governments or tribal and private owners) set their own agendas. These agendas include differing mandates and interests, which often put managers at cross-purposes (Keiter 1989). Boundaries can create divisions not only between federal agencies and other landowners, but between or even within federal agencies (Brunson 1998). These intragovernmental disputes can be damaging not only in their immediate effect on important ecosystem-specific decisions, but in the larger sense because the public cannot understand why elements of a supposedly monolithic federal government cannot agree on a direction for natural resource policy or management. A failure to acknowledge mutual responsibility for ecosystem components—especially within agency jurisdictions—often creates competition for specific highly valued resources like timber or water. As a result, other noncommodity resources (e.g., wildlife and scenic quality) do not receive sufficient emphasis or protection by all parties.

We Lack Integrated Approaches to Research

Environmental solutions clearly call for interdisciplinary actions, but here too efforts fall short. Cortner et al. (1996) assert that our current methodologies for researching problems

are insufficient to address natural resource management goals and challenges. Thus far, our institutions have largely addressed the socioeconomic and biophysical components of systems separately. There has been a tendency to break the environmental puzzle into pieces and to give specific tasks to researchers with different areas of expertise. Typically the agenda is set by biophysical scientists who want information from social scientists that will fit neatly into their models (Jamieson 1994).

Such an approach fails to recognize the cross-linkages between critical environmental elements, especially the role of humans and our sociopolitical system. We need to look for the varying degrees of interrelationships among our important resources because all environmental values—ecological, recreational, economic—imply a measure of worth to society (Stankey and Clark 1992). It is our social system that defines their value—both establishing markets and allocating resources—and thus, it is in our social processes where integrated solutions will be found. Any other arrangement implies that policy decisions are based primarily on biophysical evidence rather than also being influenced by societal values, preferences, and short-term constraints.

However, beyond opinion polls, social scientists have not done a great deal to take their line of public inquiry to greater depths. We have identified general values and attitudes and asked people about their preferences, but we have done little to find out about how, or if, people can weigh the costs and benefits of specific environmental problems and solutions. Essentially, what trade-offs are people willing to make? How much environmental change is acceptable? What are we willing to do and for how long? Gillroy and Shapiro (1986) argue these questions must be addressed, and they might best be grappled with in a public dialogue.

We Are Weak in Public Process

Finding the appropriate role for publics in policy decisions is another shortcoming facing our institutions. Since passage of laws like the National Environmental Policy Act and the National Forest Management Act that provide for public involvement, natural resource agencies with a multiple-use mandate (i.e., the U.S. Forest Service and Bureau of Land Management) have come under severe criticism for their inability to incorporate citizen views into policy planning processes. Although a number of collaborative and interactive processes exist (see Daniels and Walker 1996; Moore 1996), more often than not, practitioners have been unable to use them effectively.

Cortner et al. (1996) suggest that the problem is actually twofold; not only have resource agencies failed to implement meaningful public involvement practices, but the internal structure of the organizations themselves is impeding interactive programs and may require wholesale changes. For example, innovation and creative leadership are often stifled by more traditional top-down management styles, by an agency aversion to risk-taking activities, and by organizational standards and guidelines that fail to address local situations. These conditions negate a resource professional's ability to be creative, effective, and trusted when attempting to engage the public for planning purposes. Considering the political microscope these individuals have been asked to perform under, they are more likely to become cautious, to be tentative in their actions, and to lack credibility (Stankey and Shindler 1997). All this suggests a need for new ways of doing business that can better harness pluralism and bring about more consensual widely supported resource policy.

Unfortunately, evidence of how poorly equipped we are to make determinations

about environmental solutions exists in several important examples. First, as described above, these issues are complex and our understanding of human values, motivations, and vulnerabilities is limited. We have little knowledge or descriptions of what a sustainable human society might be. Jamieson (1994) characterized this situation as a need to develop competence both within our natural resource institutions and in the public arenas in which we make decisions:

> In the bad old days there was a tendency for government agencies to dictate policy to citizens. These days there is a tendency for citizens to try to dictate policy to government agencies. There is an admission price for engaging in a public dialogue. Part of the price is purely formal: to treat others with respect, to be sympathetic to alternative points of view, to strive for impartiality, and so on. Part of the admission price also involves knowing something substantive about the issues: the relevant science, the economics, the values and interests that are at stake, and so on. People do not come with a ready-made ability to engage in a constructive, deliberative dialogue. Our resource agencies should do what they can to develop their own competence for engaging in this dialogue, but they also should contribute to developing the competence of those with whom they engage (27–28).

In one sense, this represents a communication problem, exacerbated even by the language we employ to talk about environmental issues. The words and terms used to depict conditions often come across as scientific or management jargon that is without context for most individuals. In independent assessments, Brunson (1992) and Magill (1991) cite the inability of resource professionals and scientists to speak directly to the interests of policymakers and citizens as a primary barrier to public discourse. Of course, one danger of speaking in abstract terms is that people become desensitized to real problems or discount them as things that only affect others. By marginalizing the issues, it is easier to ignore their influence on our daily lives.

Another example of our lack of preparedness for decision making involves how we frame the choices. Essentially, for people to make a rational choice about public policy issues, they have to be given a rational menu of alternatives. However, in our most visible form of democratic policymaking, the voting booth, we often fail to frame issues in such a way that people are forced to make responsible choices. Ehrenhaldt (1994) describes our usual mechanism for determining whether we should tax ourselves and argues that most ballot measures ask the question only one of two ways; The first form is something like "do we want to tax ourselves for a particular service or improvement?" Or, as is more likely nowadays, "do we want to cut our taxes in a particular area?" More specific to natural resources, we often see ballot initiatives that simply ask if we want to ban clear cutting or to stop cattle grazing near streams. Any of these questions may in fact lead to desirable policy outcomes, but they still are presented as single choices that do not reflect the costs involved.

Ehrenhaldt (1994) insists public opinion is meaningful only when people have some understanding of more than one side of the question. On matters of environmental issues, there is no such thing as a rational policy decision without understanding what the alternatives mean. This suggests that resource professionals and politicians will have to learn how to frame choices more openly and more clearly—even ones that now offer limited possibilities because we have already used up the most attractive options (Shindler et al. 1996). To make difficult but necessary trade-offs, it will be important to include people in real-life decisions where the consequences of choices (and costs) are clear.

Here, too, social science may share some culpability. Typically, our studies of environmental values and attitudes follow standard social-psychological methodology, in which respondents are asked to indicate their strength of agreement or disagreement with statements about an attitude object (e.g., management of federal forests or rangelands). Intensity and patterns of responses are then analyzed and presented as evidence of how "the public" feels about an issue. The problem is, people will respond to these questions whether they have an informed opinion or not—just as they will respond in the voter's booth to a ballot initiative on an environmental issue whether or not they understand the consequences of their votes. Often attitude studies find mutually incompatible attitudes—for example, that we should give the highest priority in rangeland policy to the needs of rural livelihoods and life-styles while at the same time doing more to protect wildlife, rare plants, and wilderness areas (Brunson and Steel 1994). Too rarely are studies performed that pose attitude questions in their appropriate decision context, so that policymakers can gauge the true preferences of citizens faced with real and difficult choices.

NATIONAL AND LOCAL SCALES

From a national perspective, environmental change might be described as large-scale impacts caused by the accretion of local-level actions. Given this description, it is easy to understand why disagreement persists about the appropriate government hierarchy for addressing these actions and impacts. Specifically, this involves determining at what level policy decisions should be made and associated programs should be carried out. For example, Ophuls (1976) argued that threats to ecosystem health are so great that only a centralized government authority such as federal agencies will be able to protect and maintain ecosystems in the future. The premise is that people must be constrained by a central power for society to address severe problems and achieve large-scale goals (Cortner et al. 1996). Another view champions a decentralized approach so that management can be organized more effectively around local resource problems and conditions (Behan 1988). This approach assumes citizens are more in tune with local issues and are more willing to work on problems that visibly affect them.

No one is likely to argue against the need for a central overarching set of goals for how a society manages its natural resources. In the United States reaching these decisions is another matter. In the absence of legislators mobilizing themselves into an authoritarian government or reorganizing federal resource institutions into a single, forceful, finely tuned environmental management agency that speaks with one voice, American pluralistic society ensures there will continue to be fragmented approaches to natural resource issues. In short, there are simply too many competing societal forces to believe that we will have a focused, unified national resource management agenda any time soon.

On a practical level, however, it is difficult to conceive of natural resource stewardship without attempting to address problems through local means. In recognition, local collaborative decision-making processes with ecologically relevant boundaries have become a cornerstone of ecosystem management goals among resource agencies. Collaborative discussions at manageable scales are not only more likely to draw participants with geographically specific knowledge, but they may attract knowledgeable participants who lack access to larger forums (Brunson 1998). Political support for decentralization also arises from the often-held view that local resource professionals and politicians are more trustworthy than national bureaucrats (Brunson and Richardson 1997). Proponents

of the status quo may perceive that they are more likely to retain control where participation in decision making is restricted to "known quantities." Indeed, support for localized decision making tends to be stronger among commodity production interests than among environmental organizations (Jones 1996). Finally, because local communities have different pain thresholds for a variety of problems, citizens often find it difficult to connect with policies aimed at large-scale issues. Thus, focusing on identifiable geographic regions and specific resources seems reasonably tractable. It will be important to frame environmental issues at a scale people can recognize and cope with, as will targeting specific resources; people can relate to salmon, trees, waterways, or wilderness.

Arguments about the appropriate layer of government for making decisions and taking action are confounded by the fact that little is known about the level at which resources and environments are sustainable. Simply, we do not know enough about our natural environment, and perhaps we never will. But if the cumulative effects of local activities cause large-scale global changes, and if inclusive processes are important for long-term planning, then understanding how communities operate seems essential. Understanding local land use patterns and how communities adapt to change also seems to be a good place to start focusing efforts if we are to adequately address environmental change phenomena.

Throughout the United States, we have witnessed grass-roots movements resulting in marvelous environmental contributions in communities, both rural and urban.[4] Resource management set at the community level is a good way to engage these and less active citizens in responses to environmental change. Change events are more meaningful when equated to specific, recognizable problems like trees, fish, or rangelands. These are genuine social concerns because they affect people's livelihood and their quality of life. It is probable that only then will people be able to internalize and appreciate the responsibilities of wide-scale environmental stewardship. There is a need for personal analogs to national-level changes that are real for people and can be experienced before they manifest in more global events.

CONCLUSION

The institutions that must guide future natural resource policy face a daunting task. The issues we have focused on in this chapter are only some of those that confront decision makers. The pressure grows for solutions to natural resource problems, not only because undesirable environmental change continues to occur, but because the public is growing weary of conflict over policy and management. Regardless of their personal politics, few people are happy with the pace and progress of federal programs (Shindler et al. 1996). Further, natural resource problems are often bound up in issues only peripherally related to the environment, such as private property rights or the public's general skepticism toward government and the bureaucracy.

In this chapter we have identified more problems than solutions. One major discussion theme examined the shortcomings of our current natural resource management institutions, in terms of both their administrative structures and the scales at which they operate. Some natural resource agencies (most notably the U.S. Forest Service) have begun experimenting with their organizational structures: combining some administrative jurisdictions; centralizing some functions while decentralizing others; attempting more innovative forms of public outreach (Shindler and Neburka 1997); testing new

institutions such as watershed councils (Krueger 1994; Watershed Agricultural Council 1996); and creating adaptive management areas (Shindler et al. 1996). These efforts must be watched closely to see which might offer the best alternatives or enhancements to outmoded agency structures.

We also examined some of the challenges these institutions face in crafting meaningful environmental policies and programs in the face of incomplete information and high system complexity. Not only must we improve our understanding of complex environmental problems—both in their scientific basis and in the distribution of effects of environmental change across society—but we need to translate answers into descriptions of cause-and-effect relationships that are relevant for people. This is more likely to be accomplished in local settings on scales that have meaning for citizens whose participation is vital.

Another conclusion we draw is that social scientists must seek new ways to help identify those solutions: through information gathering that is relevant to the real problems faced by government decision makers and worried citizens, and by helping to develop forums for meaningful discourse between policy shapers and their constituents. It is not enough to report on attitudinal change or shifts in values. This is an age of experimentation in natural resource policy, and our institutions are struggling to find the best ways to incorporate public opinion and the most appropriate scales for making decisions that protect the shifting environmental values of citizens in postindustrial America. Research scientists and natural resource managers share a responsibility to evaluate and find the best elements of those experiments.

ENDNOTES

1. Dana and Fairfax (1980) provide a well-documented and thorough description of the evolution of natural resource policy in this era. For a recent description of how public land agencies have responded to shifting natural resource paradigms, see Brunson and Kennedy (1995).

2. Precise definitions of ecosystem management remain elusive, but probably are outlined most clearly in a pair of articles by Grumbine (1994, 1997).

3. This statement is not meant to imply there are no serious continuing problems related to federal range management. However, those problems typically are site-specific rather than generalized, such as in riparian environments, or else pertain to the loss of species or rare plant communities rather than to overutilization of forage.

4. Wondolleck and Yaffee (1994) offer many good examples of these in public lands states. For an even more comprehensive review of successful (and unsuccessful) collaborative partnerships, see Yaffee et al. (1996).

REFERENCES

Arcury, T. 1990. "Environmental Attitude and Environmental Knowledge." *Human Organization* 49(4): 300–304.

Arcury, T.A. and E.H. Christianson. 1990. "Environmental Worldview in Response to Environmental Problems: Kentucky 1984 and 1988 Compared. *Environment and Behavior* 22: 387–407.

Behan, R.W. 1988. "A Plea for Constituency-Based Management." *American Forests* 94(7–8): 46–48.

Blahna, D.J., and S. Yonts-Shepard. 1989. "Public Involvement in Resource Planning: Toward

Bridging the Gap Between Policy and Implementation." *Society and Natural Resources* 2: 209–227.

Blaikie, N.W.H. 1992. "The Nature and Origins of Ecological World Views: An Australian Study." *Social Science Quarterly* 73: 144–165.

Brown, G. and C.C. Harris. 1992. "The USDA Forest Service: Toward the New Resource Management Paradigm?" *Society and Natural Resources* 5(3): 231–245.

Brunson, M.W. 1992. "Professional Bias, Public Perspectives, and Communication Pitfalls for Natural Resource Managers." *Rangelands* 14: 292–295.

Brunson, M.W. 1998. "Social Dimensions of Boundaries: Balancing Cooperation and Self-Interest." In: R.L. Knight and P. Landres, eds., *Stewardship Across Boundaries*. Washington, DC: Island Press.

Brunson, M.W. and B. Steel. 1994. "National Public Attitudes Toward Federal Rangeland Management." *Rangelands*.

Brunson, M.W. and J.J. Kennedy. 1995. "Redefining 'Multiple Use': Agency Responses to Changing Social Values." In R.L. Knight and S. Bates, eds., *A New Century for Natural Resources Management*. Washington, DC: Island Press: 143–158.

Brunson, M.W. and K.J. Richardson. 1997. "Perceived Fairness and Effectiveness of Rangeland Collaborative Partnerships." Paper presented at the 50th annual meeting, Society for Range Management, Rapid City, SD, Feb. 16–21.

Brunson, M., B. Shindler, and B. Steel. 1997. "Consensus and Dissension Among Rural and Urban Publics Concerning Federal Forest Management in the Pacific Northwest." In: B.S. Steel, eds., *Public Lands Management in the West: Citizens, Interest Groups, and Values*. Westport, CT: Praeger Press.

Caldwell, L. 1991. "Globalizing Environmentalism: Threshold of a New Phase in International Relations." *Society and Natural Resources* 4(3): 259–272.

Cortner, H., M. Shannon, M. Wallace, S. Burke, and M. Moore. 1996. "Institutional Barriers and Incentives for Ecosystem Management: A Problem Analysis." USDA Forest Service General Technical Report PNW-GTR-354. 35.

Cramer, L., J.J. Kennedy, and R. Krannich. 1993. "Changing Forest Service Values and Their Implications for Land Management Decisions Affecting Resource-Dependent Communities." *Rural Sociology* 58: 475–491.

Dana, S. T. and S. K. Fairfax. 1980. Forest and Range Policy. NY: McGraw-Hill.

Daniels, S. and G. Walker. 1996. "Collaborative Learning: Improving Public Deliberation in Ecosystem-Based Management." *Environmental Impact Assessment Review* 16: 71–102.

Douglas, M. and A. Wildavsky. 1982. *Risk and Culture: An Essay on the Selection of Technical and Environmental Dangers*. Berkeley: University of California Press: 221.

Dunlap, R. 1992. "Trends in Public Opinion Toward the Environment: 1965–90." In R. Dunlap and A. Mertig, eds., *American Environmentalism: The U.S. Movement 1970–1990*. Philadelphia: Taylor & Francis: 89–116.

Dunlap, R., G. Gallup, and A. Gallup. 1993. *Health of the Planet*. Princeton, NJ: Gallup International Institute.

Ehrenhaldt, A. 1994. "Let the People Decide Between Spinach and Broccoli." *Governing* 7(10): 6–7.

Gillroy, J. and R. Shapiro. 1986. "The Polls: Environmental Protection. *Public Opinion Quarterly* 50: 270–279.

Grumbine, R.E. 1994. "What Is Ecosystem Management?" *Conservation Biology* 8: 27–38.

Grumbine, R.E. 1997. "Reflections on 'What Is Ecosystem Management?'" *Conservation Biology* 11: 41–47.

Inglehart, R. 1990. *Culture Shift in Advanced Society*. Princeton, NJ: Princeton University Press.

Jamieson, D. 1994. "Problems and Prospects for a Forest Service Program in the Human Dimensions of Global Change." In K. Geyer and B. Shindler, eds., *Breaking the Mold: Global Change, Social Responsibility, and Natural Resource Management*. Portland, OR: USDA Forest Service, 23–28.

Jones, L. 1996. "Howdy, Neighbor: As a Last Resort, Westerners Start Talking to Each Other." *High Country News* 28(9): 1, 6–13.

Keiter, R. 1989. "Taking Account of the Ecosystem on the Public Domain: Law and Ecology of the Greater Yellowstone Region." *University of Colorado Law Review* 60: 923–1007.

Keiter, R. 1994. "Beyond the Boundary Line: Constructing a Law of Ecosystem Management." *University of Colorado Law Review* 60: 923–1007.

Kempton, W. 1991. "Public understanding of global warming." *Society and Natural Resources* 4: 331–345.

Kennedy, J.J. 1991. "Integrating Gender Diverse and Interdisciplinary Professionals into Traditional U.S. Department of Agriculture—Forest Service Culture." *Society and Natural Resources* 4: 165–176.

Knight, R.L. and P.B. Landres. 1998. *Stewardship Across Boundaries*. Washington, DC: Island Press.

Krueger, W.C. 1994. "Building Consensus for Riparian Users Toward the 21st Century." In G. Rasmussen and J. Dobrowolski, eds., *Riparian Resources: A Symposium on the Disturbances, Management, Economics, and Conflicts Associated with Riparian Ecosystems*. Logan: Utah State University, College of Natural Resources: 77–82.

Magill, A.W. 1991. "Barriers to Effective Public Interaction." *Journal of Forestry* 89(10): 16–18.

McCloskey, M. 1996. "The Skeptic: Collaboration Has Its Limits. *High Country News* 28(9): 7.

Meidinger, E. 1997. "Organizational and Legal Challenges for Ecosystem Management." In K. Kohm and J. Franklin, eds., *Creating a Forestry for the 21st Century*. Washington, DC: Island Press: 361–380.

Milbrath, L. 1984. *Environmentalists: Vanguard for a New Society*. Albany: State University of New York Press.

Moore, S.A. 1996. "Defining 'Successful' Environmental Dispute Resolution: Case Studies from Public Land Planning in the United States and Australia." *Environmental Impact Assessment Review* 16: 90–101.

Ophuls, W. 1976. "Reversal Is the Law of the Tao: The Imminent Resurrection of Political Philosophy." In S. Nagel, ed., *Environmental Politics*. New York: Praeger Press 34–38.

Pierce, J., M.A. Steger, B. Steel, and N. Lovrich. 1992. *Citizens, Political Communication, and Interest Groups: Environmental Organizations in Canada and the United States*. New York: Praeger Publishers.

Robinson, D., M. Robson, and A. Hawley. 1997. "Social Valuation of the McGregor Model Forest: Assessing Canadian Public Opinion on Forest Values and Forest Management—Results of the Canadian Forest Survey, 1996." Research report for the McGregor Model Forest. Prince George, British Columbia: 170.

Shepard, B. 1992. "Seeing the Forest for the Trees: 'New Perspectives' in the Forest Service." *Renewable Resources Journal* 8(Summer): 8–11.

Shindler, B. and J. Neburka. 1997. "Public Participation in Forest Planning: Eight Attributes of Success." *Journal of Forestry* 95(1): 17–19.

Shindler, B., P. List, and B. Steel. 1993. "Managing Federal Forests: Public Attitudes in Oregon and Nationwide." *Journal of Forestry* 91(7): 36–42.

Shindler, B., B. Steel, and P. List. 1996. "Public Judgments of Adaptive Management: A Response from Forest Communities." *Journal of Forestry* 94(6): 4–12.

Stankey, G. and R. Clark. 1992. *Social Aspects of New Perspectives in Forestry: A Problem Analysis*. Milford, PA: Grey Towers Press: 33.

Stankey, G. and B. Shindler. 1997. "Adaptive Management Areas: Achieving the Promise, Avoiding the Peril." USDA Forest Service General Technical Report, PNW-GTR-394: 21.

Stanley, T.R., Jr. 1995. "Ecosystem Management and the Arrogance of Humanism." *Conservation Biology* 9: 255–262.

Steel, B.S. 1996. "Thinking Globally and Acting Locally? Environmental Attitudes, Behavior, and Activism." *Journal of Environmental Management* 47: 27–36.

Steel, B., M.A. Steger, N.P. Lovrich, and J.C. Pierce. 1990. "Consensus and Dissension Among Contemporary Environmental Activists: Preservationists and Conservationists in the U.S. and Canadian Context." *Environment and Planning* 8: 379–393.

Steel, B. and M.A. Steger. 1996. "Requisites for Citizen Participation in Scientific and Technical Policy Making: The United States, Canada, and the Issue of Acid Rain." In D. L. Soden, eds., *At The Nexus: Science Policy, 1996*, Commack, NY: Nova Science Publishers: 113–130.

Steger, M.A., J. Pierce, B. Steel, and N. Lovrich. 1989. "Political Culture, Postmaterial Values, and the New Environmental Paradigm." *Political Behavior* 11: 233–254.

Watershed Agricultural Council. 1996. *Whole Farm Planning: Voluntary, Farmer-Led, and Working!* Ithaca, NY: New York State Water Resources Institute.

Wondolleck, J.M. and S.L. Yaffee. 1994. *Building Bridges Across Agency Boundaries in Search of Excellence in the U.S. Forest Service*. Seattle, WA: USDA Forest Service, Pacific Northwest Research Station.

Yaffee, S.L., A.F. Phillips, I.C. Frentz, P.W. Hardy, S.M. Maleki, and B.E. Thorpe. 1996. *Ecosystem Management in the United States: An Assessment of Current Experience*. Washington, DC: Island Press.

Yankelovich, D. 1981. *New Rules: Searching for Self-Fulfillment in a World Turned Upside Down*. New York: Bantam Books.

Yankelovich, D. 1991. *Coming to Public Judgment: Making Democracy Work in a Complex World*. Syracuse, NY: Syracuse University Press.

This page intentionally left blank

24

The European Union and Environmental Policy

Glen Sussman
Old Dominion University, Norfolk, Virginia

THE EUROPEAN UNION AND ENVIRONMENTAL POLICY

Environmentalism has become a fundamental feature of policymaking within the European Union. When the European Community was formally established in the Treaty of Rome in 1957, environmental policy was conspicuously absent; yet 40 years later in the Treaty on European Union (Maastrict Treaty) environmentalism had evolved into a serious European consideration and had assumed a prominent place on the public agenda. Environmental protection became an important public concern within member states along with the realization that environmental problems had a decidedly cross-national impact.

Among the numerous common problems confronting the countries that comprise the European community (e.g., economy, trade, and agriculture) are environmental pollution and the appropriate use of the region's natural resources. Europe is a very densely populated region, which at the same time faces a host of environmental problems. Numerous warning signals have alerted both government officials and citizens to address the proliferation of environmental degradation, which confronts all European countries. The evidence is clear that the European biosphere is directly threatened by a dense population and its inherent negative externalities, e.g., a pattern of natural resources consumed at a staggering rate along with increasing waste production (United Nations Environment Program 1997: 75). Although the governments of Europe have been challenged with seeking solutions to the varied environmental problems, they have also been confronted with both domestic and regional constraints. On the one hand, each nation must seek out its own solutions. On the other hand, as Europe has become more integrated, the actions of each nation impinge on its regional neighbors. Moreover, as part of a supranational political community—the European Union (EU)—actions on behalf of the environment by regional political institutions impact the domestic politics within each of the respective member states of the EU. In effect, with regard to the environment, "The Community has two basic methods of action: the introduction of common policies and the coordination of national policies" (Hull 1994: 146).

As members of the EU, member states have indicated their commitment to regional

cooperation and integration of policymaking with regard to a host of important sectors of European society including, but not limited to, the economy, trade, transportation, and communication among others. At the same time, each respective member state has its own history, culture, and political system, which define its place within the larger community framework. As far as environmental protection is concerned, member states as part of the EU have demonstrated their concern about improving the quality of the environment through their individual and collective actions. Moreover, public opinion has indicated quite clearly that the citizens within the EU give great consideration to environmental quality and are committed to environmental protection. For example, among 13 key policy areas designated as those that should receive top priority by the European Parliament, citizens in the member states of the EU cited environmental protection second, surpassed in importance only by concerns about employment. Moreover, environmental protection ranked among the top three priority areas in 14 of the EU's 15 member states and it ranked as the top priority in five members of the EU (European Commission 1996: 84).

The EU has assumed a significant role in environmental policymaking as an institution that seeks to enhance the quality of life for some 370 million Europeans. As the current president of the European Parliament, Dr. Klaus Hansch, has commented, "European unity is necessary to meet the challenges of the future—the restructuring of European economics, the fight against unemployment, the need for a common environmental policy, and a common fight against international organized crime" (Osborn 1996a: 16). Yet at the same time, the level of economic development of member states as well as regional differences within the European community act as a constraint on effective EU environmental policymaking. For example, only Denmark—one of the 15 members of the EU—has integrated almost the entire EU environmental legislative agenda into its national law. In contrast lies Italy, which needs to work much harder to integrate more of the EU's directives as part of its national agenda (Barnard 1996a: 23). Moreover, the "Green Trio" of the European Union—Germany, Denmark, and The Netherlands—are located in the northern region of the continent as are environmentally conscious Sweden and Finland. In contrast lie the Mediterranean countries (e.g., Italy and Spain), which are less able to compete economically with the countries of the north and are also less able to impose "green" measures into their national law to the same extent as their wealthier neighbors (Barnard 1996a: 23).

For the EU, generally, attention has been focused on the relationship and cooperation among the member states. However, environmental protection has become a Europen-wide issue reflected by several recent meetings of European environmental ministers. European officials have met in Dobris Castle near Prague in June 1991 followed by a meeting in Lucerne in April 1993 and most recently in Sophia in October 1995 to discuss common environmental problems and collective goals of the European community ("Sophia Ministerial Conference" 1996). Although the discussions among the delegates described the diversity of environmental problems in western, central, and eastern Europe, the meetings expressed the commitment of the European community to address environmental quality and protection across the entire European continent.

The EU has assumed an increasingly important position as the foundation upon which to integrate environmental policy among the member states. The EU now has the legal foundation and institutional apparatus to promote common environmental policy among its member states. However, as one political commentator has pointed out, "Political, economic, and geographic diversity has challenged policymakers to develop innova-

tive strategies for overcoming differences and sharing burdens equitably" (Axelrod 1997: 299). Still, notwithstanding these differences, the EU through its now long-standing legal framework and legislative record has promoted a common bond among the member states in the effort to protect the environment.

HISTORICAL BACKGROUND

The EU as we know it today is a result of the Treaty on European Union (the Maastricht Treaty), which sought to more fully integrate the member states of the European Community (EC). Although the foundation upon which economic and political union was to be achieved can be seen as far back as the creation of the European Coal and Steel Community, which itself was established by the Treaty of Paris in 1951, the European Community as a new political and economic entity can be traced to the 1957 Treaty of Rome. However, at this time, member states were most concerned with economic and political issues while concern for environmental protection was conspicuously absent.

Notwithstanding this procedural omission, by the 1960s, the European Community began to realize the need to harmonize economic integration with concern for the environment through legislative efforts. For example, between 1967 and 1972 (the year of the Paris Summit), several initiatives were forthcoming including common standards for the safe transport of hazardous substances and automotive emissions and fuel content (Vogel 1993). In 1972 at the Paris Summit of Community Heads of State and Government, member states established for the first time that environmental protection was an integral part of European policymaking. Consequently, the EC established what would become the first of several Environmental Action Programs, which outlined environmental goals and the means to achieve them. However, as two observers have noted, "These programs did not represent a definitive commitment from the member states for implementation because each country has maintained its own set of environmental regulations" (Wood and Yesilada 1996: 178). Nonetheless, by the early 1990s, five environmental action programs had been set forth, which provided a 20-year foundation of goals and procedures committed to improving the quality of life for citizens of the EU.

Throughout the 1970s the environment gained increasing attention as a result of several factors—namely, increasing public concern about the quality of the environment, political pressure from environmental interest groups, the need to establish common product standards among member states, which was demanded due to the need for the free flow of trade across national boundaries, as well as the health of the inhabitants of the member states who felt the effects of pollution due to the close geographic proximity of the member states of the EC (Vogel 1993: 183–184). The cumulative impact of these several factors served to foster action on the part of the EC to ensure closer cooperation among its members while at the same time leading to dissension between member states in terms of their respective level of commitment to environmental protection (Barnard 1996b: 25).

The Single European Act of 1986 was the next step toward further integrating the member states of the EC. Although the primary rationale upon which the community is based concerns economic development, trade, and employment issues, the environment had by now become more fully integrated into EC thinking. The 1986 treaty institutionalized environmentalism through specific environmental objectives—namely, "preserve, protect, and improve the quality of the environment," "contribute toward protecting human health," and "ensure a prudent and rational utilization of natural resources" (Hull

1994: 148). Moreover, member states were now obligated to be aware of the impact of their activities on the environment. Member states were to take account of the environmental conditions and the economic development of the regions; the potential benefits and costs of action or lack of action and were not restrained to take action that went beyond that required by the EC (Johnson and Corcelle 1989: 343).

A further effort to bring closer economic and political unity between the member states of the EC was the signing in 1992 and the adoption in 1993 of the Treaty on European Union (also known as the Maastricht Treaty). Through agreements set forth in the treaty, member states now became known as the European Union. Included among the objectives of the new EU, which included "harmonious and balanced development of economic activities," "a high level of employment and social protection," and "the raising of the standard of living and quality of life," was the goal of establishing "a policy in the sphere of the environment" (Council of the European Communities, 1992: 11–12). Specifically, the new treaty outlined the EU's commitment to the health of the environment. The treaty's specification with regard to the environment was divided into three distinct sections—namely, the EU's objectives with regard to the environment, procedural matters regarding decision making, and the question of intergovernmentalism. First, as specified in Article 130r of the treaty, the EU was committed to four key objectives:

Preserving, protecting, and improving the quality of the environment
Protecting human health
Prudent and rational utilization of natural resources
Promoting measures at the international level to deal with regional or worldwide environmental problems

While attempting to harmonize relations among the member states, the treaty recognizes that while "a high level of protection" is a goal of the community, a diversity of conditions exists within the region, which should be taken into account when applying environmental measures. Still, the commitment of the EU to the environment is quite clear as reflected by the principles that "environmental damage as a priority be rectified at source" and the policy that the "polluter should pay." Second, Article 130s addresses how the objectives set forth in Article 130r will be achieved. As the locus of political and decision-making authority of the EU, the European Council plays a central role in environmental policymaking. Accordingly, the Council will decide what actions will be taken to achieve the objectives set forth in Article 130r. Although the Council will act "unanimously" in making its decision, it may also set policy based upon the "qualified majority" procedure. Third, with respect to intergovernmentalism, while harmonization of environmental standards is a primary objective of the EU, member states have flexibility in implementing policies relevant to their respective socioeconomic conditions. In this regard, member states may pursue more aggressive measures to ensure environmental quality as long as these measures do not contradict the intent of the treaty (Article 130t).

Moreover, the principle of "subsidiarity" assumes an important place in EU environmental policymaking. The EU is comprised of 15 soverign states each with its own long-standing national interests. On the one hand, the EU is a "community" in which its policy has the same effect on member states as national legislation (Wells 1996: 23). On the other hand, although they are members of a larger "community," each state maintains the right to pursue policies that meet its self-interest or might have difficulty implementing policies due to its specific economic capabilities. The principle of subsidiarity, a

point of contention among member states in terms of the relationship between the central organs of power in the EU and national governments, can best be described as a means by which "policy decisions be made as close to the people as possible and that the EC should act only when measures cannot be more effectively taken at the national or local levels" (Baun 1996: 115). Article 3b sets forth the principle of the necessity of Community action where its actions would be most efficient: "The Community shall take action, in accordance with the principle of subsidiarity, only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the member states and can therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community." Consequently, the role of the EU has been strengthened in the area of environmental policymaking.

Whether and to what extent the Maastricht Treaty provided the basis for fostering increasing integration among the member states "necessary to enable the Community to serve as the architectural cornerstone for the New Europe" (Baun 1996: 3), fostering ties among the member states was a step closer to an increasingly central role of EU institutions in environmental policymaking.

ORGANIZATION OF THE EU

The EU is comprised of several important institutions. The five key institutions, all of which play a role in environmental policymaking, are the European Council and Council of Ministers, the European Commission, the European Parliament, the European Court of Justice, and the European Environment Agency. In addition to these formal institutions, the EU is also comprised of several other political bodies including the Court of Auditors, the Economic and Social Committee, and the Committee of the Regions. One of the ironies or what some might call the "absurdities" of the newly instituted community of European states is that the "centralized" EU is in actuality desegregated in its location (Osborn 1996a: 17). While the EU Council and Commission are located in Brussels, Belgium, the headquarters of the EU Parliament is located in Strasbourg, France, yet party and committee work takes place in Brussels and administrative activities occur in Luxembourg. The European Court of Justice is located in Luxembourg and the European Environment Agency resides in Copenhagen, Denmark.

Although the underlying rationale for the European Union has been greater integration of economic and social progress, the environment has become an integral consideration in EU decision making. According to Eurostat:

> The European Communities policy on the environment is based on the principle of a preventive approach, i.e., devising a policy of economic and social progress which aims to avoid ecological damage. In order to be effective, environmental protection measures cannot be taken in isolation: the ecological dimension needs to be taken into consideration during the overall planning and decision-making process in all sectors, . . . Moreover, the strengthening of environmental protection standards should not be considered as petty interference but as an essential measure, since the extra costs involved are not necessarily wasted but can generate economic growth and create jobs (Eurostat 1992).

When considering economic, social, or environmental policymaking, the EU through its political organs has the ability to set the agenda for member states. In fact, its "institutions can propose and adopt legislation that is binding on its member states

and on individual citizens without need for further ratification, and can monitor, coordinate, and enforce implementation" (Birnie 1996: 77).

The European Council, which was originally established in the Single European Act of 1986, and the Council of Ministers, established under the Treaty of Rome, constitute the preeminent institutions within the EU. The European Council is comprised of representatives—the leader of government—of each member state, a rotating presidency, and the President of the European Commission. As the primary decision-making institution, the Council is responsible for policymaking and responds to initiatives set forth by the European Commission. Although the Council lacks formal legislative power, it does set broad guidelines for the members of the Community and is a forum where the representatives promote the interests of their respective states (Hayes-Renshaw 1996: 147–148). The Council of Ministers constitutes the real focus of power within the EU. The Council is comprised of ministers from each respective member state of the EU depending on a specific policy area. For example, environmental ministers—one from each member state—would address issues related to the environment. The Council of Ministers has the power to adopt several types of measures. Most important are regulations and directives, each of which has the force of law and is binding on member states. Regulations can be characterized as legislation that is geared primarily toward a specific purpose and can be enforced in the courts of member states (Wells 1996: 23). Directives, on the other hand, are the primary means by which environmental policy is made by the EU. The goals of this legal instrument are binding on member states but each of the 15 states is responsible for implementing the measures set forth by the Council into national law (Wurzel 1993: 185). For example, a directive requiring that each member state must have a procedure for packaging waste within a given period of time allows individual states to implement the procedures to achieve this objective. Moreover, some of the "poorer" members of the EU might be given additional time to meet the time table. Although members of the Council prefer unanimity and consensus when engaged in policymaking, "qualified majority voting" has also been adopted as a means to make the policymaking process more efficient (Hayes-Renshaw 1996: 156–159). This majority voting procedure has become the primary means by which environmental policy is made. In this case, the procedure is organized such that voting is weighted to reflect the variation in population of member states that provides potential power and benefits to larger states.

As the executive branch of the EU represented by some 20 commissioners, the European Commission has the responsibility to establish policy for consideration by the Council of Ministers. It also works to ensure the effective implementation of the EU's institutions' provisions by member states. The Commission is organized to represent the interests of the European Community rather than those of the member states. It is divided into 22 Directorate Generals (DGs) each with specific policy area responsibilities. The responsiblity for environmental protection is found in DG XI. According to the current EU Environmental Commissioner, Ritt Bjerregaard, "The EU is firmly committed to the achievement of a true pattern of sustainable development and believes that can only be achieved by integrating environment and resource management concerns into the heart of policymaking in all fields" ("European Commissioner Ritt Bjerregaard" 1996: 27). When necessary the Commission calls on the EU's Court of Justice when it believes that member states are not fulfilling their obligations to implement EU measures.

As the primary legislative body, the European Parliament has recently played an increasingly important role regarding the EU's legislative process although the Council's

decision is final. Citizens of the 15 member states of the EU directly elect this parliamentary body, which is currently comprised of 626 members and is divided into specialized standing committees. Women constitute approximately one-fourth of the parliament's membership (Osborn 1996b: 13). The committee generally responsible for environmental issues is the Standing Committee on Environment, Public Health, and Consumer Protection. The European Parliament is also characterized by the composition of political parties represented in the institution. There are nine political groupings within the European Parliament with the Party of European Socialists with 217 seats the largest political group. The Greens hold some 27 seats in the parliament constituting about 4% of the membership and ranking seventh in size among the nine political groupings. Among these nine distinct political interests, the Green group stands out as the most conspicuous environmentally friendly political group. The strongest parliamentary representation among the Green group is derived from Germany, France, and Italy while several member states do not have any representatives among the Green group. Although it is a minority political grouping, it has been successful in setting the environmental agenda and encouraging other political groupings within the parliament to join in an effort to address an increasingly urgent ecological agenda ("Views of the Parties" 1994: 3). In fact, the Green movement has long been established in Europe and has been characterized by active Green political parties playing an important role in the politics of several European countries (Harman 1985). Given their proenvironment policy agenda and notwithstanding their minority status within the European Parliament, it is important to note that the German Greens have argued that "the presence of the Greens in the European Parliament is vital to amplify the voices of grass-roots movements, to obtain information for them, and to use parliamentary resources to support and to draw them together" (Frankland and Schoonmaker 1992: 207).

Although the European Parliament is considered a weak institution compared to national parliamentary bodies and its legitimacy remains in question for some (Lodge 1996), it does have input into the policymaking process. Generally the parliament is in an inferior position because the Commission proposes legislation and the Council adopts what is then considered "Community law." However, in contrast to previous years when the parliament was limited to voting in favor of or in opposition to legislation or demanding that amendments be added to the legislation, the parliament's power is now bolstered by the "cooperation" procedure and the "codecision" procedure (which includes environmental protection) with the Council. In these cases, as a result of provisions in the Maastricht Treaty, the parliament has several new rights. The cooperation decision gives the parliament the right to a third reading of legislation and the opportunity to table amendments when decisions are approved by majority vote by the Council; the codecision procedure (Article 189b) enhances the parliament's legislative power by giving it the power of direct negotiations with the Council in order for legislation to be adopted in addition to the power to veto legislation supported by the Council ("More Powers Given to Parliament" 1994: 4; "Co-Decision Making with Council" 1994: 4). For example, 50 legislative proposals have reflected the codecision procedure including several environmental issues such as waste, packaging, and motorcycle engine power (Barber 1996: 21). Clearly, the power of the parliament has been enhanced from merely consultation through two readings of a proposal to "equal footing" with the Council in the policy area of the environment (Barber 1996: 20–21).

As the supreme judicial body of the EU, the Court of Justice assumes the responsibility of adjudicating cases brought before it regarding EU law. According to Wood and

Yesilada (1996: 111), "By its decisions since the 1960s, the Court has created an atmosphere that is favorable to the transfer of power from the national to the EU level. According to Articles 173 and 174 of the Maastrict Treaty, the European Parliament, the Council, the Commission, member states as well as citizens may begin proceedings with the Court. Member states are obligated to adhere to Court rulings and in the event that they fail to take appropriate measures to meet their obligations, under the Maastricht Treaty, the Court has the power to impose financial penalties on the member state (Article 171)."

The most recent institutional body to be established with jurisdiction over the environment is the European Environment Agency (EEA) established in 1995. The creation of the institution was delayed due to disagreement among member states over where the agency should be located. Moreover, it lacks formal powers and enforcement procedures that are an integral part of the Environmental Protection Agency in the United States. The EEA was finally seated in Copenhagen as a result of Council Regulation 1210/90 that formally established the agency ("European Environment Agency" 1996: 25). Unlike its "counterpart" in the United States the EEA lacks implementation and regulatory powers. The new EEA, which succeeded the earlier CORINE program (coordination of information on the environment), had as its initial priorities: air and water quality, waste management, noise pollution, chemical hazards, and coastal zone protection ("European Environment Agency" 1993: 5). According to the current EU Environmental Commissioner, the EEA "is an agency that only collects information. It has no role in implementation or regulation or anything like that. It is only to collect data and then inform our citizens inside the European Union" ("European Commissioner: Ritt Bjerregaard" 1996: 27). Although limited in its institutional capacity, the EEA has been instrumental in the dissemination of information about the environment. In 1995 alone, the EEA published two major reports about the state of the environment—namely, "Europe's Environment: The Dobris Assessment" (1996: 26–28) and "Environment in the European Union 1995" (European Environment Agency 1995).

These two reports are the result of a changing attitude toward the environment. In 1972 both the United Nations Conference on the Environment held in Stockholm and the Club of Rome's publication *The Limits of Growth* raised public concerns about the proper management of natural resources. The Stockholm conference's "Action Plan for the Environment" as well as the United Nations Environment Program (UNEP) set the stage for global and regional environmental action. The Dobris Assessment, which was organized at Dobris Castle in Czechoslovakia in June 1991, reflected an increasing global environmental awareness that had begun two decades earlier. The Dobris report, which was the result of the first meeting of public officials from across Europe to address environmental concerns, identified 56 environmental problems and highlighted 12 "major problems" affecting the environmental health of Europe (Stanner and Bourdeau 1995). The EEA's assessment of the environment described in the "Environment in the European Union 1995" was the first report requested by the European Commission. The objective was to update the EU's 1992 data about the quality of the European environment and a review of the EU's Fifth Environmental Action Program. Taken together these two comprehensive assessments of environmental quality in Europe demonstrate the importance of the EEA's position in collecting, aggregating, and reporting environmental data for the purpose of improving the quality of life for citizens in the EU's members states.