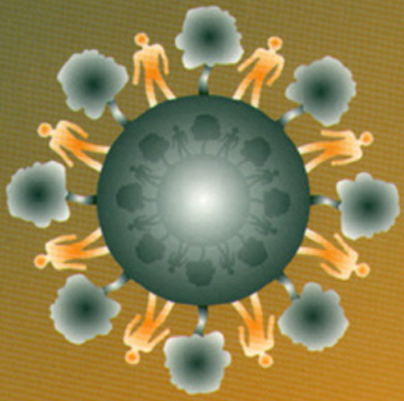
The International Handbook of Environmental Sociology



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Introduction

Graham Woodgate

A PRELIMINARY NOTE ON CONTENT AND OBJECTIVES

The International Handbook of Environmental Sociology brings together the work of more than 30 scholars from some 10 countries and a range of sociological traditions. It is still, however, a far from exhaustive coverage of either regionally or epistemologically distinctive contributions to the sub-discipline, partly because of the inevitable limitations of space, but also because environmental sociology is still very much in its infancy. Nevertheless, it does provide the reader with some background on the origins and development of the field, a flavour of the variety of ways in which sociologists engage with the environment and some examples of the analyses that may result from these different approaches. As a result, it demonstrates not only the sociological interest in global environmental issues, but also the global importance of environmental issues in general.

Beyond the similarities of format demanded by 'house style', no attempt has been made to impose an editorial style on the different contributions. What has always been intended by this project is a collection of works which expresses both the similarities and the differences in the attempts of social scientists to come to terms with the increasing number of environmental issues which exercise the minds of politicians, entrepreneurs and citizens in general at the end of the twentieth century.

SOCIOLOGY AND THE ENVIRONMENT

As we have noted elsewhere (Redclift and Woodgate, 1993, 1994, 1995), sociology has not embraced 'the environment' with ease, an inheritance that derives from its rejection of simple empiricism on the one hand and evolutionary, biologically deterministic models of social change on the other. Sociology's insistence on human distinctiveness, what Catton and Dunlap (1978) have called the 'human exemptionalism paradigm' (HEP), has tended to distance it from the material or physical aspects of environment which both influence and are influenced by human behaviour. Where sociology has taken up the environmental gauntlet, it has tended to focus on the way in which environmental issues are problematized and the social authority of different claims about the environment. 'In this regard,' suggests Hannigan (1995:2) 'environmental problems are not very different from other social problems such as child abuse, homelessness ... or AIDS.' In this sense it is perhaps more accurate to speak of the 'sociology of the environment': the investigation of societal interest in the environment.

Such an approach (which we can loosely refer to as interpretive, humanist, constructivist, relativist or phenomenological) seems to suggest that practical action can only follow, and is

therefore determined by, cognitive constructions of the environment; it is a model of cultural determinism, which has developed largely as a response to the 'unacceptable moral and political implications of biological determinism' (Redclift and Benton, 1994: 3). In contrast, the earliest exponents of environmental sociology as a distinct sub-discipline were adamant that, in distancing itself from the environment and environmental influences on human behaviour, sociology necessarily limits its explanatory power. Indeed, Catton and Dunlap (1978) were so sure of this that they promoted the adoption of their 'new ecological paradigm' (NEP) within mainstream sociology. The relativism of constructionist sociology[1] needed to be balanced by a strong dose of realism, which accepted humans as just one species among many and whose actions have both intended and unintended consequences for the whole of nature, where nature is characterized as imposing finite biophysical limits on economic growth.

Partly in recognition of his important contribution to the development of environmental sociology, we have chosen to include Riley Dunlap's chapter at the beginning of this volume. Dunlap takes us on a journey through the 20 years that have elapsed since the initial institutionalization of environmental sociology within the American Sociological Association, linking the fortunes of the sub-discipline in the USA to the waxing and waning of public interest in environmental issues, which, in turn, he relates to economic and political change. Dunlap's contribution is followed immediately by Fred Buttel's chapter, which considers the relationships which exist between social institutions and environmental change in the late twentieth century. Buttel has also been a key player in the development of environmental sociology in the USA, where he has argued convincingly for the retention of the constructivist approach. As he noted in a recent paper, 'That environmental knowledge is not simply a mirror of the natural world is an important sociological observation' (1994: 5) which demands analysis of the ways in which environmental knowledge is constructed and deployed by different stakeholders in environmental debates.

In his contribution to the present volume, Buttel identifies three major issues that continue to dominate research in environmental sociology: the environmental implications of our political and economic institutions; whether growth is primarily an antecedent of, or solution to, environmental problems; and the origins and significance of environmentalism. In one way or another, these are the issues which exercise the minds of almost all of the contributors to this volume and, while Buttel's acknowledgement that the debate between biological and cultural determinism is also reflected in the coming chapters, so too is his suggestion that 'rather than these two views being irreconcilably contradictory, there are some important opportunities for cross-fertilization'.

Perhaps Buttel's best known contribution to the formation of the field comes with his new agenda for environmental sociology published in 1987. In 'New Directions in Environmental Sociology' Buttel distinguished five important areas for the sub-discipline to consider: (1) its theoretical core, (2) environmental values, attitudes and behaviour, (3) environmental movements, (4) investigation of technological risk and its assessment, and (5) political economy of the environment and environmental politics. As Glaeser (1995) notes, however, while Buttel (1987) acknowledged the achievement that environmental sociology had made in developing into an internationally recognized sub-discipline with a solid body of empirical work and a number of useful theoretical insights, it had not succeeded in terms of Catton and Dunlap's objective of redirecting the theoretical approach of mainstream sociology.

Buttel's agenda clearly encompasses both radical environmental sociology (the first three items) as well as the more familiar territory of the sociology of the environment (the last two points). All of these areas are brought together in this book under the title of environmental sociology. This is not simply for the sake of convenience, however, but in recognition of the fact that, while in the spirit of relativism we need to acknowledge the provisional nature of all models and be prepared to accept that they may not provide a good reflection of what 'reality' is actually like (Simmons, 1993), we must nonetheless engage with the material conditions of our existence if we are to assess human impact on biophysical environments and the way in which environments and environmental change condition the structure and development of society.

As human beings we are 'unavoidably organically embodied and ecologically embedded' (Benton, in Redclift and Benton, 1994: 41) in such a way that our intellectual needs coevolve with our physical needs. At the same time, however, we are uniquely equipped to regulate and refashion the environment in ways that make it more suited to our requirements. Thus there is no single way in which we, as human beings, relate to external nature. Acceptance of the very complex and interactive way in which social and environmental change are constituted and proceed suggests that simple distinctions between 'social' and 'natural' soon become untenable. This is an idea which receives attention from a number of the contributors to this book and one which represents a distinctive philosophical position, a position which seems to be becoming a hallmark of environmental sociology, clearly distinguishing it from the great majority of modern, scientific disciplines. This characteristic of environmental sociology is attracting attention and 'followers' who want to maintain critical distance (sociology), while engaging in the real world of ever-encroaching environmental problems. In this sense environmental sociology might represent a 'reflexive environmentalism'.

STRUCTURE AND CONTENT

The structure of *The International Handbook of Environmental Sociology* leads from the general to the particular, from philosophical, theoretical and conceptual pieces to empirical analyses of specific issues and regions. We certainly would not suggest that readers need to start from the beginning and work their way methodically through to the end. On the contrary, this is a publication that can be referred to in an ad hoc way, each chapter being entirely self-contained. What provides the consistency between chapters is the obvious desire of each contributor to elucidate their own particular approach to the intellectual challenges posed by increasingly frequent and pervasive environmental problems.

While it is inevitable that many contributions contain both theoretical and empirical elements, those with a central focus upon theoretical and conceptual issues are located in Part I of the Handbook. Included here are contributions from Michael Redclift and Graham Woodgate, Wolfgang Sachs, Eduardo Sevilla-Guzmán and Graham Woodgate, Bernhard Glaeser, Marina Fischer-Kowalski, Arthur Mol, Matthew Gandy, Richard Norgaard, Barbara Adam and Peter Dickens, as well as those we have already mentioned from Riley Dunlap and Fred Buttel.

Part II provides insights into a number of substantive issues of concern to environmental sociologists. Here we find articles by Mary Mellor, Karl-Werner Brand, Alan Irwin, Steven

Yearley, Simon Shackley, Elizabeth Shove, Hans Opschoor, Tim Gray and Iñaki Barcena Hinojal, Pedro Ibarra Güell and Mario Zubiaga Garate. Finally, while many of the papers have implicit regional foci, Part III groups together contributions which provide explicit analyses of specific countries and regions. Chapters by Chris Rootes, Bernd Baumgartl, Susan Baker, Tim Allmark, José Padua, Steve Lonergan, Satyajit Singh, Hisayoshi Mitsuda, Mahamudu Seidu and Terry Marsden, Jonathan Murdoch and Simone Abram look at the relationships between environment and society and the environmentally oriented institutions which have arisen in places as diverse as Japan and Latin America, India and Eastern Europe, and England and the Middle East.

As we have already spent some time discussing the contributions of Dunlap and Catton and of Buttel to the development of environmental sociology, and mindful of the restrictions of length that we tried to impose upon contributors, we now consider some of the other contributions to the conceptual and theoretical bases of the discipline, relating these to some of the specific issues and regions that are tackled by contributors to Part II of the *Handbook*.

SUSTAINABLE DEVELOPMENT

Michael Redclift and Graham Woodgate's chapter looks at the relationship between sustainability and social construction, suggesting that the limits of our capacity to move towards more sustainable modes of living are set by our sociological models, as well as by 'the real world'. Consequently, they argue, it is in our models, as well as in our policies, that we must make decisive changes. In his contribution on the concept of 'sustainable development', Wolfgang Sachs examines its lineage from the first World Conservation Strategy in 1980 to the present day, during which time, he suggests, it has become an 'inherently self-referential' concept, which seems to mean all things to all people. The link between what Redclift and Woodgate have to say on sustainability and Sachs' contribution to the volume comes with Sachs' typology of the discourses that different groups have constructed in pursuit of sustainability.

These discourses, he suggests, differ in terms of 'their assessment of development and in the way they relate ecology to justice'. He labels the first of these the *contest* perspective. This discourse represents a realist position, which constructs the environmental predicament as a problem of inefficient resource allocation. It suggests that natural resources are grossly undervalued and therefore wastefully allocated, while human resources and technology are underutilized. Thus sustainable development can be achieved through the commoditization of natural resources and their replacement by appropriate human and industrial capital. Sachs notes that the contest perspective views the growth of civilization and its further diffusion through 'free trade' as unquestionable in terms of time, 'while its limitations in geographical space are secretly accepted'.

In many ways the contest perspective bears comparison with the ecological modernization school, various aspects of which are discussed by Arthur Mol in his contribution to this volume and, later, by Tim Gray in his consideration of 'Politics and the Environment'. Ecological modernization (EM) has, to date, focused its attention on the industrial sectors of highly industrialized nations. Gray characterizes it as a right-wing and reformist political ideology, whilst Arthur Mol is at pains to point out that we must distinguish between EM as a normative and prescriptive, political programme for change and its status as a theory of social change.

Mol perceives four central characteristics of EM as a theory of social change. First, it recognizes modern science and technology as important institutions in ecological reform rather than the culprits of social and ecological disruption. Next, he points out that it stresses the importance of market dynamics and innovative actors in ecological reform. Third, while critical of central bureaucratic states, EM theory accepts the need for state regulation in the pursuit of preventive environmental management. This should be sought, however, through decentralized, participatory policy making. Finally, suggests Mol, EM sees a changing role for social movements as they shift from critical commentators to critical participants in the movement towards ecological transformation. Mol takes the example of transformations within the chemical industry in order to illustrate the power of EM in analysing processes of environmental reform.

Bernd Baumgartl's contribution in Part III tends to support the ecological modernization thesis by looking for signs of EM in Central and Eastern European countries, through an analysis of the roles of four main groups of social actors. He suggests that EM has been limited since the collapse of communism because: for non-governmental organizations (NGOs), the environment was simply seen as a useful vehicle for mobilizing against communist rule (a claim supported by Chris Rootes' analysis of environmental movements and green parties); post-transitional governments were busy dealing with other issues; the international community had its own internal problems to deal with; and, thus, private companies have had to rely on their own efforts because of the lack of a coherent framework for environmental performance. The possibility for processes of EM to develop is clear, claims Baumgartl, but the non-contemporaneous and temporary timeframes in which different environmental actors have been relevant tend to have weakened their impact.

The second construction of sustainable development that Sachs distinguishes, in Chapter 4, he calls the *astronaut* perspective. Here 'spaceship earth' is seen as being sustained by biogeochemical processes rather than a collection of states and cultures. It is an object to be managed and new sciences and technologies have emerged which allow for (or create the illusion of the possibility of) its management. From the astronaut perspective, the North becomes responsible for the entire globe. Those who adhere to this position are the global ecologists and their work is represented by scholars such as Marina Fischer-Kowalski, with her work on the concept of 'metabolism'. This idea has recently received renewed attention from both the natural and the social sciences, with considerable research into the industrial metabolism (IM) of high-income economies (see, for example, Ayers and Simonis, 1994).

The more inclusive term, 'societal metabolism', which can be applied to any society regardless of its degree of industrialization, is preferred by Fischer-Kowalski, who illuminates the origins and development of the concept of metabolism from its roots in biology and ecology to its adoption and colonization by sociology. She questions its suitability as a core concept of an environmental sociology that moves beyond the human exemptionalism criticized by the work of Catton and Dunlap (1978) to a position that accepts humans as just one element of nature's complexity and, as a central focus, studies the interactions of societies with their environments. For metabolism to be a useful concept, suggests Fischer-Kowalski, it should be specifiable in a consistent manner across different social systems independently of scale; have consistent equations in both material and energetic terms, linking inputs, outputs and change in resource stocks; and be intelligible in terms of social meaning and activity, while remaining sufficiently abstract to apply to different social systems across time and space.

Hans Opschoor picks up the IM model and uses it in a critique of one of the basic concepts of the ecological modernization model, namely the idea that economic growth can be delinked from environmental impact. Having guided us through some mathematical models of IM, he notes that in theory the environment can be managed at different levels of sustainable supply of various environmental services. If population and welfare are to grow, however, the algorithms suggest that further deleterious environmental impacts can only be avoided by enhancing metabolic efficiency through the medium of increased throughput efficiency, that is, delinking economic growth from environmental impact. Economists who suggest that delinking may be endogenous to economic growth have a clear affinity with the EM school but, asks Opschoor, can the empirical trends which suggest that delinking is endogenous be extrapolated to satisfy all the demands for welfare of present and future global populations? Or are there upper limits to production and consumption even after delinking? Opschoor's own analyses of available data suggest that periods in which economic growth is successfully delinked from environmental impact may be followed by further periods of relinking. He concludes that 'sustained growth is not necessarily ecologically sustainable'. For this to happen would require both a tremendous amount of eco-efficiency innovation and a shift to less environmentally demanding lifestyles and consumption patterns.

Consideration of the prospects for a movement towards 'greener' lifestyles is the subject of Chapter 14. Karl-Werner Brand's contribution to this volume introduces us to recent debate in Germany in relation to new patterns of social integration and draws upon the concepts of individualization, lifestyles and milieu in order to address the question: to what extent can 'lifestyles' be understood as the structuring principle of 'environment-related attitudes and behaviour'? Answering this question is becoming increasingly difficult, suggests Brand, because, in contrast to early work which was able to distinguish core groups of ecologically conscious and engaged citizens, the institutionalization of the environment theme has resulted in the spread of ecological orientations across all social groups in German society. Although he is careful to point out that his findings should not be generalized, they do point towards links between lifestyle and environmental behaviour.

In summary, Brand suggests that, while ecology can serve as a thematic focus for lifestyles, this rarely leads to a systematic realignment of everyday life in accordance with ecological criteria. He also notes that everyday ways of dealing with environmental problems can cut across existing social milieux and that everyday representations of environmental problems are inseparable from individual and collective responsibility, scope and potential for action. These points lead him to propose a more context-related, cultural analysis of environmental consciousness and behaviour. This model suggests that structural and cultural context and related public environmental discourse and milieu-specific lifeworlds generate specific, environment-related mentalities which structure people's approach to typical opportunities for, and obstacles to, environmentally friendly behaviour. As a result, he suggests that policies which aim to promote 'sustainable lifestyles' without recognizing the context-specific, symbolic resonances of such policies and concepts are likely to generate defensive action.

Brand's conclusions take us on to Sachs' third and final epistemic community, which finds its ontological security in what he calls the *home* perspective, where sustainable development is all about local livelihoods. Such a perspective resonates with the work of Bernhard Glaeser and Sevilla-Guzmán and Woodgate, whose environmental bent stems from their

interest in rural development. Sevilla-Guzmán and Woodgate provide us with an analysis of the origins and evolution of the notion of 'sustainable rural development'. They are highly critical of what they call the 'official, ecotechnocratic' version of sustainable development, whose roots they trace back to the community development project of the 'American Rural Life School' and which, as Sachs suggests, they view as some sort of oxymoron. Nevertheless, they also identify alternative discourses surrounding rural development. Beginning with the Russian Narodniki of the last century, they follow these alternative perspectives on rural development through to the neopopulist theoretical orientation of the Hispano-American school of agroecology.

Glaeser introduces the concept of 'autonomous development', which he contrasts with development that integrates largely agrarian social formations into the international market system. The key to sustainable autonomous development is 'environmental institutions building that promotes the involvement of social groups, structures and systems in research', with the aim of developing target groups' capacity to make and implement decisions. In concluding his contribution, Glaeser offers readers a five-point critical framework encompassing the problematization of modernity and conventional development theory and practice, as a starting point for the reconstruction of 'sustainability'.

ALTERNATIVE THEORETICAL ORIENTATIONS

Other theoretical work has concentrated on the interdependence of social and ecological systems. Richard Norgaard's work on coevolution takes this interdependence as its central theme. Chapter 10 provides us with some insights into the thoughts of one of the key contributors (Norgaard, 1987, 1994) to the agroecological theoretical orientation that we have just mentioned. Having introduced the concept of 'coevolution' into his work in the late 1970s and early 1980s (Norgaard, 1984), Norgaard has recently produced an entire volume in which he sets out his coevolutionary perspective. His contribution to this publication consists in providing a critique of modernity, reflecting on the reasons for mainstream sociology's apparent unease with the environmental issues, and outlining the central tenets of a coevolutionary approach to environmental sociology. For Norgaard, the 'environment crisis is not simply a flaw ... of modernity but rather something that starts early in modernity's history and now runs broadly through it'. Coevolutionary environmental sociology, he suggests, can provide 'an explanation of how people affect their environments and environments affect people'; it helps us to see that debates concerning cultural versus biological determinism are fruitless. Furthermore, by characterizing knowledge as just another coevolutionary variable, the realist/relativist debate becomes irrelevant and the notion of objectivity is challenged.

Theoretical innovation is also to be found in Barbara Adam's chapter on 'Time and the Environment'. In a most original contribution, she demonstrates the ways in which our approach to time is involved in the social construction of environmental hazards. She illustrates this by reference to what she calls the complexity and interpenetration of cosmic, natural and cultural rhythms; the imposition of industrial time on ecosystems; and our emphasis on material things and quantity. She talks of a 'timescapes' perspective which views the environment as 'a record of reality-creating activity' and allows for the 'recombination of phenomena and their creative processes, theory and practice, nature and culture,

present action and future implications'. Her challenge to conventional science is based on the mechanistic notion that time is reversible. Recognition that it is not, and that all actions are irreversible and thus constitutive of new and irreducibly different states, she argues, is 'an important precondition to environmentally cautious and precautious action'.

The 'radical epistemological doubt' about the philosophical and ethical bases of scientific knowledge that are evident in many of the contributions to Part I of this book is a central feature of the postmodernism debate and also of constructivist analyses of contributors such as Alan Irwin, Simon Shackley and Elizabeth Shove. It is Matthew Gandy, however, who tackles the subject of postmodernism head on, in his analysis of the relationship between environmental and postmodern discourses. Gandy cuts quickly to the chase and points out that, from the most radical postmodern (or constructivist) perspective, the 'environmental crisis' is not a revelation of objective science, but 'a complex outcome of inherent uncertainty in combination with social and political influences'. This idea is clearly demonstrated in Alan Irwin's analysis of the BSE or 'mad cow' crisis, but as Steven Yearley points out, science has actually alerted us to the majority of environmental problems and, as Gandy is quick to acknowledge, such an extreme position risks divorcing social discourse from physical reality and thus denying the independent agency of nature.

The promise of the constructivist approach to environmental problems is convincingly portrayed by Irwin in Chapter 15. He starts out to explain the importance of relativism for environmental sociology by directing us to the work of Ulrich Beck (1992, 1995) and other theorists who see nature and society as the same thing and are therefore able to construct the argument that, in our current 'risk society', being 'at risk' is as much to do with the way we now live as it is with any external 'environmental crisis'. Alienated from the environment and cosseted by the paraphernalia of modernity, yet also at risk and unable to 'manage' it, we have lost faith in 'science, truth and progress'. Thus, suggests Irwin, 'the "environmental crisis" is in essence a social crisis for our institutions and for our own existential beliefs'.

Irwin claims that environmental knowledge unavoidably draws on social, natural and scientific elements, so that any attempt to categorize environmental issues as either natural or social is an essentially social construction. Therefore, he suggests, environmental sociology might consider the various rhetorical and tactical moves through which social actors attempt to recruit such categories ('natural' and 'social') to their defence. He counters criticisms of constructivist sociology's inability to engage with (and in) environmental action by suggesting that, in positing environmental knowledge as a matter of social construction, we open the way to a sustainability based upon an agenda that moves beyond scientistic and naturalistic claims, to an environmental movement in which central questions of 'values and futures' are specifically addressed, thus moving beyond a 'case by case' treatment of issues and implying the need for positive engagement with environmental action and recognition and inclusion of knowledge from outside science. Therefore, he concludes, a critical environmental sociology can suggest new forms of engagement that challenge existing intellectual and epistemological assumptions, so that environmental sociology represents much more than just another interesting area of 'applied sociology'.

Peter Dickens has contributed to this volume with a trenchant defence of the explanatory power of historical materialism. In his provocatively entitled 'Beyond Sociology: Marxism and the Environment', Dickens makes the case for a Marxist analysis, because it looks at the way in which social justice, or the lack of it, can precipitate environmental problems as the underprivileged have recourse to the environment for their survival and

because environmental degradation clearly has a more forceful impact on some groups than on others.

Dickens takes us beyond these more obvious reasons, however, suggesting that, if it is developed and adapted to the features of modern society, Marxism can offer profound insights into the way in which societies relate to the environment. His contribution brings out the realism of Marx's analysis, while demonstrating the basic premise that the expression of real, underlying processes and tendencies is contingent on the circumstances of time and space. The piece is divided into three sections. The first deals with Marx's and Engels' perspective on nature–society relationships; the second moves on to contemporary debates within the 'red–green' tradition; the final section offers suggestions about the most important themes for contemporary environmental politics.

This review and development of Marxist thinking addresses a number of the central themes of this publication. The mind/matter, culture/nature dualism is contested, noting that, if humans depend upon nature for their reproduction, yet transform nature in the course of that reproduction, then the possibility exists that they also transform themselves. The rejection of this dualism is also noted in Marx's and Engels' approach to knowledge: Marx foresaw the inevitable union of the social and natural sciences into one science; Engels tried to map out this one science in his uncompleted work, *The Dialectics of Nature* (1959). There is also a distinctly coevolutionary flavour to this understanding of the world which is clearly exposed when Dickens cites Engels' assertion that each 'victory [over nature] takes its revenge on us ... [reminding us] that we ... belong to nature, and exist in its midst'. The message with which Dickens leaves us is a clarion call to strive to bring the material back into our analyses and to end the divisions between the sciences and other disciplines.

GENDER, SCIENCE AND POLITICS: IMPORTANT ISSUES FOR ENVIRONMENTAL SOCIOLOGY

The field of gender studies has arisen largely as a response to criticisms of naturalistic explanations of women's role and status in society. Nevertheless, as appreciation of the impact of male-dominated, industrial society on the environment has grown, the links between gender and nature have once again become the subject of critical attention. Mary Mellor's chapter on 'Gender and the Environment' makes the point that a gender analysis is indispensable if ecological problems are to be addressed successfully. According to Mellor, there are two central and closely related aspects to the gender dimension of environmental issues. First, women and men have different relationships with their environments: the environment is a gendered issue; most environmental decision making is a male domain and the impacts of those decisions fall on women. Second, she notes that women and men respond differently to environmental issues, and especially that women are more responsive to nature. Mellor illustrates these two linked claims through recourse to examples from both North and South, demonstrating that, while basically sound, both may be obfuscated by other structures such as class and race. The relevance of the feminist critique of modern, industrial society is that the spread of this model on a global basis has been responsible for the greater part of global environmental degradation. The basis of modernity, according to the ecofeminist critique, rests on the domination of women by men and nature by culture. Both women and nature have been viewed as economic externalities.

Mellor then asks whether this means that women are in an epistemologically privileged position in terms of environmental questions: are they more responsive to nature? It is not, suggests Mellor, that women are essentially closer to nature, but that men are distanced from their natural environment in dualist structures. 'In particular they are distanced from the ecological consequences of their actions and the biological needs and limitations of their embodied existence.'

The ecofeminist critique of modern society places particular emphasis on Western science, which receives detailed attention in Chapters 16 and 17. Yearley begins his contribution to our understanding of the relationship between science and the environment by reviewing the main arguments both for and against science as a reliable source of information. The first point of criticism relates to Cartesian dualism, discussion of which features in many of the contributions to this book. Second, he notes that the practical project of science is all about exploiting the natural world, rather than learning about it for its own sake. And, finally, he points out that a lack of science is also often cited as a reason for not stopping some activity or other which appears to be harming the environment. Climate change is a good example and one which is developed further in Shackley's chapter on models, as is the BSE or 'mad cow' crisis, which is mentioned by more than one contributor to this volume and receives detailed attention from Alan Irwin in Chapter 15.

In defence of science, Yearley makes the point, as we have already mentioned, that it is science which has actually alerted us to the majority of environmental problems. He also notes that many people claim that scientists are needed to take a dispassionate view of the environment, which citizens cannot, because of their involvement in environmental conflicts. At the same time, however, scientists care passionately about their specialist subjects and have actually been key players in preservation and conservation movements. Finally, he observes the oft made claim that, if science is inappropriate, it can be reformed.

Rather than trying to pass judgement on science, however, Yearley examines the ways in which these arguments have been played out in three specific contexts: the national environmental policy bodies in the USA, environmental NGOs in the UK and global environmental problems. In each context Yearley's arguments suggest that science is 'an indispensable yet far from straightforward friend of environmental reform'. Thus he concludes that 'the future prospects are for continuing tension as well as interdependence between environmentalists and the institutions of science'.

Simon Shackley looks more deeply into a specific and recently revitalized area of environmental scientific endeavour, when he tackles the mediating and transformative role of computer models in environmental discourse. In an incisive analysis, Shackley demonstrates the power and value of constructivist approaches to environmental issues and at the same time demonstrates the fact that sociologists can and do engage with other scientific disciplines. He observes, however, that despite their apparent advantages, models have not achieved the same epistemological status as the controlled laboratory experiment, not because of theoretical objections, but because of a lack of trust in numerical models. This, he argues, is linked to the fact that the stability of models is not a result of their basis in natural laws, but a function of the fact that models can only function as machines, when they are provided with in-built stability. He also notes that, rather than being more holistic and therefore more realistic, large models are often cumbersome, lacking in transparency and less versatile for multiple uses than more simple models.

Nevertheless, models can be efficient 'distillation devices' or, drawing on Latour (1992) 'centres of calculation', which can integrate key insights from different disciplines and make knowledge useful to policy makers. But why should the policy makers require the integration and distillation of scientific knowledge? Because, suggests Shackley, shared knowledge in epistemic communities or discourse coalitions acts as a social glue holding together a range of actors with divergent goals and interests. Models are sufficiently general to allow for common agreement while simultaneously providing ground for more specific, individual interpretations of environmental phenomena. Shackley concludes his piece by arguing that the view of models as 'truth machines' is a more public and policy-oriented perception, while the model as 'heuristic device' is the privately held notion of most scientists. This ambiguity of models, suggests Shackley, is the cause of the relative nature of trust in models and the fluidity of their perceived trustworthiness for any given application and over time.

In Chapter 18, Elizabeth Shove also demonstrates the fact that sociologists are not averse to entering more technical fields of knowledge. In an investigation of the role of alternative sociologies in analysing the relationship between energy use and environmental impact, Shove reviews literature relating to two distinct tendencies in recent research. The first addresses the need to turn energy into a visible subject in its own right, identifying, in the process, social dimensions of energy use. This approach, which we can clearly associate with the industrial metabolism school of environmental sociology, has tended, however, to be tainted by association with asocial technical models. The second examines relationships between energy and the environment as they appear across existing sociological concerns such as social institutions, culture and consumption. This approach, which maintains the invisibility of energy and focuses, instead, on the definition and management of services and practices which involve energy consumption, provides more familiar territory for sociologists but proves difficult to translate into terms recognized and valued by energy decision makers.

In essence, then, Shove perceives the issue of energy in a similar light to that which Shackley sheds on scientific models in general, noting that the first approach risks losing sight of the social structuring of consumption, while the second risks being invisible to those making energy-related decisions. She concludes that those who wish to improve the visibility of energy have two choices: either they can work with existing constructions and seek to improve the ways in which 'social' factors are represented, or they may develop a critique of the modelling process and begin to define alternative ways of seeing energy consumption.

The penultimate chapter in Part II comes from Tim Gray, who provides us with an excellent introduction to the subject of politics and the environment, which links well with Chris Rootes', Bernd Baumgartl's and Susan Baker's contributions to Part III. Gray addresses three central questions: is environmentalism a distinctive political ideology; why has the environment become such a salient political issue in recent years; and how have politicians responded to this increased salience of environmental issues? He answers that environmentalism is distinctive, that it has become important as the result of increased public awareness and the development of post-materialist culture, but that the political response may remain fragmented and pragmatic. In short, he suggests that in the near future we are unlikely to see 'a significant diminution of this tendency to play politics with the environment'.

Gray's assertion that environmentalism forms a distinctive political ideology is challenged by Iñaki Barcena Hinojal, Pedro Ibarra Güell and Mario Zubiaga Garate in the final

contribution to Part II, which casts light on the relationships that have evolved between environmentalism and nationalism. Studies of nationalism and environmentalism in Estonia and Euskadi lead the authors to identify the lack of democracy as the thread which links the two movements together. The resultant ideology, within which environmentalism and nationalism come together, they label 'ethnoecologism'.

INTERNATIONAL PERSPECTIVES ON SOCIETY AND ENVIRONMENT

As we have just noted, the first three chapters in the final section of *The International Handbook of Environmental Sociology* also deal with political issues. Chris Rootes looks at environmental and green movements in both western and eastern Europe and notes that, while environmental consciousness in Europe appears divided by axes running east–west and north–south, this is due to differences in the '*kinds* of concern they voice, the *priority* they attach to environmental issues, and the *forms of action* they are prepared to take', rather than levels of environmental concern, which appears high for all European countries for which data exist.

He also highlights the structural conditions under which movements and parties have emerged, flourished and withered in a variety of eastern and western nations. In the west, where from the late 1970s to the early 1990s entry into party politics was the predominant direction of development for collective ecological action, there is now evidence, especially where opportunities to advance the cause by electoral means are most limited, that there has been a shift towards more direct forms of action. In the east he looks in detail at the very different cases of Russia and Hungary, pointing out that, to a large extent, differences between the fortunes of green movements in countries such as Russia and Hungary result from the very different political environments in which they operate. The variety of central and eastern European experience, he claims, 'clearly shows the impact of changing political structures, but also that the effects of such changes are still mediated by political conjunctures and the strategies of actors'.

Bernd Baumgartl's contribution to this book has already been mentioned in connection with the ecological modernization school of environmental sociology. In Chapter 24, Susan Baker focuses our attention on sustainable development policy within the European Union (EU) and its reception and impact within member-states. She begins by reminding us that the notion that sustainable development is a contested concept and then goes on to examine the rationale for the EU's commitment to promoting it through policy. As a result of her analysis, she is led to the conclusion that 'at both the EU and member-state levels, it would appear that the commitment to the promotion of sustainable development is weakened by both economic and political considerations'. This leaves Baker with the impression 'that the chances of the EU entering the next century firmly placed upon the path of sustainable development remain slim indeed'.

Chapter 25 provides another regional analysis. In a very wide-ranging contribution, which draws examples from the length and breadth of Latin America (although concentrating special attention on Chile), Tim Allmark highlights some general tendencies in the region's constantly coevolving socioenvironmental relations. Having characterized pre-Hispanic socioenvironmental relations as based on a 'pact with ecological fragility', he points out

that, during the twentieth century, this pact has been broken on a scale sufficiently widespread for environmental degradation to play a significant role in determining the structure of human settlement in the region and the quality of life of its inhabitants. This understanding seems to echo the analysis of change provided by the ecological modernization school, an observation which is reinforced by Allmark's conclusion that, against all odds, the environment in Latin America is being perceived, and fought for, as a human right whose attainment has become integral to the struggle for the democratic control of society.

José Padua maintains our attention on Latin America, but focuses on Brazil and the fate of its tropical forests and their inhabitants. Padua argues that, in order to produce effective policies and social practices for addressing the problem of tropical forest destruction, we need to design a broader and renewed conceptual framework for its understanding. The example that he provides is based on the ecological, historical and conjunctural dimensions of human occupation of tropical forests. While accepting that any synthetic perspective will necessarily be limited, he suggests that any attempt in this direction should be viewed 'as a work in progress that must be improved by intellectual and social dialogue'.

Chapter 27, by Steve Lonergan, investigates conflicts over water in the Jordan river basin, paying specific attention to the dynamic between Israel, the Occupied Territories and Jordan. This case illustrates how certain resources are linked to security and demonstrates different ways of looking at resources in the context of security. Israel is currently using water at the limits of renewability, 40 per cent of it derived from aquifers situated beneath the West Bank. This situation illustrates how global environmental problems are linked to those of peace and security. Because of Israel's water shortage, it is trapped in a 'hydraulic imperative' which prevents it from relinquishing control of the territory without facing immediate shortages and curtailment of economic development.

Water is also the central concern of Satyajit Singh's chapter on equity and sustainability in India. Taking a political economy approach to irrigation technology in the sub-continent, Singh traces the history of its development in the pre- and post-colonial eras of India's history, using a Marxist framework to examine the implications of statist intervention in irrigation development and ecological change. He concludes that there has been a continuity in the logic determining the choice of irrigation technology and highlights the differing reasons for investing in large-scale dams during both the colonial and independence eras.

Chapter 29, by Hisayoshi Mitsuda, takes us to Japan to investigate Japanese environmentalism. According to Mitsuda, increasing interest in environmental issues in Japan is largely due to two factors: first, the seriousness of environmental degradation stemming from rapid industrialization in the 1960s and 1970s and second, the emergence of post-materialist lifestyles following the economic miracle experienced following postwar reconstruction. Japanese environmentalism, then, is characterized by flourishing relationships between a wide range of environmental groups from all social classes. But, asks Mitsuda, do existing models of the development of environmentalism fit the Japanese experience? In conclusion he suggests a bipolar model of environmental concern in Japan, which distinguishes between grassroots campaigning in support of pollution victims or 'intrinsic environmentalism', and anti-development and ecological movements similar to the USA conservation movement, which he calls 'instrumental environmentalism'. One of the most serious problems faced by Japanese environmentalism today, however, is the elitism that pervades many of its organizations, such that we might characterize the Japanese public's perception of environmental issues as one of 'vast knowledge with low responsibility'.

Mahamudu Seidu offers a structural analysis, when he invites us to consider the impact of agricultural development policy on the environment of Ghana. Seidu reviews the history of official agricultural development strategies from the colonial period through to the present day, relating the central characteristics of policy to the general objectives of successive political regimes. His analysis of these policies evaluates the degree to which they achieved their objectives, while also focusing on their unintended consequences for local livelihoods and the environments upon which these depend for their continued reproduction.

The final contribution to this volume comes from Terry Marsden, Jonathan Murdoch and Simone Abram, who bring us back to the UK to look at the issue of rural sustainability in Britain. Marsden *et al.*'s chapter seems a most appropriate contribution with which to end this publication as it echoes most of the important themes that run through the entire volume. There are links to Norgaard's work on coevolution, Sachs' essay on environmental perspectives and Mol's work on ecological modernization. It also echoes Brand's call for policy makers and analysts to take account of different 'local and regional definition[s] of sustainability concerns in the context of social, economic and regulatory change', suggesting that 'sustainability needs to be constantly linked to the (socially active) policy-making and implementing process'.

In essence, Chapter 31 looks at the way in which the issue of sustainability has been incorporated into rural social science in Britain and at the prospects for realizing it. It also suggests a reorientation of the rural research agenda. The British countryside, the authors contend, can be divided into four ideal types – preserved countryside, contested countryside, paternalistic countryside, and clientelist countryside – each of which has 'arenas of representation' which link certain powerful actors to their changing contexts for action. Of particular importance for representation are the sustainability discourses which are developed among different networks of actors. For the idea of rural sustainability to be implemented, maintain Marsden *et al.*, the consciousness of these networks, their discourses, must be captured and incorporated. The implication of this is that the technological and organizational fixes implied in notions of ecological modernization are unlikely to be of much use for the differentiated countrysides of Britain.

According to Marsden *et al.*, the ecological modernization discourse must be extended in two directions: first, towards the incorporation of regional and rural diversity into its debates and models and, second, towards the consideration of the social dynamic in creating progress in sustainability goals. Thus rural social scientists have much work to undertake in progressing notions of sustainable modernization in the rural context. They must provide a more sophisticated and comparative analysis of 'differentiating countrysides' in order to understand how combinations of external and internal networks of social action influence rural development and, then, how they can progress sustainability in specific developmental contexts. This in turn will necessitate conceptual and empirical engagement at the local and regional levels in order successfully to be able to investigate organization and participation in networks, possibilities for the definition of production and consumption links, and the existing and potential use of local resources, including local cultural identity.

The authors conclude that observing rural Britain in the late twentieth century suggests that 'sustainability is neither an absolute nor an objective phenomenon[, but] a stimulus for a more imaginative and critical debate about the comparative position of rurality in late-modern society'. This brings us to some overall conclusions concerning recent developments in, and future opportunities for, environmental sociology.

ENVIRONMENTAL SOCIOLOGY ON THE EVE OF THE TWENTY-FIRST CENTURY

This introduction has already broken the guidelines of length with which we saddled our colleagues at the outset of this project, so this final section is short and, it is hoped, more cogent as a consequence. Clearly, the current social conjuncture presents opportunities to be both pessimistic and optimistic. The world is at the beginning of a new millennium: obviously a very ethnocentric construction, but one that is 'of my culture' and which exercises a significant influence over my own thinking. It is wracked by the most appalling and widespread social deprivation and it is also not uncommon to link much of this suffering to environmental issues. Nevertheless, the essentially and perhaps uniquely reflexive nature of our species should provide us with grounds for optimism. I would even argue that the existence of this book is demonstrative of the potential for a more beneficial coevolution between society and nature, since environmental sociology results from societies' preoccupations with the environmental consequences of modern industrial lifestyles.

In the film, *Housesitter*, Goldie Hawn plays a semi-destitute young woman who walks into Steve Martin's life and home town, turning it completely upside-down by constructing a fantastic storyline composed of a tissue of lies. By using her delightful personality she manages to convince everyone of the story's veracity, to such an extent that each and every actor reacts to outrageous situations with improbable responses that ultimately result in the achievement of everyone's utopian dreams. So what? Well, as I was watching this film it occurred to me that here was an example of human agency at its most powerful, a celebration of our capacity to change the world, to construct reality both cognitively and physically.

In reality, we are no less powerful as a species; everybody can be or do anything; the catch is that we cannot all be exactly what we want to be at the same time and, in the short term, our options are constrained (as well as enabled) by structures both social and natural. Furthermore, our power to construct carries with it a destructive force. Thus there are clearly ethical decisions that we need to address relating to the distribution of access to satisfactory and fulfilling lives, both in the future and, eminently more importantly, today. Moral positions or ideologies are clearly implied in all sociological endeavours, otherwise why should we want to understand any particular aspect of society any better than we might were we only citizens rather than professional sociologists? We are all full-time students of life – we have to be, for all individuals continually reinterpret the world as their timescapes unfold around them.

Environmental sociology is so distinctive from those forms of sociology which maintain their insistence on the exceptional status of the human species that it has moved beyond the position of being just another sub-discipline. Rather, it represents a departure from conventional Cartesian science, similar to the departure from Newtonian mechanics experienced by theoretical physics, for example. The recurrent theme of the indivisibility of society and nature undermines, rather than underpins, the conventional disciplinary philosophies of positivism, structuralism and constructivism. In my view, the idea of coevolution reflects many of the characteristics of Giddens' (1984) notion of structuration and the ecological concept of evolution (see Woodgate and Redclift, 1998). All propose the duality of structure. Structure results from action and action is guided by structure; we make society and society makes us; a species defines its niche and the niche characterizes the species. We continually construct, deconstruct and reconstruct both nature and society and in so doing continually refashion ourselves.

In trying to understand this condition, as one might predict, there has arisen, or coevolved, a great diversity of approaches, each of which offers an alternative insight into our current predicament. It is hardly useful, then, to debate whether the environmental crises which we perceive are material facts or simply social constructions – they are clearly both, and we shall only be able to ameliorate such problems once we have properly understood them. Some of these knowledges or approaches will prove equal to the task, possibly in their current form but more likely in some future state after a further period of coevolution and time. We must also accept, however, that we shall never achieve sustainability, for sustainability is not a state but a process: we shall never reach a position of stasis that can be maintained ad infinitum. In the light of this fact, just as it has been suggested that environmental sociology might be understood as a kind of reflexive environmentalism, we should also consider whether we might not do better to promote the adoption of this, more ecological, notion rather than the contradictory, industrial concept of sustainable development. This would move us on from the loaded concept of 'development', with its connotations of continuous material growth, and place the emphasis clearly on our relationship with nature, which, as we have so painfully learnt, we neglect at our peril. What we need to ensure is that we maintain the space and time for diversity, because in chaotic, non-linear, systems such as those of nature, and the societies and cultures which emerge from it, the illusion of sustainability over time is a product of the underlying and continually changing diversity of component elements and processes. Like sustainability itself, environmental sociology is an expression of our commitments, as well as our knowledges and cultures.

NOTE

1. The terms 'constructionist' and 'constructivist' are used interchangeably in the Introduction and throughout this volume.

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PART I

Concepts and Theories in Environmental Sociology

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1. The evolution of environmental sociology: a brief history and assessment of the American experience

Riley E. Dunlap

INTRODUCTION

Nearly two decades ago Catton and I tried to codify the burgeoning but diverse body of sociological work on environmental issues being conducted primarily but not exclusively in the United States by providing an explicit definition of the field of environmental sociology. Included in a thematic issue of *The American Sociologist* devoted to 'New Theoretical Perspectives in Sociology', our article defined the field as 'the study of interaction between the environment and society' (Catton and Dunlap, 1978). We also contended that examining such interaction would require overcoming sociology's traditional and deep-seated reluctance to acknowledge the relevance of the physical environment for understanding contemporary societies.

We argued that in particular the Durkheimian tradition of explaining social phenomena only in terms of other 'social facts', plus an aversion to earlier excesses of biological and geographical 'determinism', had led sociologists to ignore the physical world in which humans live. These disciplinary traditions were further strengthened, we suggested, by the emergence of sociology during an era of unprecedented growth and prosperity, fuelled by resource abundance and technological progress. Along with increased urbanization, which reduced contact with nature, these societal trends made it easy for sociologists to assume that, at least within industrial societies, human life was becoming increasingly independent of the physical world. Consequently, we claimed that our discipline had come to assume that the exceptional features of homo sapiens – language, technology, science and culture more generally – made industrialized societies 'exempt' from the constraints of nature. We concluded by claiming that changing circumstances (such as the 1973–4 energy crisis) necessitated shedding the 'blinkers' imposed by exemptionalism and adopting an ecological paradigm or world view that acknowledges the ecosystem-dependence of all human societies.[1]

It is clear, in retrospect, that our call for a paradigmatic revolution was issued during an exuberant period for the new field of environmental sociology. It had been formally recognized via establishment of a 'Section' within the American Sociological Association (ASA) in 1976, following similar developments in the Rural Sociological Society (RSS) and the Society for the Study of Social Problems (SSSP) (Dunlap and Catton, 1979). Buttel (1987: 466) has described this period as one in which 'there was a vibrant *esprit de corps* that a new sociology was being nurtured. ... Environmental sociologists sought nothing less than the reorientation of sociology toward a more holistic perspective that would conceptualise

social processes within the context of the biosphere.' Writing a decade ago, Buttel (ibid.) went on to argue, 'These lofty intentions ... have largely failed to come to fruition. The discipline at large has handily withstood the challenges to its theoretical assumptions posed by environmental sociologists.' While not challenging the accuracy of Buttel's appraisal of the situation at that time, I believe his pessimistic assessment of environmental sociology and his apparent confidence in the continuing hegemony of exemptionalist thinking within the larger discipline were heavily influenced by the period in which he was writing. The late 1970s were indeed a 'vibrant' period for environmental sociology, but the 1980s saw a significant decline of interest in the field, reaching its nadir at mid-decade, when Buttel wrote his overview. Since the late 1980s there has been a resurgence of interest in environmental sociology within the USA and internationally, and the larger discipline's misplaced faith in human exemptionalism has been increasingly called into question by environmental sociologists as well as by societal developments. Thus a new assessment of the field and its paradigmatic implications seems in order.

The first goal of this chapter is to trace the broad contours of the emergence, decline and revitalization of American environmental sociology, and to demonstrate linkages between these disciplinary developments and major trends in societal attention to environmental problems of the past quarter-century.[2] Having described major emphases of American work over time, and how these were influenced by societal events, the chapter's second goal will be to provide a brief assessment of the strengths and weaknesses of American environmental sociology via comparisons with discernible trends abroad. We will conclude by assessing the state of the field internationally *vis-à-vis* our original call for greater sociological attention to the environment and the importance of shedding the exemptionalist assumptions that were inhibiting such attention.

EMERGENCE OF ENVIRONMENTAL SOCIOLOGY IN THE 1970s

Although there was minor sociological interest in environmental topics prior to the 1970s, consisting primarily of research on natural resources by rural sociologists (see Burch *et al.*, 1972) and on built environments by urban sociologists (see Michelson, 1970), it is generally agreed that the field of environmental sociology developed largely in response to the emergence of widespread societal attention to environmental problems in the early 1970s (Buttel, 1987; Dunlap and Catton, 1979; Freudenburg and Gramling, 1989; Humphrey and Buttel, 1982). Not surprisingly, the bulk of this early work focused on the environmental movement, public attitudes towards environmental issues, environmental policy making and the development of environmental quality as a social problem. This work involved the application of mainstream sociological perspectives, especially analyses of the importance of various claims-making activities in generating societal interest in environmental degradation, to environmental topics. It was a 'normal science' approach and was labelled the 'sociology of environmental issues' (Dunlap and Catton, 1979).

As sociologists paid more attention to environmental issues, some began to look beyond societal attention to environmental problems to the underlying relationships between modern, industrialized societies and the physical environments they inhabit. Concern with the societal causes of environmental pollution (Molotch and Follett, 1971) was supplemented by a focus on the social impacts of pollution and resource constraints (Catton, 1972). In

some cases there was explicit attention to the reciprocal relationships between societies and their environments, or to the 'ecosystem-dependence' of modern societies (Burch, 1971).

It is apparent, in hindsight, that the widespread attention received by *The Limits to Growth* (Meadows *et al.*, 1972) and the 1973–4 energy crisis that appeared to validate its thesis led to a preoccupation with the societal impacts of resource scarcity. Sociological research on energy in the 1970s focused far more attention on the impacts of energy shortages than on the social forces influencing energy use (Rosa *et al.*, 1988). Likewise, there was considerable sociological interest in the societal impacts of resource scarcity in general, especially the inequitable manner in which these impacts would likely be distributed among social strata (Morrison, 1976). While some attention was given to the social mechanisms driving the rapid growth leading to scarcity (Schnaiberg, 1975), the dominant theme was that we were entering an era of ecological limits, exemplified by publication of an issue of *Social Science Quarterly* (September, 1976) devoted to 'Scarcity and Society' that included several contributions by environmental sociologists.

Sociological interest in the impacts of energy and other resource scarcities contributed to the emergence of environmental sociology as a distinct specialization by increasing awareness that 'environment' was more than just another social problem, and that environmental conditions could indeed affect society. While many energy researchers probably never gave much thought to the fact that their work involved examining 'society–environment interactions', and thus violated Durkheim's dictum that the causes of social facts must be sought in other social facts, the general concern with the societal impacts of scarcity facilitated the transition from a 'sociology of environmental issues' to a self-conscious 'environmental sociology' focused explicitly on such interactions. That concern also contributed to a somewhat one-sided view of these interactions, however, as it was the effects of resource constraints on society that received emphasis rather than the impacts of society on the environment (for example, Morrison, 1976).

Sociological attention to the societal impacts of resource limits was very much in tune with the *Weltanschauung* of the mid- to late-1970s, highlighted by President Carter's energy policy and his sponsorship of *The Global 2000 Report* (Barney, 1980), but an emphasis on ecological constraints was clearly at odds with the discipline's ingrained exemptionalist orientation. Thus it is not surprising that sociological work on resource scarcity never appeared in the discipline's top journals, or that several leading American sociologists directly challenged the notion of ecological limits (Bell, 1977; Lipset, 1979; Nisbet, 1980). Indeed, Daniel Bell (1977) provided the quintessential exemptionalist response by arguing that, *if* there are limits to growth, they are surely *social* rather than physical! It is also not surprising that environmental sociology's critique of human exemptionalism had little impact on the discipline at large.

Despite a low profile within the larger discipline, environmental sociology ended the 1970s with a good deal of momentum. Research on topics such as environmental attitudes and the environmental movement, along with energy and natural resources, had increased throughout the 1970s. The ASA Section on Environmental Sociology grew from 290 members in 1976 to 321 in 1979, attracting members with a wide range of interests such as housing and the built environment, social impact assessment and natural hazards, as well as environmentalism, energy and natural resources. In addition, numerous environmental sociology courses sprang up and a few graduate programmes began to offer students the opportunity to specialize in the field (Freudenburg and Gramling, 1989: 447). The situation looked quite promising, but not for long.

THE DECLINE OF ENVIRONMENTAL SOCIOLOGY IN THE 1980S

Even though the events of the 1970s had caused the public to give some credence to the idea of limited natural resources (Yankelovich and Lefkowitz, 1980), the notion of limits remained unpalatable – for expectations of endless growth and prosperity were deeply ingrained in the American psyche (Dunlap and Van Liere, 1984; Milbrath, 1982). Part of the appeal of Ronald Reagan's promise to 'make America great again' was his explicit rejection of the reality of limits. As one analyst put it during the 1980 election campaign:

> For voters terrified by the implications of an era of limits, the expansive ideology of the American Century carries powerful political force. While President Carter has suggested that the challenges ahead are extremely complicated and may require national sacrifice, [Reagan] insists that happy days are just around the corner. (Viviano, 1980)

As another analyst wrote eight years later, 'Carter's humiliating defeat sealed the end of the poor misspent '70s, a decade of limits and frustration and malaise' (Barol, 1988: 41).

From the perspective of those who conceptualized core American values and beliefs such as individualism, free enterprise, abundance, growth and prosperity as a 'dominant social paradigm' or 'DSP' (Dunlap and Van Liere, 1984; Milbrath, 1982), the Reagan Revolution was a natural reaction to the emergence of unconventional social paradigms or world views in the 1970s that were premised on the existence of limits (such as 'voluntary simplicity': Elgin, 1981). Just as adherents of dominant scientific paradigms seldom surrender quickly to challengers, so adherents of the DSP fought back. The anomaly of energy shortages was quickly 'solved' by freeing the market from government restraints, and the idea of limits lost currency. In the intellectual arena explicit rejections of limits-to-growth arguments were put forth with increased frequency. Julian Simon's (1981) argument that population growth was desirable because human ingenuity makes people 'the ultimate resource' (epitomizing a human exemptionalist perspective) resonated particularly well with Reagan's perspective and contributed to the administration's reversal of long-term US support for population control at the 1984 World Population Conference. Similarly, Simon's subsequent book with Herman Kahn, *The Resourceful Earth* (1984), was cited in support of the administration's dismissal of the Carter-sponsored *Global 2000 Report* (Boggs, 1985).

Was environmental sociology affected by this dramatic change in national mood? A variety of evidence certainly suggests so. After three years of growth, membership in the ASA Section on Environmental Sociology dropped below 300 by late 1980 and declined to 274 by 1983. The two books most widely used as texts (Schnaiberg, 1980; Humphrey and Buttel, 1982) went out of print, and were not replaced by new ones. Fewer papers on environmental topics were presented at professional meetings and this reflected a decline in sociological work, not only on energy, but on topics such as environmental attitudes and environmentalism as well. In particular, very few contributions to what Buttel (1987: 467–72) called the 'core' of environmental sociology – its theoretical critique of mainstream sociology's neglect of the physical environment – were made after 1980, and none were published in the leading sociology journals. Similarly, limited success was achieved in bringing the major 'factions' of the field, such as those involved in research on housing and the built environment and those concerned with natural resources (Dunlap and Catton, 1983), into a cohesive intellectual community (Buttel, 1987; Freudenburg and Gramling, 1989: 449).

Environmental sociology courses often suffered declining enrolments, the few existing graduate programmes experienced a levelling of student interest and there were very few job advertisements for environmental sociologists in the 1980s. Such problems were partially shared with sociology (and social science) as a whole, which came under severe attack from the Reagan administration and suffered declining enrolments due to student migration to other fields. However, not only did this situation make it especially hard to maintain the momentum needed to institutionalize a new area of specialization in the discipline, but environmental sociology's emphasis on the ecosystem-dependence of modern, industrialized societies seemed particularly out of step with the tenor of the times. It is therefore understandable that Buttel's mid-1980s appraisal of the progress of the field was less than optimistic about its future.

There were some countervailing trends in the 1980s. Problems afflicting resource-dependent communities (for example, mining, timber and fishing towns) received increasing attention from rural sociologists (Freudenburg and Gramling, 1994). The rise of citizen concern over exposure to toxic and other hazardous wastes stimulated even more attention. Levine's (1982) classic study of the controversy at Love Canal (which began at the end of the 1970s) was the first of numerous sociological investigations of community responses to local environmental hazards (Couch and Kroll-Smith, 1991). Likewise, the major accidents at Three-Mile Island (1979), Bophal, India (1984) and Chernobyl (1986) dramatized the importance of the social impacts and human responses to technological accidents.[3] The fact that exposure to such hazards was typically distributed quite unevenly across social strata also renewed interest in the distributional impacts of environmental problems (Schnaiberg *et al.*, 1986), while growing awareness of such hazards in blue-collar and minority communities stimulated research on a new form of environmentalism – local, grassroots environmental action (Bullard, 1983). More generally, increased attention to environmental and technological hazards stimulated sociological interest in the nature and role of risk in modern societies (Short, 1984).

In addition to their societal significance, work on local hazards had strong appeal to sociologists. The problems were obviously human-created, their recognition and resolution typically involved enormous levels of social controversy in which competing claims-making activities were quite apparent, and conflict over the problems could often be linked to existing patterns of social stratification and political power. They also allowed for micro-level investigations of individual communities employing a wide array of standard data collection efforts (surveys, field work, content analyses and so on). In short, sociologists' research on environmental (and technological) hazards was inherently sociological (Couch and Kroll-Smith, 1991; Levine, 1982). Although this work focused on societal–environmental interactions, the environmental conditions were often viewed as 'socially constructed' and even when taken as objectively hazardous to human health the delimited nature of the problems did not raise questions about the future of homo sapiens, as did earlier work on the impacts of limits to growth. Yet, as in the 1970s, with the emphasis on the social impacts of scarcity, work in the 1980s was initially more concerned with understanding the impacts of environmental conditions *on* humans (especially as mediated by perceptions, collective definitions and community networks) than with the impacts of humans on the environment.

THE LATE 1980s AND EARLY 1990s: REVITALIZATION OF THE FIELD

By the late 1980s, increased societal attention was again focused on what humans were doing *to* the environment, as was true when environmental quality emerged as a social problem in the late 1960s. In 1988 and 1989 alone, three major news magazines – *Time*, *Newsweek* and *U.S. News and World Report* – carried several cover stories on environmental problems such as the contamination of the Atlantic coast with hospital wastes, acid rain, ozone depletion, rainforest destruction and global warming (Mazur and Lee, 1993). *Time* went so far as to name the 'Endangered Earth' as 'Planet of the Year' in lieu of its 'man of the year' for 1988. The exceptionally hot summer of 1988 appeared to validate the notion of global warming in the eyes of the public, much as the 1973–4 energy crisis had done for limits to growth (Ungar, 1992). Thus, although the threat of energy (and other resource) shortages had receded during the 1980s, the quality of the environment was widely seen as worsening.

The renewed salience of environmental problems in the USA was given great impetus by the mobilization of public support for the 20th anniversary of Earth Day, 22 April 1990, an event that attracted unprecedented public involvement and also helped swell the memberships of environmental organizations (Dunlap and Mertig, 1992). In fact, by 1990 the American public was expressing greater concern over the state of the environment and more support for environmental protection than it had in the early 1970s. In particular, majorities felt that environmental quality had declined in recent years and expected it to continue to do so, and large majorities supported increased government spending and regulations for environmental protection (ibid.). Not long after the enthusiasm surrounding the 20th Earth Day began to subside, a new wave of interest was stimulated by preparations for the June 1992 'Earth Summit' in Rio de Janeiro (technically known as the United Nations Conference on Environment and Development).

The visibility of the 20th Earth Day and the Earth Summit, combined with media attention to issues such as the *Exxon Valdez* oil spill, tropical rainforest destruction and the environmental devastation found in Eastern Europe, resulted in an unprecedented level of societal interest in environmental issues – not only in the USA but throughout much of the world (Dunlap *et al.*, 1993) – in the early 1990s. Inevitably, as the result of 'ceiling effects' and the difficulties of keeping an issue on the public agenda, environment was bound to decline in public importance and it did by mid-decade (Dunlap, 1995). However, the recent attacks on environmental protection policies by the Republican Congress have led to a resurgence of public support (Shabecoff, 1996), reminiscent of what happened in the Reagan era (Dunlap and Mertig, 1992).

THE CHANGING NATURE OF ENVIRONMENTAL PROBLEMS

The growing salience of environmental problems over the past decade stemmed, not only from increased attention to them by scientists, media and policy makers, but from discernible changes in the nature of the problems. Contemporary environmental problems differ from earlier ones such as litter, loss of natural areas and air and water pollution in a number of critical respects. First, the scale of such problems has increased from typically localized

problems (such as urban air pollution and pollution of rivers) to the regional level (as with acid rain) and even global level (for example, ozone depletion), thereby potentially affecting far more people. Second, localized problems such as contaminated water supplies and inadequate solid waste repositories occur (and are reported in the media) with enough frequency for them to be seen as generalized problems, adding to the sense that environmental deterioration is pervasive. Third, environmental problems are increasingly recognized as often having origins that are poorly understood and consequences that are difficult to detect and predict, with the result that they appear 'riskier' than earlier predecessors (Ungar, 1995). Fourth, the impacts of many problems pose serious consequences for the health and welfare of humans (including future generations) as well as for other species, and some of these impacts may be irreversible. In short, environmental problems appear to have increased in frequency, scale and seriousness (Dunlap, 1993). Whereas in the 1960s and early 1970s environmental degradation often seemed an aesthetic issue (or, at most, an irritant affecting outdoor activities), it is increasingly seen as a direct threat to human health and well-being, from the local level (for example, toxic wastes) to the global level (for example, ozone depletion).

To summarize, the past decade has seen the emergence of widespread societal recognition of the fact that human activities are causing a deterioration in the quality of the environment, *and* that environmental deterioration in turn has negative impacts on people (Dunlap and Mertig, 1992). Thus the fundamental subject matter of environmental sociology – the relationship between humans and the environment – is much more obvious and seen as far more significant than when Buttel wrote his pessimistic appraisal of the field in the mid-1980s or even when the field was emerging in the 1970s. In addition, growing recognition of the health threat posed by many environmental conditions makes it apparent that not only do human–environment interactions occur at the symbolic or cognitive level, once posited as the core of environmental sociology (Klausner, 1971), but that such conditions can have direct (and deleterious) impacts on human behaviour and well-being.

Especially significant have been the gradual development of scientific consensus and widespread public concern over the reality of human-induced global environmental change such as ozone depletion, loss of biodiversity and, to a lesser extent, global climate change (Dunlap, 1996). The finite ability of ecosystems to absorb the by-products of industrialization without disruption is increasingly seen as a more pressing limit than is scarcity of natural resources. Global environmental change highlights the fact that ecosystems serve not only as 'resource depot' and 'waste repository' for human societies, but as our 'living space' as well, and that these three uses are increasingly in conflict (Dunlap, 1993). For example, ozone depletion and global warming – both the result of the global ecosystem's inability to absorb industrial pollutants without being altered – may affect where humans can live safely as well as the availability of agricultural crops and other resources. Ultimately, ecological limits on humans stem from the finite ability of ecosystems (from local to global) to fulfil these three increasingly competing functions.

Widespread recognition of the human origins and consequences of global environmental change (GEC) represents an enormous opportunity for environmental sociology, as well as an obvious anomaly for human exemptionalism. Examining the human dimensions of GEC necessitates study of society–environment interactions, including a balanced examination of the impacts of humans on the environment as well as the effects of ecological constraints on human societies (Stern, 1993). Further, the range of potential societal responses to such

change (denial, adaptation, mitigation and so on) highlights the vital role of human agency in responding to ecological constraints. In fact, we must acknowledge that our original call for the abandonment of the exemptionalist paradigm tended to emphasize the importance of ecological constraints and to play down the potential of modern reflexive societies to cope with (but not escape) such constraints (Spaargaren and Mol, 1992).

REVITALIZATION OF ENVIRONMENTAL SOCIOLOGY

Given the dramatic increase in the societal salience of environmental issues – measured by environmental activism, media attention, public opinion and policy making – in the USA since the late 1980s, it is not surprising that sociological interest in these topics was also rekindled. This is apparent from a variety of indicators, including membership in the ASA Section on Environment and Technology. After bottoming out from 1983 to 1985 and increasing only slightly over the next three years, section membership grew rapidly in the late 1980s and early 1990s, reaching its peak in 1993 and levelling off to around 400 since then. The field's revitalization is also confirmed by the publication of several new texts (Cable and Cable, 1995; Cylke, 1993; Foster, 1994; Harper, 1996; Schnaiberg and Gould, 1994), an obvious indicator of growing interest among both faculty and students. Finally, the few departments offering formal graduate training in the field have experienced a sharp increase in student interest.

Most significantly, unlike the situation in the 1970s, environmental sociology is now receiving a good deal of attention internationally, as evidenced by this volume. Indeed, in the 1990s a majority of the potential texts written in English have been written by Canadians (Hannigan, 1995; Mehta and Ouellet, 1995; Murphy, 1994) and Europeans (Dickens, 1992; 1996; Goldblatt, 1996; Martell, 1994; Yearley, 1991). Recent years have also seen the formation of environmental sociology organizations in countries such as the UK and Japan, and the formation of 'environmental social science associations' in Scandinavia, Brazil and Canada. In addition, a Working Group on Environment and Society, launched within the International Sociological Association in 1990, grew rapidly and achieved research committee status in record time.[4] In short, in the 1990s environmental sociology is being institutionalized internationally along the same lines as occurred in the USA in the 1970s. This likely reflects, in part, the fact that environmental conditions are now viewed as problematic in virtually all nations, as well as being inherently global in nature (Dunlap *et al.*, 1993).

Much of this new and renewed interest in environmental issues, both in the USA and elsewhere, has taken the form of sociological analyses of societal reaction to environmental problems in the form of studies of public opinion and perceptions, environmentalism, green politics and environmental policy making (see, for example, Hannigan, 1995; Martell, 1994; Yearley, 1991). The political economy of environmental problems and sociological contributions to risk analyses, both discerned as emerging areas by Buttel (1987), have continued to attract increasing attention. While some traditional sub-areas such as housing and the built environment and social impact assessment have apparently not yet benefited much from the revitalization of sociological interest in the environment (perhaps because they are only indirectly affected by the upturn in societal interest in environmental problems), new research emphases have emerged. Most obvious in the USA has been the virtual explosion of interest in issues related to growing awareness of the pervasiveness of environmental

hazards at the local level: studies of community reaction to local hazards; the rapidly spreading NIMBY ('Not In My Back Yard') syndrome; the emergence of local, grassroots environmental groups; and the interrelated phenomena of 'environmental racism' (the location of hazards in predominantly minority areas) and the emerging 'environmental justice' movement among minorities.[5]

In addition to the wide range of work noted above, the revitalization of environmental sociology is particularly apparent from a recent spate of publications self-consciously designed as contributions to the methodological, conceptual and theoretical 'core' of the field – something that was notably absent during the 1980s. Many of these contributions involve efforts to apply insights from traditional theoretical perspectives, ranging from symbolic interactionism to Marxism, to help understand human–environment relations, yet their authors (who are often British) frequently acknowledge the limitations imposed by the 'exemptionalist' nature of these perspectives and call for a reorientation away from our traditional disciplinary assumption that the biophysical environment is irrelevant to modern, industrialized societies (Benton, 1991; Dickens, 1992, 1996; Goldblatt, 1996; Jones, 1990; Murphy, 1994; Weigert, 1991). In addition to these efforts at 'greening' sociological theory, renewed attention is also being paid to conceptual and methodological issues involved in examining society–environment interactions, primarily by empirically oriented American scholars (Freudenburg and Gramling, 1993; Gramling and Freudenburg, 1996; Freudenburg *et al.*, 1995; Kroll-Smith and Couch, 1991; Kroll-Smith *et al.*, 1996). The eventual merging of these theoretical and empirical efforts promises to yield important advances in understanding the nature of society–environment relations.

In sum, although most of the 1980s, the so-called 'Decade of Greed', was a difficult time for environmental sociology in the USA, recent years have seen a dramatic resurgence of interest in the field and signs of its intellectual revitalization. Despite Reagan-era efforts to define environmental conditions as non-problematic, they continued to worsen and their significant impacts on humans became increasingly apparent. In other words, real-world conditions (and, of course, societal attention to them) seem to have stimulated renewed sociological attention to the environment (see, for example, Foster, 1994: 8).

CHARACTERISTICS OF AMERICAN ENVIRONMENTAL SOCIOLOGY

While environmental sociology may have emerged in the USA, it has now taken root throughout much of the world. This raises the question of whether American environmental sociology retains any distinct characteristics. It appears to us that in addition to – and often as a result of – its longer history, American environmental sociology has some unique features. We highlight them via a comparison of apparent strengths and weaknesses of the field in the USA relative to the situation in Europe, particularly the UK, where environmental sociology seems to be flourishing.

Empirical Orientation

As is true of the larger discipline in the USA, American environmental sociology has a strong empirical orientation. Whether one traces its roots to research on natural resources or to studies of the emergence of environmentalism, one finds large bodies of empirical studies.

In terms of the latter, for example, there are careful longitudinal analyses both of the evolution of public attitudes towards environmental issues and of membership in national environmental organizations (Dunlap and Mertig, 1992). Scores of studies of the social bases of support for various forms of environmentalism reveal that, although members of major national organizations such as the Sierra Club tend to be above average in socioeconomic status, the charge of 'environmental elitism' does not fit either the memberships of local, grassroots organizations or public support for environmental protection, which is widely distributed among social strata (Morrison and Dunlap, 1986). In short, American environmental sociology has produced a wealth of information on the nature, sources and evolution of societal concern with environmental problems.

The empirical orientation is also obvious from the body of knowledge that has accumulated concerning the sociocultural factors that influence both energy consumption and conservation (Lutzenhiser, 1993). Similarly, the rush to develop domestic sources of energy such as coal in the 1970s led to numerous studies of the social impacts of rapid growth in western US 'energy boomtowns' and findings useful for predicting the effects of rapid growth in rural areas regardless of its source (Freudenburg and Jones, 1991). Another body of research suggests that environmentally hazardous facilities such as landfills tend to be located disproportionately in lower-income and especially minorities communities, leading to charges of 'environmental racism' and pleas for 'environmental justice' (Bryant and Mohai, 1992). The validity and generalizability of this claim have recently been challenged (Oakes *et al.*, 1996) but, despite the politically charged nature of the debate, I expect that it will eventually be settled via additional and more carefully designed empirical work.

Systematic empirical research has also documented that community impacts of man-made or 'technological' disasters (such as leakage from a toxic waste site) tend to differ dramatically from those of 'natural' disasters such as floods, earthquakes and hurricanes: whereas the latter stimulate a cooperative, 'therapeutic' community, the former tend to generate controversy, conflict and community fragmentation (Couch and Kroll-Smith, 1991). More recently, researchers have discerned differing reactions to proposals to locate potentially hazardous facilities from those to discoveries of already existing hazards within communities. While siting proposals often lead to a fairly unified 'NIMBY' reaction, discoveries of hazards tend to produce great conflict (Couch and Kroll-Smith, 1994).

This small sampling of empirical research (see Dunlap and Michelson, 1997, for reviews of additional research emphases) demonstrates that American environmental sociologists have developed a range of empirical generalizations that are proving to have considerable validity and reliability as well as policy relevance. Their work involves both a 'sociology of environmental issues' (for example, studies of environmental attitudes) and an 'environmental sociology' that examines the relations between social variables (such as race and socioeconomic status) and environmental variables (such as levels of pollution). In fact, now that it is no longer difficult to justify incorporating environmental variables into sociological research (Gramling and Freudenburg, 1996) and given the difficulty at times in distinguishing between social and physical phenomena (Buttel, 1996; Redclift, 1996), this distinction seems to have lost its utility. Thus we agree with Buttel (1987) that we should treat environmental sociology as consisting of the body of sociological work being conducted on environmental topics.

Cautious Constructionism

Related to American environmental sociologists' strong empirical orientation is their tendency to avoid the strong or strict social–constructionist perspective that has evolved over the past quarter-century in social problems theory and the sociology of science[6] and that was given additional impetus by the emergence of postmodernism. This view 'asserts that the environment (and our relations with it) is a purely social construction' in that 'it is simply a product of language, discourse and power-plays' (Dickens, 1996: 71). As a consequence, strong constructionism 'denies the importance of nature as an object external to human experience' (ibid.: 73). Such a perspective eschews the possibility of examining society–environment relations, since it acknowledges nothing (at least nothing knowable) external to human society, and thereby suggests a very restricted role for sociological analyses of environmental problems.[7]

A strong constructionist orientation, typically derived from the sociology of science and postmodernist discourse analysis, has been quite influential among European environmental sociologists and clearly offers important insights (see, for example, McNaughton and Urry, 1995; Wynne, 1994).[8] Yet, thus far, strong constructionism seems to have had less appeal to Americans. Greider and Garkovich's (1994: 5) recent call for environmental sociologists to move 'away from an increasingly dominant focus on the world that is there' towards a 'focus on how humans actors creatively use culture as a resource to construct symbols and meanings that define nature, the environment and human–environment relationships' has thus far generated little enthusiasm. More telling, perhaps, was Buttel's disavowal of his apparent endorsement of a strong constructionist perspective (most notable in Taylor and Buttel, 1992) shortly after it was challenged (in an early version of Dunlap and Catton, 1994a; see also Murphy, 1994): 'Neither a "strong program" dissection of environmental knowledge nor a gratuitous postmodernist cultural sociology of environmental beliefs will or should change the reality of global environmental problems' (Buttel, 1993: 10).

In contrast, weaker forms of constructionism that analyse the important roles played by various actors such as activists, scientists and policy makers in generating societal recognition and definition of environmental conditions as 'problems' – without denying the objective existence of such problems or the possibility of discerning the relative validity of competing claims about them – have been widely used in the USA. In fact, a great deal of American environmental sociologists' work has focused on the activities of various 'claims makers' (environmentalists, industrialists and so on), the manner in which their competing claims about the environment are received by the public and policy makers, and the resulting dynamics of environmental issues in the policy arena (see, for example, Albrecht, 1975; Dietz *et al.*, 1989; Schoenfeld *et al.*, 1979). Typically, however, these analyses assume (and at times assert) the objective existence of environmental problems, rather than treating them as mere social constructions. Even Canadian John Hannigan (1995: 3), the author of an excellent book-length explication of the utility of a social constructivist approach to environmental sociology, disavows 'an extreme constructionist position which insists that the global ensemble of problems is purely a creation of the media (or science or ecological activists) with little basis in objective conditions'.

I am not trying to portray American scholars as naive objectivists (or as all of one mind in such matters). Indeed, recent cutting-edge efforts to understand the complexities of society–environment interactions explicitly combine consideration of the material/biophysical and

symbolic/sociocultural dimensions of environmental issues in innovative ways that reveal the influences of both (for example, Freudenburg and Gramling, 1994; Freudenburg *et al.*, 1995; Couch and Kroll-Smith, 1994; Kroll-Smith and Couch, 1991; Kroll-Smith *et al.*, 1996). I do, however, think it is a strength of American environmental sociology that it has clearly not limited itself to treating the environment solely or even primarily as a social construction.

The influence of Americans' scepticism regarding the merits of a strong constructionist orientation, as well as their empirical orientation, has become apparent in recent work on GEC. While Americans (Mazur and Lee, 1993) and Canadians (Ungar, 1992, 1995) have conducted a variety of constructionist-based analyses of various aspects of GEC, they have seldom offered 'deconstructions' of the concept as the latest environmental ideology *à la* Taylor and Buttel (1992). More importantly, such work has been complemented by empirical analyses of the social roots of tropical deforestation and greenhouse gas emissions (for example, Lutzenhiser and Hackett, 1993; Grimes and Roberts, 1993; Rudel with Horowitz, 1993). In contrast, most of the sociological work on GEC being conducted in Europe seems confined to theoretical analyses and investigations of the roles of various claims makers (especially environmentalists and scientists) in GEC policy debates (for a nice overview of UK work on GEC, see Redclift and Benton, 1994).

Insular and Atheoretical

While I think the cautious constructionism and empirical orientation of environmental sociology in the USA has been beneficial, this is less the case with two other interrelated characteristics that have been attributed to the field: that it has remained isolated from the larger discipline and, in part as a result, that it remains highly atheoretical (Buttel, 1987, 1996; Spaargaren and Mol, 1992). Both charges have some merit and I think they stem partially from unique aspects of the American situation.

First, regarding the presumed insularity, the lack of an 'intellectual core' within American sociology is frequently noted, and the growth of numerous specializations has led to what some term the 'Balkanization' of the discipline (Buttel, 1987). Given this, we wonder whether environmental sociology is truly more insular than many other (especially the newer) specialities in the American Sociological Association. If the field is indeed more insular in the USA than in other nations, this may stem from its earlier emergence in an era of sociological neglect of environmental issues and consequent scepticism of their relevance (they were seen as 'faddish') as well as the hostile societal situation during the 1980s. In such circumstances it is perhaps not surprising that environmental sociologists felt more comfortable, despite their differences, talking to one another rather than to the larger discipline. In contrast, by the time the field 'took off' abroad, perhaps acid rain, ozone depletion, toxic contamination and so on had made the significance of the 'ecological problématique' obvious to society (as suggested by the enormous attention accorded to the Brundtland Report) and, therefore, to the social sciences as well as funding bodies.

In terms of lack of theoretical development, a similar phenomenon may have operated along with the obvious preference for empirical over theoretical work among American sociologists. In the 1970s, leading American sociologists and influential theorists either ignored environmental issues or, as previously noted in the cases of Bell, Nisbet and Lipset, dismissed their significance (admittedly in part because of the overemphasis on 'limits to

growth' at the time). In contrast, a decade later, leading European theorists such as Giddens, Luhmann, Beck and Touraine recognized the vital role of environmental issues and problems and began to assign them key roles in their theoretical schemas. Indeed, ecological matters have now become a central aspect of European theorizing on the nature of modernization, leading Mol (1995: 23) to argue that 'the environment has moved from the periphery to the centre of sociological attention and is now acknowledged as a major factor in triggering institutional transformations'. Interestingly, however, leading American theorists such as Jeffrey Alexander have not yet tackled the environmental question.

Finally, Catton's and my own call (1978, 1980) for a paradigmatic revolution has been criticized for contributing to environmental sociology's failure to engage the larger discipline (Spaargaren and Mol, 1992). To the extent that our plea for shedding the exemptionalist blinkers of mainstream sociology in lieu of a more ecological paradigm admittedly played down the continuing importance of sociological theories for providing insight into environmental issues, I must plead guilty. However, besides being sceptical of having had that much influence, I note that several theoretically insightful analyses building upon mainstream political economy perspectives – Schnaiberg's (1980) analysis of the 'treadmill of production', Buttel's (1985) examination of environmental regulation via theories of the state and O'Connor's (1988) explication of environmental problems as the 'second contradiction' of capitalism – have failed to attract attention from scholars outside environmental sociology. Thus, once again, we face the ironic possibility (given the early emergence of environmental sociology in the USA) that American sociology in general has been an infertile field for the growth of environmental sociology. Perhaps unique characteristics of the American experience, especially resource abundance and rapid growth (Potter, 1954), continue to make the notion that human societies are free from ecological constraints particularly appealing in the USA.

In sum, environmental sociology in the USA has both strengths and weaknesses. In terms of the latter, I suspect that the increasing internationalization of sociological interest in environmental matters (both by self-identified environmental sociologists and by leading theorists), along with the globalization of environmental problems, will inevitably overcome the presumed insularity of American environmental sociology. I also think that the marriage of the strong empirical orientation apparent in the USA with the stronger theoretical orientation of our colleagues in Europe and elsewhere augurs well for the future of the field.

CONCLUDING OBSERVATIONS

I conclude by assessing the current standing of sociological interest in environmental issues relative to Catton's and my original call for the development of environmental sociology as a distinct area of specialization and for adoption of an ecological paradigm to guide it. In terms of the former, it is obvious that, despite some ups and downs, environmental sociology has established itself as a viable area of specialization, not only in the USA but throughout much of the world. Indeed, it has become institutionalized at the international level. Moreover, at least in Europe, environmental issues have begun to receive considerable attention and are increasingly assigned theoretical import in the larger discipline. Overall, our hope for increased sociological attention to the environment has been exceeded.

Our plea for replacing the discipline's human exemptionalism paradigm with an ecological one is more difficult to assess, in part because it was inherently more ambiguous as well

as provocative. One's assessment clearly depends upon one's interpretation of our call for a paradigmatic shift, which in turn is heavily influenced by one's conception of 'paradigm'. It appears to me that there are at least three possibilities (see, for example, various chapters in Mehta and Ouellet, 1995). I label them the 'strong', 'moderate' and 'weak' interpretations, reflecting differing levels of expectation for the utility of an ecological, versus exemptionalist, perspective.

The *strong* interpretation, used by our critics, treats paradigms as essentially synonymous with theories and thereby criticizes our formulation of the 'new ecological paradigm' (NEP) as lacking sufficient specificity to lead to testable hypotheses (Buttel, 1978, 1987, 1996). Our response was, and remains, that our depictions of both the dominant exemptionalist paradigm and our proposed ecological alternative represent sets of broad background assumptions (or world views) that influence the kinds of issues that are seen as appropriate for sociological scholarship, and were never intended to be logically interrelated sets of propositions from which testable hypotheses can be deduced (Catton and Dunlap, 1980; Dunlap and Catton, 1994b). We made ourselves vulnerable to this charge by de-emphasizing the obvious diversity and continuing utility of sociological theories (see, for example, Sunderlin, 1995) while emphasizing the hegemonic nature of their shared exemptionalism, and by vaguely (and somewhat over-zealously) implying that the NEP might supplant them. We subsequently noted that we expected the NEP *not* to replace Marxist, Weberian or other perspectives, but to stimulate development of more ecologically sensitive or 'greener' versions of them, which is precisely what is being done with Marxist (Benton, 1996; Dickens, 1992) Weberian (Murphy, 1994) and symbolic interactionist (Weigert, 1991) theories. Nonetheless, because we apparently created unrealistic expectations concerning the NEP's utility in guiding empirical research, it continues to receive criticism (Buttel, 1996; Spaargaren and Mol, 1992).

The *weak* interpretation of our argument would be that we were calling for sociology to shed the blinkers we labelled the 'human exemptionalism paradigm' (HEP) in order to recognize the significance of environmental problems. Judged by this criterion, our argument has fared much better. Our portrayal of sociology's exemptionalist orientation seems to have resonated with a number of previously cited colleagues whose efforts to 'green' one or more theoretical perspectives represent (in our view) reasonable operationalizations of our plea to adopt an ecological perspective, and Vaillancourt (1995) even discerns the emergence of 'ecosociology'. Other theorists have come to compatible conclusions regarding the degree to which sociological traditions have inhibited serious concern with environmental issues (for example, Beck, 1995: ch. 10; Goldblatt, 1996; Redclift and Woodgate, 1994).

Far more important, however, is the growing attention to environmental issues within the larger discipline, particularly in theoretical efforts to understand modernization and postmodernity (Mol, 1995). While obviously a response to the increased salience of ecological conditions throughout society, the attention being given to ideas such as the 'risk society' challenges Buttel's gloomy assessment of a decade ago. While it is likely that sociology 'has handily withstood the challenges to its theoretical assumptions posed by environmental sociologists' (Buttel, 1987: 366), it has apparently been less able to withstand the challenges posed by the heightened visibility of environmental degradation. One need only compare current theorising on postmodernization with the modernization theories of two or three decades ago (see Hannigan, 1995: 9–10) to see the declining credibility of exemptionalism in our discipline.

The *moderate* interpretation of our argument is that we were trying to justify incorporation of environmental variables or 'non-social facts' into sociological analyses, something that our exemptionalist traditions prohibited.[9] Like Gramling and Freudenburg (1996) I think that this has clearly been accomplished via numerous empirical investigations by environmental sociologists, such as the studies of communities' experiences with toxic wastes and minorities' exposure to environmental hazards, cited above. And, I hasten to add, analyses of society–environment interactions have clearly been enriched (albeit often complicated) by enhanced awareness of the sociocultural and symbolic meanings attached to various aspects of the environment emphasized by those with a constructionist bent. It is only when a strong constructionist orientation leads to dismissal of the possibility of studying human interaction with the environment that sociologists remain within the confines of the exemptionalist premise that the physical environment is irrelevant to modern humans.

In conclusion, while it has a long way to go, I think sociology has made considerable progress towards recognizing the importance of the ecological dimension of human existence during the past two decades. If the trend continues, I suspect that analyses of ecological matters – both empirical and theoretical – may eventually become so common among sociologists that there will no longer be a need for an 'environmental sociology' per se. This would represent the ultimate demise of human exemptionalism in our discipline.

NOTES

1. We originally labelled the dominant disciplinary perspective the 'human *exceptionalist* paradigm', but subsequently shifted to the 'human *exemptionalist* paradigm' to acknowledge that we were not questioning that homo sapiens possessed 'exceptional' characteristics, but only that these characteristics 'exempted' our species from ecological constraints. Likewise, we revised the call for a 'new *environmental* paradigm' to that for a 'new *ecological* paradigm' (Dunlap and Catton, 1979; Catton and Dunlap, 1980). For an update of the HEP–NEP argument, see Dunlap and Catton (1994b).
2. This section will draw heavily on Dunlap and Catton (1994a). We are using 'American' in the narrow sense of applying to the United States. While there are many similarities between environmental sociology in Canada and the USA, we do not purport to describe the development of the field in Canada. For insight into the Canadian situation, see Mehta and Ouellet (1995), particularly the chapter by Vaillancourt (1995).
3. The growing importance of technological accidents and hazards, along with recognition of the technological component inherent in most environmental problems, led the ASA Section to change its name to 'Section on Environment and Technology' in 1988, parallel to the SSSP Division's 1983 change to 'Division on Environment and Technology'.
4. This was accomplished by a merger with the existing Research Committee on Social Ecology.
5. See, for example, the special issue of *Social Problems* (February 1993) devoted to 'environmental justice', the special issue of *Sociological Spectrum* (January–March 1993) devoted to 'New Directions in Hazard, Risk and Disaster Research' and the special issue of *Sociological Perspectives* (Summer 1996) devoted to 'Environmental Conflicts'.
6. Yearley (1991) offers a rare usage of both perspectives. Both are variously labelled 'constructivist' and 'constructionist' and we treat the two labels as synonymous.
7. Space constraints prevent us from discussing the growing debate over the relative strengths and weaknesses of the constructionist/relativist versus objectivist/realist perspectives on environmental problems, so we refer interested readers to Buttel (1996), Dickens (1996: ch. 3), Dunlap and Catton (1994a), Greider and Garkovich (1994), McNaughton and Urry (1995) and Murphy (1994) for various perspectives on it within environmental sociology, and to Soper (1995) for a broader-ranging analysis of the two views. For useful efforts to move beyond the debate, see Rosa's (forthcoming) discussion of risk and Redclift's (1996) discussion of sustainable development..
8. Ironically, however, British 'realists' such as Benton (1993) and Dickens (1996) have been among its most vocal critics.
9. An indication of the strength of this 'taboo' at the time we were writing can be seen in debates over the

appropriateness of employing environmental variables in sociological analyses of agriculture (Dunlap and Martin, 1983).

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2. Social institutions and environmental change

Frederick H. Buttel

INTRODUCTION

Many environmental sociologists think of their scholarly speciality as being the study of social institutions and environmental change. But while the analysis of social institutions and environmental change could in some sense be said to encompass the whole of environmental sociology, the purpose of this chapter will be to examine institutional aspects of environmental change in a more specific and focused way. Our emphasis here will be on some of the major issues, particularly within North American environmental sociology, concerning the role of political–economic and sociocultural institutions in shaping environmental degradation and change.

The notion of 'institution' is one of the most common sociological concepts, but the notion is so commonplace in sociology, and so much a part of ordinary language, that it is often used in a vague or imprecise way. In this chapter we understand institution to refer to specific or special clusters of norms and relationships that channel behaviour so as to meet some human physical, psychological or social need such as consumption, governance and protection, primordial bonding and human meaning, human faith, and socialization and learning. Thus we may speak of economic, political, family, religious and educational institutions – the five institutional complexes of societies that are generally regarded by sociologists as being most important.

While institutions and institutional processes are analytically distinct with respect to one another, and tend to exhibit some autonomy or specialization, institutions of a society are also interrelated (or, to be more precise, people through their role(s) within one institution relate to social actors in other institutions). Among the most important kinds of institutional interrelations studied by sociologists are those of influence or dominance: the matter of which institutions are the predominant ones that affect or shape other institutions, and the processes, conditions or factors that determine the pattern of influence or dominance. Much of the classical tradition of social theory involved elaborating notions of which of society's institutions tend to be predominant (for example, Marx's emphasis on the determinate role of the economy or mode of production, in contrast with Durkheim's on culture, collective conscience and the normative sphere). Likewise, many of the most important debates and research programmes in environmental sociology are those that relate to establishing which social institutions are most crucial in terms of relationships to biophysical environments and environmental changes. In the nearly 25 years since environmental sociology was first established, debates and research in the field have tended to focus on the relations of three master institutions – economic, political and cultural systems – to environmental change. In this chapter I will give primary attention to these three important institutional complexes. In

so doing I will discuss three master institutional issues relating to environmental change: what are the environmental implications of economic institutions and economic expansion; are there limits to growth, or do growth and development provide the capacity to solve environmental problems; and what is the fundamental nature of ecological movements and environmental activism? But before proceeding to these tasks, it is necessary to explore the issue of how sociologists conceptualize the environment and environmental change.

ENVIRONMENTAL SOCIOLOGY AND ENVIRONMENTAL CHANGE

Environmental sociology as a sub-discipline of sociology was essentially founded in the immediate aftermath of the mobilization of the modern environmental movement. Most of the early generation of environmental sociologists, and a large share of subsequent cohorts, have been people with strong pro-environmental commitments. Thus it is not surprising that members of this sub-discipline are pretty much united by the notion that the environment matters to homo sapiens and to social life. Many environmental sociologists feel so strongly about the importance of the biophysical environment that they see the ultimate role of environmental sociology being, not only the overhaul of sociology and of social theory as a whole, in the direction of greater recognition of the primacy of biophysical factors in social life, but also a significant contribution to the cause of environmentalism (Catton and Dunlap, 1978; Dunlap and Catton, 1994; Murphy, 1994).

Given the strength of these convictions about the important status of the environment in social life, environmental change might seem to be a straightforward or unproblematic matter (for example, that of environmental degradation or 'environmental problems'). However, many of the most important issues in the study of institutions and environment involve definite assumptions – often quite divergent and contested ones – as to how the environment and environmental change should be conceptualized. Five of the most important issues concerning the conceptualization of environments and environmental change will be briefly noted here.[1]

The first issue relates to the observation, made above, that many environmental sociologists feel very strongly that environmental sociology can and must strive for nothing less than revolutionizing the way that sociologists conceptualize the social world and the processes that shape societies. These sociologists grant that their mainstream sociological colleagues can (and sometimes do: see, for example, Giddens, 1994) recognize the existence and the importance of environmentally related phenomena (such as ecology movements) or even do serious research on the way social factors shape environmental problems. This mainstream sociological posture, however, remains consistent with the classical tradition, for example the injunction by Durkheim to stress 'social facts' as explanatory variables and to de-emphasize psychological and biological factors. But from the earliest days of the sub-discipline many environmental sociologists have argued that rejection of the radical sociologism of the 'social facts paradigm' must be the hallmark of environmental sociology (for example, Catton and Dunlap, 1978; Dunlap and Catton, 1979). In this view, what concretely distinguishes environmental sociology from mainstream sociology is that the former recognizes that biophysical, as well as purely social, variables affect social structure and social change, while the latter does not.

While this agnostic or antagonistic posture towards the classical tradition retains many adherents to this day, it could be fairly said that the bulk of environmental sociological

research draws substantially from, and very seldom argues for a rejection of, sociological schemas that give primacy to social variables (Buttel, 1987, 1996). Further, as suggested by Dickens (1992), while the injunction to incorporate biophysical variables as causal factors makes intuitive sense at a metatheoretical level, it has proved to be more difficult to bring this proposition to bear at a more straightforward theoretical and propositional level. Probably the majority of environmental sociologists today find value in examining biophysical explanatory factors, while not necessarily seeing inquiry that privileges biophysical explanatory variables as representing a more genuine or superior form of environmental sociology.

A second issue in the conceptualization of environments and environmental change concerns the matter of whether and how it is appropriate to conceptualize the biophysical environment in social–psychological, symbolic, social–constructionist or perceptual terms, as opposed to an objectivist or highly material sense of the environment as a source of resources, a set of systems that provide ecosystem services and sites of human habitation (compare Hannigan, 1995 and Yearley, 1996, with Dunlap and Catton, 1994). As will be stressed shortly in this section, this issue has come to the fore primarily (and perhaps unfortunately) as a result of debates relating to global climate change.

A third key issue relating to environmental change concerns the most appropriate or useful scale or unit of analysis of environmental change for theory and research. The conventional unit of social analysis is the society or nation, and much of environmental sociology (for example, Schnaiberg and Gould, 1994) explicitly or implicitly employs society and the societal environment as the units of analysis. At the same time, it is widely recognized that ecosystems and environmental features do not coincide with political boundaries, and that the reciprocal impacts of social processes and environment occur at a variety of levels, from the local or regional to the global. These observations about units of analysis, and especially about the notion that social analysis will need to take a range of spatial units of analysis into account, are mostly uncontroversial. What has made the issue of the spatial scope of environmental change so contentious, however, is rival views on the matter of global climate and environmental change.

Virtually all observers of the most recent stage of environmental mobilization across the world recognize that it has been anchored in research data on and scientific claims about 'global change' (the master dimension or component of which is global warming, though the notion also subsumes phenomena such as stratospheric ozone depletion, tropical deforestation, desertification, land degradation and loss of biodiversity). Many sociologists (and other environmental scientists and environmentally inclined groups and individuals) see global change, particularly global warming, as a profound and distinctive phenomenon which over the long term will have singular implications for societies across the world (for example, Murphy, 1994). Further, there are strong associated convictions that the importance of global warming requires the harnessing of environmental sociology to help build scientific, public and political/policy support for addressing the climate change issue (Dunlap and Catton, 1994).

Other environmental sociologists, however, are less willing to accord such unique importance to global warming, or to see the notion of the global environment as being a 'scientific' rather than a socially shaped construct. Some environmental sociologists, for example, contend that the significance of global warming lies as much or more in its contemporary role as an environmental movement ideology and symbol (Mol and Spaargaren, 1993) as in its long-term implications for social change. Still other sociologists suggest that seeing the

essence of our most pressing environmental problems as being their global (versus regional or local) nature or incidence is somewhat arbitrary; it is argued that privileging the 'globalness' of environmental problems could have the impact of obscuring the (largely local or regional) processes by which humans and societies are affected by environmental changes (Taylor and Buttel, 1992; Yearley, 1996; see Redclift and Benton, 1994, for rival views on this issue).

The fourth key issue in the conceptualization of environmental change concerns the fact that the most influential theoretical perspectives in North American environmental sociology have tended to reflect a relatively singular conception of the environment. That is, 'the environment', even if it is acknowledged to be multidimensional and a highly complex system, is nonetheless seen in some ultimate sense as having some upper bound of (long-term, sustainable) human carrying capacity, as being essentially or ultimately finite and as having an underlying 'unity' (a particularly explicit expression of which is in Ophuls, 1977). While a particular region can exceed its carrying capacity by appropriating raw materials and ecosystem services from elsewhere (including 'deficit ghost acreage' over time: Catton, 1994), at a higher level of analysis the human community and global society cannot escape the carrying capacity limits of the biosphere. Thus this singular conception of the environment ultimately presupposes a macro (particularly a global) level of analysis. And the notion of the singularity of the environment has been reinforced in recent years as a result of the widespread attention given to global environmental change and global warming; global environmental change and global warming carry the ultimate expression of the biophysical environment as an underlying global biospheric and atmospheric system, the degradation of which will have consequences for all peoples on the earth.

Such singular conceptions of the environment, however, may be problematic in their application to concrete empirical research. This is particularly the case when that research is sub-national in scope or focuses on ecological systems that are spatially diverse or unevenly affected by human activities.[2] To take an agricultural example, we may agree that there is validity to the notion that there are some definite global constraints or limits on the size of the human population that can be supplied with food, or on the extent to which the world's people can be supplied with diets based on animal sources of protein. Even so, empirical inquiry into the ecological constraints on, and consequences of, agriculture at a sub-national level will not find this notion of global carrying capacity to be a very comprehensive source of hypotheses about the ecology of agriculture and food. Agro-ecosystems are highly variable across space, and the global agro-food system is fundamentally a mosaic of multifold ecosystems and diverse modes of production and distribution. These singular–unitary versus plural or regionally variegated conceptions of the environment obviously both contain an element of truth. Neither warrants being exclusively privileged in theory, as is illustrated by the fact that an exclusive emphasis on one or another is often difficult to sustain in empirical research.

A final issue regarding the conceptualization of environmental change is one that has just begun to emerge. Since the founding of environmental sociology in the early 1970s, there has been an implicit consensus that its core mission was to account for processes of environmental degradation. Thus, while mainstream sociology was seen to be 'fiddling' – seeing the environment as irrelevant to understanding society while all around us serious environmental destruction was proceeding apace – environmental sociologists tended in the opposite direction. Environmental sociology's most influential theories were those that demonstrated how modern social institutions contained intrinsic dynamics towards environ-

mental degradation. 'Environmental change' thus came to be seen as being virtually coterminous with environmental destruction. It must be recognized, however, that it is logically the case that social processes could involve (as either cause or effect) changes in the environment that are positive or neutral with respect to the 'quality' of the environment. Further, there is growing recognition, even among ecologists and environmental scientists (Botkin, 1990; Cronon, 1995), that environmental quality is highly multidimensional and that environmental change should not be seen as a unilinear construct of 'quality' in a straightforward biophysical sense. Thus there is now some appreciation, albeit at a relatively elementary level (for example, Buttel, 1996), of the fact that environmental sociology must diversify its conception of the environment beyond the processes of scarcity and degradation. The ecological modernization perspective (Spaargaren and Mol, 1992; Mol and Spaargaren, 1993; Mol, 1995) has shown particular promise in being able to conceptualize processes of environmental improvement at the macrosocial, political and organizational levels.

SOCIOLOGICAL MODELS OF ENVIRONMENTAL DEGRADATION: THE MATERIALIST TRADITIONS OF NORTH AMERICAN ENVIRONMENTAL SOCIOLOGY

Environmental sociology is in some sense a materialist critique of mainstream sociology. Environmental sociology's agenda is, in part, to demonstrate that the biophysical environment matters in social life and that ostensibly social processes such as power relations and cultural systems have an underlying material basis or substratum. Environmental sociology has thus long been anchored in a conception of the material embeddedness of social life. Not surprisingly, the earliest pioneers of the sub-discipline (for example, scholars such as Fred Cottrell and Walter Firey, who were trailblazers in the area decades before environmental sociology became a recognized sub-discipline) worked on topics such as the role of energy sources and converters in shaping social structure, and the interaction of culture and social structure in shaping conservation policies and practices. From the early 1970s to the present, the most influential components of the environmental sociology literature have remained those originally contributed by Riley Dunlap and William Catton and by Allan Schnaiberg, both of which are materialist accounts of the institutional tendencies to environmental degradation and destruction in modern industrial capitalist societies. But despite the common commitments to materialist explanations of environmental degradation, their conceptions of the institutional processes that generate environmental destruction are quite distinct. Dunlap and Catton stress cultural institutions,[3] while Schnaiberg stresses the role of capitalist relations and the nature of modern state institutions.

Dunlap and Catton's environmental sociology (Catton, 1976, 1980, 1994; Catton and Dunlap, 1978; Dunlap and Catton, 1994) is built around several interrelated notions: (1) environmental problems and the inability of conventional sociology to address these problems stem from world views (the dominant western world view in society at large, and the related human exemptionalist paradigm in sociology) that fail to acknowledge the biophysical bases of social structure and social life, or that see social structures and actors as being exempt from the laws of nature; (2) the dominant western world view has permeated the entire ensemble of societal institutions and has led to widespread institutional norms of

growth, expansion and confidence in indefinite material progress; (3) modern societies are unsustainable because they are living off what are essentially finite supplies of fossil fuels (what Catton, 1976, 1994, has called 'ghost acreage') and are using up 'ecosystem services' much faster than ecosystems can produce or replenish them; at a global level these processes are being exacerbated by rapid population growth; (4) societies are to a greater or lesser degree faced with the prospect of ecological vulnerability, if not ecosystemic 'crash', particularly on account of the exacerbation of global environmental problems; (5) modern environmental science has amply documented the severity of these environmental problems and is making it clear that major adjustments and adaptations will need to be undertaken if environmental crisis is to be averted; (6) recognition of the dimensions of looming environmental crisis is contributing to 'paradigm shifts' in society at large as well as in sociology (towards rejection of the dominant western world view and acceptance of a new ecological or environmental paradigm); and (7) environmental improvement and reform will be engendered through the spread of the new ecological paradigm among mass publics, and will be catalysed by comparable paradigm shifts among social (and natural) scientists.

Schnaiberg's (Schnaiberg, 1980; Schnaiberg and Gould, 1994; Gould *et al.*, 1996) environmental sociology, by contrast, is centred around two key notions: that of 'treadmill of production', and that this treadmill tends to result in environmental degradation (through 'withdrawals', that is, scarcity of energy and materials, and 'additions', that is, pollution). The treadmill of production concept has strong commonalities with the notions of fiscal crisis and the accumulation and legitimization functions of the state developed by O'Connor (1973). The treadmill of production notion holds that modern capitalism and the modern state exhibit a fundamental logic of promoting economic growth and private capital accumulation (along with a parallel imperative of devoting resources to 'legitimation') and that the self-reproducing nature of these processes causes them to assume the character of a 'treadmill'.

According to Schnaiberg, the tendency to growth is due in part to the competitive character of capitalism, which is such that corporations and entrepreneurs must continually expand their operations and their profits lest they be swamped by other competitors. But there is also an analytically distinct, but complementary, growth logic within the sphere of the state. State agencies and officials prefer growth over stagnation in order to ensure tax revenues (the essential fiscal basis of the state) and to enhance the likelihood of re-election, or the continuity or span of power. In order to enhance private accumulation, the state undertakes spending aimed at subsidizing or socializing the costs of private production and accumulation (for example, through public subsidy of R&D, transport infrastructure, military procurement and tax incentives). The accumulation that is fostered tends to be capital-intensive and thus leads to automation, unemployment and potentially to demands for job creation or welfare state-type programmes on the part of those displaced or marginalized by capital-intensive accumulation. This tendency to legitimation crisis in turn dictates that progressively more subsidy to private capital accumulation be undertaken in order to provide employment and state revenues sufficient for paying the 'social expenses' associated with the dislocations of private accumulation. The fact that capital-intensive growth creates the dislocations and political demands that undergird even more state expenditure on and encouragement of capital-intensive growth is the essence of the treadmill character of modern industrial capitalism. Further, and of most importance to environmental sociology, Schnaiberg argues that the treadmill of production is directly linked to ecological crisis,

since this accumulation process requires resource extraction ('withdrawals') and contributes to pollution ('additions').[4]

GROWTH MACHINES AND TREADMILLS: THE LIMITS OF GENERALIZATION

Schnaiberg's notion of the treadmill of production stands today as a significant synthesis of what had previously been unrelated literature: (1) the work of O'Connor (1973) which integrated the concepts of the accumulation and legitimation functions of the state, the monopoly/competitive sectoral structure of the economy and endemic state fiscal crisis as an expression of the contradictions of late capitalism, and (2) the 'limits to growth' and related neo-Malthusian literature. Schnaiberg's concept of the treadmill of production incorporated the growth–environmental degradation relationship specified by neo-Malthusianism – that there is some intrinsic growth–degradation relationship which over the long term cannot readily be obviated by technological or social–structural changes – while at the same time jettisoning neo-Malthusianism as the explanatory framework. While not relying on a formal Marxist logic, Schnaiberg's conceptualization of environmental degradation has some similarities to what neo-Marxists such as James O'Connor (1994) now refer to as the second contradiction of capital.[5]

Schnaiberg's treadmill notion has been very influential. His treadmill perspective, for example, has stimulated related work on the social antecedents and consequences of growth, with perhaps the most important instance being (urban) 'growth machine' theory (originally elaborated by Molotch, 1975; see also Logan and Molotch, 1987). Many observers now see the notions of treadmill of production and growth machine (or 'growth coalitions') as being essentially synonymous (for example, Cable and Cable, 1995) and employ them interchangeably to depict powerful institutional pressures towards expansion and environmental degradation from the local to the global levels. Schnaiberg and associates and others have extended the notion of the treadmill of production up to the global level and down to the local level (for example, Schnaiberg and Gould, 1994; Gould *et al.*, 1996; Cable and Cable, 1995). The general and flexible use of this and related concepts makes them an attractive framework.

This is not to suggest that Schnaiberg's concept of the treadmill of production is universally embraced. For example, Hannigan (1995: 22) has argued that Schnaiberg's (1980) notion is based 'exclusively on the logic of the capitalist system', a contention that in these days of retreat from neo-Marxism and political economy is tantamount to being a devastating criticism. This critique, however, is somewhat off target. As implied earlier, Schnaiberg's political–economic explanatory framework is a nuanced one in that, while it is anchored in propositions about the tendency to self-expansion of capital, it privileges neither the economy and class nor the state and politics. In fact, Schnaiberg's theory of the treadmill is more a theory of the role of the state than it is a theory of economic institutions per se. Schnaiberg draws heavily from the work of neo-Weberian political sociologists (for example, Robert Alford) and political scientists (for example, Charles Lindblom) and on related institutional economics arguments (for example, of Galbraith and Scitovsky) in developing his analysis of the role of states and state policies within the notion of the treadmill of production.

If anything, the most recent elaboration of the theory of the treadmill, in which Schnaiberg and colleagues seek to address simultaneously the processes of globalization and local

environmental 'resistance', demonstrates the political, rather than economic, underpinning of the theory. Schnaiberg in his joint work with Gould and Weinberg (Gould *et al.*, 1996) has begun to reconsider the treadmill of production notion within the context of globalization and the transition to post-Fordism. The authors' argument is essentially that, as the mobility of financial and industrial capital has increased and there has been increased international competition, there has emerged a 'transnational treadmill'. In this transnational treadmill, 'transnational treadmill market actors' predominate over 'national institutions of the nation-state, and its society' (ibid.: 8). There has been an increase in the 'tilt' (that is, the pace or 'acceleration') of the treadmill. In the process, this transnational treadmill has involved an 'increase in the influence of market actors over political actors' (ibid.). But, in the authors' view, the essence of the treadmill remains political and ideological in nature: nation-states and national labour forces have not only maintained, but have demonstrably increased, their commitment to the treadmill in order to address capital mobility and international competition and restructuring. Thus, while the self-expansion of capital is a powerful force, it is ultimately dependent on state support and social consent.

At the same time that Gould *et al.* (1996) have elaborated this concept of the transnational treadmill, they have followed the lead of Cable and Cable (1995) in pointing out homologies between the notions of treadmill of production and local 'growth machine'. This equation of the treadmill of production with growth machines and coalitions, however, may well prove to be more problematic. By growth coalition, Logan and Molotch (1987) mean a coincidence of interest among spatially proximate (generally metropolitan) land-, real estate-, commercial- and tourist-related development capitals and local state officials. This coincidence of interest is focused on the expectation that each will directly or indirectly benefit from growth in public subsidies to and private investments in infrastructure, civic capital, construction and related activities that help to attract people, employers and jobs to a local area.

There are some definite commonalities between the notion of treadmill of production and growth machine, especially in terms of the role that governments and worker-citizens play in providing ideological support for private sector expansion. But it should be noted that the theory of the treadmill, even in its most recent versions, has remained focused on theorizing the antecedents and socioenvironmental consequences of capital-intensive manufacturing growth. The energy and materials 'withdrawals' and 'additions' attributed to capital-intensive industrial activity remain the major dimension of environmental destruction that is emphasized in treadmill theory. However, growth machine-type growth as theorized by Logan and Molotch refers to quite different economic activities. Convention centres, professional sports franchises, housing subdivisions, freeway construction and shopping malls are the stuff of the growth machine, while activities such as these generally lie outside the purview of the treadmill.

Schnaiberg and associates have made a persuasive case that globalization reinforces national treadmills of production. They have also pointed out some provocative parallels between treadmill and growth machine theories. These concepts are likely to remain central to environmental sociology in North America. At the same time, theory and research that can identify the degree to which the notion of the growth machine is a comprehensive concept that can be employed at a variety of levels of analysis, or whether its usage is best confined to the national state level, is an important frontier of work in the field.

LIMITS TO GROWTH AND DEMATERIALIZATION

There have been several intellectual traditions that have converged on the notion that there is an enduring contradiction between economic growth and the environment. While this notion did not arise directly from the thought of Malthus, it has been one of the core premises of much twentieth-century neo-Malthusian scholarship. Prior to Earth Day 1970 there had been published a number of neo-Malthusian and related versions of the notion that there are ecological limits to growth (for example, the works of Paul Ehrlich and Garrett Hardin). The Meadows *et al.* (1972) book, *The Limits to Growth*, which in a sense formalized the arguments of Ehrlich, Hardin and others through a global modelling exercise, had a particularly fundamental impact on the content of environmental sociology. The arguments and conclusions of *The Limits to Growth* – that exponential growth would lead to ecological collapse, even if technological solutions to resource scarcity and pollution control were assumed to be forthcoming at unprecedented rates – arguably became a widely shared domain assumption within environmental sociology. The course subsequently taken by environmental sociology was in many respects forged in dialogue or reaction to the notion of limits to growth. The work of Catton and Dunlap, for example, can be thought of as a sociologically sophisticated elaboration of *Limits*' basic thesis. Schnaiberg's work can be seen as putting some of the core ideas of *Limits* on a sounder sociological footing, primarily by excising that book's neo-Malthusian underpinning. In the 1990s, major new statements in the field of environmental sociology (for example, Murphy, 1994) continue to be rooted in this logic.

The continuing importance of issues relating to growth and environment has been due, in part, to the emergence of fresh theoretical and empirical debates on the implications of economic institutions for environmental quality. The most significant of these debates revolve around whether there is an ongoing trend towards, or clear potential for, developing meaningful solutions to environmental problems within the context of advanced capitalist development, or whether economic growth is actually good for the environment. There has been a vigorous programme of research on 'industrial ecology' (Socolow *et al.*, 1994), 'industrial metabolism' (Ayres, 1989) and 'dematerialization' (Tibbs, 1992) in which the case is made that ongoing technological changes and business practices are making it possible for manufactured goods to be produced with substantially fewer raw material, mineral and energy inputs than was the case decades ago. Some observers have begun to generalize these results by arguing that there exists a tendency towards inverted U-shaped (or 'Kuznets') curves for the relationships between per capita income and environmental attributes among nations (see Arrow *et al.*, 1995, for a discussion and critique). More sociologically, it has been found that world system position – whether a country belongs to the 'core', 'semi-periphery' or 'periphery', in Wallerstein's terminology – bears an inverted U relationship with CO_2 inefficiency (amount of CO_2 released per unit of economic output) among nations, with semi-peripheral countries having the highest inefficiency scores (Grimes *et al.*, 1993).

Related studies suggest that, while there is no intrinsic tendency for technological change and economic growth to lead to environmental conservation, technological change under stringent environmental regulatory constraints will tend to lead to environmental improvement. As Mol (1995) has stressed, the stringent environmental regulations that tend to predominate in the countries registering progress in industrial ecology are ultimately due to

the socioeconomic conditions (state regulatory capacity, social surpluses that can be captured by states to invest in regulation and private-sector capacity for rapid technological innovation) that prevail in the richest industrial democracies. The concept of 'sustainable development', which rose to prominence during the late 1980s, is based on the notion that increased material well-being can have environmental benefits in the low-income as well as high-income countries. A related literature in the advanced countries has demonstrated that environmental regulation tends to have positive effects on growth and employment (see the summary in Repetto, 1995). Thus the 1980s and 1990s have increasingly witnessed the proliferation of theory and research about how and why contemporary economic growth can be environmentally friendly, and about how and why environmental regulation can be 'growth friendly'.[6]

Does this emerging intellectual tradition serve to undermine the more standard environmental sociological view that there is some intrinsic contradiction between growth and environment? It is important in this regard to note that the evidence in support of environmental Kuznets curves is partial, and that there is some strong contrary evidence to sustain the more traditional notion of a growth–environment contradiction. It has been found, for example, that the evidence for environmental Kuznets curves exists mainly with respect to emissions of pollutants (for example, particularly ones of predominantly local relevance such as sulphur and particulates, and also CO_2), but not for resource stocks (for example, soil and forests) or global ecosystem resilience (Arrow *et al.*, 1995). Bunker's (1996) research on global trends in raw materials consumption has shown that aggregate materials consumption has tended to be a function of the growth of world income and that, in terms of aggregate consumption levels, the dematerialization thesis is misleading. Thus the relationships between growth, income and environmental parameters should be regarded as quite complex and not well captured by notions such as limits to growth or environmental Kuznets curves.

SOCIAL INSTITUTIONS AND ENVIRONMENTALISM

Environmentalism has become one of the most widely researched modern social movements. Until recently, however, this was the case not because sociologists specializing in social movements and collective behaviour found the environmental movement a particularly important or interesting movement to explore: the bulk of research on the environment movement during the 1970s and through to the mid-1980s was done by environmental sociologists, rather than by social movements specialists. These early years of research on the 'modern' (post-1968) environmental movement were dominated by survey research on public environmental attitudes, mostly conducted with little guidance from social theory. Also this literature tended to have a partisan flavour, with much of the research being done by academics and non-academics who had strong commitments in favour of – and occasionally against – it.

Over the past 10 to 15 years, however, environmental movement researchers have been drawn more from outside environmental sociology, and their research has aimed at a higher level of generality. In particular, most general theories in environmental sociology (for example, Catton and Dunlap, 1978; Dunlap and Catton, 1979; Schnaiberg and Gould, 1994; Gould *et al.*, 1996; Murphy, 1994) now place considerable emphasis on theorizing environ-

mentalism. As noted earlier, the major general theories of environment and society have tended to take the form of theorising how it is that there are pervasive, if not inexorable, tendencies for capitalist industrial development and modernization to lead to environmental degradation. Environmentalism and the environmental movement tend to be incorporated into these theories as the predominant social response to degradation and as one of the principal mechanisms by which societies can escape the contradictions of growth and environmental destruction.

More recently, the analysis of environmentalism and ecological movements has been very strongly influenced by two interrelated trends in the sociological discipline. First, there has been a general tendency over the past decade or so for neo-Marxism and related materialist perspectives to decline in persuasiveness and for various cultural, subjectivist or hermeneutic sociologies to be in ascendance. Second, many influential figures in the new cultural sociological ascendance (for example, Beck, 1992; Giddens, 1994; see also the reviews in Goldblatt, 1996; Hannigan, 1995; Martell, 1994) have come to see that environmentalism is, at least in an incipient way, one of the defining social forces in late twentieth-century societies. In particular, 'ecology' is now commonly regarded as the prototypical 'new social movement' (see the summary of this tradition in Scott, 1990). New social movements (NSM) theories have posited that ecology and related movements (feminism, peace) involve, embody or reflect new structural patterns in modern (or 'postmodern' or 'post-Fordist') societies. New social movements have become new vehicles of expression and self-identification on the one hand, and/or are filling the political vacuum caused by the decline of traditional foci of political activism and interest aggregation (especially political parties and corporatist arrangements) on the other. Thus, while there are differences between materialist/environmental sociological and cultural sociological views of the environmental movement, they do converge on the notion that the movement is becoming one of the principal axes of the cultural politics and institutions of the advanced societies (for example, Lash *et al.*, 1996).[7]

Given the general agreement that environmentalism is an ascendant social force, the bulk of work in the field has been directly or indirectly aimed at understanding what are the factors in society and its environment that have contributed to this outcome. Three basic perspectives from the environmental sociology and related literature have been advanced. One influential tradition is that pioneered by Riley Dunlap and colleagues (for example, Dunlap and Van Liere, 1984). They argue that, as industrial society developed over the past several centuries, this process was historically propelled and accompanied by a set of beliefs and institutional patterns that can be referred to as a 'dominant Western world view' or 'dominant social paradigm' (DSP). The DSP denotes the belief that human progress should be seen primarily in material (production and consumption) terms which in turn legitimates human domination of nature. The DSP has accompanied the long-term development of industrial society across a variety of societal types (ranging from capitalism to twentieth-century state socialism) and across a wide range of institutions within societies (for example, the polity and popular culture as well as the economy). But while the social institutions of growth have led to material abundance, they have also created environmental destruction. Environmental problems and the growth of environmental knowledge are seen to be engendering a growing questioning or rejection of the DSP among many social groups. The DSP is now seen by many citizens of the advanced societies, and increasingly in the developing nations as well, to be environmentally insensitive, if not environmentally irresponsible. The result is that there is being nurtured a 'new ecological paradigm': an ethic

that involves more and more social groups rejecting DSP assumptions and seeing themselves more as a part of nature. Thus environmentalism is ultimately a social response to the biophysical realities of and scientific knowledge about environmental destruction.

Ronald Inglehart (1977) has pioneered a somewhat related view. Using neo-Maslowian reasoning, Inglehart has argued that, as industrial societies have developed, and as absolute scarcity has been conquered and most basic material needs have been met, public concerns tend to rise up a definite hierarchy of 'needs' to a point where there is an articulation of 'post-material' values. Respect for nature and interest in the quality of life rather than in the quantity of material goods are seen as the prototypical post-material values. These values, in turn, predispose citizens to support movements such as ecology.

A third general orientation towards environmental mobilization locates the growing force of ecology within the transition from the institutions of mid-century Fordism to the post-Fordist or postmodernist institutions of the late twentieth century (see the overviews in Scott, 1990; Martell, 1994). The institutional disarray associated with the disintegration of Fordism has undermined traditional reservoirs of social meaning, and weakened associational and political party vehicles of interest aggregation. These social vacuums have increasingly been filled by movements such as ecology. For many citizens these movements are more satisfactory vehicles for allowing people to articulate post-industrial concerns (particularly concern about risks to health and about environmental integrity) than traditional political institutions.

Each of these master theories of environmentalism has strengths and weaknesses. Their strengths derive from the fact that they have identified important overarching features of institutional and environmental change that are related to organized environmentalism. Their weaknesses are generally due to the fact that, in the quest for overarching explanations, they focus on certain particular forms or processes of environmentalism and play down others. A comprehensive theory of environmentalism must be able to deal with a number of pivotal characteristics of ecology movements.

First, the discontinuous surges and declines of the movement since the late 1960s suggest that biophysical (or scientific knowledge) factors do not play a predominant role in shaping movement mobilization. Second, the relatively widespread expressions of Third World environmentalism in recent years cast doubt on the notion that environmentalism is primarily a phenomenon among rich countries and affluent social classes (Martinez-Alier, 1995). Third, a comprehensive theory of environmentalism must also be able to explain anti-environmentalism, and account for the fact that in this neoliberal era anti-environmentalism at times rivals environmentalism as a political force. Fourth, there is a need to theorize the enormous internal diversity of the movement; expressions of organized environmentalism exhibit tremendous diversity in their class alignments, claims, goals and political ideologies, and the coexistence of these groups is often far more precarious than is recognized in academic treatments of them (Gottlieb, 1994). Acknowledging the internal diversity of the movement will cause environmental sociologists to recognize that there is no underlying coherence to the movement (or that it is more appropriate to see it as a series of movements rather than as a single movement). Fifth, there is a need to recognize that environmentalism is in large part a social product. For example, many contemporary expressions of environmentalism (such as indigenous resistance to rainforest destruction in the developing world and environmental justice mobilization) would not have been seen as environmental activism three decades ago. Sixth, there is a need to distinguish between public support for the

movement (which tends to be broad, but shallow and somewhat transitory) and movement participation (which is much less prevalent but more stable, and which tends to be drawn from well-educated and/or politically efficacious strata of civil society).

CONCLUDING REMARKS

Almost from the start of environmental sociology, theoretical debate has revolved around its 'double specification': that environmental sociology draws from material–ecological postures about humans as a biological species in an ecosystem, on one hand, and from the classical–theoretical emphasis on the distinctly social and symbolic capacities of humans and the social character of their institutions, on the other. The major issues in the field have continued to revolve around the relative emphases that scholars place on the biological/ecological versus distinctly social nature of human societies. We have attempted to suggest, however, that, rather than these two views being irreconcilably contradictory, there are some important opportunities for cross-fertilization. The issues identified in this chapter – the environmental implications of political and economic institutions, whether growth is primarily an antecedent or solution to environmental problems, and the origins and significance of environmentalism – are not only important in their own right, but are among the major areas in which environmental sociology is working towards syntheses of the biophysical and social dimensions of environmental change (Freudenburg *et al.*, 1995).

NOTES

1. Some of these issues (for example, whether environmental sociology should focus only on resource and habitat factors, or consider the urban or 'built' environment to be a proper focus of study) will not be examined in this chapter. See Mehta and Quellet (1995) and Cronon (1995).
2. Singular v. plural/variegated conceptions of the environment are, of course, not necessarily mutually exclusive. Note that singular and plural/variegated conceptions of the environment may both be represented in a single piece of research. A good example is that of integrated assessment models that have become the dominant focus of 'human dimensions' of global change research. At one level, the structure of these models is driven by regional contributions to greenhouse gas emissions, yielding both a global mean temperature response and disparate regional impacts and implications such as land use and land cover changes. Even so, we can say that the basic conception of the environment underlying integrated assessment modelling is a singular one: of the atmosphere and biosphere being a global system, perturbations of which will have a variety of implications for human communities and societies.
3. The fact that Dunlap and Catton stress cultural institutions while their analysis can be regarded as materialist may seem contradictory. Rather, this indicates the fact that my usage of the notion of materialism – actually, I prefer the term 'materiality' (Buttel, 1996) – is a broad one, transcending some of the more specific materialisms such as historical materialism and cultural materialism. The Dunlap and Catton style of reasoning is materialist, or involves materiality, in that the essence of their argument is that flows of energy and materials are among the most critical parameters underlying social structure and social life.
4. Note, however, that Schnaiberg does recognize that environmental degradation will tend to engender environmental resistance and social movements. His notion of 'societal–environmental dialectic', though it seemingly has been discarded in his more recent work, acknowledges that political resistance to environmental degradation may shift the nature of the treadmill to a 'managed scarcity' synthesis in which the most pernicious aspects of degradation are socially regulated and accumulation is restricted but not eliminated (Schnaiberg, 1975).
5. The first contradiction of capital is that of capital–labour antagonism and class struggle.
6. Even so, it is important to note that the notion of limits to growth has had virtually no political or policy currency (except the local politics of 'growth control': Logan and Molotch, 1987). In the post-1973 milieu of economic stagnation, rising unemployment and declining real wages, in fact, the idea of actively constraining

growth to achieve environmental goals has not been taken seriously within any national state, nor has this notion been actively advocated by any mainstream environmental group.

7. It is noteworthy in this regard that resource mobilization theory has tended not to be one of the most influential theories of the nature of the environmental movement. In part, this is because resource mobilization theory tends to place little emphasis on the content of movements, and instead is interested in matters such as social movement entrepreneurship, resource acquisition, the structure of movement organizations and the relationships between movements and political opportunity structures. By contrast, most observers of environmentalism tend to be interested more in the content of the movement than in its structure. While resource mobilization theory is often overly preoccupied with the way mobilization is made possible through 'resource' acquisition, observers of environmentalism often regard mobilization as being unproblematic: that is, as being an understandable or logical result of environmental degradation or societal value shifts. While resource mobilization theory has limitations as a comprehensive explanation, a case could be made that theories of environmentalism often exaggerate the rationality of movement mobilization, a useful corrective to which would be cautious use of the resource mobilization perspective.

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3. Sustainability and social construction

Michael Redclift and Graham Woodgate

INTRODUCTION

For historical reasons sociological theory has placed relatively little emphasis on the natural environment, which is often considered of only marginal importance to the discipline. The environment has been considered as a social construction, rendering it amenable to sociological analysis, but removing many urgent dimensions of the 'material' environment from the purview of sociologists. Sustainability represents an additional challenge. On the one hand, sociology has often assumed a progressive view of societies' evolution that is at odds with green thinking. On the other hand, the very normative quality of expressions like 'sustainable development' also provoke some embarrassment, since they appear to enrol the social scientist in an intellectual (and practical) project. For all these reasons, and doubtless others, sustainability provides conceptual problems for many sociologists.

In this chapter we want to consider the difficulties and, ultimately, opportunities that sustainability provides for sociology, concentrating principally on northern, industrial societies and their role in wider, global relations. We begin with a discussion of sustainable development and consider the objectives, and limitations, of social policies to achieve environmental ends. Next, we consider the dominant tradition represented by constructionism, and the difficulties encountered in using social constructionism to change, rather than to understand, environmental problems today. This, in turn, leads to a consideration of two bodies of theory, and practice, which contain an explicit intention to change existing (unsustainable) social relations: the development of sustainability indicators and the concern with 'ecological modernization'. The extent to which these developments have global implications is discussed. Finally, the chapter considers the contribution of a 'reinvigorated sociology', one which seeks to interpret environmental dimensions more fully, to the debate surrounding sustainability in the social sciences.

SUSTAINABLE DEVELOPMENT

Each scientific problem which is resolved by human intervention, using fossil fuels and manufactured materials, is viewed as a triumph of management and a contribution to economic good, when it might also represent a future threat to sustainability. Having jettisoned, in the 1970s, the fear that resources themselves were limited, we are today faced by the prospect that the means we have used to overcome resource scarcity, substitution and increased levels of industrial metabolism, contribute to the next generation of problems which are associated with global environmental problems. This realization provides an

enormous challenge to conventional social science thinking, encapsulated in the term 'sustainable development'.

Sustainable development was defined by the Brundtland Commission as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Brundtland, 1987). This definition has been brought into service in the absence of agreement about a process which almost everybody thinks is desirable. However, the simplicity of this approach obscures underlying complexities and contradictions. Before exploring whether we can establish indicators of sustainability, it is worth pausing to examine the apparent consensus that reigns over sustainable development.

First, following the Brundtland definition, it is clear that 'needs' themselves change, so it is unlikely (as the definition implies) that those of future generations will be the same as those of the present generation. The question then is, where does 'development' come into the picture? Obviously development itself contributes to 'needs', helping to define them differently for each generation and for different cultures. This raises the second question, not covered by the definition, of how needs are defined in different cultures. Most of the 'consensus' surrounding sustainable development has involved a syllogism: sustainable development is necessary for all of us, but it may be defined differently in terms of each and every culture. This is superficially convenient, until we begin to ask how these different definitions match up. If in one society it is agreed that fresh air and open spaces are necessary before development can be sustainable, it will be increasingly difficult to marry this definition of 'needs' with those of other societies seeking more material wealth, even at the cost of increased pollution. And how do we establish which course of action is *more* sustainable? Recourse to the view that societies must decide for themselves is not very helpful. (Who decides? On what basis are the decisions made?) At the same time, there are problems in ignoring culturally specific definitions in the interest of a more inclusive ontology.

There is also considerable confusion surrounding *what* is to be sustained. One of the reasons why there are so many contradictory approaches to sustainable development (although not the only reason) is that different people identify the objects of sustainability differently. For those whose primary interest is in ecological systems and the conservation of natural resources, it is the natural resource base which needs to be sustained. The key question that is usually posed is the following: how can development activities be designed which help to maintain ecological processes, such as soil fertility, the assimilation of wastes, and water and nutrient recycling? Another, related, issue is the conservation of genetic materials, both in themselves and (perhaps more importantly) as part of complex and vulnerable systems of biodiversity. The natural resource base needs to be conserved because of its intrinsic value.

There are other approaches, too. Some environmental economists argue that the natural stock of resources, or 'critical natural capital', needs to be given priority over the flows of income which depend upon it. They make the point that man-made capital cannot be an effective substitute for natural capital. If our objective is the sustainable yield of renewable resources, sustainable development implies the management of these resources in the interest of the natural capital stock. This raises a number of issues which are both political and distributive: who owns and controls genetic materials and manages the environment? At what point does the conservation of natural capital unnecessarily inhibit the sustainable flows of resources? Second, according to what principles are the social institutions govern-

ing the use of resources organized? What systems of tenure dictate the ownership and management of the natural resource base? What institutions do we bequeath, together with the environment, to future generations? Far from taking us away from issues of distributive politics and political economy, a concern with sustainable development inevitably raises such issues more forcefully than ever.

The question 'what is to be sustained?' can also be answered in another way. Some writers argue that it is present (or future) levels of production (or consumption) that need to be sustained. The argument is that the growth of global population will lead to increased demands on the environment, and our definition of sustainable development should incorporate this fact. At the same time, the consumption practices of individuals will change, too. Given the choice, most people in India or China might want a television or a car of their own, like households in the industrialized North. What prevents them from acquiring one is their poverty, their inability to consume and the relatively 'undeveloped' infrastructure of poor countries.

Is there anything inherently unsustainable in broadening the market for televisions or cars? If the answer is 'yes', then those of us who possess these goods need to be clear about why we consume goods unavailable to others. The response is usually that it is difficult, or even impossible, to function in our society without information or private motorized mobility, but this is to evade the question of underlying social commitments. We define our needs in ways which effectively exclude others meeting theirs, and in the process increase the long-term risks for the sustainability of their livelihoods. Most importantly, however, the process through which we enlarge our choices, and reduce those of others, is largely invisible to us. If we concentrate our attention on our own society, we can begin by identifying aspects of our management of the environment that are unsustainable. From here, it is a short step, as we shall see, to the development of sustainability indicators, the growth of interest in which has followed that of sustainable development. Again the importance of the issue is matched by the difficulty in addressing it convincingly. There are numerous indicators of unsustainability, but it has proved much more difficult to find those for sustainability.

The reasons for these difficulties are not hard to find. Economics developed, historically, around the idea of scarcity. The role of technology was principally that of raising output from scarce resources. Among other benefits of economic growth was the political legitimacy it conferred, within a dynamic economy, on those who could successfully overcome the obstacles to more spending. Wealth was regarded as a good thing, in itself. This proposition, which underlines the difficulty in reconciling 'development' with 'sustainability', strikes at the legitimation of only one form of 'value' within capitalist, industrial societies. Habermas (1971) expressed his criticism of this view forcefully, when he asked 'can civilisation afford to surrender itself entirely to the ... driving force of just one of its subsystems – namely, the pull of a dynamic ... recursively closed, economic system which can only function and remain stable by taking all relevant information, translating it into, and processing it in, the language of economic value?'

There is another dimension to the problem of increased consumption which is relatively recent. This is the extent to which, at the end of the twentieth century, we need to refer to genuinely global processes. As Miller has argued, global consumption 'provides a new egalitarianism between subject and subject' as Central Africans wear suits, Indonesians and Brazilians produce soap operas, and branded commodities acquire general importance (Miller,

1994: 3). The ethnography of consumption has the same referents, and the commodities consumed are, in some ways, great levellers (Brewer and Porter, 1993).

However, difficulties also remain that point to the way we measure wealth. William Cobbett, the early nineteenth-century English Radical, referred to these over 160 years ago, in supporting the reduction of the working day for children in the textile mills from 12 to 10 hours. Speaking in support of Lord Shaftesbury's bill, Cobbett said it was interesting to learn that all of Britain's wealth, power and security lay, not in her virility, nor in her agriculture, banking or merchandise, but in the labour of 300 000 little girls in Lancashire. If two hours of their daily work were deducted, he noted in an ironical reference to Shaftesbury's opponents, away goes the wealth, away goes the capital, away go the resources, the power and the glory of England!

The question today, as in the 1830s, is 'what is it *worth* to measure wealth in this way?' It is often assumed that increasing 'sustainability' jeopardizes the creation of wealth but, unless we are clear about how we measure wealth, it is difficult to assert that the creation of wealth is necessary for improvements in the quality of life. The recent UK White Paper on science, *Realising Our Potential* (1993) tries to side-step this problem by referring to wealth creation *and* the quality of life, as if they were separate issues. The creation of wealth, as a policy objective, tends to confine environmental factors to the closet, enabling politicians to wring their hands over the supposed high levels of unemployment that higher environmental standards herald, or the dangers of interfering with market forces which are assumed to work best when they are free from government control.

Similarly, within the European Union, a recent White Paper on *Growth, Competitiveness and Employment* places emphasis on economic growth and increased employment intensity as vehicles for economic recovery (European Commission, 1993). The familiar argument is that we need to increase both growth and employment, to generate the means to deal with environmental problems, before sustainability can be achieved. In practice, increased private consumption is seen as the key policy lever. If we increase the consuming capability of the household within the European Union, we can invest the benefits in employment-creating activities such as child care, education, vocational training and better facilities for the old and handicapped.

There is a problem in this line of argument that is rarely exposed by either the left or the right of the political spectrum. The social policy agenda that is supposed to be the beneficiary of increased growth also carries environmental implications, both in the goods and services to be provided and for the means of achieving them. If we pursue the creation of needs, as a means of lifting overall consumption and enhancing current production, we are unlikely to identify the needs which our economic system currently does *not* meet. There is a considerable risk that we will create more casual employment rather than more socially useful employment and, in the process of raising personal consumption, place environmental standards in greater, rather than less, jeopardy.

The alternative path to follow is a very radical one. It means pursuing better environmental standards – in energy production and conservation, in more efficient transport, better air and water quality – as the first objectives of policy, rather than the supposed beneficiaries of more economic growth. At the moment the European Union is setting 'environmental targets' around 'what we can afford', from the wealth created by unsustainable levels of production and consumption. The alternative is to make environmental targets the *instruments* for improving the quality of our lives. As Fleming (1994) has argued, we need to

bring sustainability out of the environmental closet and start applying it to the economy at large. The task of sociology, and the other social sciences, is to assist in the redefinition of needs and the ways in which they may be satisfied.

We can appreciate the importance of making radical changes in underlying economic processes, if we examine the intellectual inheritance left by the dominant tradition in sociological thought about the environment: social constructionism. To what extent has social constructionism served to open up a new, sustainable, policy agenda?

THE LIMITATIONS OF SOCIAL CONSTRUCTIONISM

In a recent paper, McNaughton and Urry (1995) view sociology (and, by implication, other more qualitative social sciences) as the victim of its own need to demarcate 'social' territory from the natural sciences. Redclift and Benton (1994) have similarly argued that the nineteenth-century inheritance had demarcated a social domain, and form of interpretation, distinct from the theoretical traditions of positivism, on the one hand, and evolutionary models, on the other. This left discussion of 'the environment' in a rather ambivalent position: on the one hand, it is as much a cultural product as any other, but on the other hand, the rejection of biological determinism and evolutionary theories has distanced sociological analysis from nature. McNaughton and Urry feel that this distancing of social science from nature has resulted in a response to 'impacts and implications of environmental problems, which have been initially and accurately described by the natural scientists – a kind of "Biology First" model'. In their view, 'instrumentalist disciplines have been favoured, while there is little evidence of an emerging contribution from sociology to problems of global environmental change' (1995: 204).

Although one might wish to contend the meaning of 'favoured' in this context, their central assertion is surely correct. To take one example: of the 48 research projects recently approved under the *Human Dimensions of Global Environmental Change* component of the European Commission's Fourth Framework Programme, only a handful are not technocentric and managerialist in nature. The dominant concerns reflected in most environmental research programmes in Europe today are those favoured by the 'instrumentalist disciplines' (economics, planning, geography, management and information sciences). They can be identified in notions such as 'ecological modernization', 'life cycle analysis', 'integrated environmental assessment', 'environmental accounting' and the 'analysis of climate regimes'.

It is not difficult to provide a social constructionist analysis of these policy agendas themselves. However, most sociologists in the environmental world probably prefer to follow the path set by McNaughton and Urry (1995: 208) when they assert that, 'while there exists a role for sociological research to explore further the social dimensions of current appeals to the natural, *there are other contributions sociology can provide to current "environmental" debates. These also arise from how the "social" and the "natural" are being reconstructed in contemporary societies'* (emphasis added). This quote accurately reflects the authors' intentions in their paper, which is to refashion the constructionist approach, rather than to revise it radically. Four areas are suggested as ones in which the role of sociology can be taken forward: a sociology of environmental knowledges, reading 'natures' sociologically, a sociology of environmental 'damage', and environmentalism and society.

Each of these areas reflects existing work, in sociology and related disciplines. For example, a 'sociology of environmental knowledges' is concerned with epistemic communities, 'reading natures sociologically' with postmodern discourse theory, 'a sociology of environmental damage' refers, for example, to consumer backlash to the industrial food system, and 'environmentalism and society' seems to be suggested as a way of developing the social movements literature. None of these 'contributions', however, marks a departure from existing methods of social construction. McNaughton and Urry do not indicate what we are expected to do with the knowledge, or recognition, of what appears to be 'natural'. What do these contributions offer in terms of the transformation of the social commitments which make sustainability so elusive: the habits of 'getting and spending' which drive much environmental change? The contributions sociology can provide to current environmental debate seem to be confined to deconstructing the 'environmental' and the 'natural'. Beyond social construction, they seem to be saying, is social deconstruction.

In his recent account of the contructionist approach to the environment, Hannigan (1995: 2) complains about the condition to which sociologists are reduced by the critical distance they practise in their research, saying, 'unfortunately, sociologists far too often end up as "underlabourers" in this endeavour, being viewed as supporting actors in a cast dominated by natural scientists and environmental policy-makers'. But, if sociologists feel excluded by the policy/research agenda, a problem posed by both Hannigan and McNaughton and Urry, to what extent is this a problem of their own making?

Lutzenhiser (1994), in an interesting account from a rather different perspective, argues that, if sociologists are 'supporting actors', they show a remarkable penchant for taking centre stage in their own productions.

> Just as natural science approaches tend to exclude human behaviour, so ... sociological perspectives tend to exclude the physical and environmental from their accounts of social change ... just as traditional sociological self-understandings are uneasy with 'technical' and 'biological' topics, we can now add emergent interpretivist perspectives that *see natural environments largely as social constructions – nature as a potentially important social variable risks becoming mere nature as socially variable.* (1994: 71, emphasis added)

Lutzenhiser comments that there is nothing to prevent social scientists taking up issues surrounding environmental change and making them their own, rather than being driven more or less passively by the natural science research agenda. There are some useful examples of this beginning to happen, and many more in which the gauntlet has been thrown down, if not yet picked up (Fischer-Kowalski and Haberi, 1994; Martinez-Alier, 1987; Daly, 1992; Ayres and Simonis, 1994).

The limitations of the social constructionist approach are also clear to some anthropologists. Tim Ingold subjects theories based on cultural representations to careful scrutiny: 'it is supposed that persons can neither know nor act upon their environments directly, but only indirectly through the medium of their cultural representations. This supposition rests upon a cognitivist account of perception whose roots lie deep in the western dualist world view' (1992:40). Referring to the strong tradition of ecological anthropology, represented by Geertz, Steward and others, Ingold notes that, 'as meaning-making animals, humans impose their symbolically constituted designs upon the external world. If all meaning is thus culturally constructed, then the environment on which it is imposed must originally be *empty of significance*' (ibid.: 3, emphasis added). The point is that human activity is depend-

ent on the existence of the environment, and acts upon it. There is no initial process through which culture filters sense data from the environment. Like Marx, Ingold is arguing for the materiality of environmental experience, without which culture itself cannot exist.

Finally, let us turn to environmental history, itself a fast-growing field of knowledge and interpretation, which one might expect to be most susceptible to social constructionist thinking (Redclift, 1996).

> Concepts of nature are always cultural statements. This may not strike Europeans as much of an insight, for Europe's landscape is so much of a blend. But in the new worlds – 'new' at least to Europeans – the distinction appeared much clearer ... Hence the fond conceit of primeval nature untrammelled by human associations which could later find expression in a reverence for wilderness. (Beinart and Coates, 1995: 3)

It is interesting that Beinart and Coates do not leave the matter there. They go on to argue that the 'context for ecological interactions has increasingly been set by humanity. We *may not determine how or what a lion eats, but we certainly can regulate where the lion feeds*' (ibid., emphasis added). This view represents a recognition that the environment is not merely represented through social construction, in language or symbolically. It is also the product of human activity: human behaviour affects the *environment*, leading us to consider *not only the claims that are made against nature, but also the material transformation of nature.*

In one sense, all discussion of sustainability, including environmental sustainability (Goodland, 1995), is socially constructed. Ecological principles themselves are part of science, and science in turn is part of human culture. The idea of environmental sustainability is part of the social construction of modern science. In another sense, though, recent debates about sustainability, and sustainable development, have come to reflect more specific intellectual concerns. As the policy agenda has served to incorporate the idea of sustainable development into the mainstream, so the idea of social construction has been invoked by sociologists to distance the analysis of environmental problems from the problems themselves. There are clear advantages in such an approach: it draws on well established sociological perspectives; it enables social scientists to maintain their 'objectivity'; and it does not require familiarity with scientific evidence or models. At the same time, social construction alone may be unequal to the challenge presented by sustainability, at the very moment when it could be most useful.

BEYOND THE BOUNDS OF SOCIAL CONSTRUCTION

Much of the argument hitherto has been concerned with the limitations which social constructionism places on the explanatory possibilities of environmental social science. Nevertheless, in expressing concern about the restricted agenda of constructivist sociology, we might not wish to move to the alternative extreme of biological determinism. This suggests a more balanced view of the relationship between society and its underlying material or natural conditions. It requires a move beyond the position where nature is viewed as *either* the material conditions of our existence *or* as no more than a set of culturally generated symbols. We must begin to accept nature as both.

Binary oppositions characterize much social science: constructivist/objectivist, relativist/realist, cognitive/material, subject/object, authoritative resources/allocative resources. They

represent duality as well as dualisms, the point being that each side of the equation implies the other, the existence of one demands the presence of the other. If there were no physical environment, we would not be able to construct it socially and social construction has two clearly distinguishable elements. We are both materially and symbolically creative and destructive; we refashion our environments physically *as well as* cognitively.

The debate between realists and relativists has a long history in the field of environmental sociology in the USA. Advocates of the realist position, such as Catton and Dunlap (Catton and Dunlap, 1978a, 1978b, 1980; Dunlap and Catton, 1979, 1994) are uneasy with the relativism of scholars such as Buttel *et al.* (Buttel, 1987, 1993, 1994; Buttel *et al.*, 1990; Buttel and Taylor, 1992) for a number of reasons. First, they are concerned that, in concentrating its efforts on the analysis of competing claims concerning the validity of environmental change, sociology should not abdicate responsibility for analysing the human dimensions of environmental change to those with little expertise in the field of social behaviour. They suggest that modest but growing shifts in funding from 'production science' to 'impact science' (Schnaiberg, 1980) support the 'reality' of environmental change despite the challenges to this perspective issuing from vested interests. Be this as it may, they are highly critical of the extreme relativist position, which they maintain 'proves inherently conservative: if all truth claims have validity, then there is no basis for endorsing some over others, and thus no basis for becoming proactive' (Dunlap and Catton, 1994: 22). Finally, they emphasize the fact that the act of deconstruction does not render the environment any less real.

Those adopting a more constructivist approach are also critical of the realists, however. Their worries concern the lack of analysis on 'how environmental knowledge is appropriated, "constructed", and deployed' (Buttel, 1994: 5). At the same time as we may construct the environment cognitively, however, we are also uniquely equipped to regulate and refashion the environment physically in ways that make it more suited to our requirements. Thus there is no single way in which we, as human beings, relate to external nature. Acceptance of the complex, interactive character of social and environmental change means that simple distinctions between 'social' and 'natural' soon become untenable. This is particularly clear if we consider some of the ways in which a concern with sustainability is beginning to be admitted into policy discourse, notably through sustainability indicators and the advocacy of 'ecological modernization'.

SUSTAINABILITY INDICATORS

In the wake of the United Nations Conference on Environment and Development (UNCED) in Rio in 1992, there was widespread disappointment that the quality of national reporting to the Commission on Sustainable Development had been so poor. In an effort to improve reporting and to help refine indicators for measuring sustainability, the New Economics Foundation has pioneered work on pilot indicators of national performance (NEF, 1994). These have increasingly been taken up by international organizations and national governments (Department of the Environment, 1996). UNCED's 'Agenda 21' suggested that more work needed to be undertaken on sustainability indicators, particularly by United Nations agencies and other international bodies. At its first full session, the Commission on Sustainable Development also indicated that it was interested in using indicators in the reporting

process. If it did so this would place it far in advance of any existing system of collating information from national governments.

The approach of the New Economics Foundation and the Worldwide Fund for Nature has been to concentrate on developing 'pilot indicators' as a first, and urgent, step towards the much longer process of agreeing indicators for measuring overall sustainability. An important precedent for this activity is the work undertaken by the Organisation for Economic Cooperation and Development (OECD) in seeking to develop a set of core indicators for environmental performance. These 'core' indicators are being piloted in a number of country studies. In essence, they seek to measure three things: the pressures placed on the environment (such as pollutant emissions), the current condition of the environment (such as atmospheric concentrations of greenhouse gases) and the responses of society to these problems (such as expenditure on air pollution abatement).

The set of key indicators developed by the New Economics Foundation and the Worldwide Fund for Nature reflects the issues as presented in Agenda 21, focusing on areas of concern where agreement is high. These key indicators of environmental performance reflect the 'outcomes' of policy decisions that have already been taken, over a range of issues. They describe either environmental, social and economic conditions or the pressures to which the environment is subjected. This kind of indicator is already used widely, although rarely in conjunction with sustainability planning (Jacobs, 1991). The advantage, however, is that data are already available on many of these indicators, and a degree of consensus exists as to their usefulness and limitations (NEF, 1994).

The central point that is often lost is that the usefulness of sustainability indicators is directly related to the policy context which they are used to address. Setting targets for policy implies changes not only in what is measured, or how it is measured, but also in what it is that we are seeking to achieve. Using 'core' indicators does not, in itself, provide a basis for devising new policies. However, it can provide a basis for making policy choices, which is quite a different thing. As the NEF document argues, setting sustainability targets is inevitably a political exercise. It is obviously subject to technical limitations and deficiencies of data. Nevertheless, the major problem in achieving sustainability targets is not their comparative lack of refinement, but the very difficult (and rarely consensual) political choices that lead to their being adopted. It is these political choices which need to incorporate 'sustainability', not merely the quantitative indices against which they are measured. Definitions of sustainability cannot be taken from 'nature', as we have seen, as if nature were somehow unaffected by human agency.

In the real world, governments, when pressed to consider environmental policy, tend to adopt modified versions of the more thoroughgoing, radical alternatives on offer. These modified policies represent the 'weak' dimensions of sustainability policy, as opposed to the 'stronger' dimensions advocated by environmental campaigners and activist groups. The contrast is brought out in Table 3.1, which compares both approaches. It is clear that the 'weak' dimensions of sustainability policy require shifts in the level of resources allocated to problems, combined with the establishment of higher environmental 'standards'. (This corresponds, in these respects, to what is referred to as 'ecological modernization' in the next section.) The 'stronger' measures, on the other hand, strike at fundamental policy choices, such as the shift away from road transport, or attempts to build the uses to which energy is put into the level of energy generated, and to organize production around principles of waste minimization.

Table 3.1 Conservative and radical sustainable development

Dimensions	Conservative	Radical
Environmental protection	weak	strong
Futurity	present/future	future/present
Equity	non-egalitarian	egalitarian
Participation	top-down	bottom-up
Scope	narrow	broad
Delivery	pragmatic	first principles

These kinds of exercise underline the way in which environmental management translates normative environmental goals, and political choices, into *measures of performance*. This implies at least three things: a willingness on the part of government to 'manage' the transition towards increased sustainability, an ability to do so (probably expressed as a high degree of consensus) and, finally, the expression of environmental goals in quantitative terms. It would be a mistake to view quantification as an answer to essentially political problems. For example, if countries spend more on environmental protection, it is unclear whether this is because the environment is getting better or worse. Yet, in terms of environmental management, what is being measured is the level of intervention. It is also clear that the first two prerequisites for meaningful sustainability planning rely heavily, for their success, on taking political decision making out of the sphere of the 'here and now' and placing it in that of 'there and in the future'. It is necessary to reach political agreement around sustainable objectives before measures of performance can be put to any use. The role of the social sciences lies in identifying the barriers to such agreement, and the extent to which we might be able to incorporate sustainability into our social and economic practices.

A final caveat on sustainability indicators relates to the assumption that policy makers have the ability (rather than the willingness) to intervene. Recognizing the limits within which policy is undertaken is not a moral evasion. It raises the issue of the different capacities for policy intervention which exist at local, national and international levels. The debate about sustainability indicators has helped to galvanize different levels of political activity and, in this sense, represents a good example of the contribution that the social sciences can make to the wider civil society.

ECOLOGICAL MODERNIZATION

Ecological modernization has been reviewed in a variety of publications (Simonis, 1989; Spaargaren and Mol, 1991; Weale, 1992; Janicke, 1986; Hajer, 1994; Gouldson, 1996) as well as by authors in this volume (*inter alia*, Gray, Mol and Opschoor). The central proposition behind ecological modernization is that economic growth can be adapted to meet environmental goals.

As Gouldson has expressed it, it 'assumes that there can be a synergy between environmental protection and economic development, where in the past there has been conflict' (Gouldson, 1996: 5). The prime mover is government, which helps to provide a broader

context than is usually provided by environmental policy alone. In specific terms, this means the creation of new products and services that demonstrate improved environmental and economic performance. Essentially, ecological modernization proposes the internalization of 'externalities', designing cleaner, more sustainable goods, which meet clear environmental standards.

In seeking greater integration of environmental policy goals with those of other sectors, ecological modernization seeks to accommodate late industrial society. It seeks to redefine international competitiveness in such a way that early technological innovators reap market advantages. It does not represent a threat to capitalist development, however, and those who argue for ecological modernization do not challenge the logic of international capital. As Gouldson puts it, 'ecological modernisation can be viewed as very selective in just where it apportions blame for environmental degradation' (ibid.: 8).

It is assumed that advanced industrial societies can shift their technologies and patterns of production while leaving the structures of private capital accumulation fundamentally intact. There are a number of problems with this approach on the global scale. First, it is insufficiently grounded in international political economy, where recent debates have focused on 'flexible specialization' in production, the primacy of information and associated technology, and internationally differentiated labour markets. Ecological modernization suggests that economic restructuring can be modified to incorporate environmental ends, providing a convergence between productive capital and the environmental goals of society. These green goals serve to act upon the 'real world' of contemporary capitalism, enabling new environmental values to penetrate the very heart of the industrial process. The result is that companies, and governments, will be more competitive in the longer term within the global system. The economic restructuring of global capital is a reality, but in some of the most dynamic economies environmental 'externalities' remain just that – *external*. In the 'Tiger' economies of East Asia, for example, air pollution in cities is growing faster than the rate of economic growth.

As yet, however, there is little evidence that economic competitiveness has been refashioned to reflect more sustainable objectives. For example, a recent survey, conducted by the United Nations, of 794 leading transnational corporations with sales over $US1billion per annum shows that most large companies attach relatively little importance to any environmental considerations likely to reduce their profitability. The conviction that ecological modernization represents a way forward for business in no way suggests agreement with higher levels of external regulation, or commitment to longer-term environmental objectives. As with other concepts, including sustainable development, different writers have found different things in ecological modernization. Gouldson argues that the concept represents a challenge to the nation-state and to national regulation (Gouldson, 1996), while Fleming questions whether ecological modernization is an effective way of addressing the problem of economic growth in economies where growth is beginning to flounder (Fleming, 1994). He draws attention to the contradictions between the European Union's goal of increased employment and that of 'labour-saving' ecological modernization.

The problems are more severe if we look outside western Europe. The White Paper from the European Commission on growth, competitiveness and employment (1993) states that extrapolating current consumption and production patterns within the European Union to the entire world would require a tenfold increase in resources. Europe's environmental protection industries, the nub of ecological modernization, are currently incapable of

shouldering the burden of growth within Europe. It remains to be seen whether 'social coupling', the organization of the workplace around best environmental practice, can work in Germany, Scandinavia or the Netherlands, where it is advocated most strongly. To 'globalize' from European experience would not merely require major shifts in global economies, but also exacerbate divisions and distributional problems. Where does competitive advantage take you, if everybody gains from it?

There are other problems too. At the moment ecological modernization is largely confined to 'end of pipe' technologies, where environmental regulation is usually operative. It is significant, then, that those who favour environmental regulation usually see ecological modernization as a facet of business development, rather than a means of raising environmental standards. It is argued that business will take ecological modernization seriously once it benefits financially from doing so.

The real challenge, however, as Herman Daly noted some time ago, is to reduce energy consumption throughout the economy, rather than in the production of a limited range of 'greener' goods and services (Daly, 1992). What is required is not the creation of 'greener' management accounting and environmental regulation, but a shift towards the wider recognition that sustainability might drive the economy. Until the globe's sink capacities have been assessed, and production has been modified to reflect these capacities, we will not have turned the corner to greater sustainability.

Finally, as Spaargaren and Mol, among others, have shown, ecological modernization does not extend environmental protection to many of the so-called 'global' environmental problems and risks (Spaargaren and Mol, 1991). These risks tend to be what Ulrich Beck has called risks of 'high consequence' but 'low probability', such as those of nuclear accidents or chemical warfare (Beck, 1992). In these cases, everybody is likely to be affected when risk becomes reality: 'the other' disappears altogether. The universality of high-consequence risks makes management responses, such as those of ecological modernization, an irrelevance. Even if one dissents from Beck's view that the 'positive logic' of wealth distribution has been overshadowed by the 'negative logic' of risk distribution, it remains clear that only preventative action on the global scale will enable us to deal with global risks of this kind. This has served to redefine distributive problems; but they have not disappeared. Economic harmonization around products and markets exposes the poor to exploitation as a cheap resource. The poorer you are, the less effective is preventative action.

In practice, effective international action to address environmental problems is not amenable to technical solutions alone. It requires agreement about both means and ends, in which the internalization of environmental costs (through ecological modernization) can represent a market advantage from which the rich reap most of the benefits. Economic convergence towards 'greener' production, measured by indicators of sustainability, is envisaged within the industrialized countries as a substitute for restructured economies and restructured international institutions (MacGillivray and Zadek, 1995). These international institutions were designed, in the wake of the Second World War, to address world peace by reducing economic vulnerability and world poverty. The implications of the failure to restructure the international economy around sustainable objectives are discussed elsewhere (Redclift, 1996).

CONCLUSIONS: MODERNITY AND SUSTAINABILITY

The increasing complexity of social structures lengthens the chain of connection between society and nature, so that the sustainability of highly modernized societies becomes dependent on the maintenance, not only of linkages between society and nature, but also of those between specialized social actors and institutions (Woodgate, 1992). That is, sustainability as a policy goal (rather than as a characteristic of ecological systems) means maintaining the links between individuals, their livelihoods and lifestyles, and the social institutions which condition the natural, economic and policy environments. It is these environments which provide the backdrop to social action and influence the development of social choices and which, in turn, might provide the basis for a reinvigorated, environmental sociology.

However, to refashion sociology means beginning with industrial society itself. Energy and material flows are central to the industrialization process and economic development in modern society is constrained by energy availability. The ultimate source of energy is the sun, which produces immediately available energy in the form of radiation, wind and the water cycle, and stored energy in the form of plant biomass. This stored energy may either be consumed directly, in the form of food and fuel, or, over time, may be concentrated in the form of fossil hydrocarbons. In total, however, there exists a finite amount of incoming solar radiation, placing ultimate limits on global sustainability.

The key element in the resourcing of industrial society has been the use of fossil fuels. In this sense, what Norgaard (1994) terms 'hydrocarbon society' represents one of the building blocks of modernity itself. If we consider the industrial development process from its roots in the scientific revolution, we can also conceive of the way in which mediaeval cosmology was gradually overturned to make way for a mechanistic model of nature, the elements and mechanisms which could be understood and mastered by science.

The initial harnessing of steam power, the invention of the internal combustion engine and the realization of their productive potential led to accelerated exploration, extraction and refinement of fossil hydrocarbons as highly concentrated fuels to power the process of industrial development. And yet this historical contingency – which lies at the very heart of much sociological thinking about urban, industrial society – has rarely been problematized by sociology itself. Over the course of the nineteenth and twentieth centuries, these stock resources were developed (and thereby, of course, depleted) in preference to renewable sources of energy such as wind and water. It was not only particular sources of energy which received preferential attention in the course of industrial development, however: the destination of material goods produced by industry was also tightly organized. Fossil fuels were used to power industries which produced capital goods (technology) which, in turn, required more fossil fuels to power them and produce even more capital goods, thus creating a spiralling demand for energy. In short, industrial society has one of its most important bases in fuels which, in terms of human timespans, are strictly limited in supply (Redclift and Woodgate, in Redclift and Benton, 1994).

We can trace the energy pathway from the sun to available energy on the earth to be utilized in productive activities. Production combines nature, labour and capital in the process to produce material goods, with associated material waste. Under the industrial model of development, while waste material and energy contribute to pollution, the cost of which is borne by both nature and society, material goods (the intentional products of

industry) are channelled into the reproduction of capital and the reinforcement of technocratic ideology. This is undertaken through investment in scientific and technological education, while the maintenance of natural services and products is virtually ignored (Redclift and Woodgate, 1993).

From this perspective, it is suggested that industrial development, based on non-renewable fossil energy, the degradation of natural systems and the destruction of both cultural diversity and biodiversity, represents an historical cul-de-sac. Hydrocarbon society appropriates, substitutes, devalues and ultimately destroys nature. Since the Industrial Revolution in the eighteenth century, social development has been based on unsustainable technologies and energy sources. Population growth and material consumption have developed within this context, at the same time providing positive feedback to the development of industrialism (Woodgate and Redclift, 1996).

In examining links between nature and society, it is acknowledged that structure arises out of agency as well as providing its context (what Giddens calls the 'duality of structure'). This same idea relates closely to the notion that the unintended consequences of human actions lead us into 'underlying social commitments' (Redclift, 1996; Redclift and Woodgate, 1993). Underlying social commitments are a central characteristic of modern, complex societies. The concept refers to the notion that industrial society has become embedded in large-scale technological commitments without any explicit assessment of their social or environmental implications or public decision regarding adoption: a process of 'technology as legislation'. The speed and nature of the social and environmental changes which result from these blind commitments are 'more and more rapid and, for the first time in human history, inescapable ... Some of the most decisive and encompassing features of contemporary existence arise in these ways and, for the most part, we simply have to defer to them' (Grove-White, cited in Redclift and Woodgate, 1993). But, if the human condition is so similar to that of other species, how can we explore wider human commitments and their environmental implications in the future?

Evolution in natural systems occurs over long time periods with many local catastrophes and extinctions, while the immense power that we have tapped in our hydrocarbon societies has provided us with temporary respite from the exigencies of unsustainable, social commitments. These commitments, however, have resulted in the development of innumerable goods and services and an industrial metabolism that accounts for the majority of the planetary mobilization of nutrients (with the possible exception of nitrogen) and also for the majority of toxic, heavy metals (Ayres, in Ayres and Simonis, 1994). Our underlying social commitments are themselves a product of a specific human society, one that is based on hydrocarbons, and this society constructs nature in specific ways.

How, then, do we explain the problem posed by *environmental* sustainability – that what Giddens calls 'authoritative resources' may place the physical environment in jeopardy, and that we may connive in degrading or losing our means of material support (Giddens, 1984: 258)? To answer this question we need to recognize that the bounds of sustainability are also set by cultural and historical factors. In societies that are characterized by scarce resources it is the existence of material limits that receives most attention. However, the current concern with sustainability takes us beyond traditional conceptions of physical limits, for a number of reasons:

1. Many environmental problems today – including an increasing number in developing

and newly industrializing countries – are 'externality' problems. They arise from the consequences of exploiting resources, rather than their shortage.

2. In addition, the maintenance and conservation of global sinks is now at least as important as the management of resource stocks and flows. As in the case of resource management, sink capacities raise both intra- and intergenerational distributive issues, the former often in an acute form.
3. Global economies, and the patterns of consumption that are linked to them, create value in new ways. For example, as well as value being created through the exploitation of material resources, today it is also created through command over information systems and bioengineering.

In the face of major shifts in the relationship between individuals and their environments, a two-way process is revealed which takes us beyond social and cultural constructions of the environment as something 'out there', removed from human consciousness. The limits of our capacity to move towards more sustainable modes of living are set by our sociological models, as well as by 'the real world'. Consequently, it is in our models, as well as in our policies, that we must make decisive changes.

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4. 'Sustainable development'

Wolfgang Sachs

INTRODUCTION

'Sustainable development' is the late twentieth-century expression for 'progress'. It extends the long-standing hope for universal social improvement into an era faced with a divided world and a finite nature. The rise of the concept to a key idea of international politics reflects the growing awareness that the two founding assumptions of the postwar development era have lost their validity. Ever since President Harry S. Truman coined the notion of 'underdevelopment'[1] in his inaugural address in January 1949, and promised assistance to the countries of the Southern hemisphere in their efforts to catch up with the North, it has been taken for granted that, first, development could be universalized in space and, second, that it would be durable in time. This belief has proved to be wrong. Development has in fact, notwithstanding the strides made by OPEC and Southeast Asia, deepened the crisis of injustice between North and South, just as it has provoked a manifold crisis of nature which undercuts its prospects for the future. It has revealed itself as finite in (global) space as well as in time, and it is precisely this insight which constitutes the dilemma that has pervaded many international debates since the UN Conference on the Human Environment in Stockholm in 1972.

The crisis of justice and the crisis of nature stand in an inverse relationship to one another. Those who demand more agricultural land, energy, housing or purchasing power for the poor find themselves in contradiction to those who would like to protect soils, forests, human health or the atmosphere. And those who call for less energy or less transport and oppose clear-cutting of forests or input-intensive agriculture for the sake of nature find themselves in contradiction with those who insist on their equal right to the fruits of progress. It is easy, however, to see that the basis upon which the dilemma rests is the conventional notion of development; for if there were a style of development which used up less nature and included more people, a way out of the dilemma would open up. Small wonder, therefore, that in the last two decades committed minds from all corners of the world have been calling for 'alternative models of development'.

GENESIS

'Sustainable development', as a field of discourse, emerged in the 1980s out of the marriage between developmentalism and environmentalism. Before that, 'development' and 'environment' were seen as distinct, if not contradictory, concerns. They inspired two different camps of protagonists who inhabited two different mental spaces and regarded themselves

as opponents. Out of a liaison between these two camps, 'sustainable development' was born.

The Liaison between Growth and Conservation

One impediment to the liaison between developmentalism and environmentalism has been the perception that growth is contradictory to nature. In the 1960s and 1970s, conservationists worked to defend forests and animals against the pressures of growth, citizens were appalled by the pollution of air, water and organisms, and system theorists ran world models to predict the decline of industrialism. Biocentric conservationists and advocates of a human-scale society agreed on the need to speak out about limits to growth and to consider the containment of rampant economic development. There was, however, a common belief on both sides that stabilized the perceived dichotomy of growth and nature, and that was the belief in the invariability of both.

The eventual linkage between growth and conservation required a change in that assumption. On the one hand, economic development had to be seen as variable in its structure while, on the other hand, nature had to be considered manageable. Whereas development in the postwar 'golden age' of capitalism had appeared as a unilinear, accumulative process which could either be continued or stopped, in the 1970s it was discovered that there was more than one possible path to growth. In the North, the epoch of the smoke-stack economy had ended and an upcoming generation of post-industrial technologies suggested that growth could be pursued without squandering ever more resources. As a result, it appeared possible eventually to delink economic growth from rising pollution and resource use. In the South, as conventional development revealed itself as a poverty-creating force, aid experts discovered the rural poor as a target group for a new set of strategies. 'Rural development', the 'basic needs approach' and 'ecodevelopment' pluralized the notion of development and popularized the perception that technically and socially different development paths could be chosen. In short, during the 1970s, economic development appeared to be increasingly malleable and open to conscious choice.

Likewise, the conception of nature changed. The protectionist movement had formerly been shaped by biocentric values: forests, waters, soils and wildlife were deemed worthy of preservation in their own right. In a certain way, nature was regarded as the antithesis of development, embodying values of 'otherness' and permanence to be safeguarded against the pressures of economic growth. With the formulation of the 'World Conservation Strategy' of the International Union for the Conservation of Nature and Natural Resources (IUCN), Worldwide Fund for Nature (WWF) and the United Nations Environment Programme (UNEP) in 1980, however, a shift in perception took place at the global level that had already taken root among American protectionists after the turn of the century: nature evolved from a treasure to be preserved into a resource whose yield had to be sustained.[2] Ever since the days of American progressivism, 'conservation' – as opposed to 'preservation' – had had a clearly utilitarian bent (Hays, 1979); what mattered about nature was its yield for human use. Forests, soils and grazing lands were discovered as necessary inputs to long-term growth, whose availability could no longer be taken for granted. Conservation, therefore, meant the efficient management of natural resources in order to optimize the yield of living resources, such as forests or fishstocks, by harvesting just as much as not to impair the rate of regeneration.

As a consequence, nature entered the debates of environmental diplomacy, including the UN Conference on Environment and Development (UNCED) in 1992, not as commons, but as a resource commanding an economic value. While the environmental movement had long advocated respect for the integrity of nature, both the climate and the biodiversity negotiations reflected a significant change in the use of language. In both cases, nature shifted from being a 'common heritage of mankind' to a 'common concern of mankind'.[3] Slight though this slide to anthropocentrism may appear, it signals that threatened resources, and not the rights of nature, have become the object of negotiations.

Significantly, it was in the 'World Conservation Strategy' that the concept of 'sustainable development' appeared for the first time. The notion of a manageable nature was thus fused with the notion of a multioptional development. The linkage of 'sustainable' to 'development', however, created a terrain of semantic ambivalence, which was later to accommodate a host of different meanings. Within the new concept, the locus of sustainability has subtly shifted from nature to development: while 'sustainable' previously referred to natural yields, it now refers to development. And the perceptual frame also changes: instead of nature, development becomes the object of concern and, instead of development, nature becomes the critical factor to be watched. In short, the meaning of sustainability slides from conservation of nature to conservation of development. Moreover, since 'development' is conceptually an empty shell which may cover anything from the rate of capital accumulation to the number of latrines, it becomes eternally unclear and contestable just what exactly should be kept sustainable. This is the reason why all sorts of political actors, even fervent protagonists of economic growth, are today able to couch their intentions in terms of 'sustainable development'. The term has become inherently self-referential, as a definition offered by the World Bank neatly confirms: 'What is sustainable? Sustainable development is development that lasts' (World Bank, 1992: 34).

The Liaison between Poverty Alleviation and Environmentalism

Another impediment to the liaison between developmentalism and environmentalism has been the gap in perception separating northern and southern countries (Biswas and Biswas, 1982). Any environmental restriction imposed on the South could only be read as an offence against the most loudly advertised mission of development planners and southern governments: the so-called 'fight against poverty'. In the course of the 1970s, however, the poor were discovered to be agents of environmental damage, and degradation was seen to affect non-industrial habitats and their living resources as well. Environmental decline could now be understood as a condition of poverty as well as of wealth; it resulted from the activities of man, and not just of industrial man. With that transition, a coalition was able to be formed between environmentalists who saw themselves helping the poor by safeguarding nature, and developmentalists who now could fight poverty through environmental protection.

With the link between environment and development, the southern countries acquired a stake in the environmental debate they had previously lacked. It was now possible for them to invoke the cherished 'right to development' in an environmental forum. Indeed, the principal interest of the South at the Stockholm as well as the Rio conference was the same and can be described in one word: development (Najam, 1995). In the diplomatic arena, this word has become a token for the long-frustrated southern desire to change the balance of power of the world in its favour.[4] 'Development' is the battle cry against exclusion. Yet the

notoriously slippery notion of 'development' generally expresses the ambition to follow the path of the developed countries. It expresses the mimetic desire of the South eventually to reach the levels of affluence which are found in the North. Once the 'right to development' is associated with the call for environmental care, however, any debate about the unsustainability of this claim is bound to be marginalized. Thus emerges the paradox that, until today, southern governments have been able to hail 'sustainable development' without ever abandoning the North as their implicit Utopia.

Yet a crucial conflict was obscured by efforts to link development and environment in the name of poverty alleviation. Southern states lay claims to the resources of their territory in order to shield themselves against northern predominance, but as a consequence to centralize control over them internally, often disregarding the rights of local communities. After all, southern societies are usually highly polarized within: power is mostly concentrated in the hands of an urban, globally oriented middle class, while large parts of the rural population in particular remain at the margin. Turning plants into genetic resources, forests into sinks, rivers into electricity or wildlife into a tourist attraction – in short, marshalling local resources for the national interest – often constitutes a threat for those local communities which may derive their livelihood from these resources. Indeed, inequality within states surfaced in international environmental negotiations only in the discussion about farmers' rights to compensation in the context of the Biodiversity Convention, but generally, most of the noisy disputes about injustice between North and South have in reality just been quarrels among factions of the global middle class.

The Brundtland Compromise

In 1987, the World Commission on Environment and Development firmly installed 'sustainable development' as a key concept of international politics. The commission succeeded in building a conceptual bridge between those who emphasized the rights of nature and those who stressed the right to justice, offering the definition which has since become canonical: sustainable development is development 'that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission, 1987: 8). The formula is grounded in the notion of time. It recalls the words with which Gifford Pinchot, the steward of Theodore Roosevelt's conservation programme, sought to bring utilitarianism up to date: 'conservation means the greatest good for the greatest number for the longest time'. But upon closer inspection, one notes that the definition given by the Brundtland Commission does not refer to 'the greatest number', but focuses instead on the 'needs of the present' and those of 'future generations'. While the crisis of nature has been constitutive of the concept of 'sustainable development', the crisis of justice finds only a faint echo in the notions of 'development' and 'needs'. In the definition, the attention to the dimension of time is not counterbalanced by an equal attention to the dimension of space. It is therefore no exaggeration to say that the canonical definition has resolved the dilemma of nature versus justice in favour of nature. But two crucial questions remain unanswered: 'What needs?' and 'Whose needs?' Is sustainable development supposed to meet the needs for water, land and economic security or the needs for air travel and bank deposits? Is it concerned with survival needs or with luxury needs? Are the needs in question those of the global consumer class or those of the enormous numbers of have-nots? That the Brundtland report remained ambiguous throughout, largely

side-stepping the crisis of justice, has not been without consequences in the years that have followed.

DISCOURSES

Statements of 'sustainable development' implicitly or explicitly position themselves in terms of the crisis of justice and the crisis of nature. Different social actors generate different types of knowledge; they highlight certain issues and underplay others. Where attention gets focused, how the problem is defined, where solutions are sought, which agents are privileged – all depends on how the debate on sustainability is framed. There is, however, one assumption that is common to all sustainability discourses: it is the hunch that the era of infinite development hopes has passed, giving way to an era in which the finiteness of development becomes an accepted truth. Yet these discourses differ drastically in the way they understand finiteness; they read the limits to development either more in terms of space or more in terms of time. On the one side, there are those who continue to see development, for all practical purposes, as infinite in time, yet who shruggingly take for granted that it will be confined to the northern part of the globe; while on the other, there are those who accept that development has no future, asserting that such a limitation offers more room for equity in the world. In other words, the discourses differ in their assessment of development and in the way they relate ecology to justice.

The Contest Perspective

With the most recent waves of economic transnationalization, competitiveness has become the urgent imperative for economic and political actors around the world. As the USA, Europe and Japan struggle for primacy while fending off the increasing strength of newly industrializing countries, and southern countries either strive to become players in that arena or labour to avoid bankruptcy, public policy is more and more shaped by this imperative.

In the light of the contest perspective, environmental concern emerges as a force propelling economic growth. Shifting consumer demand spurs innovation, trimming down resource use lowers production costs, and environmental technology opens up new markets. Ecology and economics appear to be compatible; the pursuit of both promises to be, as the magic formula goes, a positive-sum game. Growth is regarded as part of the solution and no longer as part of the problem (for example, Reilly, 1990, Fritsch *et al.*, 1993). Indeed, it is perhaps this conceptual innovation which has done most to propel environmentalism into mainstream thought. Ever since the OECD in the early 1980s raised the prospects of an ecological modernization of industrial economies (Hajer, 1995), advocating a new mix of resources, an altered structure of growth and an emphasis on prevention, a language linking business and environmental concerns has been developing. It centres around the redefinition of the environmental predicament as a problem of efficient resource allocation. Natural resources are considered grossly undervalued and therefore wastefully allocated, while human resources along with technology are underutilized; redressing the balance would basically do the job. Thus achieving 'eco-efficiency' (Schmidheiny, 1992) is proposed as the key strategy for business, a strategy of considerable innovative power. The contest perspective goes further, however; by transferring the principle from the microeconomic to the

macropolitical level, looking at society as if it were a corporation, and political regulations which do not aim at efficiency are regarded as pointless or even wrongheaded. Issues such as legislation controlling multinationals, the evaluation of technologies in the public interest and a sustainable GATT were pushed off the agenda.[5] Public authority in the realm of business activities remained taboo, an outcome which, however, fits nicely in the neoliberal Utopia of those years which purported to bypass collective human decisions (Hobsbawm, 1994: 565).

But even the contest perspective needs to look beyond the arena of competition. After all, the rich economies require more land and natural resources than are available for them within their own boundaries. Plugging into the 'syntropy islands' (Altvater, 1992) of the South had for centuries fuelled accumulation in the North, a scheme which is increasingly threatened as biophysical limits to exploitation come to the fore. As natural resources become scarce, some new regime, based either on the price mechanism or on political agreements, is mandated in order to cool down exploitation and to keep it at an optimal level. Moreover, in the 1980s, the concern for nature as a resource was complemented by the concern for nature as a sink. The absorptive capacity of the biosphere for chlorofluorocarbons (CFCs) and CO_2 appeared to be exhausted, suggesting that the scarcity of sinks is even more pressing than the scarcity of sources. However, whereas access to sources could classically be secured bilaterally through occupation or trade, securing access to sinks required limiting the emissions of a large number of countries. Making all utilize less can only be achieved multilaterally. For this reason, a new domain of international politics has emerged, in which international conventions are negotiated with the purpose of containing the claims on the biosphere. Multilateral negotiations no longer centre on the redistribution of growth, as in the negotiations about the New Economic Order in the 1970s, but on the redistribution of reductions. Given that all governments feel obliged to maximize their space for economic development, however, any reduction is seen as a loss. As a consequence, the ensuing conflicts are usually heated, up to a point where the environmental objectives fall by the wayside, as happened with most of the Rio agreements.

The search for competitive strength can live with the concept of the finiteness of development in space, but cannot concur with the notion of finiteness of development in time. For the contest perspective, therefore, the growth of civilization, and its further diffusion through 'free trade', remain unquestioned in terms of time, while their limitation in geographical space is secretly accepted. Though the bitter environmental effects produced in the North reach the far corners of the globe, the radius of responsibility remains restricted. As generally in the contest perspective, it is the South which emerges as the major arena for environmental adjustment. The strategic goal that prevails is to minimize the burden for the North and to shift the cost of environmental adjustment as much as possible to the South. Obviously, the population question figures prominently on such an agenda: after all, no issue lends itself so easily to taking the South to task, no issue grants the status of innocence so clearly to the North, as this one.

The inclination to define environmental problems in the Third World in such a way that their solution can only come from the North is a benign variant of the tendency to project responsibility onto the South. For example, the bulky 'Agenda 21' – UNCED's plan of action of about 800 pages – has been drafted largely in this spirit. It divides the world ecologically into deficit countries and high-performance countries. Environmental problems in the South are framed as resulting from insufficient capital, outdated technology, lack of

expertise and slackening economic growth. And the definition of the problem already implies its solution: the North has to increase its investments in the South, to provide technology transfer, to introduce competence in eco-engineering and to act as a locomotive of growth for the South (Hildyard, 1993). It is easy to see how the conventions of development thinking shape this outlook; once again, the South is pictured as the home of incompetence and the North as the stronghold of excellence.

The Astronaut's Perspective

Many environmentalists claim to be saving nothing less than the planet. For them, the blue earth, that suggestive globe, suspended in the dark universe, delicately furnished with clouds, oceans and continents, has become the reality that ultimately matters. Since the 1970s, the world has been increasingly perceived as a physical body sustained by a variety of biogeochemical processes rather than as a collection of states and cultures. As with the world models which lead to 'Limits to Growth', the biophysical conception of the earth as a system[6] also projects a transnational space where the existence of nations, the aspirations of communities or other human realities fade into irrelevance when compared to the overwhelming presence of the natural earth. In this way, especially within an epistemic community of scientists around the globe (Haas, 1990), a discourse has developed which constructs the planet as a scientific and political object. This community thinks in planetary terms; they frame 'sustainable development' through an astronaut's perspective.

Without photographs of the earth it would scarcely have been possible to view the planet as an object of management (Sachs, 1994). But there is a political, a scientific and a technological reason as well. Only in the course of the 1980s – with the ozone hole, acid rain and the greenhouse effect – did the border-crossing, global impact of pollution by industrial societies force itself into the foreground. Furthermore, scientists have made enormous headway in representing the biosphere as an all-embracing ecosystem, linking biota with processes in the atmosphere, oceans and the earth's crust. And finally, as happens so frequently in the history of science, a new generation of instruments and equipment created the possibility of measuring global processes. During the past decade, satellites, sensors and computers provided the means for calibrating the biosphere and displaying it in models. In fact, research on the biosphere is rapidly becoming big science: spurred by a number of international programmes (Malone, 1986), 'planetary sciences', including satellite observation, deep-sea expeditions and world-wide data processing, are being institutionalized in many countries. With this trend, sustainability is increasingly conceived as a challenge for global management. Experts set out to identify on a planetary scale the balance between human extractions/emissions, on the one hand, and the regenerative capacities of nature, on the other, mapping and monitoring, measuring and calculating resource flows and biogeochemical cycles around the globe. 'This is essential,' says Agenda 21, 'if a more accurate estimate is to be provided of the carrying capacity of the planet Earth and of its resilience under the many stresses placed upon it by human activities' (ch. 5.1). Feeling the pulse of the earth seems to be the unstated objective of a new geoscience, the planet is put under sophisticated observation like a patient in an intensive care unit. The management of resource budgets has become a matter of world politics.

The image of the circular earth underscores the assumption, fundamental to this perspective, that, because the effects of industrial civilization spread globally, the range of responsibility

of the North should also embrace the entire globe. As a consequence, the globe is considered the proper arena for environmental adjustment, and not chiefly the South, as in the contest perspective. Security against global threats is sought primarily in the rational planning of planetary conditions, not in the defence of the empires of wealth. The fragility of the biosphere put under stress by human action is the story line of this approach. It is recognized that economic development is threatened along the dimension of time. Since, however, the rational design of global conditions can never be achieved without the cooperation of many political actors, some new balance between North and South has to be found. To put it more delicately, at least some of the expectations of the less privileged parts of the global middle class have to be met if a new global order is to be achieved. In this perspective, the commitment to countering the crisis of nature does not permit neglecting the crisis of justice.

The unity of mankind, as the image of the planet demonstrates, is not merely a dream of the Enlightenment but a biophysical fact. What is required, in the eyes of global ecologists, is the translation of the biophysical reality into political fact. For this reason, numerous environmentalists have set their hopes on some political unification of the world which would provide the framework for an efficient management of global resources. Far-reaching schemes such as the establishment of a worldwide retirement fund, paid for by the North, to bring down fertility rates may be an expression of that view; so, too, the ambition to place eco-efficient investments wherever in the world they promise the highest return in resources saved, as in the plans for joint implementation under the climate convention. In any case, international regulations, global information systems, multilateral obligations and earth councils of various kinds generally are part and parcel of this perspective. Some protagonists are prepared to go further; they call for new schemes of global governance and eventually for some sort of world government. Since the inclusion of the South is imperative for such a strategy, appeals for a 'global Marshall Plan' arise (Gore, 1992). Such a plan seeks to concentrate all efforts on stabilizing the world population, developing environmentally sound technologies, modifying the economic rules of the game, concluding collective treaties and launching an information campaign for the citizens of the globe. On the horizon is the noble vision to make ecology the centrepiece of a domestic world politics which would carry out the rational organization of global affairs.

The Home Perspective

'Sustainable development' in this perspective is neither about economic excellence nor about biospherical stability, but about local livelihoods. From this angle, the number one cause of environmental degradation is overdevelopment and not an inefficient allocation of resources or the proliferation of the human species. The focus here is the goal and the structure of development, which is seen in the South as a force disempowering communities, in the North as one diminishing well-being, and in both instances as environmentally disruptive. 'Sustainable development' is suspected of being an oxymoron; in one way or the other, practical and theoretical efforts therefore aim at alternatives to economic development. Moreover, it is only in this perspective that the crisis of justice figures prominently in the debate. Internationally, conserver societies in the North are expected to expand the room for southern societies to flourish, while nationally sustainable lifestyles for the urban middle classes would leave more control for peasant and tribal communities over their resources.

Consequently, the question of whose needs and what needs sustainable development is addressing looms large in this perspective; most inquiries in the last analysis turn around the question: how much is enough (Durning, 1992)?

Despite their differences, the indigenous and rural populations in the hinterlands of the global middle classes often share the common fate of being threatened by the claims of urban–industrial developers on their resources. For when water sources dry up, fields are lost, animals vanish, forests dwindle and harvests decrease, the very basis of rural people's livelihood is undermined, pushing them onto the market, for which they have no sufficient purchasing power. Misery is frequently the result of enclosed or destroyed commons. Wherever communities base their subsistence on the renewable resources of soil, water and plant and animal life, the growth economy threatens nature and justice at the same time; the environment and the people's life support are equally degraded (Gadgil and Guha, 1992). In this context, for many communities, sustainability means nothing less than resistance to development (Tandon, 1993). To protect both the rights of nature and the rights of people, the enclosure of extractive development, a federal state with village democracy (Agarwal and Narain, 1989) and an affirmation of people's 'moral economies' are called for. Searching for sustainable livelihoods in this sense means searching for decentralized, and not accumulation-centred, forms of society.

Smaller NGOs, social movements and dissident intellectuals comprise most of the social base of the home perspective. What links the efforts of southern groups with those in rich countries is that both expect the North to retreat from utilizing other people's nature and to reduce the amount of global environmental space it occupies. After all, most of the northern countries leave an 'ecological footprint' (Wackernagel and Rees, 1995) on the world which is considerably larger than their territories. They occupy foreign soils to provide themselves with tomatoes, rice, feedstuff or cattle; they carry away all kinds of raw materials and they utilize the global commons, such as the oceans and the atmosphere, to an extent far beyond their share. Northern use of the globally available environmental space is blown out of proportion; the style of affluence in the North cannot be generalized around the globe, it is oligarchic in its very structure. From the home perspective, the North is called upon to reduce the environmental burden it places on other countries and to repay the ecological debt accumulated from the excessive use of the biosphere over decades and centuries. The principal arena for ecological adjustment is thus neither the southern hemisphere nor the entire globe, but the North itself. It is the reduction of the global effects of the North to the reach of domestic responsibility which is at the centre of attention, not the extension of northern responsibility to coincide with the radius of the effects, as from the astronaut's perspective. The home perspective believes in making room for others by means of an orderly retreat; it proposes a new kind of rationality, which could be called 'the rationality of shortened chains of effect', for meeting the crises of justice and of nature. Good global neighbourhood, in this view, requires above all the reform of 'home' in a cosmopolitan spirit.

But the reform of home is a major challenge, particularly in industrial countries. According to the current rule of thumb, only a cutback of between 70 and 90 per cent in the throughput of energy and materials over the next 40 to 50 years would meet the challenge (Schmidt-Bleek, 1994). Therefore the home perspective hesitates to overemphasize efficient resource management and attempts to focus the social imagination on the revision of goals rather than on the revision of means. For, over the longer term, saving effects are invariably

swallowed up by the quantity effects involved, if the overall dynamics of growth are not slowed down. Consider the example of the fuel-efficient car. Today's car engines are considerably more efficient than in the past, yet the relentless growth in the number of cars and miles driven has cancelled out that gain. In fact, what really matters is the overall physical scale of the economy with respect to nature, not only the efficient allocation of resources (Daly and Cobb, 1989). Efficiency without sufficiency is counterproductive; the latter has to define the boundaries of the former.

There are indications, however, that many industrial societies passed a threshold in the 1970s, after which growth in GNP no longer corresponded to a growth in quality of life (Cobb and Cobb, 1994). This is good news for the home perspective, because it encourages these voices to assume that even a shrinking volume of production would not necessarily lead to a decline in well-being; on the contrary, it could make livelihoods flourish through more common wealth.

Such a civilizational transition, however, implies new models of prosperity which are ultimately not based on permanent growth (Turner, 1995). At the dawn of the twenty-first century, it is argued, it may be conceivable that the aspirations of the nineteenth century, 'faster, farther and more', lose importance. Intermediate speeds that favour an unharried society, shorter distances that strengthen regional economies, intelligent services that replace throw-away goods and selective consumption that decreases the volume of commodities are signposts for the route towards a sustainable civilization (BUND–MISEREOR, 1996). Still, whether the principle of capital accumulation can be made compatible with the principles of a conserver society remains the conundrum of this perspective. No doubt a politics of self-limitation in the end always implies a loss of power, even if it is sought in the name of a new prosperity.

NOTES

1. Entry 'underdeveloped', *The Oxford English Dictionary*, 1989: vol. XVIII, p.960. Extensive inquiries into the history of the development discourse can be found in Sachs (1992). For the history of the word 'development', see Arndt (1981).
2. Significantly, as early as 1955 the IUCN had changed its title from the International Union for Protection of Nature to the International Union for the Conservation of Nature and Natural Resources. However, as Lee Talbot, IUCN director-general, said in his 1981 report, 'there really was no broadly accepted platform reflecting this change, no reference base for reconciling the classical requirements of nature protection and those of sustainable economic progress' (quoted in McCormick, 1986: 185). The concept of a sustainable use of resources originally came from the eighteenth-century German Forest Service (Kehr, 1993).
3. In 1989, the government of Malta, encouraged by its experience with the 'Law of the Sea', initiated the first UN climate resolution referring to the 'common heritage of mankind' (Hohmann, 1992: 525), which was subsequently changed to a 'common concern of mankind'. Likewise, while the Food and Agriculture Organization (FAO) in 1983 and the preparatory drafts for the biodiversity convention had still referred to biodiversity in this way (Yamin, 1995: 540), in the end only the formula 'common concern' was left in the convention's preamble.
4. In particular, after the 'lost decade' of the 1980s, under the burden of huge debts and losing ground in the General Agreement on Tariffs and Trade (GATT) negotiations; in short, with nothing like a new economic order on the horizon, most countries of the South were afraid of being left behind forever.
5. Through the Business Council on Sustainable Development, for instance, whose membership list reads like the 'Who's Who' of the chemical, steel and car industry, this perspective in large part shaped the results of the UN Conference at Rio de Janeiro in 1992.
6. Examples include Clark and Munn (1986), *Scientific American* (1990), Rambler *et al.* (1989), Nisbet (1991) and, in a different spirit, Lovelock (1979).

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5. 'Sustainable rural development': from industrial agriculture to agroecology[1]

Eduardo Sevilla-Guzmán and Graham Woodgate

INTRODUCTION

This chapter investigates the origins and evolution of the notion of 'sustainable rural development' from its roots in the early opposition to what, in the latter half of the nineteenth century, were already seen as the unacceptable impacts of capitalist development in the rural arena, through to the current discourse surrounding the theoretical orientation known as 'agroecology' that has been developing in the Spanish-speaking world over the course of the 1980s and 1990s. The historical roots of the concept are to be found in the debate between orthodox Marxists and populists (or Narodniki) in Russia, surrounding the agrarian question and the role of agriculture and the peasantry in the historical process. Moving into the twentieth century, the debate was taken up again as, first, the 'American Rural Life' school and later, the 'agricultural modernization' school were confronted, respectively, by neopopulists and heterodox Marxists, and dependency theorists. The essential point, however, is the emergence in the late nineteenth century, of an alternative current of thought that challenged the capitalist development trajectory.

Having established the genealogy of sustainable rural development, the chapter goes on to outline the philosophical and conceptual basis of the 'theoretical orientation' of agroecology. Here we recognize the dispute between agroecology and the hegemonic theoretical orientation which guides what we have called the 'ecotechnocratic discourse on sustainability'. What we have attempted, then, is an interpretation of the evolution of social thought, through the application of a dialectical framework which views the transformation of social thought as a result of the political struggles between various social groups.

An analysis of the origins and evolution of the notion of 'sustainable rural development' is an extremely complex task, for several reasons. In this chapter, we focus on just two of these reasons. The first relates to the fact that there is no consensus about what sustainable rural development actually means and implies, while the second arises from the fact that we could approach our analysis from so many different angles. These two problems are compounded by the need for brevity. The first problem, concerning the definition of sustainable rural development, will be approached by way of a critical analysis of the 'official discourse' that has been generated by international organizations such as the United Nations, the International Bank for Reconstruction and Development (IBRD) and the International Monetary Fund (IMF) and their many and varied commissions and working parties. The second problem will be addressed by an analysis of the historical configuration of the concept as it has unfolded within the major theoretical orientations that have arisen from and guided

discourse surrounding the 'agrarian question'. The final problem, the need for brevity, will be addressed by presenting much of what we have to say on the matter in the form of synthetic frameworks, which attempt to illustrate our argument by reference to key events and individuals. In this way we hope to portray the complexity and heterogeneity of the concept of sustainable rural development, as well as its importance in the face of the gravity of the ecological crisis to which it is so clearly linked (Toledo, 1992; Sevilla-Guzmán and González de Molina, 1993).

PRELIMINARY NOTES ON SCOPE AND METHOD

The concept of 'theoretical orientation' which we will be using is similar to the idea of 'scientific paradigms'. Clearly, however, the notion of paradigm itself has many meanings, even as it was used by Kuhn (1962) in his work on *The Structure of Scientific Revolutions*. The idea that we wish to convey, however, is that of a disciplinary matrix, within which various theoretical frameworks may develop. It is also worth mentioning at this point that we will be using the term 'theoretical framework' to refer to something as particular as Sorokin and Zimmerman's (1929) 'Rural–urban continuum' and something as generic as 'Farming systems research', which, while representing multiple theories and technical developments that have analogous political/ideological assumptions, does not possess a clear theoretical identity and thus does not warrant the status of theoretical orientation. We take a similar position with respect to the frameworks of 'ecodevelopment' and 'farmer and people first'. The important thing is to relate these approaches to more general theoretical orientations. Here we take a series of mainstream theoretical orientations and investigate their articulation in the configuration of conventional scientific thought. We also focus our attention on the way they have been challenged, at various historical conjunctures, by alternative thinking.

Conventional scientific thought claims to be objective and apolitical. Nevertheless, as has been noted elsewhere, its authority is dependent upon reciprocal processes of legitimization, which link it with the state and powerful, vested-interest groups in civil society (Redclift and Woodgate, 1993). As a result of these linkages, conventional science tends not to question existing social relations and thus the rural development praxis that it promotes often continues to legitimize the reproduction of existing social order. In contrast, alternative thinking places no particular emphasis on western science, which it regards as simply one way of knowing among many, while the action suggested by such alternative thought tends towards the transformation of social order.

Our outline and brief analysis of the origin and evolution of the concept of sustainable rural development will be limited to a taxonomic classification of the distinct theoretical frameworks that have been used to explain one or another aspect of social reality, and from which social actions in pursuit of rural development have been derived. There are obviously value judgements involved in the selection of the frameworks that are presented in the following pages. Those we have chosen are the ones which, in our opinion, have had the greatest repercussions in terms of continuity or change in rural development praxis and that are linked together in the formulation of the theoretical orientations that configure conventional scientific thought. All of these frameworks and orientations, including the actions they prompt, have their genesis in the formulation of the classical notion of progress, which we associate with the scientific revolution of the seventeenth century.

Progress is clearly a Eurocentric notion, even if it has come to dominate the globe. Scholars such as Descartes and Newton refashioned the world around a model of nature as a mechanical device. Descartes also proposed the idea that the world could be separated into two distinct spheres: those of mind and matter. 'Cartesian dualism' poses human and non-human nature as two distinct, opposing and independent realms, so that in the course of their researches people have no effect upon the world they observe and, similarly, the workings of the natural world have no effect upon the minds of their observers. It was Francis Bacon, however, who drew the conclusion that this new philosophy allowed for an objective understanding of nature which, as a result, could be rendered intelligible and 'mastered', rather than the very real limits which nature imposed on human society at that time having to be accepted.

The initial division of the world into the realms of mind and matter, the conceptual separation of humans from the rest of life on earth, was quickly followed by the further subdivision of nature into distinct compartments: if the world was a machine, it had to be taken to pieces in order to be understood. The tremendous successes of the physical sciences drove a still more impressive technological development, which engendered further confidence in the canons of empiricism, reductionism and objective monism. Thus science, through the impact of technology and the industrial revolution, replaced religion as the authority that underlay the emerging social order. Nevertheless, the processes of social and ecological degradation that are legitimized and re-enforced by 'conventional science' have their genesis some centuries earlier, as the development of navigational technology led to the expansion of European influence and a form of appropriating nature for human ends that later became known as capitalism.

The exploration of the planet both geographically and in its microscopic detail, combined with the harnessing of concentrated forms of energy and the fruits that these innovations bore, began to feed back on themselves, promoting further increases in productivity by the continued replacement of the elements and processes of natural ecosystems by elements of industrial capital and the processes of commodification. These increases in productivity and production appeared to release society from the constraints of nature and allowed the populations of the first industrial nations to expand well beyond the inherent carrying capacities or 'endogenous potentials' of local and regional agricultures. As the spread and further development of industrialization gathered pace, the reproduction of the first industrial nations soon became dependent on their access to fossil hydrocarbons and the colonization and domination of new territories and peoples – those whom Eric Wolf (1982) so perceptively called 'the people without history'.

Industrialization required a continuous supply of energy and materials from nature and the constant assimilation of the wastes that resulted from industrial production and consumption. It was accompanied by a gradual deterioration of nature and a reorganization of population through processes of urbanization. Thus the modern, industrial form of production induced increasingly severe degrees of social inequality and growing environmental instability and degradation (Sunkel and Gligo, 1980) which, together, have more recently been conceptualized as the 'crisis of modernity'. In consequence of the appearance of this crisis, the concept of sustainable development arose and it is to its genesis and development that we now turn our attention.

SUSTAINABLE DEVELOPMENT: THE OFFICIAL DISCOURSE

The concept of 'sustainable development' is, or has become, essentially shorthand for those forms of development that attempt to meet the needs of present generations without compromising the ability of future generations to meet their needs, rather than those that simply promote indiscriminate economic growth at any cost. Sustainable development will be promoted, we assume, by stimulating the establishment of economic activities which avoid and redress the damage done by previous, unsustainable, industrial growth. However, the official discourse, as represented in the Brundtland Committee report, *Our Common Future* (World Commission on Environment and Development, 1987), seems to differentiate between the meaning of sustainable development as it applies to industrial nations and its implications for countries whose economies are relatively less industrialized.

For the latter, sustainable development appears to encompass two main types of development. First, it means the realization of the potential for economic growth in those areas where basic needs remain unsatisfied and, second, it promotes generalized increases in levels of consumption so long as they remain in line with ecological carrying capacity and do not exceed levels to which all may reasonably aspire. For highly industrialized nations, however, where levels of consumption already greatly exceed domestic production and carrying capacity, sustainable development allows for the continued realization of a nation's growth potential, so long as it is not achieved at the expense of others. Such growth *will continue to be industrial in nature* as, according to the World Commission on Environment and Development (1987), industrial production is of 'fundamental importance to the economies of modern societies and an indispensable motor of growth'.

The industrial nature of northern-style sustainable development also seems to extend to agriculture. Today, as a result of the application of 'green revolution' technology, agriculture has been converted into little more than another industrial activity the deficiencies of which, suggest Brundtland *et al.*, can be overcome by 'the new techniques of tissue culture and genetic engineering [that] will soon generate plant varieties that are resistant to pests and diseases and capable of fixing atmospheric nitrogen [which] will reduce the threat of pollution by agrochemicals'. Thus it seems that sustainable development includes environmental strategies based on the continued development of supposedly sustainable industrial activities (ibid.: 218).

The definition of sustainable development which we have summarized above, while it is extracted from the Brundtland report, was the result of a dynamic gestation, which is represented schematically in Table 5.1. The various international conferences and publications that are reviewed, were the result of a multitude of scientific reports, operationalized and modified by international functionaries employed by the institutions that have arisen from the transnational articulation of nation-states (Daly, 1994). Thus it comes as no surprise that the resolutions that have resulted from these international events contain multiple contradictions.

Our brief analysis of the concept of sustainable development, together with our schematic representation of its genesis, suggest that the official definition has been immersed in a profound polemic of a multidisciplinary character. This polemic has developed between what we have already identified as the theoretical orientations of, on the one hand, the *liberal traditions of conventional scientific thought* and, on the other, a variety of *alternative discourses*. It is towards this polemic that we now turn our attention.

Table 5.1 The genesis of 'sustainable development' in 'official international discourse'

Event	Discovery/product	Character
The Stockholm Conference (1972)	Modern, industrial societies realize that there is only 'one world'	A first official recognition of environmental deterioration
The work of the Club of Rome (1972–4): 'Limits to Growth'	Realization of the impossibility of infinite growth with finite resources	The first official studies of global environmental deterioration
'Global 2000' commissioned by President Carter, published 1980, ignored by President Regan	Realization that northern lifestyles cannot be reproduced globally	A first diagnosis of the causes of global environmental deterioration
'World Conservation Strategy' (WCS) published by IUCN/UNEP/WWF (1981)	Nature conservation can be achieved regardless of human welfare in the vicinity	First global strategy for nature conservation and introduction of concept of 'sustainable development'
World Commission on Environment and Development publishes 'Our Common Future' (1987)	First official definition of the concept of 'sustainable development'	The first suggestion of an international strategy for confronting the crisis of modernity
Second WCS, 'Caring for the Earth: a strategy for sustainable living', IUCN/UNEP/WWF (1991)	Global nature conservation requires the participation of local people	Revised global strategy for nature conservation
United Nations Conference on Environment and Development: The Earth Summit (1992)	The Earth Charter (Agenda 21)	A code of human conduct for the twenty-first century
	The Climate Convention	A convention to control climate change due to atmospheric pollution
	The Biodiversity Convention	A convention to promote the conservation of biodiversity

DEVELOPMENT THEORY AND THE ORIGINS OF SUSTAINABILITY

If 'sustainable development' has arisen in response to the crisis of modernity and aims to satisfy the needs of humanity while remaining within the ecological limits of the planetary ecosystem, it seems reasonable to look for its origins in strategies that have been employed to tackle the ultimate causes of the crisis. As has been demonstrated before (González de

Molina and Sevilla-Guzmán, 1993), these causes are clearly linked to the form of appropriation of nature known as capitalism and therefore to conventional scientific thought.

The first forms of resistance to, or confrontation with, capitalism are perhaps to be found in the less industrialized countries at the time when Europe began to reproduce itself through conquest, pillage and the expatriation of great wealth and riches, while at the same time devastating local ecosystems and modifying or replacing them with a range of introduced domestic and wild species. Unfortunately, we do not have space to explore these episodes in any depth and, although we might also make reference to processes such as the Romantic Movement of the late eighteenth and nineteenth centuries, the first sufficiently well documented movement that we offer by way of example is the challenge to capitalist development represented by the Narodniki, or Russian populists (see, *inter alia*, Venturi, 1952; Walicki, 1969; Shanin, 1983).

We begin our rapid review of rural development theory, then, with a look at a debate concerning the development of capitalism in Russia in the nineteenth century. Table 5.2 presents a selection of key works representing both Marxist and populist challenges to capitalist development. In the context of the present chapter, we have characterized as 'protorural development' what has previously been called 'the movement towards the people', because it was within this historical and intellectual context that the first alternative theories of rural development, and thus the early precursors of sustainable rural development, arose. It was not until the twentieth century, however, that intellectual concern with rural development really began to grow and the future of 'rural life' began to receive both academic and political attention. Here again, there are two broadly opposing schools: those promoting the further development of capitalism (Table 5.3) and those proposing a variety of alternatives (Table 5.4).

At the beginning of the twentieth century, we can observe the unravelling of both conventional scientific thought and alternative approaches to rural development. In the USA we have the work of scholars associated with the Land Grant Colleges and the preservation of

Table 5.2 The genesis of 'rural development' in social theories concerning the agrarian question : the movement towards the people as protorural development

THEORETICAL ORIENTATION	
Orthodox Marxism	Russian populism
The progressive function of capitalism in the historical process (G. Plekhanov)	Theory of the 'backward march' (N. Chernishevski)
Unilinear nature of the historical process (F. Engels)	The subjective sociology of 'uniting with the people' (Lavrov-Mikhailovskii)
Theory of social polarization in agriculture (K. Kautsky)	The peasantry as revolutionary agents (M. Bakunin)
Theory of the differentiation of the peasantry (V.I. Lenin)	Mutual support as the motor of history (P.A. Kropotkin)

Table 5.3 Theoretical orientations and frameworks of rural development within conventional scientific thought

Theoretical framework	Key authors
The American rural life school: community development	
The 'rururban community'	C. Galpin
The rural–urban continuum	P. Sorokin and C. Zimmerman
Rural community power studies	W. Lloyd Warner and others
Theories of Agrarian modernization: integrated rural development	
Amoral kinship	E.C. Banfield
The image of the limited good	G. Foster
The modernization of peasant agriculture	E. Rogers
The stages of economic growth	W.W. Rostow / C. Clark
Economic dualism	W.A. Lewis
High-input agriculture	T. Shultz / R. Weitz
Induced technological change	V. Ruttan and A. de Janvry
Sustainable rural development	
Ecodevelopment	I. Sachs
Farming systems research	Francophone (e.g. M. Servillote, 1996) Anglophone (e.g. D. Gibbon, 1991)
Farmer and people first	R. Chambers / M. Cernea

'American rural life' (Table 5.3), while in northern Europe diverse groups of Marxists and neopopulists are found focusing their attention on aspects of peasant production which appear to depart from the logic of the market (Table 5.4). Thus we can locate the first precursors of 'sustainable rural development' in the period which runs from the second half of the nineteenth century until the beginning of the Second World War.

The links between this early version of an alternative rural development discourse and the theoretical orientation of agroecology outlined towards the end of this chapter can be followed though the work of heterodox Marxists[2] and neopopulists such Rosa Luxemburg and Alexander Chayanov and, more recently, Maurice Godelier and Theodor Shanin, as specified in Table 5.4. During this same period, however, we can also recognize the establishment of the hegemonic position of liberal theoretical orientations with respect to agrarian modernization. It was work such as Charles Galpin's (1923) seminal publication on rural life and the need to preserve it that paved the way for the extension of industrialized agriculture through the 'green revolution' in the postwar era.

THE EVOLUTION OF SUSTAINABLE RURAL DEVELOPMENT

As we have already signalled when discussing what we have called the 'official' definition of sustainable development, its theoretical configuration began at the beginning of the 1970s, when early environmentalists began to exert pressure on the legislatures of the more

Table 5.4 Alternative theoretical orientations and frameworks of rural development

Theoretical framework	Key authors
Neo-Narodniki and heterodox Marxists	
Spaces void of capitalism	R. Luxemburg
Vertical cooperation	N. Bukarin
Primitive socialist accumulation	E. Preobrazhensky
Social agronomy	A. Chayanov
Dependency theories	
Centre–periphery / world systems	A. Gunder Frank, I. Wallerstein
Internal colonialism	A. Gorz, P. Casanova González, M. Hecter
Articulation theories	C. Bettelheim, P.P. Rey, C. Meillassoux, R. Montoya
Theories of transition	M. Godelier, H. Alavi
Ethnodevelopment	R. Stavenhagen
Peasant studies	
The moral economy	K. Polanyi, E.P. Thompson
Agrarian social structure	B. Galeski
Historical peasant ecotypes	E. Wolf, K. Wittfogel, S. Mintz
Ecological anthropology	A. Vayada and R. Rappaport
Marxist neopopulism	T. Shanin, M. Godelier
Peasant technologies	A. Palerm and H. Xolocotzi
Agroecology	
Ecological economics and political ecology	J. Martinez Alier and J.M. Naredo
Agroecology (ecology and agronomy)	M.A. Altieri and S.R. Gliessman
Ethnoecological coevolution	V.M. Toledo and R.B. Norgaard
Ecological neo-Narodniki	E. Sevilla-Guzmán and M. González de Molina

industrialized nations. (We should note the earlier work of Carson, 1962, but especially that of Commoner, 1972, 1976. For a synthetic account, readers are directed towards Lenkov and Buttel, 1983.) This explosion of environmental concern in the civil societies of Europe and the USA coincided with the United Nations Conference on the Human Environment (1972). The Stockholm Conference, as it is commonly known, gave rise to the United Nations Environment Programme (UNEP) and, by establishing 26 principles concerning the relationship between people and nature, may be considered as the theoretical progenitor of 'sustainable development'. Although, paradoxically, the majority of the 26 principles refer to underdevelopment as the cause of environmental degradation, the work of the Club of Rome would soon demonstrate the gravity of environmental problems and provide scientific evidence that the rich, industrial nations were also implicated in the appearance of critical environmental degradation. Nevertheless, as we might expect of research funded by big

business, the reports of the Club of Rome stopped well short of claiming, as we do here, that the more industrialized nations had developed a form of production and consumption that squanders natural resources and energy and pollutes and destroys the natural equilibria of the biosphere (Alonso Mielgo and Sevilla-Guzmán, 1995).

It was during this intellectual and political conjuncture that the liberal, agrarian modernization theoretical orientation began to find itself in crisis. Theories such as Banfield's (1958) study on *The Moral Basis of a Backward Society*, Foster's (1965) 'Image of Limited Good', Rogers' (1969) *Modernization among Peasants* and Shultz's ideas on investing in human capital, together with *Weitz's Revolutionary Strategy for Development* (1973), began to be fiercely criticized by dependency theorists (see Tables 5.3 and 5.4). Curiously, however, rural development actions guided by liberal, agrarian modernization thinking actually multiplied in the face of such criticism.

The main criticisms of the modernization school came from a variety of heterodox Marxist sources. The idea that capitalist development in the central or metropolitan nations and cities resulted in processes of underdevelopment in peripheral countries and rural areas stemmed from the dependency theorists, while claims concerning the backwardness of rural areas in the periphery were countered by another group of heterodox Marxists that adhered to what is known as the 'Peasant Studies' school. This lively debate between the liberal modernization school of conventional science and the alternative thinkers, many of whom were citizens or residents of less industrialized nations, took place in the face of mounting problems as governments and international institutions attempted to implement more and more World Bank-funded projects in the largely agrarian economies of the South. Such policies, designed by organizations such as the United Nations Food and Agriculture Organization (FAO) and the IMF, were developed, strengthened and provided with an institutional identity in what has become known as the 'green revolution'. It was the negative impacts of the green revolution that modern science hoped to solve with a new approach to agricultural research and development that has become known as 'farming systems research'.

ON FARMING SYSTEMS RESEARCH

The term 'farming systems research' (FSR) refers to attempts to develop an agriculture which reduces the negative impacts on underlying ecological and social systems relative to those experienced with green revolution technologies. Although many authors differentiate between francophone and anglophone approaches to FSR, we wish to show here that they have many aspects in common.

During the 1970s, several criticisms of conventional agricultural research arose in France. Dumont recognized both the ecological and cultural impacts of the techniques and technologies developed using conventional approaches, while Henin and Sebillote proposed a model for on-farm research, which introduced the concept of 'technological pathways' and redefined the concept of cropping systems. Criticisms and proposals such as these led to the formation, in 1979, of a group of non-sectoral researchers within the French National Agricultural Research Institute (INRA), which was to focus its attention on agrarian systems and development (INRA-SAD) (Institut National de la Recherche Agronomique – Systèmes Agraires et le Développement).

There are two key features of the INRA-SAD approach to FSR. The first is the 'farm system' as an object for the analysis of technological pathways which allows for the management and development of both biological and economic efficiency. Key to this task was the introduction of temporal and spatial subsystems. The second feature is the emphasis on the need to locate the analysis of the farm within the wider context of the 'agrarian system' as a delimited rural social space (perhaps the parish or municipality) within which people attempt to generate income from natural resources (Gras *et al.*, 1989; Servillote, 1996; Petit, in Servillote, 1996; Bonnemaire, 1994).

Hildebrand and Poey (1989) focus on anglophone FSR, the genesis of which they also link with the problems created by the green revolution and, in particular, its failure to meet the needs of small-scale agricultural producers. The American and British approaches to FSR start by defining the purpose of agricultural production as the satisfaction of both individual and national needs (Spedding, 1988:2). The central elements of the anglophone approach include (1) an holistic perspective with respect to the socio-economic and political environment, (2) client orientation and (3) multidisciplinarity (Gibbon, 1991).

In addition to the features which francophone and anglophone approaches have in common, we would also suggest that they are comparable in terms of their failure to deal with a number of important issues. We will consider these shortcomings of FSR only briefly, preferring to illustrate them by setting out the alternative approach and agenda of the theoretical orientation of agroecology.

1. Although both francophone and anglophone FSR claim to address problems experienced at the farm level, no attempt is made to liberate producers from their technological dependence on transnational corporations and fossil fuels.
2. While a systemic approach may be evident, it fails to recognize both people and natural resources as elements of living ecosystems.
3. The multidisciplinary approach adopted by most farming systems research falls short of true interdisciplinarity and has yet to take account of the more important concept of transdisciplinarity (Leff, 1994: 41–51).
4. In the same way, while much research is carried out on-farm, the relationship is one of patron–client (researcher–farmer) rather than one of equals as developed within the Participatory Action Research movement (Fals-Borda *et al.*, 1992).
5. The holism claimed by FSR, as we have already mentioned above in respect of technological dependency, also misses the point which Maxwell (1986) makes, that structural changes outside the farm economy represent a key influence on production strategies. During the 1990s, the most important dynamic influencing agricultural production has been processes of globalization, which have yet to be considered by the FSR movement.
6. Perhaps the most important criticism to be levelled at FSR is its adherence to the epistemological canons of conventional science. Ironically, constructing linear, mechanistic models of farm systems, based on average data concerning inputs and outputs, obscures our appreciation of their dynamic nature (Allen, in Ayres and Simonis, 1994). It is our contention that the richness and vitality of agroecosystems relies upon the existence of a wide diversity in both natural and cultural elements, which cannot be understood in terms of averages.

RESPONDING TO THE CHALLENGE OF UNSUSTAINABLE DEVELOPMENT: THE CASE FOR AGROECOLOGY

Agricultural research and development only represents one branch of the ecotechnocratic discourse. Other theoretical frameworks that have arisen in pursuit of the official version of sustainable rural development have been grouped together at the bottom of Table 5.3. Together they represent the academic contribution to the ecotechnocratic discourse that feeds into policies for an officially sanctioned 'sustainable rural development'. Having outlined our critique of this official path to rural sustainability, we now lay out some of the basic tenets of the alternative thinking that is represented by agroecology.

In the second half of the 1980s, in two clear intellectual loci, a new theoretical orientation arose, and is still developing, in response to the official, ecotechnocratic discourse. In Mexico, this response started from the theoretical legacy of Angel Palerm and Efrain Hernández Xolocotzi. It has been further developed and refined in studies undertaken by Víctor Toledo (1985) and scholars from the USA, such as Gliessman (1989) and others who have spent considerable time researching and teaching in Mexico (see Sevilla-Guzmán, 1991; González Jácome, 1988). In Spain a parallel response has come from the likes of Martínez Alier (1987) and José Manuel Naredo (1987) on ecological economics and, more recently, Martínez Alier (1992) on popular ecologism. Further contributions have come through the studies of the Institute of Sociology and Peasant Studies of the University of Córdoba (cf. Sevilla-Guzmán and ISEC team, 1995).

The central tenets of this response have been synthesized in works such as Altieri's *Agroecology* (1987) and his work with Hecht (1990), *Agroecology and Small Farm Development*. The 'executive branch' of the agroecological response to the ecotechnocratic discourse is represented by institutions such as CLADES (Latin American Consortium on Agroecology and Development) in Chile and AGRUCO (The Agroecological University of Cochabamba) in Bolivia. In these institutions, research is undertaken towards the construction of sustainable rural development options for the poor, in contrast to the international organizations which we have mentioned, whose preoccupations seem to be with sustainable development for the rich.

So what is implied when we talk of the theoretical orientation of agroecology? It is clearly more than just another conventional scientific discipline, resting as it does on a critique of modern society and its bases in science and capitalism. Radical agroecology represents an attempt to break free from the fossil fuel trap in which modern society has become ensnared and promotes ecological – rather than industrial – management of natural resources and agricultural production. It represents a political endeavour as well as an intellectual challenge and draws on both 'red' and 'green' traditions in constructing its agenda for progress.

As a point of departure, then, we offer an initial definition, which we will subsequently develop in terms of its key conceptual components. *Agroecology promotes the ecological management of biological systems through collective forms of social action, which redirect the course of coevolution between nature and society in order to address 'the crisis of modernity'. This is to be achieved by systemic strategies that control the development of the forces and relations of production in order selectively to change modes of human production and consumption that have produced this crisis. Central to such strategies is the local dimension where we encounter endogenous potential encoded within knowledge systems*

(local, peasant or indigenous) that demonstrate and promote both ecological and cultural diversity. Such diversity should form the starting point of alternative agricultures and the establishment of dynamic yet sustainable rural societies.

This definition should not be taken to imply that conventional science has no role to play within systemic strategies, simply that science should not be confused with wisdom. Science should be understood as one way of generating knowledge among many (Redclift and Woodgate, 1993), while wisdom, although relying on access to sound knowledge, also incorporates an essential ethical element.

Having defined agroecology, we must now go a little more deeply into some of its key components. While we will be developing each of the concepts that we emphasized in our initial definition, we will not do so in strict order of appearance. Instead, we begin with the context in which agroecology has arisen, and which it intends to address. We have described this context in shorthand as 'the crisis of modernity'. As we have noted, this crisis relates to two major problems that have arisen from modern society's industrial perception of nature. First, in the search for equitable economic growth, we have in fact provoked an ever-widening gap between the welfare of the rich and of the poor. Rather than 'trickling down' to the poorer members of society, as elite social groups would have us believe, the material benefits of economic growth have tended to accumulate to those who control the reins of power. The second dimension of the crisis is ecological. The industrial focus of modern society has socially constructed nature as an inanimate set of resources that function as inputs to the development process. As a result of this perception, ecological structures and processes have been replaced by industrial ones, rupturing the underlying elements and cycles of the biosphere. The response of the global elite, articulated within international organizations such as the World Bank and International Monetary Fund, has been the generation of an ecotechnocratic discourse based on an 'official definition of sustainability', which suggests that ecological problems can be addressed through the further application of conventional science and industrial technology and the extension of so-called democratic structures (Sachs, 1992, 1993). Agroecology implies an alternative definition of sustainability from which is generated an ecologically (rather than industrially) oriented discourse. A central element of this discourse is the concept of 'coevolution'.

The notion of coevolution is derived from ecology, where it is used to explain the parallel development of morphological or physiological characteristics of two species such that each depends upon the other for its continued reproduction. The concept has been developed by Richard Norgaard (1994), by whom it is employed to characterize the parallel and interactive development of society and nature. The industrial transformation of nature through the application of science and highly concentrated, yet strictly limited, energy sources has, in just a few hundred years, seriously degraded the bases of renewability of all previous ecosystems. This simple fact obliges us to identify and rehabilitate such mechanisms of reproduction. Agroecology intends to undertake this project starting from an analysis of the ways in which traditional cultures have captured the agricultural potential of both social and biological systems in the course of their coevolution. Such potential is represented within knowledge systems.

Local, peasant or indigenous knowledge systems tend to differ from scientific knowledge in that they are practical and encoded in culture rather than theoretical and abstract (Toledo, 1992). In this sense the difference reflects that which we mentioned between wisdom and science (a point also made by Toledo, ibid.) inasmuch as culture has an essential ethical

element as part of its unique identity. Science, on the contrary, bases its claim to objectivity on its cultural neutrality or universal nature. That is to say, it claims to be context-independent. The problem with such a claim, we would suggest, is that, when we come to consider agriculture, we are immediately aware that it is actually defined, not just by its biophysical context, but also with reference to its sociopolitical environment.

The hegemony of the ecotechnocratic discourse that we mentioned in reference to the official response to the crisis of modernity is based on a reciprocal process of legitimization between elite groups and the scientific establishment: the ecotechnocratic discourse of elite groups in modern society builds its claims to authority on its basis in science, while science is empowered by the economic and political patrons by whom research and extension are financed. Such is the dominance of this discourse that all forms of knowledge other than conventional science tend to be dismissed as little more than myth or superstition. The radical agroecological approach attempts to rescue and revitalize local, peasant or indigenous knowledge systems and thereby re-empower local groups to take control of their own reproduction. Therefore it is also important to demonstrate the wisdom of such systems in the context of their specific biophysical and social settings and, we believe, to seek suitable mechanisms for their defence in the face of the ecotechnocratic discourse, both in respect of its negation of local knowledge and, ironically, of its cooptation such as is evidenced, for example, in the registration of genetic property rights.

Every agroecosystem has an endogenous potential in terms of the production of materials and information (knowledge and genetic codes) that arises from the historical articulation of society and nature (coevolution). Such potential tends to have been masked and degraded both in its social and ecological aspects by processes of industrial modernization. Radical agroecology seeks to utilize and further develop this endogenous potential rather than negating it and replacing it with industrial structures and processes. The social aspects of endogenous potential may be brought to light in the struggles of local groups to resist processes of industrial modernization, while the ecological dimensions are to be found in the genetic diversity of the agroecosystems that such groups seek to maintain or reclaim. Examples of these struggles can be found, not only in the peasant and indigenous cultures of the less industrialized nations, where they are represented by the now famous Chipko movement in India and the story of Chico Mendez and the plight of the Brazilian rubber tappers, but also in the industrial centre, where ecological protest movements campaign and engage in direct action against further industrialization – witness the anti-roads protest in Britain and the bioregionalists in the USA. It is our belief that the role of the agroecologist is not only to investigate the technical aspects of endogenous potential, but also to engage with the political and ethical struggles of local groups that seek to maintain it together with their local identity.

The further development of endogenous potential depends upon the ecological management of biological systems. This differs from the industrial model inasmuch as it tends to reinforce rather than override or replace the mechanisms which provide for the reproduction of nature. One of the prime characteristics of the theoretical orientation of agroecology is its respect for the ecological structures and processes from which, as an associated species, we may achieve social reproduction through collective forms of social action. In the context of the pursuit of eco-friendly pathways for agrarian development, collective forms of social action relate to the relationships which agroecologists enter into with those social groups that are attempting to challenge industrial modes of production, consumption and circulation.

As we have noted, such groups include citizens of the centre as well as the periphery: the urban and the rural.

Collective forms of social action can be employed in the generation and employment of systemic strategies, which imply a holistic approach to the redirection of coevolution between society and nature. The social factors that we need to take account of include ethnic, epistemological, ethical, religious, political and economic and gender-based elements of agroecosystems. However, rather than trying to understand them in reductionist isolation, they must be interrelated within an overall understanding of society. Similarly, we need to take account of a broad range of biophysical factors such as water, soil, solar energy and plant and animal species, in terms of the ways in which they interact, not only among themselves, but with social factors such as those we have already mentioned. Systemic strategies require an understanding of energy, material and information flows generated in processes of production, consumption and circulation within and between systems, while the redirection of coevolution towards more sustainable modes of production, consumption and circulation requires the taking of ethical decisions. With respect to production, such decisions relate to the maintenance of the potential for biological reproduction and local self-sufficiency. In terms of consumption, we must accept the necessity to achieve an equitable distribution of access to the means of social reproduction in order to maintain the cultural diversity which forms such an important element of sustainability. Finally, with respect to circulation, we must minimize the distance between producers and consumers through the dismantling of global structures and the development of alternative markets which allow for the retention of added value at the local level.

It should be self-evident from the foregoing discussion that sustainability relies, most importantly, on the existence of both ecological and cultural diversity. Agricultural biodiversity cannot be separated from natural biodiversity, given that wild genes have historically constituted a continuum within traditional agriculture, which in its many forms is a product of myriad cultural groups. Agroecology thus aims to defend the concept of cultural diversity, which it views as an important legacy for future generations. Conventional scientific thought and the politics of modernization, on the other hand, have consistently adopted an ethnocentric position, which suggests that the European experience represents the pinnacle of social achievement and a model which should be extended on a global scale. The extension of processes of global modernization promotes a vision of the world as a collection of supranational entities in a structure of increasingly interdependent social, economic and political relations under the supposedly benign control of world markets. This interpretation of social progress encompasses the endorsement of global institutions and processes as the only possible means of counteracting the crisis that is currently faced and thus represents a key element of the ecotechnocratic discourse which we need to confront.

CONCLUDING COMMENTS

For those whose interests in environmental sociology relate to the search for more sustainable options for modern industrial society, the agroecological discourse that we have attempted to elucidate in the preceding paragraphs may appear to be of little relevance or even misconceived and inappropriate. We would remind these readers, however, that fully 75 per cent of the population of this planet find themselves reliant on agriculture for their

day-to-day survival and, as we have noted, it has long been recognized that most of them will never experience the levels of resource consumption that characterize the lives of citizens in highly industrialized nations. If sustainability is to be the goal for these people, it becomes necessary to take another look at current development objectives.

The very word 'development' has been anathematized by some thinkers on the current situation in Mexico. Esteva and Illich (1986) discuss the effects of development on Mexico's peasant population. They suggest that development signifies

> having started down a road that others know better, toward objectives others have achieved ... Development signifies sacrificing possibilities, solidarity, traditional interpretations and customs, on the altar of the experts whose assessments are always changing. Development promotes getting rich but for the majority it only signifies the modernization of their poverty and growing dependence on the guidance and administration of others. (5–6)

What the agroecological perspective suggests is that any notion of development or social progress that aims to modify the modern industrial mode of production and reproduction without questioning its underlying social commitments – its basis in the consumption of fossil fuels and cultural homogenization – is restricted to tackling the proximate manifestations of the crisis of modernity rather than its ultimate causes. Sustainable societies, we would argue, must be based on sustainable agricultures, which harvest renewable energy rather than transforming fossil fuels. In reaching such a conclusion we imply a complete rejection of the homogenizing tendencies of the global modernization project and the redirection of coevolution towards more sustainable ways of living that are based upon the endogenous potential of an infinite diversity of locally relevant agroecosystems.

NOTES

1. This chapter is the result of the authors' joint participation in an Msc course on 'Agroecology for Sustainable Rural Development'. Sevilla-Guzmán established and coordinated the course and Woodgate was an invited speaker. The course was held at La Universidad Internacional de Andalucia, Ibero Americana, La Rábida, Andalucia, Spain from May to July 1996.
2. Some readers may feel that Preobrazhensky is more accurately clasified as a revisionist: that his contributions to Marxist discourse reside more easily with those of authors such as Otto Baur or Rudolf Hilferding, suggesting a shift to the right of orthodox Marxism. However, what is important to bear in mind in this instance is Preobrazhensky's credentials as an orthodox Marxist and his contributions to the construction of Russian socialism. In our opinion his key work, *The New Economics* (1965), and in particular his theory of primitive socialist accumulation, identify him as one of the heterodox, rather than revisionist Marxists. We are, we believe, supported in this position by Shanin's inclusion of his work in the classic volume, *Peasants and Peasant Societies* (1971).

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6. Environment and developing countries

Bernhard Glaeser

INTRODUCTION

Development theories traditionally ask how a structural order can be produced and how it was produced historically in any given society or in a set of societies. Socially, this process refers to institution building in the civic society, politically to nation building and economically to market building. Usually, these theories do not take into account how societies relate to and interact with nature. Interaction with nature refers to socioeconomic input variables such as matter and energy just as to the corresponding output variables such as waste and heat dissipation. To modernize or not to modernize is the theoretical core emphasis in all of the explanatory or justifying attempts dealing with development: either the industrializing process is considered to be a valid and viable strategy (theories of modernization) or the contrary is true owing to power structures inherent in world capitalism (theories of dependency). The frame of reference is usually the historical process of development in the northern halves of the European and American continents. The recent notion of the world society's ecological sustainability engenders questions concerning its compatability with economic competition on the world market (cf. Altvater, 1992: 398; 1996a: 90).

THE INTERNATIONAL SYSTEM VERSUS AUTONOMOUS DEVELOPMENT CONCEPTS

Interestingly, some of the ideas relating to western dominance in world development, as spelled out later by the protagonists of dependency theory, can be found as early as 1927 in an article written by R.D. McKenzie (1927: 28–42) who is often referred to as a founding father of environmental sociology and human ecology: 'The concept "dominance" suggests a centre and a margin of activity, an inner locus and an outer periphery' (36), whereby the [city] centre is defined as an 'area of dominance ... where the intelligence is received and transmitted, where brains and ability concentrate' (35). Next to imposing trade and plantations on the marginal tropical zone, industrialism is 'the most recent development in the expansion of Western dominance. It implies the introduction of machine industry under outside finance and management into the less industrialized parts of the world ... Modern dominance penetrates new parts of the world in catastrophic fashion; that is, large-scale industry or business breaks into undeveloped or differently developed parts of the world in a sudden and mature form'(37). Profound changes pertain to the spatial and occupational distribution of the population and include disintegrating family structures and deteriorating villages. A new economy enforces the transition from a 'self-sustaining agricultural form to

a condition of high specialization in the production of a product which is consumed in other parts of the world ... Consequently outside labour is imported'(38). 'During the first half of the nineteenth century most of the world was a frontier region to the centres of dominance in Western Europe. ... Her superior technique of communication enabled [England] to import raw materials from the ends of the earth and ship back manufactured products ... to sustain a population far in excess of the limits of her local food supply'(39). Later, 'the people of the East have gradually learned the white man's technique and scheme of organization'(40) with the result that 'new centres of dominance are arising'(42). *In nuce*, this text contains the developmental problématique with respect to socioeconomic and environmental sustainability.

On a national scale, a strategy oriented towards the poor may be opposed by the leading class and its bureaucracies in favour of a strategy to reduce foreign debts. Elements of the former strategy for rural areas would imply self-reliance by means of food crop production, concentration on local and domestic markets, regional housing and other programmes with employment and income effects. Elements of the latter strategy would be incentives for cash crops, and foreign and world market orientation: in other words, the production of standardized goods by means of capital-intensive technologies that tend to employ fewer people. A consequence of such a strategy is the decapitalization of rural areas in favour of urban ones. Ultimately, it involves the decapitalization of the southern developing political sphere in favour of the northern industrialized and 'banko-cratic' one.

Thus international financing agencies and markets may determine national development strategies and even regional and local rural development. This includes the choice of technology. Depending on political goals and development objectives, technology can be imported – this reduces development costs, and it can be capital-intensive – which secures high output. It can also have adverse ecological effects. On the other hand, it may be 'appropriate'; that is, oriented to the poor (self-reliant and labour-intensive), small-scale and environmentally sound.

The environmental factor in particular has gained increased attention in development and technology debates. International markets and agencies favour monocultures in agriculture and their equivalents in the extracting and processing industries, thus preserving lopsided economic structures inherited from the colonial times; however, it is becoming clearer that monocultural structures promote ecological disruption. This in turn brings economic problems and social inequality (Redclift, 1984). The problems associated with the technology of the 'green revolution' (Frankel, 1971; Glaeser, 1987; Conway and Barbier, 1988) need not be recounted here. Thus the limits-to-growth theme in the debate of the early 1970s has developed into the dichotomy of economic growth versus limitation of the damage incurred by such growth.

If development is understood as a 'process of social, economic and political change and growth, where people's needs for land, food, shelter, education, health care, energy supplies and improved techniques are methodically being satisfied', then a process of growth with 'the benefits accruing to a minority' while 'the needs of the majority are not being met' could be called a process of underdevelopment because it bears the 'seeds of poverty, injustice and conflict' (Mitchell, 1980: 4). In this sense, the above-mentioned social conflicts are conflicts between development and underdevelopment.

For these reasons the concepts of ecodevelopment and appropriate technology have gained in importance. Both concepts, which were developed independently, stress endogenous as opposed to exogenous factors and approaches: needs orientation, labour absorption, indigenous resources, local skills and environmental preservation versus export orientation,

import of capital goods and international division of labour with its comparative cost advantages. In other words, 'autocentric' development is propagated at least to the point where certain technological and economic levels and standards are attained, and at which further development calls for foreign inputs. The local economy is to be stimulated and dependence on foreign economies reduced, until the comparative position of the country's own economy has reached sufficient power to be successfully tied into the world market and the different countries can profit mutually and equally. Such a design follows the development pattern of the underdeveloped USA (Jéquier, 1976: 28–30) or an underdeveloped continental Europe, as they were in the nineteenth century – not the development of an industrially advanced England (Senghaas, 1982).

Appropriate technology can thus be understood as a finely honed tool for a precise notion of development. It is a means towards the end of attaining development (Evans and Adler, 1979: 24). In contrast to the earlier modernizing concepts, with their emphasis on industrial development, alternative development strategy (ibid.: 15) and theory (Nohlen and Nuscheler, 1982: 292–413) began to understand development as social development, recognizing the importance of the rural sector (integrated rural development) and emphasizing the satisfaction of basic needs as its cardinal aim (basic needs strategy). Temporary dissociation from the world market, it was argued, is a first step towards collective self-reliance as opposed to neocolonial dependencies (autocentred development, dependency theory). Finally, it was contended that development and the environment form a dialectical union, the separation of which would bring harmful results for the social development of the rural poor in their achievement of self-reliance (ecodevelopment, sustainable development).

Since not all of the concepts presented survived, it might be useful to review a few of the past and present environmental issues relating to developing countries. The following sections will identify some historical milestones, present a case example and look into environmental policy and aid before an outlook is given. Needless to say, this endeavour in such limited space cannot be exhaustive and has to be personally biased.

SOME HISTORICAL MILESTONES

The Conflict of Interest between North and South

The highly industrialized western countries 'discovered' environmental problems in the 1960s; they were also the motive forces behind the realization of the first world environmental conference, The United Nations Conference on the Human Environment (UNCHE I), held in Stockholm in 1972. In developing countries of all political persuasions, the problem either was not recognized or – in imitation of the industrialized countries – it was set aside politically for the time being. The popular line of reasoning was that compensatory developmental needs would have to be met first; there would still be time enough later for remedial environmental protection. This was adjoined to the ideological charge, made above all by Brazilian scientists, that the industrial countries were promoting worldwide environmental protection merely to protect, or even extend, their own industrial lead over and at the expense of the developing countries (Egger *et al.*, 1972: 259f).

Ten years later, at the time of the second environmental conference (UNCHE II), in Nairobi, 1982, the picture had changed. The United Nations Environment Programme (UNEP)

had been created immediately following Stockholm as a new United Nations agency; in addition to other measures, it succeeded, with the help of international experts, in initiating the theory and strategy of 'ecodevelopment' as a developmental political alternative. Again, following the Stockholm Conference, more or less effective institutions for protecting the environment were established in many developing countries, from research institutes to national environmental agencies, some of which, as in the case of the People's Republic of China, even attained ministerial status.

Apart from the effect Stockholm had as a 'political umbrella' – which must not be underestimated – the fact that the interrelatedness of environment and development could no longer be ignored, not only in the industrial sector, but above all in the economically and demographically far more important agricultural sector, certainly played a role. As a follow-up to the Nairobi Conference, the establishment of the World Commission on Environment and Development, with its permanent secretariat in Geneva, for the purpose of dealing with problems of development and the environment, provides telling confirmation of the change that had taken place in political outlook.

Of course, for different – and unforeseen – reasons, the 1980s suffered a setback. The worldwide redistribution of income and trade flows, set off by, among other things, the shock of the second oil price increase in 1979, brought about a recession of many years' duration, the effects of which were felt in more or less all the industrialized nations. The consequence for the developing countries, whose exports suffered a drastic decline, and whose attempts at development could thus no longer be financed, was the accumulation of debt on a hitherto unknown scale. A new economic world crisis – cancellation of repayment on the part of the large, especially Latin American, debtor nations would have inevitably led to bank failures on a grand scale, thus spreading the crisis to the western creditor and industrialized nations – was only narrowly avoided. The solutions took the form of a moratorium and rescheduling; that is, suspension of, or delay in, repayment. The political price for this was high: increased dependence on the international banks, which demanded the imposition of austerity measures, which led above all to reductions in welfare for the lowest population strata, thereby increasing the potential for revolutionary upheaval; and, of course, investments in the environment also fell victim to the cutbacks.

This has resulted in the current dilemma: on the one hand, the long-term importance of preventive environmental policy to the developing countries has become more apparent than ever, namely for the creation of job opportunities, the promotion of modern technology, improvement in health care facilities and natural resource conservation; on the other hand, however, short-term limitations on financing nip these considerations in the bud, since there are not even enough funds to sustain conventional development programmes.

Sustainability was the normative goal widely agreed upon during the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992. It could not, however, prevent the emergence of conflicting 'paths' for achieving that goal (Martínez-Alier, 1993; Jordan, 1994). While the economically developed North by and large has preferred to rely on technological fixes and emission reductions in both the South and the North, the developing South initiated the change of lifestyle debate that basically put the environmental burden and clean-up cost onto the North. Eventually, and this was not an easy achievement, the conventions on climate change and biological diversity were signed, and two politically important instruments, the Rio Declaration and Agenda 21, were adopted.

In pursuing their various development strategies, most nations of the Third World have tried to follow the route taken previously by the industrialized countries which, they are convinced, will lead to success. Observable success in many areas notwithstanding, striking failures cannot be denied. Seen from the social perspective, income disparity – the gap between rich and poor – has worsened in many cases. Looked at from the point of view of ecology, the environmental problems resulting from industrialization, modernization of agriculture and urbanization were greatly underestimated.

Damage to the Environment Resulting from Agriculture, Industry and Urbanization

The following main forms of rural environmental damage are discernible (Egger, 1985): the tropical forests are disappearing, being transformed into savannahs, owing to the fact that they are being completely cleared, sometimes burnt over, instead of being utilized carefully. Moist, richly-wooded savannahs are turning into steppes, their soil eroded because of overgrazing. In a similar manner, highland soil quality is deteriorating and the forests there are being destroyed. In steeply inclined areas especially, erosion pours sand and gravel into the rivers, which then sweep them into fertile plains and valleys. Run-off is increasing, the water balance becoming upset, and the climate is adversely affected. The 'genetic reservoir' is diminishing because living space for wild flora is being reduced and standardized, high-yield monocrops are spreading. Thus environmental disorders seem to result largely from the use of ecologically unsuited agricultural and forestry production methods, hence they are anthropogenic, or man-made. Natural disturbances, such as changes in climate, flood or drought disasters, only serve to exacerbate the negative effects of incorrect behaviour; they are not, however, the sole cause.

The impact of industry on the environment is essentially the same as in the industrial countries, though it must be noted that there is a definite lack of information concerning this issue, and special regional aspects must also be taken into consideration (Hartje, 1985). In some cases, the degree or the intensity of environmental impact far exceeds that of the industrial countries, since relevant industries are concentrated mostly in a few locations, namely the capital coastal cities, and in many countries environmental protection measures have not yet attained the political importance attached to them in the industrial nations.

Mention must first be made of water pollution. Water for drinking and irrigation is taken from open sources, and is at once the most important and most endangered raw material. The poorest rural population strata, who are forced to rely on this kind of water supply, suffer especially from danger to their health, and from declining fish yields, which in many cases constitute their sole source of protein. Then there is the importance of water to hygienic, problem-free waste disposal. It was the awareness of the importance of water as a source of life that prompted the United Nations to declare 1981–90 to be the International Drinking Water Supply and Sanitation Decade (Glaeser, 1983).

Air pollution, mostly only SO_2 and dust measured in the urban conglomerates, is caused mainly by industry, energy conversion and traffic. In the industrial sector refineries, chemical production and the manufactures of fertilizers, textiles and cement are especially significant. In the energy sector, above all it is coal-burning power plants and rural burning of firewood and dung that represent the chief sources both of energy and of pollution. In the area of traffic, similar to the situation in the industrialized nations, the concentration of cars and street traffic has increased greatly. Here it is even more apparent than in the agricultural

sector that the choice of production technique plays a decisive role in determining the type and extent of environmental impact that will occur; thus environmental destruction is an anthropogenic process.

The emergence of urban conglomerates must be seen within the context both of industrialization and of rural area development (Hübler, 1985). Population growth, industrialization, rural–urban migration and, last but not least, the appeal of the metropolises contribute to their expansion. Population figures for the new metropolises have long since surpassed those of the 'classic' capitals of the industrial nations. The mere fact that millions of people live together in the smallest possible space places excessive burdens on available resources, absorption capacities and infrastructures of every type. Bottlenecks occur in supply (above all, drinking water), disposal (refuse, sewage) and regeneration. Open spaces, including those that are used in accordance with traditional farming methods, are being pushed ever farther out of the cities, thus limiting ecological balance functions. (For aspects of global environmental change, see Smil, 1993.)

Ecodevelopment and Ecofarming: an Alternative Historical Approach

Ecodevelopment, as the new paradigm of the 1970s which simultaneously emphasizes the ecological foundations and constraints of development, encompasses the ideas underlying previous and contemporary non-modernizing concepts. Historically, these concepts have not only had a strong rural bias, but also have been strongly oriented towards agriculture. This may be related to the fact that international development aid concentrated on agricultural development and that a revival of ecologically oriented farming methods in tropical regions resulted in some early successes. Since the early 1970s, after the United Nations Environment Programme (UNEP) was founded, a great deal of theoretical insight, as well as practical experience, was gained in the fields of ecodevelopment and ecofarming (Glaeser, 1984, 1995a; Rottach, 1988; Sachs *et al.*, 1981; see also: Nerfin, 1977; Stokes, 1981; Tolba, 1987; UNEP, 1982; World Commission on Environment and Development, 1987).

Thus ecodevelopment advocates an alternative concept of development as a policy and strategy containing three main elements:

1. *Needs*: compatibility with social needs and wishes. This includes participation in the process of development and involves the poorest segments of the population.
2. *Self-reliance*: compatibility with local human and natural resources. This includes a strategy for creating income or employment on a local basis.
3. *Environment*: compatibility with the surrounding human–ecological system. This includes energy-saving technologies to preserve the ecological basis of economic development.

Ecologically appropriate production methods, in short, ecological farming (Rottach, 1988), constitute the agrotechnical application of ecodevelopment. The principles of ecofarming may be summarized under three following key headings: ordered diversity, cyclic economy and biological erosion control. Aided by the application of these principles, ecofarming maintains and improves soil fertility, which is based on soil quality, water supply and bioecological potential. A comparison of ecological and conventional agriculture (see Table 6.1) will serve to show that the seed–fertilizer–technology model relies on incomparably

Table 6.1 Alternative farming methods

Seed–fertilizer–technology	Ecological farming
productive simplification of the system	productive, guided system diversity
specialization	product diversity
separation of tree–field–fodder	integration of tree–field–fodder
cultivation or animal husbandry	cultivation and animal husbandry
specialized crops	multi-use crops
linear, material and energy throughput	self-sustaining material and energy cycles
fertility through (artificial) fertilizers and pesticides	fertility through high biomass turnover
high inputs	low inputs
high yield	medium yield
low stability	high stability
intensive mechanical processing	moderate mechanical processing
mechanical erosion control	biological erosion control
arrangement using fencing	arrangement using hedging
susceptible high-yield varieties	resistant medium-yield varieties
monoculture	polyculture
weed elimination	tolerance of weeds

Source: Egger (1979: 241f).

greater use of athropogenic energy. In addition, the environment is occasionally subjected to overdoses of agrochemicals.

Needs-oriented Development

'Can we meet basic human needs without transgressing resource and environmental outer limits?' This was the fundamental question raised in the mid-1970s by Maurice F. Strong, then Executive Director of UNEP (Matthews, 1976: 9). The question combined the problems of a participative sociocultural approach and environmental sustainability. The solution, local self-reliance with regard to material and know-how, led to the strategy of ecodevelopment, as discussed above.

Apart from their historical and cultural foundation, do needs not have a common denominator? If a North Indian asks for roti (bread) and a South Indian for rice, both are hungry. If an African desires a round hut and a European or North American a rectangular bungalow, both wish to be protected from environmental threats. So are there not 'universal needs', irrespective of their historic/cultural or individual concretization? In this sense, needs can be defined as 'those human requirements calling for response that makes human survival and development possible in a given society' (Masini, 1980: 227). Thus needs that can be termed universal are mediated by historically and culturally bound desires to achieve concrete and individual goals of satisfaction. This distinction between need and desire is a necessary one in theory (*distincto rationis*). It is in this context that the integration of the two 'schools' of needs, the 'universal' and the 'historical' (Lederer, 1980: 3, 8), is not only of practical, but of theoretical necessity.

Needs (and desires) are based on the physical/physiological and the psychic/spiritual components of human beings. Aristotle differentiated between external goods, goods of the body and goods of the soul (*Politics*, 1323). From this evolved a clear distinction between physical and psychic needs in the following centuries, resulting in a hierarchical order of basic and secondary, of lower and higher needs (Glaeser, 1980: 314). Needs dynamics were discovered by including satisfaction mechanisms: 'The satisfaction of every single need calls immediately for a new need, be it farther reaching, be it higher' (Brentano, 1908: 58, author's translation). In a similar vein, Abraham Maslow, perhaps the most influential founder of needs research, states as a consequence of his empirical research:

> At once other (and higher) needs emerge and these, rather than physiological hungers, dominate the organism. And when these in turn are satisfied, again new (and still higher) needs emerge, and so on. This is what we mean by saying that the basic human needs are organized into a hierarchy of relative prepotency. (Maslow, 1970: 38)

Maslow's well-known needs system ascends from physiological and safety needs to the need for belonging and love, the need for esteem and the need for self-realization. As a rule, non-satisfaction of lower needs prevents the formation of higher ones; the closer the needs are to the upper end of the scale, the less they are satisfied. The major criticisms of this 'classical hierarchization' of human needs within and outside development have been the following (Mamali, 1979: 9–13): (1) the motivational hierarchy is not rooted in time and space; it exists outside the sociocultural context and is identical for different personalities and communities; and (2) the ranking order is static in character, overlooking social relations; the one-way transition from bottom to top does not account for changes in the previously existing lower needs.

While the concept of ecodevelopment, in accordance with ecofarming technology and the basic needs approach, was the first attempt to take account of the growing environmental concerns and problems in developing countries, it was criticized for not having produced a macro theory of development (Bruckmeier, 1994a: 162–71). Indeed, ecodevelopment was explicitly grassroots and project-oriented, serving the poor at the local level. Propagating self-reliance at the household and village level, it could be linked to the sociological macrostrategy of autocentred development, with emphasis on the rural sector. In fact, those countries whose developmental policies show the closest affinity to ecodevelopment, such as Tanzania, Nicaragua and China, are the ones that dissociated themselves from the world market, at least temporarily. Sustainable development, in a way ecodevelopment's successor, displays a somewhat more systemic orientation, demanding structural changes in the world economic system, while theory and practice of transformation into a more 'sustainable society' (Milbrath, 1989) still remain unclear.

CHINA AS AN EXAMPLE

While China had appalling pollution problems from the beginning of the Mao Zedong era, there were also attempts made as early as this to alleviate some of the difficulties. Many of the efforts concentrated on the health of the affected population, but also had an environmental impact. However, the Stockholm Conference in 1972 seems to mark the turning point where environmental considerations were afforded greater attention than previously.

The UNEP and its ideals were the catalyst behind China's more recent environmental policy programme. China's development approach was an ecodevelopment approach, whether intentionally or accidentally, because it held to the conviction that environmental considerations were an integral part of development policy and, ultimately, economic and ecological issues could not be reasonably separated. This conviction was very obvious in China's rural development policy, as is well illustrated by the integrated pest management (IPM) programme, energy policy and biogas development. It was less obvious in Chinese urban industrial policy, in whose earlier stages strategies such as waste recycling and energy saving were strongly promoted only for economic reasons. As public health deteriorated and working conditions steadily worsened, and as environmental hazards and the effects of environmental damage in rural and urban settings made themselves felt, it became clear to the Chinese leadership that neglect of these factors also had serious implications (Glaeser, 1987b).

On the other hand, environmental policy in China was never fully or altogether successfully implemented, despite its serious intention, consistency and bureaucratic support. Several factors account for its shortcomings. China, a developing country as large as Europe, made some specific achievements in environmental policy, but it simply lacks the financial resources to install expensive technology on a large scale. There was little incentive at factory level to implement cost-intensive policies. There was little enforcement of policy through fines by state authorities, because this would imply the state *as* property owner taking money out of one pocket and putting it in another. Successive failures of economic reforms suggest that environmental protection policy is useless if, at the same time, economic reform abolishes the very institutions needed to implement policy measures: for example, China's IPM programme and, to some extent, the biogas programme, were dependent upon the collectives, but these institutions were abolished by agroeconomic reform (Glaeser, 1995b: 86–107).

Still a certain consistency in China's environmental policy despite political changes can be traced in part to the Chinese heritage. It was in fact not so very long ago that Chinese society was an agrarian society completely dependent upon natural recycling, the reuse of agricultural wastes, the use of organic fertilizers, biological pest control, multicropping and low energy inputs – in short, what can be called 'ecofarming' techniques. This approach to agriculture was, to some extent, transferred to industrial production.

Another attempt to explain China's consistency in environmental policy maintains that dialectical materialism was already deeply rooted in Chinese thought and attitudes. The notion of 'walking on two legs' means that two opposing or apparently contradictory approaches are just two sides of the same coin. Differing approaches may eventually be combined but, in any case, each may stand in its own right. In matters of agricultural production, for instance, this attitude still pervades the thought of Chinese planners; it ensures that any one of two ways is never really completely eliminated. This kind of thinking has its roots in Taoism, whereas the pervasive benevolent Chinese attitude towards nature is inherent in Buddhist ideas. But how can we explain 'un-Taoist action contrary to nature' (Tuan, 1968, cited in Callicott and Ames 1989: 283) such as the construction of the Great Wall, massive deforestation and, more recently, devastating air and water pollution?

Some authors (Yu, 1987) maintain that a major factor behind Mao's political success was the adaptation of Marxism, in the sense that Chinese philosophy, including its practical bent, was reconstructed for evolutionary purposes. Thus Mao's interpretation of the classical

Confucianist debate on the relationship between knowledge (*zhi*) and practice (*xing*) was in accordance with the neo-Confucianist philosopher Wang Yangming (1472–1528) in that it emphasized the unity between the two: 'To discover truth (knowing) through practice (doing), and through practice to verify and develop truth' (Mao, 1965: 308, cited in Yu, 1987: 27).

ENVIRONMENTAL POLICY AND AID

Two conclusions from the preceding discussion become readily apparent. First, just as in the industrial nations, the ecological destruction just described, including the disasters, are anthropogenic; that is, they are caused by the behaviour of human societies, especially by their settlement patterns and their productive activities. On the other hand, such environmental damages are functions of poverty. Regardless of whether we are dealing with industrial technology that fails to apply proper filtering techniques, or the continuation of traditional methods of agriculture, including the burning of woodlands for cultivation, these phenomena have come about in societies that are underdeveloping or, at least, capital-poor.

Is there a 'correct' development strategy? Thailand's model of unrestricted capital growth apparently is not, since it is accompanied by severe social and environmental problems, not only in Bangkok, but at the periphery as well (Donner, 1985), due in this case to poverty. Nor does an oil-rich land like Saudi Arabia serve as a positive example; there, cheap, subsidized energy encourages waste, in addition to the wealth-related impacts we are already familiar with in the industrialized nations: in agriculture (poison in the soil), industry (water and air pollution) and urban conglomerations (traffic, noise pollution and air quality problems) (Freyer, 1985).

Even individual developmental projects that previously went unchallenged, such as dam construction for purposes of irrigation and the production of energy, have come under fire because, apart from immediate, negative impacts on surrounding settlements and ecosystems, they present still more far-reaching political problems once these impacts have crossed boundaries. Either neighbouring countries' vital supplies of water are cut off upstream (Stottele/Meuer, 1985) or just the opposite: such a project can endanger the physical existence of a modern harbour facility by retaining deposits and sediments, as in the case of Togo's capital city, Lomé (Sharma, 1985).

Where are the mistakes that can be avoided, the first signs of a solution, to be found? No one would argue in favour of demodernization, or indeed deindustrialization. What remains, then, is a sustaining modification of the chosen development strategy (cf. Norberg-Hodge and Goering, 1992). Power politics and *raison d'état* considerations, however, may impede the implementation of environmentally sound policies. There are abundant examples, from Assuan in Egypt, to Tucurui in Brazil, of the destruction of ecological and social systems brought about by the construction of large dams (Omo-Fadaka, 1983; Augel, 1983; Boschmann, 1983; Schwefel, 1985; Monosowski, 1986). Moreover, in countries such as Kenya, nomads are being forced to adopt a sedentary way of life, completely irrespective of whether or not the environment – in this case semi-arid areas – can sustain them. In addition, mountain tourism is being encouraged in Nepal which, while it most certainly is bringing about the destruction of forest resources, is of dubious benefit to the people who live there. Finally, in Sudan, for religious reasons, the peoples who live in the south are being subjected

to brutal repression; cultural uprootedness strengthens the domination of the Islamic north; no heed is given to ecological aspects.

In international development discussions, NGOs are usually referred to as the 'other side' of institutionalized development policy: they are seen as an alternative to governmental development policy (Princen and Finger, 1994: 217–36). They are perceived to be more flexible, more grassroots-oriented and to have stronger links with the rural poor (Stucke, 1990: 181–2). In developed countries, NGOs include private development organizations which function as donor agencies to organizations in the Third World. NGOs in the latter category act as catalysts; they receive funds from various sources and spend these on target groups directly (Panda, 1987: 512).

Many expressions are used to describe such bodies. They are called for instance, 'voluntary organizations', 'voluntary agencies', 'development groups' or 'action groups'. In fact, each of these are only vaguely defined and include a battery of NGOs with different goals, activities, philosophies and scope (Jessen and Nebelung, 1990: 271–3; see also Roy, 1987: 17–19). They can be categorized into four groups according to their goals and functions: relief and charity, development, social action and, finally, support, documentation and dissemination.[1]

Self-help groups, based on traditional organizations, village communities and women's schemes (see among others, Conroy and Litvinoff, 1988; Agarwal and Narain, 1989; Cernea, 1991), have taken up actions to improve the access to local resources and to counteract environmental deterioration. Environmental self-help projects represent a novel type of environmental action (community-based: Korten, 1987: 1–12; people centred: Ickis *et al.*, 1986: 240–51) which overlaps the new concept of institution(al) development.

'Institutional Development in Environment' (IDE) and related concepts 'Environmental Capacity Development' or 'Environmental Institution Building' may be considered integrated approaches in that they are understood as holistic, following a systems approach and being process-oriented. They promote self-help and strengthen indigenous institutional capacities (see, among others, van Reenen and Waisfisz, 1988; Bruckmeier, 1994b; Bruckmeier and Glaeser, 1992).

The IDE concept was adopted by the Development Assistance Committee (DAC) of the OECD in the late 1980s. Its main features are that the development of environmental institutions has to be viewed as an open process within society that involves different types of institutions (governmental and non-governmental, including universities and business companies) and transcends sectoral (agriculture, industry, tourism) strategies. Traditional project aid is more or less abandoned. The new development 'expert' is more of a mediator or facilitator who advises on how to initiate environmental organizations and social change or to solve conflicts (Bruckmeier, 1994: 235–58). The key actors are northern and southern NGOs, and social and grassroots movements (Korten, 1987 and 1989; Cernea, 1988; Jessen, 1990).

To achieve sustainable development, two preconditions have been identified. First, the social target groups, structures and systems have to be assessed and involved in research and decision making. Recently developed research methods in development practice include 'participatory action research', 'participatory rural appraisal' and 'recherche–action' (Chambers, 1983; Cernea, 1991; Schönhut and Kievelitz, 1993; Schneider and Libercier, 1995). Second, the competence to perform and implement decisions among the groups involved has to be developed (Redclift, 1992: 257).

In evaluating IDE, one should stress that it represents, for the first time, a strategy of development that does not primarily rely on imitating industrialized countries. Culturally specific implementation is necessary, a universal approach being impossible. While in practice IDE has been adopted by a multitude of donor nations and organizations, including the World Bank's environmental action plans in Africa, it remains to be seen whether IDE may be transformed into a new instrument of western dominance, by introducing new environmental conditionalities connected to the aid received.

PRESENT TRENDS IN DEVELOPMENT THEORY

The crisis in development theory became visible for the first time in the 1970s, when the notion of modernity as such was called into question. The traditional (Third World) and the modern (industrialized world) were conceived of as two developmental stages that coexisted in time and that would eventually merge into a single, global industrial or post-industrial society. Failures, malconceptions and lack of success in the practice of development aid led to a distrust of modernization theory and its sociological underpinnings as represented by Talcott Parsons' duality of structure and function. The Latin American notion of structural dependence (for sustainability aspects, see Altieri and Masera, 1994) replaced the Euro-North American notion of structural change. Both of these opposing approaches and, actually, world views were challenged in the late 1980s by a new concept (which had its predecessors), sustainable development (World Commission on Environment and Development, 1987). It must be pointed out, however, that the new view has not yet led to conclusive theoretical developments. Politically, the 1990s witnessed a powerful revival of modernization after the collapse of the Soviet Union and with the emerging needs of the underdeveloping East European societies to catch up with the West, again, after half a century of suppression.

In fact, when scrutinizing present-day approaches in development theory, it becomes apparent that sustainability concepts by no means prevail. The leading (policy-oriented) development journal in Germany, *Entwicklung und Zusammenarbeit* (Development and Cooperation) devoted two special issues to the topic of new approaches in development theory (*Entwicklung und Zusammenarbeit*, 10/1995 and 2/1996). Out of seven approaches and contributions, four dealt with economic issues, two were political science-oriented with a strong economic slant and only one featured sociological issues. The thematic of environment and/or sustainability was touched upon only marginally by the two political scientists. Since the selection seems to represent the mainstream thinking in the field, it may be worthwhile to have a closer look at the topics presented.

The general trend is that the breakdown of the 'socialist camp' and of the post-Second World War world order has led to a revisiting of theories and strategies of development (Shaw, 1994: 59–82). The lack of success of anti-capitalistic models had to be admitted while at the same time it was stressed that the capitalistic ones needed more democratic inputs. Above all, the overwhelming importance of the market was stressed, and doubt was expressed as to whether the same model could be applied to all societies.

Human capital was featured twice as the motor of development in the sense that it would be the trigger to enhance endogenous, market-oriented development (Gundlach, 1995; Hemmer and Wilhelm, 1996). New theories of economic growth build on this idea; their key issue is to reduce consumption at present in favour of investments for the future – not

exactly a brilliant prospect for the poor masses in the 'Fourth World'. The other two economic contributions emphasize the need to build up competitive competence for world market integration (Eßer *et al.*, 1995) and the importance of the finance sector and monetary instruments for trade and aid (Schelkle, 1995).

The sociological contribution reviewed the concept of autocentred development, as introduced by Samir Amin in 1974, and its revisions since. Endogeneity as a prerequisite for good governance was stressed, acknowledging that most developing societies are agrarian societies (Hein, 1995).

The political scientists point out that the western development model in its most triumphant moments appears to be neither desirable nor universally applicable because it is simply not sustainable. What is to be applied universally, however, has been consensually identified in four normative principles: participative democracy, free market economy, enforcement monopoly by the modern state and human rights (Tetzlaff, 1996). The western dominant bonanza economy, however, cannot cope with ecological restrictions, sinks and the planet's carrying capacity. The new development paradigm will have to reckon with entropy limitations and to apply thermodynamically oriented economics to the management of the global ecosystem (Altvater, 1996b).

These approaches not only represent different university disciplines (cf. Cernea, 1991: 12–32), they also show different values being attached to development (Haila and Levins, 1992; cf. Friedmann, 1992). One could interpret the involvement of the issue of environmental sustainability in this sense, and the same may hold true for most of the historical attempts to tackle the problem from the theory, policy or planning point of view. We may call them phases or simply fashions or fads, depending on the stance taken. These notions include human needs, human rights, intermediate or appropriate technology and capacity or institution building, to name a few. Many of them originated in the 1970s, a decade still filled with developmental optimism. And, as values and attitudes are closely related to ethics and behaviour, the 1970s were a period abundant in ethical imperatives on the necessity of 'catch-up' development, but the instruments proposed did not always comply with the chosen goals.

So when it comes to sustainable development as a, perhaps, new development paradigm not only in political practice (OECD, 1995; World Bank, 1995), but also in theory (Redclift and Benton, 1994), a critical frame has to be developed that enables the theoretical reconstruction of sustainability in light of the prevalent current and historical agenda in the studies of development. Merle Jacob suggests three aspects (to which I add another two) to be treated while taking up critical theory as the framework to reconstruct sustainable development.[2] First, the notion of modernity in its relation to development (Norberg-Hodge and Goering, 1992) has to be problematized in that the West European enlightenment project from Descartes to Kant turned into what serves the donor nations export interests. Second, an environmental critique of technology has to be put forward, much of which, perhaps in a less reflected way, can be found in the appropriate technology debate of the 1970s. A critique of technical reason refers back to Habermas' (1972) critique of science and technology as ideology, to Horkheimer's and Adorno's (1947) critique of enlightenment and, of course, to Kant's (1787) critique of pure reason. Third, with the thawing of the cold war, the continuing critique of military security affects the developing world. The ecological security concept (Langlais, 1995) transforms the notion of sustainable development into a conflict solution approach for the management of scarce resources. Fourth, the feminist

critique of development practice as relating to the dominance of male-oriented western scientific thinking (Shiva, 1989; Jacobson, 1992) has to be taken into account. Fifth, the relation between theory and practice in development has to be scrutinized. The failure of grand theory is concomitant with the end of the Third World, as Menzel (1992) puts it, after the fall of the Soviet Union and the decline of the 'Second World'.

All of this amounts to a critical merger of the discourses on environment and development in light of a future theory (Gupta, 1988; Hein, 1990; Dietz *et al.*, 1992). While this may be the task of tomorrow, acknowledging the fact that even the environment and development-oriented sub-disciplines within sociology have hardly touched upon one another, the interaction between them may present a new and promising approach (Buttel, 1987: 484). This may, in particular, refer to sociological attempts to understand the process of globalization (Buttel and Taylor, 1992; Shaw, 1994: 3–27; Milbrath, 1994). At the same time, the links between environmental questions may be nominated as among 'the most conspicuously global of contemporary cultural issues' (Yearley, 1996: viii). The nature–culture interface should include anthropological perspectives (Descola and Pálsson, 1996). No doubt nature is a cultural concept to which different values are attributed. These values differ between social groupings and societies, eventually leading to a value-loaded North–South divide. Environmental globalization has to acknowledge cultural differentiation at the national, regional and local level. The 'global village' represents the dialectics of unity and difference.

NOTES

1. Eldridge identifies six types of 'community action groups': (1) charitable groups, (2) development-oriented groups, (3) action groups that emphasize mobilization and organization, (4) federations of action groups or community organizations, (5) groups referred to as 'pre-party political formations', and (6) support groups (Eldridge, 1984: 412–14).
2. I owe this idea to discussions and seminars with Merle Jacob in Gothenburg in 1996.

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7. Society's metabolism: on the childhood and adolescence of a rising conceptual star

Marina Fischer-Kowalski

INTRODUCTION

In one of the founding articles on environmental sociology, Catton and Dunlap (1978) claimed it would not suffice if environmental sociology turned into just another subgroup within the discipline. Instead, it would have to offer a new paradigm, a fundamental concept of society differing from the hegemonic 'human exceptionalism paradigm'. This new paradigm should view humans as but one of many species interlaced in the 'web of nature', in which purposive human action produces many unintended consequences, and it should accept that the world is physically and biologically limited (Catton and Dunlap, 1978: 45; see also Catton and Dunlap, 1980). This paradigm should support the study of interaction between society and the environment, the core task of environmental sociology (Schnaiberg, 1980). Could a view of society as having a material and energetic metabolism and, therefore, depending upon continuous energetic and material flows from and to its environment, provide a core concept of such a paradigm? And could the study of the social (that is economic, technological and cultural) regulation of society's metabolism become a genuine sociological task of highly practical value in view of the ecological problems confronting industrial society? Contemporary research on human-induced global environmental change increasingly focuses on two broad and overlapping fields of study:[1] One of them is industrial metabolism,[2] focusing on the flow of materials and energy in modern industrial society through the chain of extraction, production, consumption and disposal. This has been the subject of multidisciplinary work engaging mainly scientists from physics, chemistry and engineering, from the life sciences and from economics. Sociological competence so far has hardly entered the field.[3]

This chapter will investigate how the concept of metabolism *has* been applied to human social systems, and whether it *should* be applied. We first elaborate on the biological meaning of this term and its uses in ecology, and then review some of the early uses of this notion in sociology, cultural anthropology and social geography.[4] Finally, a discussion of some of the epistemological preconditions for importing this term into sociological theory and a tentative suggestion of ways in which some of the problems might be resolved are followed by a brief assessment of the outlook for the future.[5]

The awakening of environmental awareness and the increase in cultural acceptability of a critical view upon economic growth during the late 1960s triggered a breakthrough of concern for society's metabolism under a new perspective (Wolman, 1965; Ayres and Kneese, 1968, 1969; Meadows *et al.*, 1972; Daly, 1973). There followed more than two decades of

relative stagnation: the 'size' and 'growth' – perspective receded before the predominance of pollution and toxicity, and sociologists focused on enviromental (social) problems and movements. Now, in the 1990s, there is a virtual explosion of research dealing with industrial metabolism, and the term itself has been (re)born (Baccini and Brunner, 1991; Ayres and Simonis, 1994; Fischer-Kowalski and Haberl, 1993; Lehmann and Schmidt-Bleek, 1993) as a powerful unifying concept to relate the functioning of society to its consequences upon the environment. But this is the part of the story which is not told here.

METABOLISM IN BIOLOGY AND ECOLOGY

One of the standard textbooks in biology, Purves *et al.* (1992: 113), reads:

> To sustain the processes of life, a typical cell carries out thousands of biochemical reactions each second. The sum of all biological reactions constitutes metabolism. What is the purpose of these reactions – of metabolism? Metabolic reactions convert raw materials, obtained from the environment, into the building blocks of proteins and other compounds unique to organisms. Living things must maintain themselves, replacing lost materials with new ones; they also grow and reproduce, two more activities requiring the continued formation of macromolecules.

And, a little later:

> Metabolism is the totality of the biochemical reactions in a living thing. These reactions proceed down *metabolic pathways*, sequences of enzyme-catalyzed reactions, so ordered that the product of one reaction is the substrate for the next. Some pathways synthesize, step-by-step, the important chemical building blocks from which macromolecules are built, others trap energy from the environment, and still others have functions different from these. (Ibid.: 130)

It is explained similarly in another classic (Beck *et al.*, 1991: 175):

> Metabolism includes the following processes:
> * All the chemical processes by which food and its derivatives are broken down to yield new building blocks and energy. This segment of metabolism is termed *catabolism*.
> * All the chemical processes by which living cells and tissues are produced and built up. This is *anabolism* (build-up of new molecules by biosynthesis).
> * All the regulatory mechanisms that govern these intricate systems.

Whereas the concept of metabolism is widely applied at the interface of biochemistry and biology when referring to cells, organs and organisms in biology, it seems a matter of dispute to use this term on any level further up the biological hierarchy. E.P. Odum, one of the leading system ecologists, clearly favours terms like 'growth' or 'metabolism' on every biological level from the cell to the ecosystem (for example, Odum, 1969: 7). A statement like the following from Beck *et al.* (1991: 679) 'The metabolism of the whole body is simply the sum of all the metabolic processes in all the cells of the body', is not controversial in biology: to aggregate cells to an organism seems to be always legitimate. Which processes may and should be studied on hierarchical levels beyond the individual organism, though, is a matter of debate dating back to Clements (1916) and still going on.[6] Basically, this is a debate about 'holism' (or organicism) versus 'reductionism'. Do populations (that is, the members of a species), communities (the total of living organisms in an ecosystem) or

ecosystems (the organisms and the effective inorganic factors in a habitat) have a degree of systemic integration comparable to individual organisms? Does evolution work upon them as units of natural selection? These questions are contested in biology, and thus the use of the term 'metabolism' for a system constituted by a multitude of organisms does not pass unchallenged. What would be challenged is not the energy conversion and the nutrient cycling in ecosystems – this is taken as a fact. The tough point is whether there exist any kind of controls, information-mediated feedback cycles or evolutionary mechanisms working on the systems level as such, and not just via individual organisms.[7] Notwithstanding the answers to these questions, it is widely accepted that in effect biotic communities and ecosystems have self-organizing properties that allow them to optimize the utilization of energy and nutrients.[8]

According to these standards, it is obvious that humans maintain a metabolism. Like any other animal, they are heterotrophic organisms, drawing their energy from complex organic compounds (foodstuff) that have been (directly or indirectly) synthesized by plants from (mainly) air and water utilizing the radiant energy from the sun. The human organism converts most of these organic compounds ('biomass') by respiration (utilizing oxygen from the air) into carbon dioxide and water, thus extracting chemical energy.[9] The metabolic rate is roughly determined by body weight energetically (so humans fit into the scale of mammals somewhere between dogs and horses), and by physiology qualitatively. Humans can only digest certain foodstuffs, and they cannot synthesize all the amino acids they need from carbohydrates alone (as most herbivorous animals can). So far go thermodynamics and biochemistry, and there humans certainly are no exception to any rules. If humans are to survive and to reproduce, they must be able to sustain their metabolism.

Since humans are social animals, with an ability to communicate and to cooperate beyond that of any other known species,[10] they have tended to solve this problem collectively. It makes sense, therefore, to look at human communities and societies as organizations serving human survival. Societies will, in effect, sustain a metabolism that at least equals the sum of the metabolisms of their human members. If they cannot maintain this metabolic turnover, their populations will die or leave them. If there is a surplus, this will rarely be processed through the cells of the human body. From an ecosystem perspective, for example, the materials birds use in building their nests constitute a relevant material flow associated with birds. In ordinary biological language, however, they would never be considered as part of a bird's metabolism, irrespective of the fact that it may be vital for the bird's reproduction. So, in fact, the concept 'metabolism' needs to be expanded to encompass material and energetic flows and transformations associated with 'living things' but extending beyond the anabolism and catabolism of cells. Whether it is a population or some other entity, the overall material and energetic turnover of a subsystem of an ecosystem, its consumption of certain materials, their transformation and the production of other materials may be an ecologically useful parameter. In biology, even less so in biochemistry, this would not be called metabolism.

We know about humans, of course, that they sustain at least part of their metabolism, not by direct exchanges with the environment (as they do, for example, in breathing), but via the activities of other humans. This is a matter of organization. Any attempt to describe this organization in terms of a biological system – whether it be the organism, or a population in a habitat, or an ecosystem – has to draw on analogies and runs the risk of being reductionist.[11] On the other hand, the concept of metabolism in biology has valuable features. It refers to a

highly complex self-organizing process which the organism seeks to maintain in widely varying environments. This metabolism requires certain material inputs from the environment and it returns these materials to the environment in a different form.

ROOTS AND TRACES OF 'METABOLISM' IN THE SOCIAL SCIENCES

Metabolism in Sociological Theory

Within the nineteenth-century foundations of social theory, it was Marx and Engels who applied the term 'metabolism' to society. 'Metabolism between man and nature' is used in conjunction with the basic, almost ontological, description of the labour process:

> The labour-process ... is human action with a view to the production of use values, appropriation of natural substances to human requirements; it is the necessary condition for effecting exchange of matter between man and nature; it is the everlasting nature-imposed condition of human existence, and therefore independent of every social phase of that existence, or rather, is common to every such phase. (Marx and Engels, 1867: 183f)

The 'elementary factors' of the labour process are (1) the personal activity of man, that is, work itself; (2) the subject of work ('Arbeitsgegenstand'); and (3) its instruments (ibid.: 178). 'In the labour-process ... man's activity, with the help of the instruments of labour, effects an alteration, designed from the commencement, in the material worked upon. The process disappears in the product; the latter is a use-value, Nature's material adapted by a change of form to the wants of man' (ibid.: 180). The subject of labour may be 'spontaneously provided by nature' or it will have been 'filtered through past labour'.

Benton (1989: 66) claims that 'the intentional structure of the labour-process is, for Marx, a transformative one'. This view does not, so Benton says, properly encompass all forms of labour, particularly not what he terms 'eco-regulation'(for example, most of farm work) and 'primary appropriation' (hunting, gathering, mining and so on), those types of labour closest to natural processes. Nor does it cover unintended consequences and various other ecologically important characteristics of the labour process. Thus, Benton concludes, as Marx's and Engels' theory presents itself in the mature economic writings, it bears several theoretical defects, 'the net effect of which is to render the theory incapable of adequately conceptualizing the ecological conditions and limits of human need-meeting interactions with nature' (Ibid.: 63).

Marx's and Engels' notion of metabolism was moulded by the biology of their times and popular writings from physiological materialists like Moleschott (1857)[12] differing from modern textbooks. It implies a higher degree of interdependence between man and nature, and more of a relation on equal terms, than the widespread simple idea of man 'utilizing nature'. The notion points to a fundamental material interrelatedness on an anthropological rather than on a societal level. In other contexts, Marx uses the expression 'societal metabolism' as an analogue to describe the exchange of commodities and the relations of production within society (see Schmidt, 1971: 92).

References to societal metabolism in the writings of Marx and Engels are about the only reference to be gained from the 'founding fathers' of modern social science. While most social scientists tended to be highly interested in the advances of biology of their times, it

was mainly evolutionary theory and its implications for universal progress or the healthiness of competition that attracted their attention (for example, Spencer, 1862; Morgan, 1877). There is another angle, however, from which considerations of societal metabolism derived, and this had to do with physics rather than biology: energetics.[13]

The process of societal advance and the differences in stages of advancement among societies can be accounted for by energy: the more energy consumed, the greater the advancement, stated Herbert Spencer in his *First Principles* (1862). Sir Patrick Geddes, co-founder of the British Sociological Society in 1902, sought to develop a unified calculus based upon energy flows and capable of providing a coherent framework for all economic and social activity (Geddes, 1884), an attempt 'rewarded with near-instant oblivion', according to Rosa *et al.* (1988: 150). Wilhelm Ostwald, 1919 winner of the Nobel prize for chemistry, had a somewhat similar contribution to make: the more efficient the transformation from crude energy into useful energy, the greater a society's progress (Ostwald, 1909). This work provided Max Weber (1909) with an opportunity for an extensive discussion. Weber reacted in quite a contradictory, even double-bind manner. On the one hand, he dismissed Ostwald's approach as 'grotesque' (401) and as 'mischief' (381), and challenged its core thesis on natural science grounds: in no way would an industrial production be more energy efficient than a manual one, it would only be more cost-efficient (386f). At the same time, he rejected natural science's arrogance towards the 'historical' sciences and the packaging of value judgements and prejudices in natural science 'facts' (401). On the other hand, although he admitted that energy may possibly be important to sociological concerns (399; see also Weber, 1904), he never elaborated such considerations.

Frederick Soddy, another Nobel laureate in chemistry, also turned his attention to the energetics of society, but did so with an important twist: he saw energy as a critical limiting factor for society and thus was one of the few social theorists sensitive to the second law of thermodynamics (Soddy, 1912, 1922, 1926). Similarly, Werner Sombart (1902, II: 1137f) in his analysis of late eighteenth-century development at least recognized the social relevance of energy: the scarcity of fuel wood, according to him, was at that time seriously threatening to halt the advance of capitalism altogether. In the mid-1950s Cottrell (1955) raised the idea that available energy determines the range of human activities. According to him, this is one of the reasons why pervasive social, economic, political and even psychological change accompanied the transition from a low-energy to a high-energy society.

For the development of sociology as a discipline, these more or less sweeping energetic theories of society remained largely irrelevant. Later authors such as O.D. Duncan, who operated with the term 'ecological complex', implying a web-like interdependence between population, organization, environment and technology (the 'POET' model), carefully circumvented any references to natural conditions or processes. What Duncan calls the environment is devoid of physical characteristics. It is a social, and at best a spatial, variable (Duncan, 1959, 1964), as it had been for the Chicago-based school of social ecology (Park, 1936).

Before the advent of the environmental movement,[14] sociology just did not refer to natural parameters as either causes or consequences of human social activities. Neither the system-oriented nor the interaction-oriented US traditions, nor the 'materialist' Marxist traditions revived in the 1960s, dealt with possible physical properties of society and society–nature interaction. This judgement is strongly supported by the review of Dunlap and Catton (1979) focusing on the American literature. As one of the few exceptions, they mention

Sorokin's, as they say, underrated analysis of the social repercussions of famine (Sorokin, 1942: 66–7, 122, 262–4, 289). Some of the French mergers of Durkheim, social history and Marxism, such as Foucault (1975) or Bourdieu (1985), at least invite the human body onto the sociological stage. The same can be said about the German sociological theorist Elias (1969). Looking at other major macrosociological European theorists such as Giddens (1989, 1990), Habermas (1981) or Luhmann (1984, 1986), one will search in vain for concepts referring to material dimensions of the society–nature interaction.

Metabolism in Cultural and Ecological Anthropology

Similar to sociology, the beginnings of cultural anthropology were marked by evolutionism (as in the works of Morgan, 1877) and cultural anthropology then split into a more materialist and a more culturalist tradition. The materialist line, from which contributions to societal metabolism should be expected, did not, as was the case in sociology, turn towards economics and distributional problems, but retained a focus on the society–nature interface. In effect, several conceptual clarifications and rich empirical material on societies' metabolism can be gained from cultural or, as the more materialist branch is termed by Orlove (1980), 'ecological' anthropology.

Leslie White, one of the most prominent anthropologists of his generation, rekindled interest in energetics. For White, the vast differences in the types of extant societies could be described as social evolution, and the mechanisms propelling it were energy and technology: 'Culture evolves as the amount of energy harnessed per capita and per year is increased, or as the efficiency of the instrumental means (i.e. technology) of putting the energy to work is increased' (White, 1949: 366). A society's level of evolution can be assessed mathematically: it is the the product of the amount of per capita energy times efficiency of conversion. So this in fact was a metabolic theory of cultural evolution – however unidimensional and disregarding of environmental constraints it may be.

Julian Steward's 'method of cultural ecology' (Steward, 1968) paid a lot of attention to the quality, quantity and distribution of resources within the environment. His approach can be illustrated from the early comparative study, 'Tappers and Trappers' (Murphy and Steward, 1955). Two cases of cultural (and economic) change are presented, in which tribes traditionally living from subsistence hunting and gathering (and some horticulture) completely change their ways of living as a consequence of changing their metabolism. The authors analyse this as an irreversible shift from a subsistence economy to dependence upon trade. Eastern Montagnais, in the northeastern Algonkin, used to live in multi-family winter hunting groups, and in somewhat larger units during the summer season of fishing and caribou hunting. At the time of the establishment of white trading posts, the trapping of fur-bearing animals and trade for hardware and foodstuffs was secondary to native subsistence activities: 'The Indians could devote themselves to the luxury of securing trade articles only after assuring themselves of an ample food supply' (ibid.: 337). By the use of barter and credit systems, though, they became dependent upon the traders and finally fur trapping became more important than hunting for subsistence. This resulted in a complete restructuring of their patterns of settlement and communal ties (with a strengthening of nuclear families and territorial family property at the expense of interfamilial ties).

The second example is given for the Mundurucú, native Indians originally living in semi-sedentary villages in the gallery forests and savannah lands in the state of Pará, Brazil, on

slash-and-burn horticulture and hunting, until they were drawn into 'the ecology of rubber collection'. The authors give a more elaborate description of the metabolic transformations:

> During the nineteenth century (and to the present day) the Mundurucú, like the Algonkians and in fact most aborigines, had been acquiring a seemingly insatiable appetite for the utilitarian wares and trinkets of civilization ... Firearms ...clothing, ... [but] also ... many strictly non-utilitarian goods, such as ... raw cane rum and beads. Reliance upon manufactured goods entailed further dependence upon many adjuncts of these goods. For example, firearms required powder and lead, while garments of factory-woven cloth had to be made and repaired with scissors, thread and needles. The substitution of metal pots for native ones of clay and of manufactured hammocks for the native product has reached the point where many young women do not know how to make these articles. ... they would be helpless without the copper toasting pan used to make maniok flour. ... Despite the flourishing trade in gewgaws, the allure of most trade goods lay more in their sheer utility than in their exotic qualities. The increased efficiency of the Mundurú economy made possible by steel tools must have been enormous. (ibid.: 344f)

Translating this analysis into the terms of 'metabolism' (a concept the authors do not apply), the following transformations have taken place: (1) the substitution of metabolism based upon the natural environment by a metabolism based upon exchange with other societies, whereby these cultures become 'primary producers' or 'extractors' in a social division of labour on a grander scale, and (2) the replacement of certain materials and sources of energy by others, produced and distributed by completely different mechanisms on a completely different spatial scale. These changes in metabolism contribute to a transformation of many social and cultural features of these communities.

Several outright analyses of metabolism have been produced by authors that Orlove (1980) groups together as 'neofunctionalists': Marvin Harris, Andrew Vayda and Roy Rappaport. The followers of this approach, according to Orlove (1980: 240), 'see the social organization and culture of specific populations as functional adaptations which permit the populations to exploit their environments successfully without exceeding their carrying capacity'. The unit which is maintained is a given population rather than a particular social order (as it is with sociological functionalists). In contrast to biological ecology, they treat adaptation, not as a matter of individuals and their genetic success, but as a matter of cultures. Cultural traits are units which can adapt to environments and which are subject to selection.[15] In this approach, human populations are believed to function within ecosystems as other populations do, and the interaction between populations with different cultures is put on a level with the interaction of different species within ecosystems (Vayda and Rappaport, 1968).

This approach has been very successful in generating detailed descriptions of food-producing systems (Anderson, 1973; Kemp, 1971; Netting, 1981), some of which we will draw upon more closely in the next section. In addition to that, it has aroused the envy of colleagues by successfully presenting solutions to apparent riddles of bizarre habits and thereby attracting a lot of public attention (Harris, 1966, 1977). To illustrate the method, we will briefly report on Harner's (1977) famous analysis of Aztec cannibalism.

Pre-Conquest Mexicans were practising human sacrifices in unprecedented numbers. A number commonly cited for Aztecs was 20 000 sacrifices a year. According to Harner's explanation, population pressure increased in the Valley of Mexico and wild game supplies were scarcely adequate to provide protein for the diet. Carbohydrates could be secured by agricultural intensification, but domesticated animal production was limited by the lack of a

suitable herbivore. In the Old World, the domestication of herbivorous mammals proceeded apace with the domestication of food plants. In the New World, the ancient hunters had completely eliminated potential herbivorous mammalian domesticates from the Mesoamerican area (in South America, llama and alpaca had survived, along with the guinea pig).[16] This made the ecological situation of the Aztecs unique among the world's major civilizations. Large-scale cannibalism, disguised as sacrifice, was the cultural solution to an ecological problem. The estimated ratios of 5–20 sacrificed war prisoners a year per 100 inhabitants of Tenochtitlan can be looked upon as a significant contribution to protein diet. This practice also helps to understand a political peculiarity: the Aztecs always withdrew from conquered territories and did not seize them in the Old World fashion. Questioned by Cortez, Montezuma explained that this was done so that his people could continue to obtain captives for sacrifice nearby (Harner, 1977: 130).

This is a clear example of a metabolic argument. Under certain environmental conditions (that have, at least in part, been produced by previous human cultures), the metabolic needs of a population translate themselves into specific cultural practices. These practices in fact do serve human metabolism. What is not discussed by Harner, though, is the overall ecological efficiency of these practices. Presumably, it is not high: humans are not good at converting energy and, even if mainly raised on a herbivorous diet, will not use the available yield of the land very efficiently. On the other hand, however, these practices result in a certain control of population. This analysis has stood quite uncontested: Hicks (1979) objects only to a minor argument within Harner's theory, and even Orlove (1980: 243), who does not hide his dislike of functionalist interpretations, cites no sources that would substantively criticize Harner's line of reasoning.

There certainly are some theoretical and methodological problems in this approach which need to be discussed in greater detail. They entail the difficulty of specifying a unit of analysis. A local population? A culture? This is related to the difficulty of specifying the process of change, and to the difficulty of locating intercultural (or inter-society) interactions in this framework. These scientific traditions, however, have prepared cultural anthropologists to be among the first social scientists actively to participate in the later discussion of environmental problems of industrial metabolism (see several contributions in Thomas, 1956b; Kemp, 1971; Rappaport, 1971).

Metabolism in Social Geography and Geology

In 1955, 70 participants from all over the world and from a great variety of disciplines convened in Princeton, New Jersey, for a remarkable conference: 'Man's role in changing the face of the Earth'. The conference was financed by the Wenner-Gren Foundation for Anthropological Research and the geographer Carl O. Sauer, the zoologist Marston Bates and the urban planner Lewis Mumford presided over the sessions. The papers and discussions were published in a 1200-page compendium (Thomas, 1956b) that documents, one may claim, the world's first interdisciplinary panel on environmental problems of human development, staged by top representatives of science.[17]

The title of the conference paid honour to George Perkins Marsh, who had in 1864 published the book *Man and Nature; or, Physical Geography as Modified by Human Action*, and who is considered the father of social geography. For Marsh, man was a dynamic force, often irrational in creating a danger to himself by destroying his base of subsistence. The

longest chapter of *Man and Nature* is entitled 'The Woods', pleading for the recreation of forests in the mid-latitudes. He was not, as the participants of the 1955 conference noted, concerned about the exhaustion of mineral resources. He looked upon mining rather from an organismic point of view, considering it 'an injury to the earth' (Thomas, 1956a: xxix).

The issue of possible exhaustion of mineral resources was taken up by the Harvard geologist Nathaniel Shaler in his book, *Man and the Earth* (1905). In considering longer time series he noted that, 'since the coming of the Iron Age', the consumption of mineral resources had increased to a frightening degree. In 1600, only very few substances (mostly precious stones) had been looked for underground, but at the turn of the twentieth century there were several hundred substances from underground sources being used by man, of essential importance being iron and copper. Shaler was concerned with the limits of the resource base. One might say that this shift of focus from Marsh (1864) to Shaler (1905) reflects the change in society's metabolism from an agrarian mode of production (where scarcity of food promotes the extension of agricultural land at the expense of forests) to an industrial one, where vital 'nutrients' are drawn from subterrestrial sinks that one day will be exhausted. It reflects it – but it does not reflect upon it.

With the 1956 volume, the concern with a limited mineral base for an explosively rising demand for minerals is even more obvious. Such a 'materials flow' focus seems to have been strongly supported by wartime concerns and institutions: Ordway (1956: 988) quotes data from a 1952 report of the 'President's Materials Policy Commission' worrying about the 'soaring demand' for materials.[18] The depletion of national resources is part of a global concern: 'If all the nations of the world should acquire the same standard of living as our own, the resulting world need for materials would be six times present consumption.'(ibid.). Based on these considerations, Ordway advances his 'theory of the limit of growth', based on two premises:

> 1. Levels of human living are constantly rising with mounting use of natural resources. 2. Despite technological progress[19] we are spending each year more resource capital than is created. The theory follows: If this cycle continues long enough, basic resources will come into such short supply that rising costs will make their use in additional production unprofitable, industrial expansion will cease, and we shall have reached the limit of growth. (Ordway, 1956: 992)

McLaughlin, otherwise more optimistic than Ordway, states in the same volume that, by 1950, for every major industrial power, the consumption of metals and minerals had exceeded the quantity which could be provided from domestic sources (McLaughlin, 1956: 860).

Similarly, the 1955 conference experts discussed the chances of severe shortages in future energy supply. Eugene Ayres, who spoke about 'the age of fossil fuels', and Charles A. Scarlott, treating 'limitations to energy use', reminded listeners of the limits inherent to using given geological stocks. Ayres, elaborating on fossil fuels since the first uses of coal by the Chinese about 2000 years ago, was very sceptical about geologists' estimates of the earth's reserves, believing them to be much larger than current projections suggested, but nevertheless concluded: 'In a practical sense, fossil fuels, after this century, will cease to exist except as raw materials for chemical synthesis' (Ayres, 1956: 380). Scarlott (1956) demonstrated the diversification of energy uses and the accompanying rise in demand, and then elaborates on a possible future of solar energy utilization (!) and nuclear fusion as a source of energy.

The bulk of materials flow considerations in the 1955 conference was devoted to the input side of material metabolism, however. The overall systemic consideration that the mobilization of vast amounts of matter from geological sinks (for example, minerals and fossil energy carriers) into a materially closed system such as the biosphere would change parameters of atmospheric, oceanic and soil chemistry on a global level did not yet occur. Still many contributions of this conference documented the transformations of local and regional natural environments by human activity, both in the past and in the present.[20]

The global environmental change issue was taken up by a special issue of *Scientific American* in September 1970, devoted to the biosphere. One year later, *Scientific American* produced an issue on energy and socioeconomic metabolism in terms of energy (vol. 224, no. 3, 1971). But this already belongs to the post-1968 cultural revolution of environmentalism that we have excluded from this review.

SOME SUGGESTIONS FOR BRIDGING THE EPISTEMOLOGICAL GAP BETWEEN SOCIETY AND NATURE

'The study of the interactions between society and environment comprises the core of environmental sociology' (Dunlap and Catton, 1979: 251). If human society is conceived of as a purely symbolic system (a system of communication, as Luhmann has it, or a system of cultural meanings, as in the tradition of Mead and Schütz), then how does society influence the material world? There must be some touching sphere, some possible *agens* reaching over from the symbolic to the material. On the other hand, with a strictly materialist conception of society, how can one portray the complexity of social processes? Is it possible, for example, to explain how something like a language, or certain modes of perceiving and organizing these perceptions, evolve? From a materialist perspective it cannot be understood why highly organized symbolic arrangements remain robust over time and why they are not completely randomized by a change in material conditions.

Given the tools of modern systems theory, there is no need to claim that the symbolic, the 'cultural', is something entirely unique to or an exclusive property of human social systems. Processes of self-organization, of information exchange and learning, autopoiesis of some kind, may occur in various complex systems, whether humans are involved or not (see, for various perspectives, Bateson, 1972; Maturana, 1970; Maturana and Varela, 1975; Prigogine and Stengers, 1990). One may say that these theories have outdated the traditional divide between 'materialist' and 'idealist' approaches, Plato's schism between the world of matter and the world of ideas.

Modern systems theory may be utilized for properly conceiving of society's metabolism. Following Sieferle (1997), to do so calls for a dual approach.[21] One needs to be able to describe how symbolic systems may influence material systems, and vice versa. So it makes little sense to put 'society' merely on the symbolic side, and 'nature' on the material side. It takes a notion of human society that comprises both types of elements, symbolic and material.

In order to escape some of the philosophical strain involved in using distinctions of a contested tradition of 2000 years, involving all the subtleties and misunderstandings accumulated in such a long history, we will 'modernize' these conceptions according to current technology and experiment with the terms 'hardware' and 'software'. Hardware is a struc-

ture that is made to function by means of software, given a free flow of energy. Hardware and software can be handled independently, but one without the other does not work. Software usually works on more than one hardware, and vice versa. Both can be developed fairly independently (which presents a business risk to contemporary computer producers which they try to minimize). Neither can be said to 'rule' or to 'dominate' the other: they have to fit together, to understand each other, to communicate well, to be compatible (one is free to choose a term from the more material, technical side, or from the more symbolic, informational side). One learns about software by making it work on hardware, and one learns about hardware by making software 'run' on it. From the systems point of view of software, hardware is just part of the environment, such as, for example, the user. From the systems point of view of hardware, software is environment: hardware has to be constructed in a way that fits into the world of softwares. From the point of view of the user, though, both are complex systems that have to be respected in their own right and, if anything is to be achieved at all, they have to cooperate smoothly – as a system of a second order. What is required, then, is (1) that hardware and software be well organized systems in themselves, (2) that they are linked and fit one another, and (3) that there is a flow of free energy entering their linkage to get them moving.

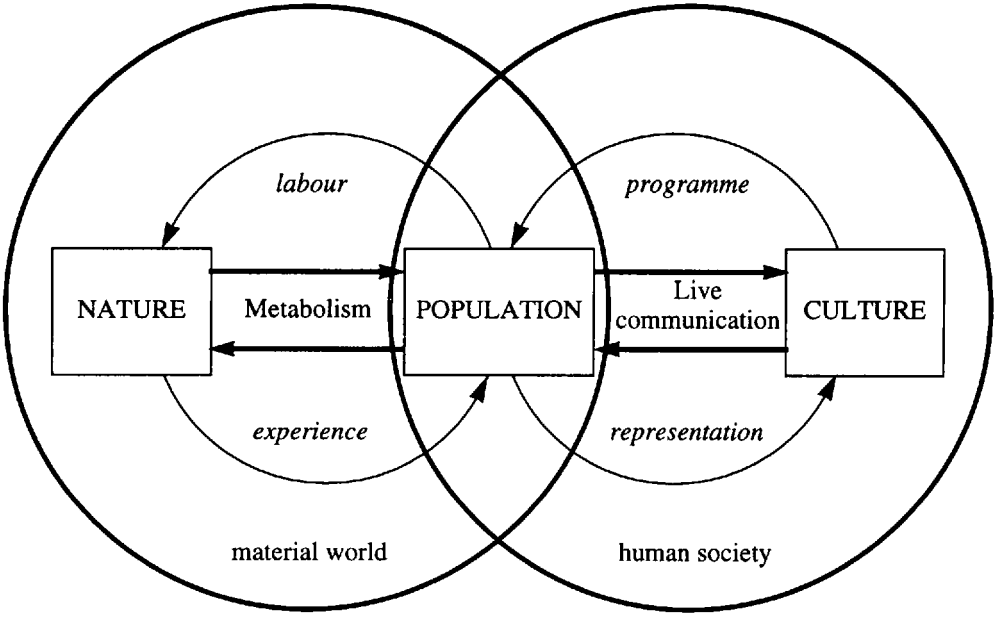
So, then, how do hardware and software influence each other? Directly, they make each other work in a specific way. Beyond that, software can be constructed so that it learns from the pecularities of the hardware, and as a consequence changes incrementally. Hardware cannot 'learn'. If used, it grows old and corroded (a process which can be either enhanced or slowed down by software), will use up its parts after a while and will therefore constantly require a supply, not only of energy, but also of materials (which is where material metabolism, beyond energetic metabolism, comes in). Nothing like that will be needed for software. If it is a 'learning' software, it may accumulate too much information and get stodgy and slow as time moves on. But there could also exist an internal mechanism eliminating unnecessary information, or removing it from the path of operation. So software cannot get old and corroded – but it can be outdated by 'new' software or even be rendered useless by a completely new generation of hardware.

It does not make sense to dispute whether either one – hardware or software – 'really exists' (to pull the constructivist string), but it takes both of them to find out. In the physical world, hardware and software can hardly by separated at all. A molecule contains both the matter and the programme for operation (they may even be the same thing, a theoretical physicist might say). In the world of living things there is a very important separation: that between an organism and its DNA sequence. The software may be passed on to other organisms, while the hardware dies,[22] but there is still required a very specific hardware to which the software may be passed on. In the social world of humans, software may be passed on in almost any fashion. Going from sounds and mimes to spoken language, to books and electronic media marks a path of increasing independence from the hardware, the human body, and an increasing flexibility of hardware–software links altogether.

Within this picture, culture may be viewed as a highly complex system of software, *software designed to work on the human body*. The human body, of course, is simultaneously run by other software, natural software (genes), and the two kinds of software have to have a certain compatibility with one another – although the relationships far from deterministic. For the purposes of environmental sociology, then, but probably for many other purposes as well, it makes sense to conceive of human social systems as systems of second order, comprising

the system of culture (or software) as its symbolic compartment, and a certain human population, that is a certain number of somehow interconnected human bodies, as its material compartment. And for the purpose of societal metabolism, as we will argue below, it also makes sense to consider material artefacts and domestic animals as material compartments of human social systems, dragged in from nature.

Sieferle himself stresses that this is still a tentative model (see Figure 7.1). However, it makes it possible to establish a systematic link between what he calls the 'symbolic' system of culture and 'material' systems of nature: the population. The population relates to the system of culture by receiving its 'programme' (or software, as we chose to call it above) and by generating representations of the material world that are fed back to the cultural system. On the other hand, it relates to the material world by means of 'labour' (physical expenditure of energy in an intentionally designed fashion) and by the 'experience' it makes in the material world. Both 'labour' and 'experience' are, of course, highly structured symbolically, but they also contain material elements. In the terms introduced above, one might say they consist of hardware guided by cultural software.



Source: Adapted from Sieferle (1997).

Figure 7.1 Interaction model of society and nature

How, then, does metabolism fit into this model? If we think of it as a process of material and energetic reproduction of the material compartments of society, this certainly must comprise more than the energy and matter processed by the human bodies that make up the population. What it comprises has to be properly defined and should, if possible, fulfil the following prerequisites.

1. It should be specifiable in a consistent manner for various social systems, whether they are ordered hierarchically or horizontally. If this were the case, it would alleviate the problems associated with choosing the proper level and unit of analysis.
2. It should be consistent with the physical law of constancy of energy and matter, or, put differently, have consistent equations between input, output and change of stocks in material and energetic terms.
3. It should make sense in terms of social meaning and activities but be sufficiently abstract to apply to various social systems (both historically and with regard to hierarchical level).

Various operational definitions have been advanced more recently in the course of analyses of 'industrial metabolism', but they hardly comply with the above standards. Fischer-Kowalski *et al.* (1997) suggest considering as part of the metabolism of a social system *those material and energetic flows that sustain the material compartments of the system.* This seems quite in accordance with the biological and biochemical definitions of the term. But what, then, are the material compartments of a social system? We have made the following proposal: material compartments of a social system are those *physical entities that are continually reproduced by the labour expended in this system.* For the level of a society as a whole this encompasses the following:

1. the population, that is, the human organisms that 'belong' to that system;
2. those physical objects that anthropologists term artefacts: buildings, machines, goods in use (note that this does not comprise all man-made objects, only those that are still kept in a certain condition by the application of human labour; artefacts to which this does not apply are waste and left-overs on their way to renaturalization);
3. those animal organisms that are 'kept' by humans, fed and bred (livestock and domestic animals);
4. possibly those plant organisms that are 'kept' by humans – but note that the word 'kept' cannot be properly applied to plants, since it is much harder to distinguish between plants 'kept' and those not 'kept' (Fischer-Kowalski, 1997: 62ff).

Typically, social systems do define and reproduce their boundaries in terms of their compartments: they distinguish between what 'belongs' to them and what does not. An important definition of this kind is 'property': property may be regarded as a symbolically defined relation between a social[23] 'subject' and a (not necessarily, but frequently, material) 'object'. So in operationally defining the material compartments of social systems one can (and should) usually draw upon the system's self-definitions.[24] When trying to establish the energetic and material flows required for sustaining the material compartments of social systems, the self-definitions of this system are only of limited support, however. Systems usually are only aware of those flows they spend effort upon, and not of those flows that seem to occur 'naturally'. But if one does not want to violate condition 2 (input–output equality), one has to consider, for example, not only the food a hen is fed but also the oxygen it requires to digest this food, and not only the manure it deposits but also the carbon dioxide it exhales. So, once the compartments are established by utilizing social definitions, the material and energetic flows can be and have to be analysed with the tools of natural science.

OUTLOOK: SOCIOECONOMIC METABOLISM AS A KEY CONCEPT OF 'SUSTAINABLE DEVELOPMENT'

When in the late 1960s it again became culturally possible to take a critical view of economic growth and consider its environmental side-effects, the stage was set for a new twist in looking at socioeconomic[25] metabolism. Up to this point, metabolism had mainly come in as a set of arguments claiming that natural forces and physical processes mattered for the organization and development of society, that they should be attributed some causal significance for *faits sociaux*. The mainstream of social science dealing with modern industrial society – whether it was economics, sociology or political science – had not cared about this issue at all. In the mid-1960s this started to change and, apparently originating from the USA, a set of new approaches developed, often triggered by natural scientists and typically elaborated in cooperation with social scientists subsequently. In these approaches the material and energetic flows between societies (or economies) and their natural environments became a major issue, governed by worries that a 'cowboy economy' might not be compatible with a 'spaceship earth' (Boulding, 1966). The common picture of cultural evolution as eternal progress started to give way to a picture of industrial economic growth possibly resulting in a fatal devastation of human life. This had to be looked at as a basic change in world views, and it took hold of a wide range of intellectuals across many disciplines. And, so it may be claimed, it promoted something like a rebirth of the paradigm of socioeconomic metabolism, applied to industrial societies. Still rather alien to mainstream sociology, it may influence the future development of this discipline, nevertheless.

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NOTES

1. See, for example, National Research Council (1990), UN Handbook (1993), European Commission (1994), Enquête-Kommission (1994), SCOPE (1996).
2. The second one concerns land-use/land-cover change, and deals with the alteration of the land surface and its biotic cover.
3. Take as an example the authors of the classic book, edited by Ayres and Simonis in 1994, *Industrial Metabolism*. Out of 22 writers, nine are from physics, chemistry or technical engineering; six from the life sciences; five are economists and, finally, just two are sociologists.
4. What readers might consider an important omission, I did not do a specific inquiry into the history of economics. In particular, the type of resource economics practised during times of war (for example, Paley Report, 1952) and the history of economic input–output analysis (see Leontief, 1970) would be promising areas.

5. A section on the more recent literature, which had to be omitted because of space constraints, is going to be presented and published on the occasion of the conference, 'Sociological Theory and the Environment' at the University of Wageningen, in March 1997.
6. Tansley (1935) established the term 'ecosystem' as a proper unit of analysis. He did so by opposing Clements' 'creed' in an organismical theory of vegetation; he also opposed the term 'community' by arguing that it did not seem legitimate to lump together animals and plants as members too different to be put on equal footing (296). Lindemann (1942) then proceeded to analyse ecosystems in terms of energy conversion mathematically, with plants being the *producer* organisms to convert and accumulate sun radiation into complex organical substances (chemical energy) serving as food for animals, the *consumer* organisms of ecosystems. Following death, every organism is a potential source of energy for specialized *decomposers* (saprophagous bacteria and fungi) thereby closing the cycle in generating inorganic nutrients for plants. This is basically what Odum refers to when talking about the metabolism in an ecosystem.
7. See the more recent debate of Engelberg and Boyarsky (1979) and Odum and Patton (1981) about the cybernetic nature of ecosystems. Engelberg and Boyarsky claim the dominant interaction between different populations of an ecosystem to be the exchange of brute (informationally unspecific) matter and energy in the absence of information-mediated feedback cycles. Odum and Patton also see the food web (as an interconnection of conservative rather than informational processes) as the most fundamental element of ecosystems, but claim a secondary information network to be superimposed upon this network of conservative flows. A somewhat similar debate is carried on by Salt (1977), as contradicted by Edson *et al.* (1981), on the existence of 'emergent properties' in ecosystems to be distinguished from merely 'collective' properties.
8. Lotka proposed, as early as 1925, a 'law of maximum energy in biological systems'; similar arguments are presented in theories of succession and climax in plant communities (Odum, 1959, 1969).
9. About three-quarters of this energy is dissipated as heat; the rest directly participates in body functions. However, with one exception, even this fraction is eventually converted into heat. The single exception arises when the muscles perform external work, creating either potential energy by lifting a mass against gravity or kinetic energy by, for example, turning a wheel.
10. For the extraordinary importance of spoken language, see Diamond (1992).
11. It is interesting to note that biologists tend to attribute organismic (or system integration) characteristics to the human society where they might deny them to an ecosystem. For an early example, see Tansley (1935: 290). For a critical discussion, see Oechsle (1988).
12. According to Schmidt (1971: 86), Marx drew much of his understanding of metabolism from this source and imported a notion of the trophical hierarchy, food chains and nutrient cycling rather than an organismic, biochemical interpretation of metabolism. Besides it should be noted that the German word 'Stoffwechsel' literally means 'exchange of substances' (between A and B) and does not so much convey a meaning of chemical conversion as the latin term.
13. My task of reviewing the literature was greatly facilitated by the excellent review of Rosa *et al.* (1988).
14. See Benton (1991) for the importance of social movements for bridging the scientific gap between biology and sociology.
15. Orlove's criticism of the inadequate use of biological terms, in this case of group selection as a mechanism not accepted by biological theory (Williams, 1966), appears as too harsh. The unit to which the selection applies is not the population as such. Cultural maladaptation to an environment may in fact decimate a population, but the effect this may have upon the genetic composition of consecutive populations in this environment certainly is not the cause for whatever cultural changes may occur (Harris, 1991: 33–45).
16. Crosby (1986) used the availability of domesticated herbivores as one of the most important factors explaining the capability of Europeans to conquer the New World.
17. Including not one woman, but equally not a single sociologist (if one does not take Lewis Mumford as such, which he himself in his biography does not), but several economists (among them, for example, Kenneth Boulding), cultural anthropologists and historians.
18. This report should be an excellent source for reseach into longer time series of materials consumption. Ordway even quotes a number for the 'raw-material consumption' of the USA in 1950: '2.7 billion tons of materials of all kinds – metallic ores, non-metallic minerals, construction materials and fuels' (988). Note the number given by Ayres and Kneese (1969) including agricultural products, but excluding construction materials: 2.4 billion tons. With 151 million US inhabitants in 1950, the President's Materials Commission numbers amount to 18 tons of raw materials per inhabitant per year, which is just a little less than Japan's numbers nowadays (President's Materials Policy Commission, 1952, commonly called Paley Report).
19. It is interesting to note that even the idea of materials consumption growing less than GDP because of increases in efficiency is taken up in the Paley Report. In its projections for 1975, the Paley Report expects US GDP to double compared to 1950, but expects the materials input necessary for this only to rise by 50–60 per cent (quoted from Ordway, 1956: 989).
20. This tradition is explicitly continued in a further publication, representing the contemporary state of the art

of social geography, dating from 1990: *The Earth as Transformed by Human Action: Global and Regional Changes in the Biosphere over the Past 300 Years*, edited by B.L.Turner and others.

21. This also permits a theory of evolution comprising both sides without being reductionist.
22. In commenting upon this paper, R.P. Sieferle made me aware that, more specifically, one would have to distinguish between hardware that serves as a carrier of information (a floppy disk, for example, or a genome) and hardware that performs the physical functions (such as a robot, or a body).
23. When using the term 'social', we always mean both material and symbolic, thoroughly interlinked.
24. Admittedly, the distinction between material system compartments and the environment will remain fuzzy. Consider a heap of sand in front of a house. First it was transported there for some purpose; then it was left for the rain to sweep away; then a new purpose arose, and the sand was built into the floor of the terrace. Or maybe there is just the neighbour's child digging into it with his shovel, stirring up an argument about 'property' versus 'leftover'.
25. When talking about industrial society, one has to take into account its high degree of functional differentiation, with the economy mainly responsible for handling material and energetic flows. It might contribute to common understanding, therefore, to talk about 'socioeconomic' systems. This also helps to evade another terminological problem: 'social systems' are not confined to humans. Thus, in order to be precise, one would mostly need to refer to 'human social systems', which is probably irritating for social scientists and not precise from a systems theory perspective, either.

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8. Ecological modernization: industrial transformations and environmental reform

Arthur P.J. Mol

INTRODUCTION: THE HISTORICAL BACKGROUND OF ECOLOGICAL MODERNIZATION

The history of environmental concern in western, industrial societies is usually divided into two or three different waves in the literature, depending on the authors' historical outlook. At the outset of the twentieth century, the first wave of environmental concern focused mainly on the degradation of 'natural' landscapes due to increasing industrialization and the expansion of cities. Social concern during this phase of environmental degradation did not so much question the foundations of the emerging industrial society; the emphasis was rather on demands for the protection of valuable nature areas against the devastating influence of rapid industrialization and urbanization. Nature reserves and semi-protected areas are the typical products of this wave in most industrial societies.

The central notion of environmentalism in the 1970s was that a fundamental reorganization of the social order was a *conditio sine qua non* for an ecologically sound society. But the ecology-inspired demand for social change during this second wave resounded only to a limited extent in the institutions of industrial society. Among its most significant successes were the creation of government departments for the environment in most industrial societies, an expanding environmental legislation and planning and a rapid increase in the number and membership of non-governmental environmental organizations. Although a large number of measures to combat environmental destruction were adopted and some were actually implemented, most of the challenged institutions of modernity, such as those which play a key role in the industrial structure, in economic relations and in scientific–technological developments, were not deterred from their devotion to a narrowly defined economic 'progress'. The meagre results of industrial change in the 1970s and 1980s are reflected in the dominant social theories on environmental degradation and (failing) environmental reform. It was especially neo-Marxists and so-called deindustrialization theories that concentrated on the explanation of a continuing environmental crisis and stagnating environmental reform. Where neo-Marxists such as Hans Magnus Enzensberger (1974), Allan Schnaiberg (1980) and David Pepper (1984) emphasized the central role of the capitalist mode of production in both the generation of environmental degradation and the impossibilities of overcoming this environmental devastation, deindustrialists or counterproductivity theorists such as the earlier Rudolf Bahro, Otto Ullrich, the late André Gorz and Barry Commoner concentrated primarily on the devastating influence of large technological–industrial developments (often, but not always, in relation to capitalist modes of production). In that sense the general debate in the 1960s about whether

industrialism or capitalism should be seen as the central characteristic of western societies was prolonged into the 1970s in the environmental domain.[1]

A third upsurge of attention to the 'burdening of the sustenance base' in the industrial societies becomes noticeable from the late 1980s onward. The Brundtland report (WCED, 1987) and the United Nations Conference on Environment and Development (1992) are often cited as the milestones of this third wave. In comparing the environmental upsurge in the 1970s with the third rise in environmental awareness in the late 1980s and early 1990s, some important distinctions have been observed by various authors (for example, Buttel and Taylor, 1992). As reported, the nature of, and the key notions employed in, the current environmental debate differ considerably from those in its predecessor. But the third environmental wave differs from its predecessors not only with respect to the nature of the environmental debate and in the key notions on which it centres. The last decade of this millennium is experiencing the commencement of actual, environment-induced, transformations of the institutional order of industrial society. Today's institutional transformations to protect the environment can no longer be interpreted as mere window-dressing, as environmental reform was generally seen by environmental commentators in the 1970s. It is precisely against this background that the theory of ecological modernization has gained so much attention and popularity. Although its history dates back to the early 1980s, the idea of ecological modernization emerged especially in the early 1990s in the writings of scholars in political science and sociology. Ecological modernization does not focus so much on the continuing burdening of the sustenance base but rather concentrates on the environment-induced restructuring of processes of production and consumption.

There exists an additional difference between the third and the second wave, with respect to our sociological understanding. During and after the second wave general sociological theory was hardly informed by environmental questions and its 'refinement' for a sociological understanding of environmental degradation and reform was limited. The 1990s, however, show an increasing commitment of general sociological theory to ecological problems (for example, the later work of Anthony Giddens) and some major theories were even essentially build around (global) environmental questions, such as Ulrich Beck's Risk Society theory (see also Goldblatt, 1996). Ecological modernization theory and other 'third wave' social theories on the environment profit from this increasing attention paid by social theory to environmental questions.

ECOLOGICAL MODERNIZATION AS A THEORY OF SOCIAL CHANGE

Albert Weale (1992: 75) rightly observes: 'There is no one canonical statement of the ideology of ecological modernisation as *The General Theory* is a source for Keynesianism. It is a view about the relationships between environment, the economy, society and public policy that has to be pieced together from various sources.'

Different authors – social scientists, environmental activists, political parties and managers – have used the notion of ecological modernization, but not all in the same way. The concept of ecological modernization has appeared in distinct contexts, which has led to some confusion as to what is exactly meant by ecological modernization (theory). Two categories of distinction aid clarification. First, a distinction should be made between

ecological modernization as a *theory* on social continuity and transformation and ecological modernization as a *political programme* for change, that is for environment-inspired reform of contemporary industrial society. The two denotations are interdependent, but should be separated analytically. Authors like Udo Simonis (1989), Albert Weale (1992) and Mikael Skou Andersen (1994) have each made significant contributions to the definition and promotion of a political programme of ecological modernization as the new agenda for western European environmental politics.[2] Environmental sociologists, on the other hand, have constructed a social theory labelled 'ecological modernization' (cf. Huber, 1982; Spaargaren and Mol, 1992; Wehling, 1992; Jänicke, 1993; Hajer, 1993; Mol, 1995). Starting from an analysis of changing social practices in production and consumption, environmental politics and environmental discourses, the latter have constructed a theoretical approach to generate a sociological understanding of transformations in contemporary industrial societies in dealing with ecological challenges. A second analytical distinction should be made between the analytical/descriptive and the normative/prescriptive conception of ecological modernization. Although Goodin (1992: 22) seems to believe otherwise, the two dimensions or denotations of a theory can in principle be separated, although they are usually closely interrelated in social theory. The analytical/descriptive conception provides a coherent and consistent set of specific concepts and ideas for adequately characterizing and analysing the way contemporary industrial societies (are trying to) cope with the environmental crisis. Most of the critical references to ecological modernization theory primarily aim at its prescriptive undertones, and question the feasibility and desirability of such a normative course or project for environmental reform. These critics question the assumption that if, and only if, modern society follows the path set out by ecological modernization theory, the ecological crisis can be controlled and eventually solved in an acceptable way.

These different connotations do not mean, however, that the core features of ecological modernization theory cannot be formulated. In formulating them, we limit ourselves to the domain of production.[3] According to Zimmerman *et al.* (1990), Huber (1991), Spaargaren and Mol (1992) and Jänicke (1993), among others, ecological modernization is, above all, a concept dealing with the institutions of modern technology, (market) economy and state intervention. It has been developed and refined in a constant debate with other social theories on environmental reform, such as Risk Society theory, so-called postmodernist theories (cf. Bauman, 1993; Gare, 1995), neo-Marxism and counterproductivity theories.[4] We will consider four characteristics.

First, ecological modernization theory identifies modern science and technology as central institutions for ecological reform (and not in the first place as the culprits of ecological and social disruption). Science and technology are principal institutions in *ecologizing economy*. In the era of reflexive modernity and in confrontation with the ecological crisis, scientific and technological trajectories are changing. The simple end-of-pipe technological regimes, that were criticized so strongly in the 1970s (for example, Jänicke, 1979), are increasingly being replaced by more advanced environmental technologies that not only redirect production processes and products into more environmentally sound ones, but are also starting to be engaged in the selective contraction of large technological systems that can no longer fulfil stringent ecological requirements. In that way technological measures within ecological modernization are not limited to 'just another artefact'; and technological-fix criticism – so often addressed to ecological modernization theory (cf. Hannigan, 1995: 184) – is therefore hardly adequate.

Second, ecological modernization theory stresses the increasing importance of economic and market dynamics in ecological reform and the role of innovators, entrepreneurs and other economic agents as social carriers of ecological restructuring (in addition to state agencies and new social movements). In doing so it anteceded and is in line with the Brundtland concept of sustainable development (cf. WCED, 1987) in rejecting the fundamental opposition between economy and ecology. Economic development and ecological quality are interdependent but not antipodal or incompatible in a simple monocausal way, as was proclaimed in the 1970s. Environmental improvement can go together with economic development via a process of delinking economic growth from natural resource inputs and outputs of emissions and waste, although, in order to do so, the nature, content, pace and geographical allocation of this economic growth will have to alter fundamentally. Modern economic institutions and mechanisms can be, and are to an increasing extent, reformed according to criteria of ecological rationality. Along similar lines of argument, social theories on environment-informed legitimation crises in capitalist economies are challenged. As Albert Weale (1992: 89) claims, the theory of ecological modernization points to the fact that the conflict between legitimated state action on the environment, and related mass loyalty, on the one hand, and the imperative of capitalist accumulation, on the other, is not as fundamental as was once thought. The internalization of external effects via *economizing ecology* is one of the mechanisms put forward within the project of ecological modernization (cf. Andersen, 1994), in addition to the articulation of environmental 'standards' in economic processes by insurance companies, credit institutions, (industrial) consumers, certification organizations, branch associations, and so on.

A third distinction between ecological modernization theory and other social theories on environment and modernity relates to the state. Following the discussions on state failure in, among other things, environmental policy (cf. Jänicke, 1986), ecological modernization amends the traditional central role of the state in environmental reform. Although ecological modernization is critical of the role of a strong bureaucratic state in the redirection of processes of production and consumption,[5] it does not deny the indispensability of the state in environmental management, as some of the theory's critics assert. Rather, the role of the state in environmental policy is changing, or will have to change, from curative and reactive to preventive, from 'closed' policy making to participative policy making, from centralized to decentralized, and from dirigistic to contextually 'steering'. Moreover, some tasks, responsibilities and incentives for environmental restructuring are shifting from the state to the market. Private economic actors become involved in environmental reform, for instance by certification of products and processes, by asking for environmental audits and by competition on environmental performance and the creation of niche markets. Leaving fewer – be they essential – elements of environmental policy making to the central state and changing the interrelation between state and society/economy, prevents the state from becoming an environmental Leviathan (cf. Paehlke and Torgerson, 1990). Following his earlier analysis of state failure, Jänicke (1993) has most strongly underlined this changing role of the state in environmental policy making by emphasizing the process of political modernization along the lines mentioned above, as part of a process of ecological modernization. Others have referred to similar tendencies in using the concept of reflexive governance (cf. LeBlansch, 1996).

Finally, the reorientation of state and market in ecological modernization theory also modifies the position and role of social movements in the process of ecological transforma-

tion. As the prime initiators and carriers of proposals for ecological restructuring in the 1970s, their initial role was to put the environment on the public and political agendas and to question the limited rationality of technoeconomic developments. With the institutionalization of the environmental question beginning in state, market and scientific–technological developments, the role of environmental movements is slowly shifting from that of a critical commentator outside societal developments to that of a critical – and still independent – participant in developments aimed at an ecological transformation. Their ability and power to generate (alternative and innovative) ideas, mobilize consumers and organize public support or disapproval is increasingly used to support and cooperate with those societal forces that aim at an ecological reconstruction of modern society. This parallels a – for some radical northern and southern environmental activists controversial (cf. Sarkar, 1990) – ideological switch of the dominant environmental NGOs in industrialized countries. While in the early 1980s the Dutch sociologist Tellegen (1984) could see the idea of demodernization or anti-modernity as the central common denominator of environmental movements throughout the world, this characterization was no longer valid in the early 1990s for the major environmental organizations in industrialized countries.

This perspective of ecological modernization can be employed to analyse processes of environmental reform that are currently being initiated. We will take the chemical industry – one of the most polluting sectors of western societies – as a case study for this.

INDUSTRIAL TRANSFORMATIONS: THE EXAMPLE OF CHEMICAL PRODUCTION

The development of the chemical industry can be traced back to the sixteenth century, but it expanded significantly during the industrial revolution in the nineteenth century. In the late eighteenth century, France was a major producer of chemicals, but Great Britain took over in the early nineteenth century and then Germany towards the end of that century. Today, the USA, Germany, UK, Japan, Italy, Switzerland and the Netherlands are usually mentioned among the top chemical production countries of the world. Developments in industrial nations were far from homogeneous, both spatially and temporally, but in spite of this diversity in development paths, most modern industrial countries have acquired a chemical industry of a more or less similar structure, with only minor variations. This more or less homogeneous chemical industry has been and is notorious for its damage to the environment. From its early stages, chemical production was accompanied by severe environmental deterioration and loud public protest, while only limited and unsuccessful efforts were put into its ecological reform. Only from the 1980s onwards was some serious progress made towards its ecological restructuring, keeping pace with undiminished anxieties about its dangers and risks among segments of the population.

Ecological restructuring

In the 1980s, widespread environmental concern triggered a process of ecological restructuring in the chemical industry, both at the level of individual chemical companies, and at the level of the chemical sector. In order to indicate the dynamics and scope of this reform process, we will look at these levels separately.

At the company level environmental management systems have been established within the majority of chemical industries, coordinated by environment, health and safety officers and departments within these companies. The monitoring and management of the inflow and outflow of material and energy is increasingly becoming an integral component of company strategy, parallel to financial/capital monitoring and management and human resources management. This has resulted in the introduction of new instruments such as annual environmental reports, environmental certification systems and environmental audits. Special environmental officials have been appointed to translate general environmental requirements – often set by governmental agencies – into specifications and criteria for all company activities and outputs. Company expenditures on environmental measures and investments have increased during the last decade, both in absolute terms and as a percentage of the economic company results (Commission of the European Communities, 1993). For contemporary chemical industries, expenditures on environmental measures of up to 10 per cent of the total annual investments are the rule rather than the exception, and this percentage is expected to increase in the near future. In addition, research and development (R&D) resources have been reoriented towards the environment. In sectors such as the pesticides industry, R&D resources devoted to the environment have rocketed, but the expansion has been considerable in other chemical sectors, too. Although there exists some variation in the definition of environment-oriented R&D, most authors and chemical firms claim that 30–80 per cent of company R&D costs are related to the protection of the environment. Furthermore, as managers of chemical companies indicate, the development and introduction of new products without a corresponding environmental benefit will be vetoed in the internal decision-making process, because the commercial risks are too high. Ex ante ecological evaluations of new products (sometimes via life cycle analysis) and environmental audits of production sites have become standard practice, resulting, for instance, in modifications in the kind of raw materials applied and the design of new production processes. In addition, chemical industries have engaged in new activities. For instance, polymer producers have introduced research programmes to investigate new plastics-recycling technologies such as chemical recycling; many of them have acquired a majority share in plastics recycling companies (APME, 1992). These technoeconomic and organizational changes at the company level can no longer be seen as small adaptations of a continuing economic development path. They should rather be interpreted as the precursors of transformation processes that move beyond the individual firm.

At the sectoral level, the environment is increasingly becoming a factor in the competition between chemical companies. Some examples make this clear. Low organic solvent paints (water-based paints, high solids, radiation-cured systems, and so on) increasingly challenge the market for traditional organic solvent paints. While the production of low organic solvent paints was initiated by some small niche market firms, nearly all the major paint industries have by now switched to the expanding market of these new paint systems. Some small traditional paint companies are not in a position to generate the resources and expertise to develop such new, ecologically more sound paint systems, and evidence is emerging of the takeover or collapse of these small, traditional, often family-owned, firms. Producers of PVC plastics have seen their market share decreasing, in favour of other commodity polymers such as PP and PE.[6] The unsatisfactory environmental performance of PVC – in the view of some sectors of society – is the main cause of this shift in market shares, especially in Germany, the Netherlands and Denmark. In addition, recycling requirements

affect the product development and polymer choice of plastic manufacturers and industrial end users such as the motor industry. This results in a diminishing variation of polymers in products and the emergence of fixed contracts between polymer producers, industrial end users and recycling companies, limiting free competition. The primarily environment-induced growth in resources and time spent on R&D and the (obligatory) registration of pesticides have resulted in an acceleration in (de)merging and joint ventures in the 1980s among pesticide industries (cf. Mol, 1995). Consequently, active ingredient production has almost disappeared from the Netherlands, to become concentrated in France, Germany and the UK.[7] Besides these new frontiers of competition, environmental cooperation within the chemical industry has been augmented. In particular, branch associations – at both the national and the EU level – have stepped up their environmental activities and often doubled their staff to fulfil environmental tasks and services. Negotiations with regulatory agencies on the environment are often coordinated by branch associations, as are public relations and communication with other interest organizations. In addition, branch organizations have begun to engage in the translation of regulatory requirements down to the level of individual companies, to some extent evolving into a kind of neocorporatist organization in environmental politics.

As has been suggested above, this ecological restructuring can be understood as the growing importance of ecological factors and arguments in industrial development *vis à vis* economic ones, although the latter of course will remain dominant for some time. With reference to the chemical industry, this increasing importance of ecology in industrial transformations can be noticed in various mechanisms. Within the market for chemical products, the environment has become a relatively independent factor which cannot be reduced to economic factors. Actors within the market for chemical products articulate demands from both economic and ecological points of view; traditional economic and quality criteria have been extended to include environmental standards. Consumer organizations are widening their product quality tests, evaluations and advice with environmental criteria. Customers not only ask for environmentally sound products, but are starting to expand their demand to include environmentally sound chemical production processes by asking for certified environmental management and audit schemes. This new dimension of consumer/customer demand is paralleled by new marketing strategies, new product information standards, changing advertisement designs, and so on. The environment has emerged as an independent factor not only on product markets but also on financial markets. Insurance companies normally carry out an environmental audit before they insure chemical industries. Specified requirements must be met before a company is insured. In some cases, financial organizations such as banks make investment loans conditional on an environmental evaluation. However, chemical producers should not be seen as purely reactive actors, confronted with an ecologized market demand. They have partly created this ecologization of the market, for instance, since specialized chemical producers identified it as a niche market.

If we are looking for the mechanisms that move this process of ecological restructuring within the chemical industry, we can identify several interacting social forces. Besides the above-mentioned economic demand and supply factors, governmental measures, public pressures articulated by NGOs and international developments are among the most relevant dynamics forcing environmental transformations. The role of the state is touched on only briefly here, in order to concentrate on environmental NGOs. Governmental interventions

have a dual aspect. Partly they follow the traditional line of command and control, and partly they are changing to more communicative and negotiation strategies, in which long-term agreements with the chemical sector are made on general environmental goals, taking the sector's knowledge, preferences on time paths and kind of (technological) measures into account. A more indirect way of governance is increasingly used. Liability policy, for instance, has stimulated some chemical companies to use white lists instead of black lists for chemical substances allowed in their products. The division between the two modes of intervention differs from country to country, depending among other things on policy style and political culture.

A central characteristic of contemporary ecological reform is that the quest for environmental improvements does not have to be explicitly expressed and enforced by the state continuously, as the environment has become institutionalized to some extent in economic practices, as the example of liability policy shows. This institutionalization would become even greater if the most powerful mechanism in capitalist market institutions was mobilized on a larger scale: prices. Until now, price differences according to ecological standards have been introduced only marginally by regulatory organizations (for instance, by means of different VAT percentages, taxes or deposit systems). Until now, the resistance of the major chemical producers to such reforms has been rather effective.

In spite of the improved ecological performance of, and the institutional transformations within, the chemical industry, feelings of insecurity and anxiety remain in lay perceptions of these large-scale and complex chemical–technological systems. Various polls by both independent scientific institutions and chemical interests associations indicate a persistent negative public attitude to chemicals and the chemical industry because of their environmental risks. Risk assessments, life cycle analysis and scientific–technological control and management of the chemical industry's expert systems are challenged time and again by counterexpertise and newly available information, as well as by chemical accidents. And these challenges are now on a global scale. While in the 1950s and 1960s chemical dangers and risks were primarily of local origin, the 1980s witnessed an increasing globalization of chemical risks via food and commodity chains, international transportation of (bulk) chemicals and global ecological interdependencies. The adherents of Ulrich Beck's Risk Society theory may rightly conclude that the confrontation with chemicals and chemical production in almost every aspect of daily life has not resulted in an unquestioning, basic trust in the chemical industry. But on the other hand, no massive movement away from a 'chemicalized' lifestyle can be identified, nor a fundamental distrust of the scientific foundations underlying the development of the chemical industry. Protests against the plasticized throw away society in the 1970s have been transformed into scientifically informed analyses and counterexpertise on various (chemical) product and processing alternatives. And the current environmental NGOs' plea is for the change to a sustainable chemical industry rather than for a dismantling of chemical production, so characteristic of the 1970s. Only in the (natural) food sector do we see serious initiatives to abolish chemicals, mainly pesticides and chemical fertilizers.

It is essential to underline that the above analysis and evidence do not mean that the chemical industry is no longer challenged on its ecological performance, or that we are advancing the possibility of a sustainable chemical industry in the near future. This is far from being the case, as most figures and data on emissions and environmental quality parameters show. But the analysis does indicate that, first, transformation processes in the

chemical industry are to a significant extent environment-informed and, second, this ecological transformation is a process of radical modernization involving (and transforming) the institutions of modernity. In this sense this ecological restructuring of the chemical industry resembles what has been labelled the 'modernization of modernity', while other, alternative ways out of the environmental predicament seem to come to a dead end, as will be made evident in the next section.

Soft Chemistry: a Stagnating Alternative to Restructuring

The most clearly defined alternative to an ecological modernization of the chemical industry is the idea of soft chemistry. Soft chemistry (*sanfte chemie)* is the chemical equivalent of Lovins' soft energy path and is akin to Ullrich's alternative of *sackgasse* technology (Lovins 1977; Ullrich 1979: 149ff). Soft chemistry moves away from some of the central characteristics of modern technological systems and revitalizes the environmental concepts that were prominent in the early 1970s, albeit with a modern outlook.

According to von Gleich (1988, 1991), one of the founders and interpreters of the soft chemistry paradigm, three criteria can be used to distinguish soft from hard chemical (or nuclear or genetic) science and technology. First, soft chemical technology distinguishes itself from its antipode by intervening only superficially, less 'profoundly', in chemical structures. The increasing profundity of intervention (*Eingriffstiefe*) of hard chemical technology has three consequences: increasing power of man over nature, increasing risk potentials due to extended time–space dimensions and irreversibility, and a widening gap between the scope of our knowledge of nature and the scope of our intervention in nature. The fact that the intervention level of soft chemistry is less deep does not mean that these technologies are without problems, but rather that they have retained a use-dependent neutrality: negative consequences of the use of this technology are not inherently related to technology itself but rather to the application of the technology. Second, soft chemical technology can be distinguished by its instrumental character (*Werkzeugcharakter*), that is the possibility for labourers (the primary producers) to use and control the natural properties of the natural resources used in production. While hard chemical technology has to use standardized and uniform natural resources and Fordist production processes, in which primary producers and natural resources are adapted to production technology, soft chemical technology – in contrast – is adapted to the properties of the natural resources as they are found. Finally, soft chemical technology makes use of the coproductivity (*Mitproduktivität*) of nature instead of interpreting nature as a mechanical/cybernetic compound. Biological and ecological processes are part of chemical production. Chemical production technology should not mean the exclusion of nature and biological/ecological processes.

The idea of soft chemistry has hardly found any application in contemporary chemical industry and chemical products. The production of so-called 'natural paints' is generally seen as the most important and promising soft chemical technology, but even during the third wave of environmental consciousness in the late 1980s and early 1990s the market for natural paints stagnated and did not rise above a 1 per cent share of the market in European countries. State programmes in, for instance, Germany and the Netherlands aimed at the environmental improvement of paints and the paint industry have been hesitant to support natural paints, because of their inferior product quality, their poor environmental performance on volatile organic compounds and the risk of endangering the good relations with the

regular chemical paint industry. Moreover, in criticizing the chemical industry, most of the environmental movements in Germany and the Netherlands have not founded their ideology on soft chemistry, but have pleaded, instead, for an environmental modernization of the chemical industry. Natural paints have only been advocated by a small proportion of the environmental movements, and have sometimes even been subjected to fierce criticism from an ecological point of view by environmental organizations. In other chemical sectors and products, soft chemistry plays an even more limited role.

In conclusion, it can be asserted that soft chemistry, as a way out of the environmental crisis caused by the chemical industry and an alternative to ecological modernization, seems to have lost both its descriptive powers and its normative value for major parts of the environmental vanguard of modern industrial society.

EPILOGUE

In the process of environmental reform of one of the most challenging sectors (from an ecological perspective) of modern society, the institutions of modernity are by no means fading away. Although other economic sectors will show to some extent differences in their path of ecological reform, the general processes, dynamics and institutions involved will be broadly similar.

In this reform process the ecological question reflexively transforms these institutions by making their 'linear' economy–technology–oriented progress difficult. Ecological problems seem to be one of the major issues that contribute to a more reflexive process of modernization, in which current institutions are constantly questioned and transformed. In that sense modernity has lost its innocence and we are definitely entering a new phase of modernity, labelled by different authors as 'late' or 'reflexive' modernity. However, it is going one step too far to designate this new phase 'postmodernity', as all the major institutions of modern society are still dominant. The fact that ecological considerations play such an important role in this transformation process is increasingly recognized by sociologists, and is reflected in the growing attention paid to ecological issues by general sociological theory, as we have observed in the introduction.

It is of course not only ecological modernization theory that profits from this increasing attention that sociological theory pays to the environmental question. Risk Society theory and various versions of a postmodernist idea of environmental reform, to name but a few, have also taken advantage of these theoretical developments. Although this will definitely not lead to a uniform and dominant social theory for analysing and understanding current (and reflecting on future) environmental reform, it has already improved the quality of the theoretical and societal debates on these issues, as compared to those of the 1970s. Maybe that is one of the major steps forward in modern environmental sociology.

NOTES

1. Goldblatt (1996) recently reopened this debate by questioning Giddens' conceptualisation of the environment in relation to the industrial rather than the capitalist dimension of modernity. According to Goldblatt, Giddens deals only superficially with environmental degradation in hardly paying attention to the capitalist mode of production as its basic source, in addition to industrialism.

2. The ideological vanguard of especially Dutch and German environmental organizations and political parties have contributed on a more practical level to the political acceptation of the idea of ecological modernization. See, for instance, Schöne (1987), Fisher (1991), Friends of the Earth Netherlands (1991) and van Driel *et al.* (1993).
3. For an elaboration on ecological modernization theory with respect to the sphere of consumption and lifestyle: Spaargaren (1996).
4. Mol (1995: 7–26) has analysed the different schools of thought in environmental sociology from the late 1960s onward.
5. The bureaucratic state environmental policy of the 1970s and 1980s is regarded as inflexible, economically inefficient and unjust, slowing down rather than propelling technological innovations, unable to control the billions of material and energy transmutations occurring each day and incapable of stimulating progressive environmental behaviour by companies (for example, Jänicke, 1986; Huber, 1991).
6. PVC = polyvinyl chloride; PP = polypropylene; PE = polyethylene.
7. Production of the first-generation pesticides that have became so notorious in Western societies because of their ecological side-effects, is no longer under patent and is seen in so-called 'Third World' countries.

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9. Postmodernism and environmentalism: complementary or contradictory discourses?

Matthew Gandy

INTRODUCTION

Since the mid-1980s, the postmodernity debate has rapidly permeated virtually every dimension of academic discourse, extending from the humanities and social sciences to branches of physics and evolutionary biology. In trying to make sense of this vast and complex debate it is useful to divide postmodernism into three often overlapping areas of concern. First, there is the aesthetic dimension, encompassing developments such as changing styles in architecture and art; second, there is the historical debate focused on whether the period since the early 1970s represents a distinctive postmodern era; and third, there is the pervasive questioning of the ethical and philosophical foundations of knowledge in the context of radical epistemological doubt (see Table 9.1).

In addition to this simplified threefold typology of postmodernist thought, it is also useful to make a further distinction between postmodernist literature which is broadly enthusiastic towards these new developments (for example, Jencks, 1986; Lyotard, 1984) and another set of literature which is deeply sceptical and pessimistic about the development of postmodernism (for example Habermas, 1987; Harvey, 1989). Readers will detect that the present author's perspective lies somewhat towards the sceptical side of this divide, but it will be argued here that the implications of the postmodernity debate for environmental discourse remain inescapable and should form the focus of greater scholarly attention.

The chapter is divided into three main sections in order to explore these three dimensions in greater detail: the first section is concerned with changing aesthetic sensibilities towards nature; the second examines historical developments since the early 1970s and the third focuses on the impact of radical epistemological doubt.

CHANGING AESTHETIC SENSIBILITIES TOWARDS NATURE

To talk of a postmodernist aesthetic is something of a misnomer, for two reasons: first, the inherent pluralism in postmodern discourse constantly stresses the diversity and heterogeneity of different styles and developments to the preclusion of any easily identifiable or classifiable trend; and second, the high point of postmodernism as a recognized style or approach was reached some years ago. Nonetheless, we can draw out some distinguishing features which place postmodern aesthetics in a separate realm from the dominant characteristics of twentieth-century modernism. The most significant and far-reaching development

Table 9.1 Environmental dimensions to the postmodern condition

Characteristics of the postmodern condition	Areas of intersection between postmodern and environmental discourses
Aesthetic sphere	
Eclecticism, pluralism and 'double coding' to public and professional audiences	New approaches to urban planning and architectural design based on principles of diversity, pluralism and ecological sustainability
Focus on democratization of culture and celebration of pluralism	Quasi-religious pantheistic role of sublime nature in environmental ethics and concern with wilderness areas
Renewed interest in the aesthetic sublime and irrationalist thought	Renewed interest in romanticism and the legacy of *fin-de-siècle* European thought drawn from the critique of urban industrial societies
Historical sphere	
Space-time compression and the rise of 'flexible accumulation' in western economies since the early 1970s	Accelerated commodification of nature identified in neo-Marxist analysis of postmodernism as distinctive epoch associated with capitalist restructuring
	Linkages between the post-industrial thesis and ecological sustainability
Rise of the new social movements since the 1960s	Debate over the degree to which the environmental crisis is an outcome of the modernity project
Emancipatory postmodernism founded on greater sensitivity to difference through recognition of cultural and social otherness	Green consumerism as elite market niche in response to the diversification of consumption patterns
Epistemological sphere	
Neostructuralist primacy of the signifier over the signified and radical indeterminacy of meaning	Social constructivist views of nature and greater recognition of uncertainty and unpredictability in the analysis of environmental systems
	Critical realist concerns with the 'epistemic fallacy' and the basis of normative science
Universal political goals and ethics replaced by micro-political 'language games' and the search for context-specific consensus	Search for place-bound values as forms of bioregionalist 'local knowledge'
	Tension between essentialist and non-essentialist strands of ecofeminism
Incredulity towards 'grand narratives' and resistance to 'terroristic reason'	Rejection of Cartesian dualism and debates over the role of modernist science in environmental destruction
	Suspicion towards technology and universalist forms of rationality
Post-Newtonian conceptions of the universe as spontaneously self-ordering and non-teleological	Influence of new scientific ideas such as anti-chaos and post-Darwinian evolution on the Gaia hypothesis and postmodern scientific formulations

Source: Gandy (1996).

has been the breaking down of barriers between high modernism and popular culture. This 'democratization' of aesthetic discourse has involved the opening out of the arts to new audiences and situations. Nature-based art has been a central element here, with the emergence of so-called 'Land Art' using nature for the basis of site-specific sculptures and installations. This 'ecological avant-garde' includes figures such as Michael Heizer, Richard Long and Robert Smithson. The unifying theme here is the challenge to established modes of institutionally based art in combination with a desire to re-engage with nature and landscape as a source of artistic inspiration (see Beardsley, 1991; Ross, 1993). We should note that the resurgence of nature-based art since the 1960s contains diverse impulses. In some cases, the romantic tradition of nature-based transcendence has been invoked in what is simply a modern reworking of late eighteenth-century and early-nineteenth century European thought. In other cases, however, the re-engagement with nature has been predicated on a non-transcendent dialectic which celebrates rather than suppresses human interactions with nature.

Another important development has been a challenge to the alienating and oppressive dimensions to modernist design in the built environment. The era of technological modernism, epitomised by De Stijl, Le Corbusier and the large-scale reconstruction of cities has been increasingly challenged since the 1960s by planners and architects anxious to return urban life to a more heterogeneous and neighbourhood-oriented approach to urban space (Hamel, 1993). A pervasive theme here is bringing nature back into the urban environment through the creation of green spaces, community gardens and other new small-scale community-based initiatives. Yet we should be wary of the putative superiority of small scale communities advanced in some of this anti-modern and anti-urban literature. In many cases there is an implicit endorsement of the superiority of rural life, a pastoral sentiment which may imply exclusionary conceptions of social communities (see Berman, 1982; Young, 1990). The recent emergence of 'green architecture' and new green spaces such as urban plazas may similarly be criticized as merely a façade for the radical restructuring of urban space as part of wider global processes which are inimical to environmental protection and social justice.

The break-up of cultural modernism, particularly in its technological guise, has ushered in a diversification of aesthetic engagements with nature, ranging from art to urban planning. We should be careful, however, to disentangle the historical and political lineage of these different developments. Implicit within romantic anti-urban sentiments is a return to nature and pre-modern societies: in many cases this involves perpetuating and reinscribing existing social relations. In contrast, the more dialectic approaches to nature which eschew the essentialist and transcendental trappings of the past may lead to new fusions of nature and culture which celebrate the possibilities for new interactions between human creativity and nature. If we restrict our analysis to the aesthetic dimensions alone, however, we risk overlooking the radically changed political and economic realities for art, architecture and planning which have emerged over the last 30 years.

ECOLOGICAL CRISIS IN A POSTMODERN WORLD

The period since the UN Stockholm Conference of 1972 has been marked by a series of social, political and economic developments which have fundamentally altered the wider

context for environmental discourse. Since the mid-1980s, the terms 'postmodern society' and 'postmodern condition' have been used with ever greater frequency to refer to these interrelated developments. Evidence suggests that societies have become far more heterogeneous and individualist in their structure and orientation (see Beck *et al.*, 1994; Crook *et al.*, 1992). Growing disparities in income in combination with marked regional disparities have developed out of a global reorganization of economic activity (see Soja, 1989). These far-reaching economic changes since the early 1970s have been widely referred to as an era of greater flexibility in production. At the microeconomic and sectoral level of analysis, emphasis has been placed on a plethora of new managerial and technical innovations in the production process. This has been linked to discourses of 'ecological modernization' through the application of less energy and materials in the production process (Dietz *et al.*, 1992; Roobeek, 1987). Whilst there have been important advances within individual firms and sectors, along with evidence of lower levels of pollution within specific localities, the broader picture remains far more uncertain. The rise of the so-called 'fictitious economy' and the speculative impetus of global financial trading has shifted the emphasis of economic activity towards trade in information rather than physical commodities. This stateless 'casino economy', with its physical manifestations in the financial centres of global cities such as London, New York and Tokyo, is embedded in a series of developments suggestive of an accelerated commodification and exploitation of nature on a global scale (Altvater, 1993). The increasing mobility of capital is mirrored in the extensive shifting of the environmental externalities of production to take advantage of disparities in laws and regulations and ensure further capital accumulation. We cannot conceive of 'ecological modernization' as a paradigmatic environmentally friendly shift in the economic production process without considering the articulation of these local and sectoral shifts within their global context.

In the core economies of the West there has been the growth of increasingly sophisticated niche markets for goods and services. This now extends to the development of 'bio-consumerism' or 'green consumerism' as a distinctive and unprecedented development in consumption where consumers choose goods they believe are environmentally superior. A new era of sophisticated consumer-oriented politics has become integral to mainstream environmentalism, where the ecological demands of consumers complement the application of market-based policy instruments in wider society. A flexible polity predicated on the shifting price signals in the market place is advanced as a new approach to environmental policy making. Yet it is highly questionable whether consumer-based environmentalism can offer anything more than a cosmetic contribution to resolving the crisis of relations between nature and society (see Luke, 1993).

At a political level, environmental concerns have altered the agenda for public policy and given rise to a number of green political parties which have achieved some significant electoral successes, especially in western Europe. The era of mass political parties reflective of classic workplace conflict between labour and capital have become displaced by a proliferation of smaller political parties whose support is not easily identified with particular social and economic classes but indicative of new alliances and greater fluidity in western electorates. The emergence of environmentalism is frequently singled out as an example of a new political development indicative of the breakdown in established patterns of political activity and the emergence of a 'subpolitical' realm (Beck, 1992). From this perspective, environmentalism and green political parties represent a radical challenge to existing patterns of policy making in western societies. Yet we should be cautious not to exaggerate the

significance of this shift for three reasons. First, environmentalism is extremely diverse and does not represent a clearly defined political interest comparable to that of capital or organized labour. Second, while many green activists proclaim their views to be both new and transcending the right–left divide within existing political discourse, this invariably involves suppressing or obscuring the historical roots of environmental ideologies. Third, the shifting fortunes of 'green parties' and environmentalism are closely tied into a wider political and economic context. The agenda and aspirations of environmental activists have not supplanted long-standing electoral concerns with macroeconomic issues. Nor has environmentalism made a significant contribution to key areas of social policy such as the future of health, education and social services, or the resurgence of racism and intolerance in western societies.

The postmodern era, as a distinctive historical period since the early 1970s, is a deeply paradoxical one for environmental discourse. On the one hand, social and economic developments have facilitated the emergence of 'post-material' political concerns with lifestyle issues such as environmental quality. On the other hand, the underlying dynamic of global social, economic and political change has been towards neoliberal deregulation, higher levels of worldwide consumption and an acceleration in environmental degradation and resource use at a global level. Contemporary environmental discourse has scarcely begun to reconcile these contradictory developments.

RADICAL EPISTEMOLOGICAL DOUBT

An overriding characteristic of postmodernist thought has been the wide-ranging challenge to existing approaches to intellectual and scientific inquiry. There are several interrelated elements here: the challenge to so-called 'grand theories' such as Marxism or positivism which seek to simplify reality into a smaller number of laws or relationships; the rejection of universalist modes of explanation which ignore the heterogeneity and difference inherent in social reality; and the suspicion towards essentialist ideas rooted in an external foundation or invariant source of truth. This complex medley of developments is bound together by a greater sensitivity to the limits to knowledge and to the need to open up intellectual debate to a broader array of actors and perspectives. A primary element here is the feminist challenge to androcentric science which refuses to acknowledge its own interests and limitations. Yet feminist thought is itself engaged in vigorous debate over the degree to which it should adopt a radical postmodern agenda and dispense with structuralist modes of explanation. We should be careful, therefore, to distinguish between different perspectives on the basis of their epistemological approach to knowledge: while some postmodern accounts group all modernist thought under a series of binary categorizations such as Cartesian dualism, there are in fact vast differences between various empiricist, positivist and structuralist approaches to environmental research.

A central element in the growth of radical epistemological doubt concerns the questioning of environmental rhetoric and an emphasis on the language of environmental discourse. 'Nature' and 'environmental crisis' are no longer conceived as simple categories but as discursive formations laden with historical and ideological meanings (see Bennett and Chaloupka, 1993; Haraway, 1989, 1991; Soper, 1995). In some formulations, nature itself is given a more prominent role in scientific discourse, as an independent actor in its own right

(see Latour, 1988). Nature is portrayed as a 'quasi object' traversing both the physical world and cultural discourse, thereby blurring the subject–object distinctions that permeate western intellectual thought (Latour, 1993). A further issue which builds on this theme of epistemological doubt is the failure of science to acknowledge the limits to knowledge and understanding (see Wynne 1992, 1994; Lash *et al.*, 1995). These types of studies have introduced social and cultural dimensions into environmental discourse in order to challenge both the epistemological inadequacies and the suppression of uncertainties inherent in mainstream environmental science. From these radical perspectives, the idea of an environmental crisis is not a self-evident revelation of objective science but a complex outcome of inherent uncertainty in combination with an array of social and political influences. If we move to a purely socially constructivist perception of nature, however, we risk cutting off social discourse from physical reality, and thereby denying the independent agency of nature (Gandy, 1996a).

In some cases the critique of specific aspects of modernist thought has been extended into a complete rejection of the Enlightenment project (see Grandy, 1996). These kinds of views are especially well developed in the burgeoning environmental ethics literature, where a variety of anti-modern and nature-based philosophical perspectives have been developed. It is in these overtly anti-modern positions that we can find the most clear expositions of a 'postmodern environmentalism'. The environmental crisis is portrayed as the inevitable outcome of the radical splitting of humankind from nature (Atkinson, 1991; Bordessa, 1993; Cheney, 1989). What many of these perspectives share is a demand to return to nature-based and pre-modern types of societies, thereby providing strong links to bioregionalist and deep ecological discourses. Nature-based ideologies form a prominent element in the emergence of deep ecological discourses which eschew any rationalist or anthropocentric grounding of environmental discourse (Gandy, 1997). In other cases an ill-specified combination of nationalist and bioregionalist sentiment is invoked in order to challenge global capital and relativist nihilism (Gare, 1995). Yet these overtly anti-modern environmental formulations remain problematic. The precise interrelation between modernity and environmental crisis is left uncertain (particularly with regard to the social and economic developments described in the last section). In many cases there is an overemphasis on aesthetic concerns with the protection of wilderness to the relative exclusion of the practical needs of complex urbanized societies. The emphasis on place-bound forms of knowledge and the radical endorsement of difference does not satisfactorily resolve the underlying ethical and epistemological issues inherent in an anti-modern environmental discourse (Gandy, 1996). Similarly, the relativist and social constructivist impulses behind postmodern environmentalism are especially weak with regard to the historical crisis of the public sphere and the possibilities for any kind of consensual advance in environmental discourse that is capable of articulating the interests of the whole community.

CONCLUSION

This chapter has highlighted a number of areas where postmodern and environmental discourses intersect: the socioeconomic restructuring and ecological modernization literature; the inherent diversity and pluralism across a range of environmentalist and postmodern thought; the recognition of scientific uncertainty and the limits to positivist environmental

science; the resurgence of nature-based approaches to art, design and planning since the 1960s; and development of bioregionalist anti-modern sentiments. Yet there are a number of flaws in any simplistic combination of environmentalism with postmodernism: there is the pervasive caricature of the Enlightenment project as the primary cause of the environmental crisis; there is the failure to resolve satisfactorily how values inherent in either nature or in various forms of 'local knowledge' can be clearly evaluated; and there is a lack of recognition of the universality of capital in relation to the crisis of the public sphere (Gandy, 1996, 1997).

The most important lesson to emerge from any serious engagement between postmodernism and environmentalism is that we cannot understand changing relations between society and nature by relying on ahistorical and positivist modes of explanation which refuse to engage with the social and ideological dimensions of environmental discourse. The agenda for environmental research has suddenly become far more complex and interdisciplinary than has hitherto been the case. This places a major intellectual burden on environmental research to provide explanations for environmental degradation that are capable of contributing to policy discourse without presenting partial and misleading accounts of environmental change. Without recourse to false claims of either positivist neutrality or nature-based transcendence, our knowledge becomes open to negotiation and interpretation. It remains to be seen whether a revitalized environmental discourse will ever be powerful enough to challenge the profound irrationality of the environmental crisis.

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10. A coevolutionary environmental sociology

Richard B. Norgaard

INTRODUCTION

Environmental sociologists have documented the concerns and social movements arising out of environmental change associated with modernization in capitalist societies. In the sociological tradition, environmental sociologists have taken modernization as inevitable. This has meant that, for the most part, neither societies before modernization nor non-modern societies have been considered seriously. While this boundary demarcates sociology from history and anthropology, it has meant that environmental sociology has not been broadly comparative. To the extent that a few sociologists have endeavoured to explain how environmental changes themselves have arisen, they have rooted the problem in the social distancing associated with modernity or in the inherent structure of capitalism. While these explanations are socially historical, they are not environmentally historical, for the biophysical world has not played a historical role in the way environmental problems manifest themselves. The coevolutionary environmental sociology developed in this chapter addresses these shortcomings. It can be used to explore how modern and non-modern societies have differed, it provides an explanation of the ways in which people affect their environments and environments affect people over time, and it can be used to document culturally and environmentally specific histories.

Sociology's modernist beginnings, reviewed in the first section, have constrained sociological thought on progress and the environment in a manner which has made it ill-suited for interpreting current environmental crises. Similarly, because sociologists have had mixed experiences with biological explanations, they have limited their pattern of explanation and now argue that biological thinking should be left to biologists. The second section documents how evolutionary theory and the social sciences have been intertwined from the beginning. The third section describes how coevolution helps us to understand how processes of change can result in social structures which tightly interlock together. Key to our environmental discontents with modernity, the coevolutionary approach also explains why things so frequently do not turn out as expected. Applying the coevolutionary paradigm to social and environmental systems interacting together, the fourth section, links social and environmental histories and develops a new, broad explanation of environmental problems. Advantages of this coevolutionary environmental sociology are identified in the following section and the chapter concludes with an appraisal of policy implications.

NATURE, PROGRESS AND THE ORIGINS OF SOCIOLOGY

Sociologists have long been irresistibly drawn to ecological and evolutionary metaphors to explain social interaction and change. At the same time, environmentally deterministic arguments have generated controversy within sociology from its very beginnings. This contradiction has hindered the development of an environmental sociology that is more than simply a documentation of the environmental movement. Many of the contradictions are embedded in the founding of sociology itself. Environmentalism is a critique of the way people have 'progressed' by dominating nature through science and technology. The critique addresses modern assumptions about the role of nature and the particular ways modernity unfolded. Environmentalism is fundamentally at odds with the modernist foundations of sociology.

August Comte, the founder of sociology and coiner of the name, waxed ecstatic about the way in which science could free humanity from nature's burdensome constraints and whims. Further, he argued that applying the scientific method to people would allow sociologists to understand social systems so that they too could be redesigned to work for human progress. Herbert Spencer – natural scientist, philosopher and fervent father of evolutionary thinking in sociology – was also confident that the laws of social systems would follow from natural law and thereby facilitate progress. Emile Durkheim insisted that social systems could be studied independently of environmental factors because humankind was already becoming free from nature and would only be more so. Among the founders, there was a strong sense that social systems needed to be scientifically understood and redesigned rationally in order to fully take advantage of the opportunities to become independent of the environment. Sociology was to be the science to hasten this social transformation. Thus, for example, rural sociology was established to propel farmers into agriculture's industrial future. But sociology's founders, like modern people since, did not elaborate on the particular features the future would have to have for it to be judged human progress. Rather, the future simply would be good. Max Weber lamented the untoward consequences of the progress earlier sociologists had so enthusiastically looked forward to, but he accepted the inevitability of the social transformation wrought by modernization. With few exceptions, though these have dramatically increased over the past few decades, sociologists have fully embraced their own beginnings, the historical modernist beliefs which have unfolded in reality as environmental degradation, excessive social distancing and loss of human dignity.

Born into a culture of progress and reared with a sense of modern predestination, sociology, even more than the other social sciences, has been congenitally blind to virtues lost in our own past and to the strengths of other cultures. Interpretations of other times and peoples are all we have with which to compare modernity. Yet sociologists are quick to say 'don't romanticize the past' or 'don't romanticize traditional people' whenever one infers a good thing about earlier times or another culture. To say someone is being romantic, of course, has long been used in opposition to the modern, more advanced state of being scientific. The accusation of romanticism also excuses as inevitable whatever is lost in modernity's rage. It is only in recent decades that sociologists have given serious attention to anything but industrial societies. It is hardly a coincidence that the sub-discipline that has since evolved to look at other peoples assumed the name 'development' sociology.

Sociology's historical assumption that people could be studied apart from nature became a dogma that people were apart from natural processes. The slightest hint of environmental

determinism generates controversy. Thomas Malthus' naturalistic argument about population growth and human misery has become a San Andreas Fault dividing and constantly shaking social and natural scientists. E.O. Wilson's sociobiology of the mid-1970s remains a lightning rod even though he integrated culture into his model in the early 1980s in response to cultural determinists' critiques. And the excessive reaction to sociobiology may be traced back to sociology's own embarrassing history with social Darwinism. The separation between environmental factors and social factors has been insisted upon. The environment is simply the field on which society plays, the material world whose distribution determines power. But the rules of the game and how nature ends up being distributed cannot include environmental processes themselves. Again, the sun increasingly shines through here and there, but sociology's modernist beginnings remain a heavy cloud.

Coevolutionary environmental sociologies have people coevolving with environmental systems. The particular coevolutionary environmental sociology developed in this chapter is ideal for questioning the particular ways in which science and technology have led to social and environmental transformation. A review of evolutionary thinking, particularly its relation to social thought, will lay a foundation.

HISTORY OF EVOLUTIONARY CONCEPTS

For millennia, people have philosophized on the way nature changes over time. These historic ideas on evolution still infuse much of our use of the term in the social sciences. Our formal understanding arose only recently. Charles Darwin and Alfred Wallace in 1858 coidentified the underlying processes of our biological understanding of evolution. Both credit Thomas Malthus, parson and economist, for suggesting at the end of the eighteenth century that populations expand to their 'natural' environmental limits, forcing the selection of stronger individuals over weaker. Thus a model that developed as economics emerged from moral philosophy underlies our biological understanding of evolution. It is also important to keep in mind that Herbert Spencer was critically important in publicly voicing opposition to creationism before Darwin and Wallace, in publicly defending and elaborating their theory when it emerged and in incorporating evolutionary theory as a basis for sociology. Spencer's eloquent writings on evolution, both biological and social, were more often read than those of Darwin. In addition to the importance of Malthus and Spencer to the biological theory of evolution, the emphasis biologists have historically placed on competition when describing evolution, rather than the many other ways in which animals and plants interact with each other, is also attributed to the dominance of economic thought in the nineteenth and twentieth centuries. Thus, whatever the appeal to both biologists and social theorists, the argument that evolutionary theory ought to be left to biology and biologists is historically naive (Greene, 1959).

Karl Marx admired his contemporary, Charles Darwin, and frequently referred to evolutionary thought as an interesting way to ground history and class struggle. Yet Marx by no means converted to a Darwinian world view. His linear materialist history, forces of production and visions of a unified socioeconomic order, to say nothing of his predictive claims as to its future, were based on Newtonian mechanical systems dynamized by the unfolding processes of Hegel's dialectical method. While many find parallels between dialectical and evolutionary understandings of change, the underlying explanations of process are different.

Even as an admirer of evolution, Marx correctly worried, as early as 1862, that Darwin's theory could be used to rationalize the power of capitalists and the existence of capitalism (Hodgson, 1994).

And it was precisely such a rationalization that Herbert Spencer firmly planted in the latter half and the American sociologist William Graham Sumner eagerly cultivated at the end of the nineteenth century. Social Darwinism misinterpreted evolutionary concepts that were still in the process of forming in biology, combined them with an ugly brew of western superiority, liberal individualist values and immature visions of progress, and rushed them along a totally different track as sociology. A critical error was to equate evolution with progress. This justified colonialism, imperialism and racism as 'natural' in the march of western progress. It is this episode, now history in sociology yet still common in popular understanding, that has made the incorporation of biological concepts, and evolutionary ones in particular, so suspect in social theory (Tax and Krucoff, 1968).

Evolution is mistakenly equated with progress to this day because the evolutionary process has been so often explained in terms of individuals of a single species being selected to fit increasingly well into a predefined, physical niche. We can all imagine, for example, species of tortoise evolving to better fit increasingly dry desert niches. This directional explanation was easily conflated with western beliefs in progress and thereby contributed to social Darwinism. The directionality, however, results from thinking in terms of but one species and of the niche in predefined, physical terms. The most important characteristics of most species' niches are the characteristics of other species. When evolution is seen within the context of species interacting, we see species' characteristics placing selective pressure upon and coevolving with each other, closely with a moderate number of species and more distantly with effectively all species. In a coevolutionary world, all direction and predictability are lost. There is considerable evidence that evolutionists have long considered species interaction and coevolution. The directional explanation, however, even dominated their own understanding for a century. Paul Ehrlich and Peter Raven (1964) broke this dominance with a seminal article on the coevolution between the defence mechanisms of plants and the characteristics of the insects which fed upon them. Thus the understanding of evolution on which their paper builds is still relatively recent and not a part of popular knowledge.

SOCIAL AND ENVIRONMENTAL COEVOLUTIONARY CHANGE

Development can be portrayed as a process of coevolution between social and environmental systems. Environmental factors affect the fitness of particular aspects of social systems and, in turn, social systems influence the fitness of particular aspects of environmental systems. Norgaard (1994) subdivided social systems into knowledge, values, organization and technology systems which coevolve with each other and with environmental systems. In this portrayal (Figure 10.1), each of these systems is related to each of the others, yet each is also changing and affecting change in the others. Deliberate innovations, chance discoveries, random changes (mutations) and chance introductions occur in each system which affect the fitness and hence the distribution and qualities of components in each of the other systems. Whether new components prove fit depends on which characteristics dominate each of the systems at the time. With characteristics of each system putting selective pressure on characteristics of each of the others, they coevolve in a manner whereby each

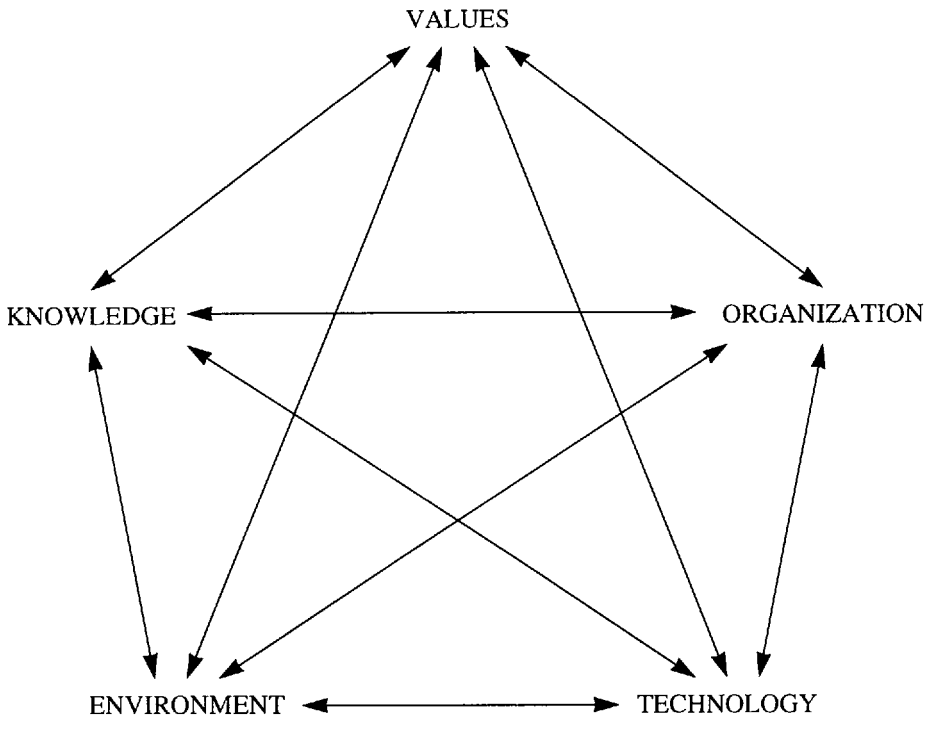

Figure 10.1 The coevolution of environment and society

reflects the other. Coevolution explains how everything appears to be tightly locked together, yet everything also appears to be changing.

To further elaborate the process, imagine that the systems of Figure 10.1 – values, knowledge, social organization, and technology – are made up of different types of ways of valuing, knowing, organizing and doing things. Similarly, the environmental system consists of numerous different types of species, environmental factors and relationships between them. The survival and relative dominance, or frequency, of each particular type in each subsystem is 'explained' by its historical fitness with respect to the relative dominance of types of things in the other systems. The relative importance, or frequency distribution, of types results from selection processes.

Now imagine that a new type is introduced into one of the systems. For example, imagine that a new way of understanding the world, let us call it N for Newtonian, is introduced into the knowledge system of western culture. The survival and relative importance of N will depend on the selection pressures from the components in the other systems. If N fits by in some way complementing sufficient other components, it survives, and vice versa. If N fits significantly better than other ways of knowing, it will outcompete and replace them, or at least reduce their relative importance. And if N survives, it will begin to put selective pressure on the components of other systems and affect their relative dominance. This process of experiments, discoveries, chance mutations and introductions within each of the systems drives coevolution across all of the subsystems

simultaneously. With each of the systems applying selective pressure on each of the others, they all reflect each other.

In the coevolutionary paradigm, the environment determines the fitness of people's behaviour as guided by alternative ways of knowing, forms of social organization and types of technologies. Yet, at the same time, how people know, organize and use tools determines the fitness of characteristics of an evolving environment. At any point in time, each determines the other. Over time, neither is more important than the other. And depending on genetic mutations, value shifts, technological changes and social innovations that arise randomly, the evolutionary path is reset for a period until another change occurs. Thus the coevolutionary perspective explains why options are disturbingly limited in the short run: culture has determined environment and environment has determined culture. At each point in time there is a near gridlock of coevolved knowledge, values, technologies, social organization and natural environment. Yet over the longer run we approach the equally disturbing situation of nothing determining anything, that all will change in unpredictable ways. Where we will be in the future is determined by neither today's culture nor environment alone but by these and a host of unpredictable future factors. Yet, come the future, near gridlock will prevail.

The coevolutionary explanation of change acknowledges that people design new elements and introduce them into their cultures, but its emphasis on the selective pressure of the components of existing systems, as well as on the continental change driven by the random nature of mutations and introductions throughout the system, helps explain why designs often fail and at other times occasionally succeed by evolving into something quite unexpected. From within the coevolutionary perspective, designs are better thought of as deliberate evolutionary experiments, for the outcomes of experiments are uncertain by definition. New elements which prove fit are successful because they interrelate with other elements in some functional way. While the experiments may be random or designed, those which succeed are no longer elements in a system of random elements. Quite the contrary: when marvelling at the way everything interrelates so intricately in nature, many proclaim that only a Grand Designer could have accomplished the task. For social systems, we attribute the intricate pattern to modern rationality while even agnostics and atheists bow to the invisible hand of the market. To reiterate, people are constantly trying to use rationally the knowledge they have to affect the outcome of the future, but only a few of our technological or organizational designs are selected as fit.

We are, of course, environmentally disillusioned because so many of the modernization projects which we have initiated over the past century have had unforeseen consequences. In an N or Newtonian world, the environment can be known and its future predicted; our environmental transformations, similarly, have predictable outcomes. But, in a coevolving world, the medium future is murky, the distant future invisible. We have intervened in nature as if we were in a Newtonian world but history unfolded in a coevolutionary way, hence our surprises and environmental disillusionment.

Selection, a central concept in evolutionary models, entails power over future outcomes. Though evolution explains change, today's dominant characteristics will most likely be dominant tomorrow and will influence the characteristics of other elements that are allowed to become dominant. In this sense, power infuses the evolutionary process. At the same time, this infusion is diffuse in a coevolutionary model. The model itself has no a priori locus of power such as capital or capitalists. It seems possible to give particular elements in

a coevolving system more staying and selection power. Indeed, by doing so in the extreme, one could probably develop a model that parallels and facilitates insights into existing models of power. In our own work, however, we have not given any agent in the process more power a priori. Rather, we have let the diffuseness help us to see how widely different elements influence each other. Consequently, the model is neither more environmentally determinant nor more culturally determinant on balance, more concerned with the importance of technology than that of social organization, or driven by any one factor more than another. And, in this sense, the way we have used the coevolutionary model is an oddity and minor irritation to those in diverse schools of thought who have self-selected or just become comfortable with their own school's factor being more important than others.

On the other hand, it is impossible to consider all aspects of the coevolving process simultaneously. In our own work, we have given greater weight to the underlying cosmological and epistemological assumptions of modern knowledge without arguing that these have determined our history. We have followed the way these have placed selective pressure on our technologies and social organization, particularly in conjunction with the transformation from a productive process driven by the sun to a productive process driven by fossil fuels. Other coevolutionary stories can be told, but this is the one which coevolved between the author's own experiences, training, reading, and academic and policy interactions.

THE COEVOLUTION OF UNSUSTAINABILITY

Now let us use the categories of Figure 10.1 and the coevolutionary understanding of process to develop a broad, historical explanation of modernity's environmental crisis (elaborated more fully in Norgaard, 1994). When agriculture began some five to ten thousand years ago, there were probably about five million people in the world. Population doubled eight times, increasing to about 1.6 billion people by the middle of the nineteenth century. These eight doublings in world population were facilitated by diverse, location-specific, coevolutions of values, knowledge, ways of organizing, technologies and environmental systems. With economic and environmental systems coevolving in different ways in different places, a patchwork quilt of coevolving cultures eventually covered the globe. The process was contextual and historically contingent. Life improved through a myriad of agricultural innovations within each patch and exchanges between the patches. From an energy perspective, we can see that people managed to capture more energy from the sun, but the technological innovations were selectively matched by social transformations to provide, for the most part, sustaining feedbacks with the environment. Improvements in ships roughly 500 years ago eventually led to vast but weak commercial empires, followed by stronger colonial systems of rule. These systems were largely imposed over the patchwork of different cultures, accelerating the transfer of European ideas, materials, technology and ways of knowing. Yet the patches still remained fairly distinct until well into the nineteenth century.

Beginning in Europe and North America, values, knowledge, institutions and technology began to coevolve with fossil hydrocarbons rather than with ecosystems. By the beginning of the twentieth century, it was obvious that industrial social systems had coevolved with fossil hydrocarbons, systems that were strikingly different from the agrarian systems that had coevolved with the sun's energy captured through ecosystem processes. New transport

technologies and infrastructure, larger firms and bigger cities, new emphases in education and new ways of organizing people coevolved. Ecological systems were also transformed, but the process of transformation changed from the minor experimental manipulation undertaken during the rise of agriculture to the overriding and controlling of ecosystem functions through energy imported into agricultural systems in the form of fertilizers and mechanical equipment. Fossil hydrocarbons drove a wedge between the immediate and longer-term interactions people had with ecosystems, and earlier knowledges, technologies and institutions for managing ecosystem interactions steadily decayed. To the extent that social systems were responding to environmental systems, they were reactionary, belated efforts to prevent excessive damage rather than efforts to enhance new opportunities.

By tapping fossil hydrocarbons, western societies freed themselves, at least for a time, from many of the complexities of interacting with environmental systems. Tractors replaced animal power, fertilizers replaced the complexities of interplanting crops that hosted nitrogen-fixing bacteria, and pesticides replaced the biological controls provided by complex agroecosystems. Inexpensive energy meant crops could be stored for longer periods and transported over greater distances. Agriculture was transformed from an agroecosystem culture of relatively self-sufficient communities to an agroindustrial culture of many separate, distant actors linked by global markets.

But we have already placed too much emphasis on fossil hydrocarbons. Western atomistic portrayals of nature, among other cosmological and epistemological assumptions, facilitated the coevolution and were strengthened in turn. The agricultural transformation was facilitated by separate agricultural sciences working on parts of the system at a time. For the medium run, separate adjustments of the parts seemed to fit into a coherent stable whole. Individual farmers seemed to be freeing themselves from nature's whims. But to rely on fossil hydrocarbons was simply to transfer the environmental impacts to other people, to broader and broader publics, increasingly distant in space and time. Individual farmers had no incentive to comprehend and consider these impacts. The public has been confronting them belatedly and instituting experimental organizational mechanisms to bring each problem individually under control. But the larger process of modernization, specifically technological change and globalization, is outpacing the reforms.

The environmental crisis has been unfolding over several decades in a series of particular public realizations of failure. Collectively, they are leading to a profound comprehension among many that we are on an unsustainable course. Modernity did not free us from nature, rather it expanded the temporal and spatial dimensions of our interactions and coevolution with nature. Further, coevolving with fossil hydrocarbons rather than with nature left our knowledge, organization and technology bases ill-fitted to cope with the expanded dimensions of our newly comprehended interactions. Applying minor adaptations for environmental management of the institutions which led to the crisis is not likely to succeed.

A coevolutionary portrayal of our environmental crisis can be made much richer and more satisfying. Even in the foregoing sketchy portrayal, however, the coevolutionary framework facilitates a new, broad and potentially deep critique of modernity. The environmental crisis is not simply a flaw, whether correctable or fatal, of modernity but rather something that starts early in modernity's history and now runs broadly through it.

ADVANTAGES OF A COEVOLUTIONARY ENVIRONMENTAL SOCIOLOGY

The foregoing coevolutionary model provides a new framework for thinking about the way people have interacted with their environments historically and suggests new directions for the future. The coevolutionary framework has the following advantages as an approach to environmental sociology.

1. Simply because the coevolutionary framework is new, it will provide new insights. It provides a new way to understand how diverse systems, including natural, organizational, technological, values and knowledge systems, can affect each other over time.
2. The coevolutionary framework helps us see how and why our debates over environmental versus cultural determinism were unproductive.
3. By including knowledge systems in the coevolutionary process, we have a cosmology which includes how we know as an active agent. This gets beyond the debate between realists and social deconstructionists (Soulé and Lease, 1995). Such an inclusion explains how both traditional and modern knowledges can be valid and how they participate in the transformation of nature. Such a formulation can also help us understand how western premises about nature and about the way we think, being inconsistent with the coevolutionary process, have transformed nature in unexpected ways and left us environmentally disillusioned.
4. Many will find coevolution uncomfortable at first because Newtonian words which have been important to western argument, such as 'cause', 'force' and 'law', are incongruous with coevolutionary thinking. But coevolution does not replace mechanics. Coevolution in biology assumes ecosystemic relations. Mechanical and other descriptions of the structure and dynamics of portions of social systems over certain time periods will still be appropriate and advantageous even within a broader coevolutionary argument. Thus the framework forces a new pattern of thought yet is methodologically pluralistic and open to earlier patterns.
5. Coevolution, by stressing the ultimate unpredictability of the future, fits our experience and explains our environmental disillusionment.

POLICY IMPLICATIONS

Are there policy implications associated with so encompassing an approach to environmental sociology? Coevolution explains the past well, but by its nature does not predict. It does not give us any stable cause and effect relationships by which we can choose between actions to reach desired goals and avoid undesired effects. And yet realizing this weakness is also a virtue. The first and perhaps most important policy lesson from this understanding of social and environmental process is that the belief that we could predict or control environmental outcomes is a delusion. If processes in many cases really are best understood as coevolutionary, the ability to predict and control will always be limited. And if this is indeed the case, the first policy implication of a coevolutionary environmental sociology is that experimentation should be undertaken frequently, cautiously and on a small scale, with as much monitoring of the evolutionary chain of events thereafter as possible. Massive

programmes to quickly adopt new ways of knowing, organizing and doing things are inherently risky. Multiple small experiments are better than a few big ones.

The second policy implication inherently associated with the coevolutionary way of thinking is related to the first. Experiments which entail very long time commitments should be avoided. If our ability to foresee the future is limited, changes which can be undone quickly or will naturally depreciate are preferable. The folly of committing ourselves to the management of nuclear wastes for 50 000 years, for example, is clearer from a coevolutionary perspective.

The third lesson is also closely related to the first. Diversity in coevolving systems is inherently good. Without diversity, the coevolutionary process can stagnate. With diversity, systems will more likely survive changes in climate or other external disturbances. This means excessive dominance – whether of knowledge systems, economic systems or raw political power – is inherently bad from a coevolutionary perspective.

The fourth lesson is a mixture of bad news and good news. From the coevolutionary perspective, things really are interconnected and adding a new component, such as a new agency or technology, will not quickly shift the way the system behaves. This is simply because the component is likely to be selected out. If the coevolutionary course is going well for people, it is likely to be pretty stable, but the same is true if it is going badly. On the other hand, small changes which do prove fit, that is which are initially compatible with other components in the system, can still change the coevolutionary course for better or for worse.

The fifth lesson is also extremely valuable. The preliminary coevolutionary explanation of the emergence of unsustainability outlined in earlier sheds new light on reasons for the industrial revolution being so important. Prior to the significant exploitation of fossil hydrocarbons, cultures coevolved with ecosystems. With the exploitation of fossil hydrocarbons, cultures coevolved around hydrocarbons, apparently becoming increasingly free of ecosystems for the last century. To a large extent the apparent freedom was due to the long delays between the initial net oxidation of hydrocarbons and the cumulative impacts of their use which we now think are leading to climate change. In any case, modern values, knowledge, organization and technological systems reflect the availability of fossil hydrocarbons rather than the features needed to interact and continue to coevolve effectively with ecosystems. The transition to sustainable development will not be easy because of the extent to which hydrocarbons have driven a wedge between cultural evolution and the biosphere.

The coevolutionary explanation of social and environmental interaction is no more right or wrong than modern explanations. The coevolutionary explanation, however, differs dramatically from modern views. This difference can heighten our understanding of modernism and of the challenges of sustainable development, effective social organization and cultural diversity. If we had had this understanding earlier, our environmental disillusionment, as well as other disillusionments with modernity, could have been avoided. And, as we gain this perspective, it may provide the basis for alternative relations with nature and each other.

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11. Time and the environment

Barbara Adam

INTRODUCTION

Environmental problems continue to make the headlines. At the time of writing (Easter, 1996), the European beef industry is collapsing; all fishing is suspended off the coast of West Wales; baby milk and plastics have been identified as potential sources of infertility; 16 years of compulsory sheep dipping in the UK are leaving a growing number of farmers and their families with crippling neurological problems; a decade after the nuclear explosion at Chernobyl, physical and living environments across Europe are still contaminated by radiation. These events and their inherent and unquantifiable risks form part of a wider picture where socioeconomic and technological successes metamorphose into excesses, where achievements return to haunt us as hazards: they are part of the boomerang effect associated with the industrial way of life. Although concentrated in a particular time and space, that is in Europe, these phenomena are symptoms of globalized economic and industrial processes. As such, they are inseparably linked to specific conceptions and approaches to time and space, an aspect that is largely neglected in social scientific contributions to the environmental debate.[1]

This chapter gives an overview of the ways in which our approach to time could be said to be implicated in the sociocultural production of environmental hazards. To this end it focuses on the conflicts that arise from (1) the complexity and interpenetration of rhythms: cosmic, natural and cultural; (2) the imposition of industrial time on the rhythmicity and pace of ecosystems; and (3) emphasis on visible materiality and quantity at the expense of that which is hidden from view and latent. As an alternative, the chapter offers a timescapes perspective which relates to the environment, not as space, but as a record of reality-creating activity. Thinking of the environment as a timescape brings with it a number of conceptual advantages. It allows us to recombine what science and the industrial way of life have set apart: phenomena and their creative processes, theory and practice, nature and culture, present action and its unintended impacts that continue to operate for an indefinite future.

SPACE AND TIME: UNDERSTANDING NATURE AND THE ENVIRONMENT

Nature tends to be identified in relation to that which it was not: artefacts, culture, self, humans and the cultivated realm of agriculture. In both scientific and everyday conceptions it receives its definitional clarity as 'other', as that which is not created by humans. Nature

conjures up images of mountains and forests, countryside and meadows, wild animals and birds. These visions refer to the products of nature, to the externalized outcomes of processes, to decontextualized physical phenomena without activity and process. Temporality and context, however, are essential to any representation of life. That is to say, living nature is active and changing, its processes being contingent upon contexts: birds are nesting and migrating at specific times and places; a localized countryside is turning colour with the seasons; specific mountains are showing signs of erosion. Without this contextual time-space of activity and processes, nature remains abstract and remote, detached from self, cultural activity and humanity.

Moreover, such a product-oriented understanding of nature fails to take account of the immanent force that gives rise to the phenomena identified with nature. It thus excludes what transformed our earth from its gaseous state into an environment that evolved life and different species, that what acorns into oaks and the flap of a butterfly wing into a hurricane. It ignores the energy as well as the (re)productive and (re)generative capacity that operates irrespective of and despite human activity: the sprouting of new growth after a tree has been felled, the mutations which emerge in response to herbicides and pesticides – in other words, that which humans battle against and seek to bring under their control. As this force works below the surface and beyond the reach of our senses it falls outside the remit of scientific investigation and measurement and is, not surprisingly, neglected by the social sciences. This one-sided product orientation, however, has implications for what it means to act in a sustainable and environmentally friendly way.

The environment, too, tends to be conceptualized in spatial terms as the material base or physical realm within which human activity and the nature–culture intersection take place. As rural, agricultural, urban, or industrial context, the environment is conceived in everyday terms as an external condition, relative to the natural/social organization in question. Its spatial boundary is recognized as fluid, extending from the immediate physical surroundings to the upper stratosphere of the earth and beyond. Similar to the view of nature, this conception ignores the centrality of temporality. This neglect of time means that responses to arising hazards are built on rather uncertain foundations.

If instead we focus on the time-space of being, a very different picture emerges. First, we recognize that the spheres of nature and culture are not as neatly separable as common language use would lead us to suspect. Seasons and tidal extremes, for example, are affected by industrial activity just as some of the limits to industrial activity are set by the fact that humans are tied to the rhythms of night and day, that we, alongside most other living beings, are constituted by a multitude of circa rhythms, which range from the very fast firing of neurones to the heart beat, from digestive to activity-and-rest cycles, and from the menstrual cycle to the larger regenerative processes of growth and decay, birth and death. Those internal and species-specific rhythms, moreover, pulse in synchrony with the rhythms of the cosmos. Environmental changes from dark to light, warm to cold, wet to dry set the developmental pattern for all life on this planet, to be internalized and adapted for specific evolutionary and environmental niches. From cells to organs and even brain activity our physiology is tied to those periodicities. Women's reproductive cycles are tuned to it and so are our collective activity and rest patterns – all superbly timed and orchestrated into a symphony of rhythms. Sickness and even deaths tend to cluster around specific times of the day, synchronized with the temporal patterning of our earth: asthma attacks shortly after midnight, heart attacks and strokes around 9 o'clock in the morning, onset of fever from

bacterial infection between early morning and midday, death from viral infections between early afternoon and evening (Rose, 1989: 87–90).

This multitude of coordinated environmental and internal rhythms gives a dynamic structure to our lives that permeates every level of our existence. It constitutes temporal frameworks within which activities are not only organized and planned but also timed and synchronized at varying speeds and intensity, and orchestrated to intricate scores of beginnings, sequences, durations, pauses and ends. All aspects interpenetrate and have a bearing on each other. All coexist and are lived simultaneously. All are known at an everyday level with varying degrees of clarity, from the most tacit to the theorized. A symphony of rhythms and temporalities thus underpins our development as humans and as living organisms. It marks us as creatures of the Earth, as beings that are constituted by a double temporality: rhythmically structured and embedded in the rhythmicity of the cosmos. Instead of dualities of external and internal, spatial and temporal, natural and cultural antinomies, focus on time(s) thus emphasizes the interactive and constitutive dimension of sociocultural life. From a temporal perspective, there is no nature–culture duality: we are nature, we constitute nature and we create nature through our actions in conditions that are largely preset for us by evolution and history. And yet, simultaneous with the transcendence of this duality we are forced to recognize important distinctions between cultural time(s) and the temporalities of nature.

Focus on time brings to the fore difficulties which arise when the rhythmicity and timescales of nature are denied or ignored and when cultural constructions which work on the basis of different temporal principles are superimposed as alternatives, not just on the everyday lives of humans, but on the lifestock and crops associated with agricultural production. Industrial time, with its emphasis on the times of machines, economic relations and laboratory science, is a pertinent case in point. The clash of principles between these two divergent temporal systems means that their interaction and interpenetrations entail costs and losses that feed into environmental crises. To illustrate this point, we give below a brief outline of the characteristics of industrial time in order to illuminate the significant differences between this temporal constellation and the contextual rhythmicity of natural systems.

INDUSTRIAL TIME

Industrial time[2] is centrally structured to (1) the invariable beat of the clock, (2) the economic commodification of time and (3) the scientific use of time as measure of abstract motion. Clock time is based on the principle of repetition without change. Distanced from the variable rhythms and contextual difference of living systems, it recasts time in atemporal form. As such it can be applied anywhere and any time. Its spatial representation through the number system makes clock time quantifiable and divisible into mathematical units. As machine time it reaches deep into the social fabric and affects actions and interactions across the social institutions of society from work and education to the provision of social services and farming practices: in educational establishments, learning is taking place in specified temporal units; banking transactions are possible within standardized timeframes that are rationalized across the globe into a grid of time zones; even in agriculture the aim is to transcend as much as possible the 'inconveniences' of seasonal variation.

Owing to the powerful effects of clock time on the institutions of contemporary industrial societies we are inclined to lose sight of the complexity of times in the environment and to

neglect the fact that we too are 'clocks'. Owing to the pervasiveness of clock time we tend to ignore that *we* are timepieces beating the multiple pulses of our earth, that we oscillate in synchrony with nature's rhythms. Once we take in this knowledge, however, the discrepancy between artefactual time and its sources becomes apparent. We begin to recognize that our machine-based rhythms beat to a different pulse from the rhythms within which they are embedded. Our own multiple physiological clocks, for example, vary in intensity and rate. Their speed alters with both internal and external conditions, while invariance and uniformity are the characteristics of the artefactual time. The rhythmicity of our sun–earth life system is part of what the mechanical clock symbolizes. The human device, however, is out of sync with its multiple sources. That is to say, idealized invariance, motion without change and spatialized time are at odds with the temporal, variant, creative and generative time upon which the artefactual time is based.

This discrepancy relates to wider environmental issues. Many of our technical and chemical inventions, for example, are copies of nature. In contrast to the originals, however, the replicas are created in invariant form, fixed in time and abstracted from the give-and-take of the ecologically interconnected and interdependent world. Problems arise when the principles of the originals and the copies no longer coincide, when the replicas exclude cybernetic and metabolic principles and the symbiotic relationship of beings with their environments. The human products, created as isolated things rather than interactive, mutually dependent, contextual processes, end up as waste on rubbish dumps, adding to the earth's entropy instead of contributing to the life-generating activity of our planet. Resource depletion, pollution and degradation of the environment are some of the inevitable outcomes of the neglect of the temporality of life, of variance, cycles of change and context dependence, of ecological connectedness and generative time. The neglect of temporal issues therefore has physical consequences and is thus not merely a conceptual matter.

The time of economic exchange, as the second central feature of industrial time, is built on the back of the principles that underpin the time of the clock. As abstract exchange value, it translates the work of people and machines into money. As such, it depends centrally on quantification. As was indicated above, however, the rhythmically constituted processes of ecological transactions and reproduction are not easily quantified. This makes translation into money almost impossible. In a world where money is synonymous with power, any time that cannot be given a money value is by definition associated with a lack of power and falls outside the value system of economic relations of production and consumption. The time of ecological give-and-take becomes subsumed under time consumption and generative temporality under the construction of permanence in artefacts and symbolic systems, products of science, institutions and market structures.

This equation of time with money has implications for economic practice: to be profitable, an employer has to spend as little as possible on work time since efficiency, in this scheme of things, means the production of something (or the performance of a task) in the shortest possible time. To be competitive, moreover, is to be faster than a rival. The commodified time of economic exchange therefore brings with it time values specific to itself: speed is valued over processes that take a long time and over procedures and actions whose duration cannot be accurately estimated and calculated. This 'time equals money' and 'speed equals profit' relation plays a crucial role, for example, in agricultural production and is clearly expressed in farming practices: a high-performance milking cow is thus an animal that produces the maximum of milk and calves over a lifespan of approximately five and a

half years. Such efficiency is to be differentiated from the performance of a cow whose productive species-specific time life spans 30–40 years and who produces far more milk and calves over that period than her industrialized, 'high-performance' counterpart. With respect to BSE (mad cow disease), for example, we can see the link to the time equals money and speed equals profit approach to time when feeds containing protein were seen by the industry as a solution to the constant economic pressure to reduce maturation time and to increase yields from livestock.

The economic approach to time tends to facilitate a strong present orientation and thus works against a long-term perspective. This trend is exacerbated by the economic practice of discounting the future, which means that, the further into the future a potential gain occurs, the lower its value.[3] This is clearly a highly problematic approach when actions today create the future for thousands of years hence, when industrial developments and policies predetermine and delimit the present of an indeterminate number of successor generations. Closely connected are 'out-of-sync' timeframes, a prominent feature of a great number of environmental problems: topsoil and forest ecosystems that took thousands of years to develop are destroyed or used up in centuries and decades. Compared with evolutionary change, the impact of new technologies operates in compressed timeframes. Moreover, in such industrially produced phenomena there is a lack of correspondence between the timescales of an action, its emergence as a symptom, its recognition as an environmental hazard, the responses to such a problem and their implementation, and the system's eventual recuperation (if this is possible at all). This problem of out-of-sync timescales intensifies with hazards that are not bound in time and space; that is, processes that are dispersed globally and extend from a reasonably bounded past into an open-ended future.

The time equals money and speed equals profit associations get further complicated and flip into opposite meanings when they are linked to quantity and corporate interests, so that it has become cheaper, for example, to buy fruit that has been transported half-way across the globe, ripening somewhere along the way, than to purchase fruit that has been locally produced on a small scale and allowed to ripen on the tree up to the point where it is ready to eat or store for the winter. In this case, distance and duration are inversely related to cost with complex interdependencies of quantity, subsidies and power relations operating below the surface of this phenomenon. The complexity of the issues is such that we cannot arrive at simple oppositions: the time of economic exchange and the valorization of speed are neither a necessary nor an invariant conjuncture and with reference to environmental matters they consequently have to be understood in relation to a multitude of other factors. With respect to agriculture and food production in particular, the complexity of commodified time is staggering: no simple either–or choices here, no linear causal connections, no purely rational choices, no certainty, no substantial measure of control. Rethinking environmental issues in temporal terms gives us theoretical access to that complexity.

The time of laboratory science forms the third leg to the triple constellation of industrial time. As measure of motion, time is abstracted from context and postulated as reversible with respect to the past and future. In Newtonian physics this reversible time is applied to such phenomena as the swinging of the pendulum or the elastic collision of billiard balls where, if a film were taken of the events, we could not tell whether it was running forward or backward. This postulation of reversibility, Prigogine and Stengers (1984: 61) argue, is based on the assumption that everything is given and that, irrespective of the number of transformations a system undergoes, it could in principle return to its original condition. The

notion of reversibility also forms a central feature of environmental discourse. Ideas that one could possibly reverse trends, undo damage or get the land back to its original state are expressions that reflect the permeation of everyday life by this scientific view of time. Reversibility, however, signifies the possibility of unacting, unrelating, unknowing, unstructuring and growing younger instead of older. Stated in that way, it is clearly an absurdity. Applied to environmental matters, this belief is not merely erroneous but highly problematic: if one believes in the possibility that mistakes and damage can be undone then one is much more likely to take risks than if one is aware that this is an impossibility, that there is no return to some original state, no redemption from past transgressions. Recognition that all actions are unidirectional and thus constitutive of new and irreducibly different states and conditions is thus an important precondition to environmentally cautious and precautious action.

A second, closely related, feature of scientific time relates to the physical sciences' approach to nature. Since science predominantly studies nature in the laboratory, its subject matter is invariably severed from its networked ecological context and the rhythmicity of life. That is, laboratory nature is abstracted from its temporal interconnections and contextual dependencies. In laboratory science, therefore, rhythmic interdependencies are negated and the contextual, embedded temporality of living beings becomes an irrelevance. A number of implications follow from this move: first, abstracted from interdependencies and context, processes can be controlled, programmed, manipulated, changed, speeded up and slowed down.[4] Second, everything is available at any time and in readiness for use 24 hours a day, 365 days a year. Control of time and constant availability of products find everyday expression in the arhythmic and decontextualized non-stop principle, just-in-time production processes and the consumer expectancy of being able to buy seasonal foods everywhere and at all times: strawberries in winter and apples in early summer in Northern Europe, for example, and their equivalents in other parts of the world, all with dramatic effects on the environment.

Together, these three aspects of industrial time – machine, economic and laboratory time – form a powerful conceptual bloc: time becomes a quantifiable resource that is open to manipulation and subject to use, allocation and control. Emphasis is placed on visible materiality at the expense of that which is latent, immanent and hidden from view: the bulk below the surface remains inaccessible. The complex temporalities of the majority of environmental problems, however, are located outside the range of this particular conception.

'ICEBERG PHENOMENA': FROM LATENCY TO SYMPTOMS

Whether we are encountering chemical processes, ozone depletion, air and water pollution, radiation or a new disease such as BSE, we are dealing with phenomena where the impacts of actions work invisibly below the surface until they materialize as symptoms, at which point, however, they are no longer traceable with certainty to original sources. That is to say, these industrially produced phenomena and processes are characterized by invisibility and periods of latency and are recognizable only once they emerge as symptoms and once they have been identified through the mediating loop of science. This means that the products are not graspable with the conceptual tools of their construction.

Let us illustrate this point through the example of nuclear radiation. Radiation works silently and invisibly from within. Consequently, it proceeds outside the reach of our senses:

it is known only to our cells. Its materiality beyond the capacity of human perception and sensibility (except where extended by scientific instruments) affects our collective present and long-term future, our own and other species' daughters and sons of a thousand years hence. Thus is a fate that we share with a global community of beings. Unbounded, radiation is dispersed in time and space and marked by complex temporalities and time–space configurations. Its life cycles of decay span from nano seconds to millennia. This means its time horizon, too, exceeds human capability and concern. Furthermore, radiation permeates all life forms to varying degrees and disregards conventional boundaries: skin, clothes and walls, cities and nations, the demarcation between the elements. This means that its 'materiality' falls outside the conventional definition of the real, outside conceptions where 'real' means 'material' and where this in turn is defined by its accessibility to the senses. Invisibility, vast and variable timespans of decay, networked interdependence and the fact that effects are not tied to the time and place of emission, therefore, make radiation a cultural phenomenon that poses problems for traditional ways of knowing and relating to the material world. As such, radiation is one of the prime examples of contemporary phenomena and processes whose temporality falls outside the industrial understanding of time.

We do not have to go far, however, to find ways of understanding and knowing that encompass the invisible. Everyday knowledge (even in northern Europe and the western world more generally) always incorporates absences and brings together with ease what the classical tradition of science has kept apart: time and space, culture and nature, phenomenon and process, quality and quantity. We explain this below, through the example of the landscape, and end by proposing the development of an equivalent perspective of timescapes.

LANDSCAPES AND TIMESCAPES

When we look at a landscape we see historical records of activity: of wind, weather and climate, of the growth cycles of nature, of animal and human life. Consistently lopsided trees, for example, indicate coastal winds and the nearby sea. Hedges and stone walls tell us about human agricultural activity, even if we see no houses or people engaged in such activities. Moreover, by looking at the stone walls, we can tell about the geology of the area, about the kind of farming that is practised in the locality and about the animals that are being kept within those boundaries. The way the stone walls are built and maintained gives us a further indication about current activities and the state of individual farms.

A landscape therefore is a record of reality-generating activity. It is a chronicle of life and dwelling.[5] That is to say, the visible phenomena making up the landscapes have the invisible constitutive activities inescapably embedded within them. The landscape thus includes in its representation spatial and temporal absences. It tells a story of immanent forces, of interdependent interactions that have given rise to its existence. From the point of view of the observer, of course, a landscape can never be an objective absolute since what observers can see depends on their prior knowledge, their power of deduction and their imagination. It is the scape – be this a landscape, seascape or cityscape – that creates the unity of observer and observed, material phenomena and forces inaccessible to the senses, visible and invisible influences.

The important thing here is that landscape is a record of constitutive activity, it includes absences and it conceives of natural and cultural activities as a unified whole. It is relative to

the eye of the beholder and as such differs from images of nature and culture which are defined negatively in relation to each other: culture as the product of humans and not nature, nature as that which is created without the aid of humans and which functions irrespective of or despite human activity. Such transcendence of dualisms becomes essential today where globalized local human activity creates holes in the ozone layer, changes the level of CO_2 in the atmosphere and causes abnormalities at the level of cells in plants, invertebrates and humans alike. It becomes pertinent when nature is inescapably contaminated by human activity and when, as Marx (1968: 59) observed during the first part of the nineteenth century, 'the nature which preceded human history no longer exists anywhere'.

There is an urgent need to take this understanding further and extend it into the temporal realm of environmental issues. With the idea of the timescape,[6] we can aim to achieve a temporal equivalent of the understanding associated with a landscape, to develop an analogous sensitivity to temporal interdependencies and absences, and to grasp environmental phenomena as complex, unified, temporal, contextually specific wholes. This involves a shift in emphasis, not just from space to time but, more importantly, to that which is invisible and outside the capacity of our senses. Since we have no sense organ for time, we must utilize the entire complement of our senses working in unison with our imagination before we can experience its workings in our bodies and the environment. Such an effort at the level of imagination is needed if we are to be able to take account in our dealings with the environment of latency and immanence, pace and intensity, contingency and context dependence, rhythmicity and timescales of change, the influence of the past and the projection into an open future.

A timescape perspective enables us to integrate the constitutive self, cultural action and humanity in general with the workings of nature and to become aware of the clashes and stresses that tend to be left implicit in classical scientific analyses and political debate. It allows us to move from single and dualistic approaches and abstract, functional perspectives to knowledge that emphasizes inclusiveness, connectivity and implication. It promotes understanding that acknowledges the relativity of position and framework of observation while stressing our inescapable implication in the subject matter and acknowledging our personal and collective responsibility. It explicitly incorporates absences, latencies and immanent forces, thus helping us to move away from the futile insistence on proof and certainty for situations characterized by indeterminacy, timelags of unspecifiable duration and open dispersal in time and space.

Thus, a timescape perspective provides us with the opportunity to link the valorization of speed and negation of seasonality, for example, with the understandings, approaches and activities that facilitate such an approach to time and their open-ended effects. It conceives of the conflictual interpenetration of industrial and natural temporalities as an interactive and mutually constituting whole and stresses the fact that each (in)action counts and is non-retractable. This in turn has the potential to encourage more cautious, precautious and sustainable action than is the case with an assumption of reversibility and to promote recognition that our relationship to time is centrally implicated not only in the industrial way of life but also in any conscious construction of a sustainable future.

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NOTES

1. The Tutzinger Time-Ecology Project in Germany (Tutzinger Projekt *Ökologie der Zeit*) being a notable exception. At the time of writing there had been five interdisciplinary conferences on various aspects of the temporal dimension of the environment, three of which have already been published (in German): Held and Geißler (1993), Schneider *et al.* (1995) and Held and Geißler (1995). Adam *et al.* (1997) is in press. Hofmeister and Spitzner (1998) as well as a special issue of *Gaia* are in preparation.
2. For a populist analysis of industrial time, see Rifkin (1987).
3. See Price (1993) for a detailed account of this economic convention.
4. For an excellent discussion of laboratory time, see Nowotny (1994: ch. 3).
5. For writings on landscape which demonstrate this approach, the reader is referred to Ingold (1993) and Shama (1995).
6. The concept of the timescape for environmental theory is to be developed in Adam (1997/8). For writings from a general time perspective, see Adam (1990, 1995), Ermarth (1992), Nowotny (1994), Rifkin (1987) and Young (1988). For a time perspective on the environment, see the German publications listed under note (1) as well as Adam (1994a, 1994b, 1995: ch. 6, 1996), Adam and Kütting (1995) and Kümmerer (1996).

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12. Beyond sociology: Marxism and the environment

Peter Dickens

> The realm of freedom really begins only where labour determined by necessity and external expediency ends; it lies by its very nature beyond the sphere of material production proper. Just as the savage must wrestle with nature to satisfy his needs, to maintain and reproduce his life, so must civilised man, and he must do so in all forms of society and under all possible modes of production. This realm of natural necessity expands with his development, because his needs do too; but the productive forces to satisfy these expand at the same time. Freedom, in this sphere, can consist only in this, that socialised man, the associated producers, govern the human metabolism with nature in a rational way, bringing it under their collective control instead of being dominated by it as a blind power; accomplishing it with the least expenditure of energy and in conditions most worthy and appropriate for the human nature. (Marx, 1981: 958–9)

Why Marxism? Marx's assertion that human freedom lies in subjugating and governing nature seems hardly in tune with the tenets of modern environmentalism. Indeed, it might well be argued that scientific rationality and the notion that human freedom lies in the conquering of nature have created the very ecological problems which modern society is now witnessing and trying to deal with. Furthermore, the experiences of the previously communist societies are hardly a ringing endorsement for bringing human society's interactions with nature 'under collective control'. The ecological and social problems associated with the Soviet and East European regimes were, if anything, even worse than those experienced under capitalism.

A sound reason for taking Marxism as a starting point would be to combine questions of social justice with questions of environmental justice. On the one hand, social justice and inequalities are at least in part one of the causes of environmental degradation; on the other hand, environmental degradation clearly falls on some groups more than others, as dominant social groups attempt to displace environmental destruction away from themselves and towards those who are not in a position to offer resistance. (See, for example, Red–Green Study Group, 1994.) Such an analysis is powerful and necessary, and it is indeed one to which this chapter will return.

This chapter will argue, however, that modern environmental thought and philosophy can go well beyond the most obvious critiques and connections between Marxism and environmentalism. This is particularly the case if we learn from Marxism, develop its analysis and adapt it to the features of modern society. Marxism can offer profound insights into the ways in which societies relate to the environment. Indeed, as this chapter hopes to show, this area of social thought offers considerable advantages over most mainstream sociology. This is because it recognizes the insights of additional disciplines outside sociology. Most environmental sociology remains largely contained within the discipline itself. Marx, and to a

greater extent Engels, were no respecters of academic boundaries. Their endorsement of science, their inclusion of scientific analysis within their explanatory framework and their insistence on the emancipatory potential of science marks out their work from most contemporary sociology.

This chapter is divided into three main sections. First it outlines in broad terms the perspective on society–nature relations adopted by Marx and Engels. Second, it discusses some of the current debates amongst those within the 'red–green' tradition. Finally, it draws out some of the most important themes for contemporary environmental politics.

MODERNITY AND THE ALIENATION OF HUMANITY FROM NATURE

There is little point pretending that the environment was at the heart of the analysis offered by Marx or Engels. By carefully selecting from their very extensive writings, we can indeed make them seem like ecologists manqués. (See, for example, Schmidt, 1971.) Not only does such an approach improperly reflect the main concerns of Marx and Engels, but it runs the real risk of separating 'the environment' from the ways in which society actually operates. Perhaps the key strength of Marxism is that it holds together questions of 'the environment' or 'nature' with questions of the ways in which societies are, have been, and might be organized. There are a number of related sub-themes within the overall perspective of historical materialism which require some initial clarification. These include Marx's understanding of human nature and the connections between humans and the environment and, also, his dialectical and realist mode of reasoning. These theoretical and ontological preliminaries allow us to explore Marx's understanding of the changing relations between human beings and nature and, in particular, the alienation of people from nature in modern society. In pursuing these perspectives we will also refer to Engels' work on the relations between society and nature. As suggested above, in some respects, his work went even further than that of his colleague.

A central theme throughout much of Marx's writing is that nature forms an integral part of humanity. Nature is in effect part of humanity and vice versa. Humans depend on nature for their biological as well as their spiritual survival:

> Nature is man's *inorganic* body, that is to say nature in so far as it is not the human body. Man lives from nature, that is nature is his *body*, and he must maintain a continuing dialogue with it if he is not to die. To say that man's physical and mental life is linked to nature simply means that nature is linked to itself, for man is part of nature. (1975: 328, emphasis in original)

Nature is therefore integral to 'man'. Humanity needs it in order to thrive both physically and spiritually. It is important to note straightaway here Marx's dialectical mode of reasoning. Human beings' lives are conducted *in relation to* nature. Similarly, human beings are seen as essentially social animals. But to thrive properly they need fulfilled *relations* with their own species, with other human beings. Marx's dialectical mode of analysis is even extended to plants: 'The sun is the object of the plant – an indispensable object to it confirming its life – just as the plant is an object of the sun, being an expression of the life-awakening power of the sun, of the sun's objective essential power' (quoted in Ollman, 1976: 28).

So whether we are talking about humans and their relations to nature and to other human beings or even about non-human objects, the argument is always *relational*. Objects are seen as constituted by potentials and underlying tendencies and the question of how, or even whether, these potentials are realized is contingent on the particular circumstances in which they exist. This is a realist argument, one which suggests that beneath our immediate observations are underlying – and real – causal powers, processes, relationships and tendencies. Again, however, whether and how these processes and tendencies are actually expressed depends on the contingent circumstances of time and space.

Human beings are seen by Marx as constituted by particular and very distinct kinds of potential. Part of their 'species being' is their universality. Unlike all other animals, they are able to appropriate and convert the whole world to their own ends. Through combining with one another, they have found ways of setting themselves free from nature, not being utterly dependent on it to satisfy their own needs. Humans have a 'natural being' like any other kind of animal. Like all animals, they reproduce and they eat in order to survive. But, at least according to Marx, humans have distinct and unique *human* characteristics. These include the capacity to reflect on what they are doing, to conceptualize their actions before they undertake them, and to think and act creatively. This universality of human beings even includes the capacity to think and act on behalf of other species besides themselves.

So far, therefore, we have a picture of human beings as composed of a certain kind of essence, albeit one which is not necessarily confirmed by the particular circumstances in which they live. This essential being includes a special significance of nature to human beings' own human nature. Marx again incorporates a dialectical emphasis. This is not only a 'one-way' relation. Clearly, if human beings are increasingly able to convert nature into the things they need and yet are dependent on that nature as their 'inorganic body', the distinct possibility exists that people, through changing and assimilating nature, start to change *themselves*. All these considerations bring us to Marx's historical materialism, since a central part of his argument is that this essence is definitely not confirmed, and is even destroyed, by contemporary capitalism.

History, according to Marx, is the product of people forming relationships and interacting with nature to produce the things they need. In considering historical change we often concentrate on the things that human societies make, but more important for Marx are the social relations and the uses made of nature in making social change. However, such materialist analysis of human history received somewhat different emphases during Marx's life. In his early work and in *Grundrisse*, the prime emphasis was on property relations. In pre-bourgeois societies, he argues, a kind of community existed between people and between people and nature. Early nomadic tribes in Europe, for example, consisted of relatively independent households which periodically came together. Communality was principally organized around these households, but community life was maintained through common language, ancestry and direct, unmediated relations with nature. Another example comes from Ancient Rome. Here communal life was organized around the city as an economic and social totality. The relationships between the individuals and between the individual and nature were relatively clear and uncomplicated. Finally, in what Marx called 'the Asiatic form', the individual had no property. Property was held in common, even though the individual had his or her possessions. Once more, the relationship between the individual and between individuals and nature was relatively coherent.

Marx's general point is that, in these early societies, the relationships between individuals and between individuals and nature were mediated both by the commune and by the occupation of land and soil. Individuals' relations with one another and the land were relatively clear. The point is, of course, that in these earlier forms of society human beings' relation with nature, their inorganic body, was confirmed.

> The individual relates simply to the objective conditions of labour as being his; relates to them as the inorganic nature of his subjectivity, in which the latter realises itself; the chief objective condition of labour does not itself appear as a product of labour, but is already there as nature; on one side the living individual, on the other the earth, as the objective condition of his reproduction. (Marx, 1973: 485)

Marx was, of course, well aware that these relationships were by no means always wonderful. The relationship of people to the earth in these earlier societies was mediated by their membership of a tribe or some kind of communal life, but of course such relationships were by no means always peaceful and harmonious affairs. Furthermore, certain members of society were themselves made into 'nature' in these early societies. Slaves or serfs, for example, were exploited in much the same way as cattle and other species. They were made into some humans' 'inorganic body'. Referring to slaves in Rome, for example, Marx says: 'One part of society is treated by the other as itself merely an inorganic and natural condition of its own reproduction' (ibid.: 489).

According to Marx, however, with the rise of private property and capitalism human society as a whole became fully alienated. It is at this point that workers exist in 'dot-like isolation', despite the fact that they appear to be 'free' to work for whom they like. In the early manuscripts (especially Marx, 1975) particular attention is given to private property itself as alienating people from nature. And in passing we should note another important dimension to alienation which Marx briefly mentions but does not fully develop. He argues that, as humanity increasingly impinges on nature, the *understandings* that will be needed to appreciate such interactions will have to be changed. Writing in the mid-nineteenth century, he points out that understandings are primarily organized around 'science' for the natural world and 'philosophy' for the human world. Marx was distinctly 'pro-science' in the sense that it offered valuable insights into real causal processes. Indeed, his scientific materialism was an attempt to develop for the social world the same sorts of achievement which had been made in the natural and physical sciences. But such rigid dichotomies between the social sciences, on the one hand (what he called 'philosophy'), and the natural sciences, on the other, were seen as, in the end, clearly inadequate in circumstances where 'the natural' is being increasingly affected by 'the human'. Eventually, Marx suggests, a single science will have to be created, one which recognizes the growing interaction between humans and nature. Eventually,

> natural science will lose its abstractly material, or rather idealist, orientation and become the basis of a *human* science, just as it has already become – though in an *estranged* form – the basis of actual human life. The idea of *one* basis for life and another for science is from the outset a lie ... Natural science will in time subsume the science of man just as the science of man will subsume natural science: there will be *one* science. (Ibid.: 355, emphasis in original)

It was actually Engels, in his remarkable but incomplete book, *The Dialectics of Nature*, who attempted to sketch out what this 'one science' looked like, a framework for a science

in which connections between the physical, biological and human sciences are systematically explored. In many respects Engels prefigured twentieth-century research in the physical and social sciences. He proposed, for example, that matter and energy are one and the same thing, that they are two ways of expressing the same idea. This was later confirmed by Einstein's theory of the equivalence of mass and energy (Woods and Grant, 1995). Similarly, he suggested that the evolution from ape to 'man' was again a dialectical process, one in which the upright gait of the earliest apes allowed them to make additional uses of their hands. This gave our early ancestors a number of evolutionary advantages, including the gathering and holding of food and the fashioning of flints into cutting instruments. And, as part of their control over nature, they slowly developed forms of cooperation, communication and language which in turn led to the development of 'the brain and its attendant senses'. Again, Engels' assertions about the evolution of human beings have been largely confirmed by subsequent archaeological investigation (Ingold, 1986; Dickens, 1992).

Engels' arguments therefore again centred on production in attempting to explain the rise of human beings and their advanced consciousness and powers of abstraction. By modifying nature through the appropriation and fashioning of objects, they started to change themselves. This dialectical approach, and its emphasis on work and the labour process, paralleled Marx's increasing emphasis in his later years. Especially in *Capital*, Marx's emphasis switched away from private property per se as underlying the alienated condition of humanity to the ways in which human beings worked on nature to produce the things they wanted. For Marx the labour process is 'purposeful activity aimed at the production of use-values. It is an appropriation of what exists in nature for the requirements of man. It is the universal condition for the metabolic interaction between man and nature' (1976: 290).

Labour in any society, therefore, is a process by which human beings regulate and control the interactions between themselves and society. And people use their own biologically endowed nature to appropriate what Marx calls 'the materials of nature', converting these into what is needed by society. This is of course not done solely with bare hands. 'The objects of labour' (for example, water, timber and animals) are 'filtered through previous nature' – through, that is, the instruments such as tools and technologies which humans have earlier made from nature with a view to manipulating the natural world. These resources even include other animals. Domesticated animals might seem like unadulterated nature, but they too have been subjected to human interventions and gradually transformed over many generations. On the one hand, they are simply raw materials for eating; on the other hand, they are also used as 'instruments' as when, for example, they are used for making other materials, such as manure.

And it is the capitalist labour process which, in Marx's maturer work, is at the core of humanity's alienated relations both with nature and among human beings. Many features of such alienation are a familiar feature of Marxian philosophy. As is well known, Marx argued that human beings become estranged from their own work in the labour process. The fruits of their work are appropriated by the capitalist and placed on the market as commodities. The very thing they have made with their creative labour turns into a separated, estranged product, something dominating their lives despite the fact that they have made it. Human beings therefore finish up alienating themselves during the labour process. Despite their humanity, they are reduced, according to Marx, to the level of pure animals or 'beasts'. Furthermore, people become alienated from one another under capitalism. Whereas in earlier societies people belonged to some form of comprehensible community, under

capitalism people are set against members of their own species, competing for jobs and protecting themselves as individuals rather than in a collective fashion and with their families. In short, humanity's essential sociality becomes denied under capitalism.

Less well recognized is Marx's argument that human beings' relations with nature, their 'inorganic body', also become denied under capitalism. This is not simply the result of private property. It is, again in Marx's later work, a direct product of the labour process. 'Nature' becomes simply raw materials, a series of inputs into an alienated work. It is not something to be valued in its own right. It becomes something as a means to an end. For the worker this end is simply survival. But even for wealthy people the things they need for spiritual or aesthetic uplift become valued only in cash terms: 'The dealer in minerals,' Marx argues, 'sees only the commercial value, and not the beauty and peculiar nature of the minerals' (1975: 353).

The result is again the denial of the capacities of human beings: in this instance, their spiritual or aesthetic needs. Furthermore, the estrangement of human beings from nature, their 'inorganic body', means that they become insensititive to nature as an ecological system and their relations to such a system. In a now often-quoted part of *The Dialectics of Nature*, Engels wrote of the unforeseen impacts that humanity can have on nature. Nevertheless, he was wise enough to recognize that disasters created by 'man' are not limited to those created under capitalism. Early Mesopotamian and Greek civilizations, as well as the destruction of early forms of agriculture such as dairy farming in the Italian Alps, showed that human beings meddling with the laws of nature could easily entail nature having its eventual 'revenge':

> Let us not, however, flatter ourselves overmuch on account of our human victories over nature. For each such victory takes its revenge on us. Each victory, it is true, in the first place brings about the results we expected, but in the second and third places it has quite different, unforeseen effects which only too often cancel the first. ... Thus at every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature – but that we, with flesh, blood and brain, belong to nature, and exist in its midst. (1959: 12)

In alienating themselves from their environment under capitalism, therefore, human beings assumed advantages over other animals in terms of creativity, and universal or abstract reasoning become not only denied but turned against themselves. Human beings are the only species to have degraded the environment to such an extent that they threaten their own existence. But again, according to Marx and Engels, this is not necessarily the end of the story. A dialectical and materialist understanding of history recognizes the continuous interacting between human beings and the circumstances they have made for themselves. The view of both Marx and Engels was one in which human beings are continually remaking themselves. So, as they see their impacts on nature, renew their understandings of society–nature relations and become more aware of the social system which lay behind their alienation from one another and from the rest of nature, they will change themselves and their consciousness. Eventually, such change would, for Marx and Engels, take the form of a proletarian revolution, an overthrow of capitalism and the transition to a communist state in which human beings were no longer constituted in isolation from one another and from nature.

MARXISM AND THE ENVIRONMENT: RECENT DEVELOPMENTS

This chapter has so far been outlining Marx's and Engels' dialectical and historical materialism, with particular emphasis on the relationships between humanity and nature. We will now examine how this type of analysis has fared since the days when Marx and Engels were writing.

What, then, of the notion of 'species-being' and the alienation of humanity from nature? These ideas have continued to be influential, even if they have been modified. Perhaps the biggest 'sympathetic' challenge to ecological Marxism comes from feminist, and especially ecofeminist, thought. As we have seen, Marx and Engels argued that it is work, and the alienation of people from one another and from nature during work, which lies at the heart of modernity's estrangement from nature. Marx and Engels clearly had paid or waged labour in mind here, but of course much work in modern society does not take this form. Unpaid and largely unrecognized domestic work is just as much a part of contemporary society's alienation. And this includes alienation from the natural world. Food preparation in modern societies, for example, is often far removed from its production. So it is not only in the sphere of paid work that we become alienated from nature and the processes and relationships involved in making the things we consume. The purchase of organic food and the demands for animal welfare are, arguably, attempts to recover the alienation we experience in domestic work.

Closely related to the above is the whole question of subordinated social groups being treated as part of 'nature'. We saw the early Marx arguing that some categories of people such as slaves and serfs were treated as part of nature in pre-modern societies. They formed part of the 'inorganic body' of society's dominant classes. Ecofeminism would greatly extend this to argue that it was not only slaves and serfs who joined cattle as part of 'man's inorganic body'. Merchant's path-breaking book, *The Death of Nature* (1989), shows the ways and extent to which women have been consistently identified with nature in different historical epochs. In the sixteenth century, for example, nature was seen in many western cultures as a living entity, with a living female earth at its centre. By the early seventeenth century, however, this image of an organic cosmos was giving way to a different vision in which nature was disorderly, chaotic and in need of control with the aid of science. Like the earlier image of Mother Earth, however, nature remained equated with womankind. On the one hand, she was socially constructed and treated as a virginal earth mother offering fertility; on the other hand, she was considered to be a witch bringing violence, disorder, famines and plagues. All such social constructions of course helped to perpetuate the notion that women, along with slaves and other non-human animals, were part of nature and should be treated as such.

Marx's picture of social domination and the equation between nature and exploited groups therefore needs extending. And, as ecofeminists such as Mies and Shiva (1993) and Plumwood (1993) point out, there is still in our own male-dominated society a strong sense in which women and nature are constructed as equivalent, both being in need of rationalization and control. But Marx's realism continually reminds us that environmental analysis should not be limited to social construction in its strongest variants. All knowledge, as indeed Marx and Engels recognized, is constructed in and by a society. It could not be anything other than socially constructed. In a letter to Engels, Marx wrote:

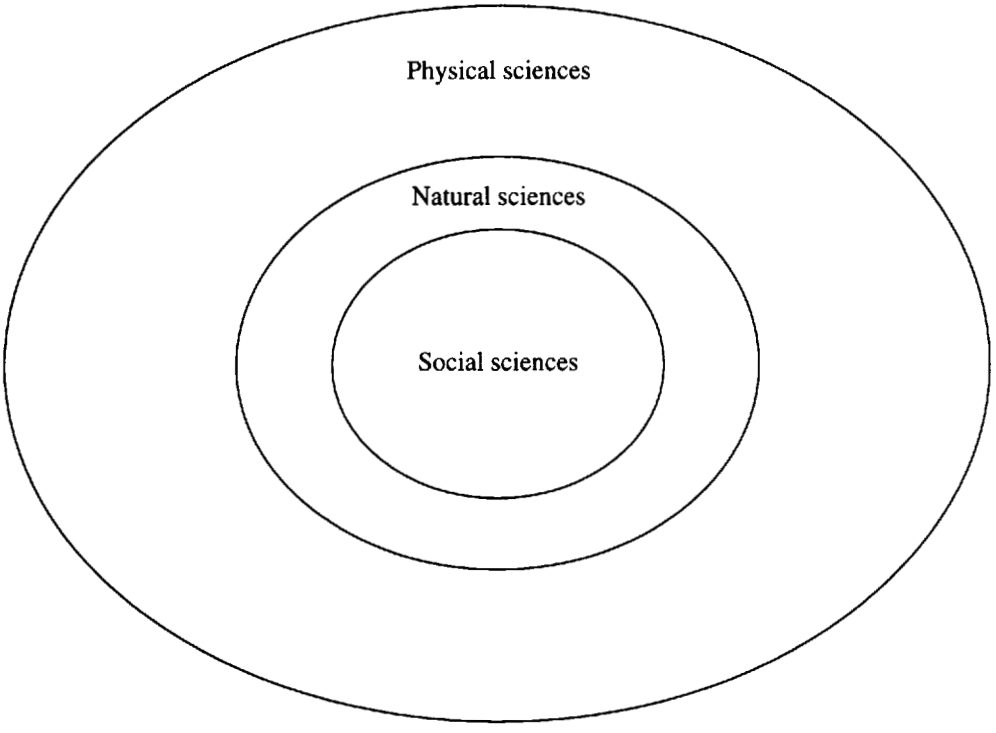
> It is remarkable how Darwin recognises among beasts and plants his English society with its division of labour, competition, opening up of new markets, 'inventions', and the Malthusian 'struggle for existence'. It is Hobbes's 'bellum contra omnes', and one is reminded of Hegel's *Phenomenology*, where civil society is described as a 'spiritual animal kingdom', while in Darwin the animal kingdom figures as civil society. (Quoted in Schmidt, 1971: 46)

Marx's realism insists, however, that knowledge is not necessarily *only* socially constructed. In other words, there are indeed powers and tendencies in the human and natural worlds which exist over and above social constructions. Chemical formulae, for example, or the laws of thermodynamics and Darwin's evolutionary biology, are not *only* social constructions. They refer to real processes to which humans and other species are subject, albeit in many diverse ways. A Marxist approach to environmental questions is therefore at odds with a dominant theme in much contemporary environmental sociology, one in which all scientific claims are reduced to power relations and the particular claims of interest groups (see, for example, Hannigan, 1995). As we have seen, however, Marxism is not opposed to the idea that theories are socially constructed, or indeed that different forms of science will be deployed by different social interests. Rather, it would claim that there is much more to science than this; specifically, that real causal powers and processes exist independent of the power plays that underline the language we use to describe such processes.

In these ways an environmental sociology which is in tune with Marx's and Engels' original ideas would continue to proceed beyond sociology itself and recognize that there actually are entities and causal processes which cannot be contained within social theory. In fact, as Martínez-Allier (1987) points out, there has long been an intellectual tradition in social thought which takes society's relations with nature as its starting point. Energy flows are a key theme in much of this work. In the 1880s, for example, Podolinsky developed a remarkable version of Marxism in which he took the labour theory of value as a starting point but went on to analyse the combinations of labour and technology which would result in an optimum amount of energy remaining for humans' use on the earth's surface rather than its being dissipated into space. He presented his work to Marx and Engels but, paradoxically, they did not see the real value of what he was attempting. Later on, Frederick Soddy was to develop a critique of Keynesian economics, arguing that it cannot be assumed that capital will simply continue to expand if it is properly invested. This is because all investments are ultimately subject to the laws of entropy. They will be, to varying degrees, wasted.

Such approaches are clearly at odds with the disciplinary divisions of labour which remain characteristic of environmental analysis as a whole. The need for an understanding which transcends disciplinary boundaries in these ways has become even more urgent since Marx, Engels and the likes of Podolinsky and Soddy were writing. As humanity has increasingly made an impact on the biological and physical worlds, so it becomes increasingly necessary to develop theories and understandings which cut across these different spheres. Fortunately, recent developments within realist philosophy indicate how the 'one science' to which Marx and Engels were alluding can begin to be constructed (Bhaskar, 1978, 1989; Collier, 1989, 1994; Sayer, 1992). This again entails recognizing the real causal mechanisms and powers within the physical, biological and social spheres. These mechanisms and powers operate in a stratified way, relating to each other.

As Figure 12.1 suggests, all human activities, as examined by the social sciences, are nested within biological processes and mechanisms. These latter affect the growth and



Source: Collier (1989).

Figure 12.1 Relations between the realms consisting of the entities governed by the various sciences

development of organisms. Humans must be envisaged as a type of animal subject to the laws and mechanisms outlined by the natural sciences. At the same time, humans, their relationships and practices, are also made up of other real processes, as outlined by the basic laws of physics. Thus all human entities are biological, but not vice versa, and all biological entities are physical, but not vice versa. The interactions between these different stratas' relationships with one another can be best described in terms of 'emergence'. Biological mechanisms such as the process of natural selection are rooted in chemical and physical processes but they cannot be explained simply by reference to such processes. They *emerge* from them, being made up of their own causal powers and tendencies. Again, human societies are composed of their own internal relationships and mechanisms and, while they are rooted in biological and ecological systems, they cannot be understood by simply reducing an appreciation of human practices to the biological level. So each of the mechanisms operating at the outer layers in some sense 'determines' what takes place within the strata it contains. Furthermore, and this is of particular relevance to the present day, it now seems that there are increasing feedback relationships between the strata involved. It seems likely, with for example the possibility of global warming and the thinning of the ozone layer, that humans are not only contained within the laws of physics but are beginning to

have significant impacts on the way those laws work out in practice. We are therefore involved in a two-way dialectical process, albeit in an unequal two-way process.

This type of thinking about the relations between society and nature is, therefore, in line with Marx and Engels' original vision. But there remain a number of complex issues here. (For more detail, see Dickens, 1996.) It is important to point out that a realist ontology of this kind does not provide any ready-made answers as to how the physical world affects the biological world and how biology relates to human relations and practices. Figure.12.1 is primarily a research programme. The complex powers and mechanisms at each stratum and, even more important, the relationships between these strata, largely remain to be established. But Figure 12.1 is a diagrammatic representation of Marx's 'one science'. And Engels' *The Dialectics of Nature* was a first shot at specifying and exploring these relationships. It showed how human beings and human society (represented by the centre of Figure 12.1) emerged from these basic biological processes of survival and reproduction. As Engels' work indicated, and as biological theory has shown since, organisms are not just passive pawns moulded by their environment. Rather, they actively make environments for themselves (Levins and Lewontin, 1985).

In these ways, therefore, the rigid dichotomies between organism and nature start to be overcome by recognizing the dialectical *relations* between humans and nature. Another way of exploring, and eventually denying, rigid divisions between humans and nature is to examine what we mean when we say that Marx is 'anthropocentric'. One of the most important areas of debate within current environmental theory inspired by Marxism as its starting point concerns the supposition that nature is there solely to fulfil human needs and the potential speciesism of Marx (Benton, 1988; O'Neill, 1993; Hayward, 1994). As noted at the beginning of this chapter, Marx insisted that human emancipation lies in the control and manipulation of nature. Benton sees this attitude towards nature as constituting 'a quite fantastic species-narcissism':

> If we can only be at home in the world, be properly, humanly connected with the world only on the basis of a thorough-going transformation of it in line with our intentions, then what space is left for a valuing of nature in virtue of its *intrinsic* qualities? If we can 'see ourselves' in, or identify only with a world which we have created, then what is left of our status as *part* of nature? Nature, it seems, is an acceptable partner for humanity only insofar as it has been divested of all that constitutes its otherness, insofar, in other words, as it has become, itself, human. (1988: 7, emphasis in original)

It has to be said that Marx's writings are not wholly coherent on this point. The argument largely hinges on what is meant by 'mastering' nature. Sometimes Marx does indeed seem to imply what Benton says: humans thoroughly transforming nature solely in their own image and for their own, very narrowly defined, purposes. If this is what is meant, then Marx's triumphalist tendencies would seem severely at odds with much contemporary environmental and ecological thought. At other times, however, Marx's implication is that 'mastering' means 'understanding'. In other words, he has in mind the kind of science which Engels started to sketch and which subsequent realists such as Bhaskar and Collier have spelt out. But even given this second interpretation, there is of course no guarantee that such an understanding would automatically lead to a recognition of nature having an independent status. It would by no means guarantee, for example, that the rights of animals would be recognized and that humans might have to make relative sacrifices in this regard.

A closely related point concerns the dualism between humans and animals in Marx's work. Throughout much of Marx's work there remains the tacit dichotomy or dualism between humans and animals (Benton, 1988). Humans are seen as reduced to the level of mere 'beasts' in alienating labour processes, for example. And humans are supposed to have that something 'extra': mind, the power of abstract thought which allows them, *inter alia*, to operate as universal animals on behalf of the whole globe. Yet, on the other hand, Marx insists that humans are part of nature. They are a type of natural species, with some needs which are the same as those of other animals. There are clearly some important issues here which need, to coin a phrase, 'fleshing out'. As Benton points out, much contemporary work in the fields of biology and ethology would deny the rigid separation between 'man' and other animals. Stories are becoming commonplace of, for example, elephants which stand for long periods of time over the remains of the dead of their own species. They appear to be going through a form of ritual or 'mourning' which has some parallels with the cultures of death in human culture. More generally, animals seem to have emotional, psychological as well as social lives. And this in turn means we would again be unwise to insist on a rigid division between humans and 'other' animals. Or, to put this another way, given that humans cannot enter into the inner emotional lives of other species, we would be wise to assume some form of continuity rather than persist with the Cartesian notion that animals are only machines, while only humans have that added extra of 'mind', 'spirit' and so on.

However, such a view is not necessarily at odds with the view that humans have indeed evolved with especially well-developed capacities for conceptualizing, for communicating and indeed for controlling (or, more accurately, for *thinking* that they can control) the rest of nature. As the work of Benton, Collier and others suggest, the practices undertaken by humans, and the relations they form in their social life, are in some degree founded on their biology: on, for example, their inborn propensities to survive and reproduce future generations. As Benton points out, what we call 'human culture' is, in the end, the particular ways humans have developed for flourishing and reproducing:

> Each species has its own characteristic species-life. Organisms can 'confirm' or 'manifest' their essential powers only within the context of their species-life, and so can be said to flourish only when the conditions for the living of the mode of life characteristic of their species are met. For each species, then, we can distinguish conditions for mere organic survival – the meeting of nutritional requirements, protection from predators and so on – from conditions for flourishing, for the living of the species-life. But how this distinction is made, the specific survival conditions and flourishing conditions which are identified, will vary from species to species. (Benton, 1988: 13)

We saw earlier how the rigid division between organism and environment (and by extension 'man' and 'nature') starts to be overcome once we recognize how organisms work on nature in their attempts to survive and reproduce. In a parallel way, the dichotomy again starts to be overcome when we recognize the continuities between 'man' and 'nature'. Benton's perspective therefore also helps to deny this unsatisfactory dualism which is explicit in much of Marx's thought. Furthermore, it does so using the same realist ontology used by Marx himself. It also begins to suggest ways in which the speciesism inherent within much of Marx's thought can be overcome. As we have seen Benton suggesting, there is a strong suggestion in much of Marx's work, and in particular in the notion of 'nature as man's inorganic body', that nature is there solely for human fulfilment. On the face of it, this does seem to imply that the regulation of nature, and particularly of

other species, is conducted solely in order to serve human ends. But the question, as O'Neill (1993) and Hayward (1994) have pointed out, is what 'human ends' actually are in this context. They *could* be (and there is arguably now evidence that this is taking place) not just the subordination of other species but the recognition of their intrinsic value. In other words, there is no necessary conflict between the needs of humans and those of other species. They could coincide and, as Hayward points out, their coincidence could lead to the development of human beings' own powers: 'Human emancipation can thus be seen not in terms of an extension of humans' power over external nature, but rather in terms of an attempt to develop human capacities of internal development and adaptation' (Hayward,1994: 75).

Given such possible coincidence of human and animal interests, however, there remain immense questions as to whether the ends of humans are compatible with ends of *all* other species. And, if not, are *all* other species to be allowed to survive by 'man', the universal animal, which will survive unchecked? Sorting out these difficult matters will surely challenge humans' 'capacities of internal development and adaptation'.

MARXISM AND THE POLITICS OF THE ENVIRONMENT

This leads us to the question of political practice. The distinctive feature of Marxism is, of course, that it is a theory of practice. As is very well known, Marx predicted that the transition to communism would occur as a result of the contradiction between the means of production and the social relations of production. Capital accumulation is made through the exploitation of labour. Yet the long-run tendency under capitalism is for labour to be replaced by technology. As this occurs, there will arise a 'realization' problem. Large numbers of goods will be produced, yet mass unemployment will mean that a great number of workers will have insufficient resources to buy commodities. According to Marx, therefore, there is an immanent contradiction within capitalism. Capitalism is undermining the very conditions it needs for its own survival and expansion. Crisis in the economic sphere is seen as a prelude to major social and political crisis and upheaval. This would be the context for the creation of a communist society, one which would assist in the dealienation of human beings. Under communism and collective control over the means of production, human beings would create a more adequate understanding of themselves, the products of their work and their places in the social and natural world.

It goes without saying that the cataclysmic upheaval envisaged by Marx and Engels has not occurred. This has been partly a tribute to capital's ability constantly to restructure and reorganize on a global scale. However, running through Marx and, indeed, through Engels is the notion of a second contradiction. This is not one given such prominence as that outlined above, but it is especially relevant in our own era. This second contradiction is what Foster (1992) calls 'the absolute general law of environmental degradation' (see also O'Connor, 1988). Here again, capitalism is seen as (and almost literally in this case) digging its own grave. Private profit making is proceeding at an accelerating pace, but this is at the cost of massive destruction to the very environment it needs for continued accumulation. Continued levels of production will ensure, through the second law of thermodynamics, increasing levels of waste, or what Foster calls 'entropic degradation'. But, worse still,

> the contemporary structure of commodity production, with its built-in dependence on pesticides, petrochemicals, fossil fuels and nuclear power generation, and its treatment of external habitats as a vast commons, tends to maximise the overall toxicity of production and to promote accelerated habitat destruction, creating problems of ecological sustainability that far outweigh the general entropic effect. (Foster, 1992: 79.)

In other words, according to this second contradiction argument, 'revenges' by nature on society will continue to be wreaked by capitalism. Several related questions remain, however. First, will capitalism be able to restructure itself once more, this time in the form of what has been called 'ecological modernization' (Mol, 1995)? Second, what are the implications for state power which result from these revenges? One important effect of contemporary environmental crisis is to undermine state legitimacy. Governments are showing themselves incapable of responding to their position as cockpits in society, on the one hand responding to diverse demands for environmental reform while at the same time attempting to ensure economic growth and social stability (Hay, 1994). It is quite difficult, therefore, to envisage the type of effective governance that is likely to emerge in the context of environmental degradation and the demands of the market.

Perhaps even more important, is it correct to give such weight to capitalism in the destruction of the environment? Are there not features of any advanced industrial society which would lead, not only to 'the general entropic effect', but to the various forms of degradation outlined by Foster? In short, perhaps we should return to some of Marx's earlier work in developing an understanding of our alienated relations with nature which in turn affect why, as a society, we appear not to care about environmental degradation. In particular, the division of labour in modern society has much to be responsible for (Dickens, 1996). It divides an understanding of society–nature relations into the fragmented understandings offered by different and well-established disciplines. Just as importantly, it divides people up into 'lay' and 'expert', ensuring that these two types of knowledge remain segregated from one another. And it divides company from company, institution from institution, gender from gender. It even has a spatial dimension, regional divisions of labour in a globalized society resulting in people increasingly surrounded by monocultures which offer little understanding of the way their particular part of nature relates to the complexity of the global environment. Many of these divisions will surely be a necessary feature of any modern society and, indeed, they have clearly been productive with, for example, specialists in different fields such as physics, biology and sociology obviously making great strides in developing their own disciplines. Yet the time has now come to start ending these divisions and to make links between these different areas of analysis. Marx and Engels were saying this in the mid-to-late nineteenth century and critical realist analysis of the kind offered by Collier (see Figure 12.1) offers the tools for research and analysis which can continue in the Marxist tradition. But this is not only a question of analysis. It is also a political process. Through the making of such links, emancipation becomes more possible. As people begin to see themselves as part of nature, and as they start to link their own lay, tacit and local knowledge to more abstract forms of understanding, they will surely enhance themselves and their practices as human beings. And such improvement is a first step towards the emancipation of non-human species.

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PART II

Substantive Issues for Environmental Sociology

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13. Gender and the environment

Mary Mellor

The gender dimension of environmental issues rests on two linked claims. The first is that women and men stand in a different relationship to their environment, that the environment is a gendered issue. The second is that women and men respond differently to environmental issues, in particular that women are more responsive to 'nature'. 'Nature' in this sense is more diffuse than the specific natural environment (the local ecosystem, the resource base of communities and so on); it reflects a more holistic and active view of 'nature' as a force. The term 'environment' will be used below to refer to the more limited meaning and 'nature' to refer to the wider meaning. The claim that there is a gender dimension to environmental issues is initially the less contentious. It rests on the idea that, inasmuch as men and women have different life experiences, they have different environmental experiences. This idea becomes more problematic when extended to the assertion that environmental problems have more of an impact on women than on men. This in turn becomes linked to the second claim, that women are more responsive to environmental issues. Joni Seager (1993), for example, has pointed out that women readily become active in campaigns about environmental issues and are overrepresented at the local level in formal environmental movements although underrepresented in the leadership of those movements. There is also evidence that sexism and gender inequality in green movements are reflected not only in the leadership profile but in green ideologies (Mellor, 1992b; Salleh, 1992).

The claim that women are more responsive than men to environmental issues has been expressed in two ways. The first is based on women's different experience in a gendered society, arguing that women and nature are in a historically contingent relationship, that they have a socially constructed connection. The second sees the link as a more fundamental one: that women have an elemental affinity to the natural world based on biological or cultural sex differences (Mellor, 1992a, 1996). In either case, raising the question of women's relationship to nature is very problematic for feminism which has long sought to separate sex and gender. Nature in relation to women has tended to become entangled with embodiment, the perceived biological limitation and 'weakness' of being female that has denied women political and social rights. As Simone de Beauvoir (1968) pointed out so forcefully, women appeared to be more prey to their biological destiny than men, they were locked in domestic and bodily immanence and could only gain freedom by rejecting and transcending their womanhood. The case for reconnecting women with nature must therefore be a good one if all the gains of (some middle class, white) women are not to be lost.

This case has been made by the ecofeminist movement which emerged contemporaneously in the mid-1970s in several different countries – France, Germany, the USA, Sicily, Japan, Venezuela, Australia and Finland (Kuletz, 1992; Salleh, 1991) – although the French writer Francoise d'Eaubonne (1974) is credited with coining the name. Ecofeminists argue

that the reconnection of women with nature is necessary because the gendered nature of human society is directly related to the current pattern of ecological consequences. The risk for women that feminists see in opening up the woman–nature issue is justified by the need to confront the present scale of ecological destruction. Modern feminism in both its liberal and socialist forms has sought to rescue women from their association with nature and the body, although more recently the postmodern feminist position is more ambivalent. Ecofeminists do not see an equality or 'equal opportunities' approach as the most progressive way forward. As Ynestra King, one of the founders of the ecofeminist movement in the USA, has argued, 'what is the point in participating in a system that is destroying us all?' (1990: 106). If society is to go forward on a more sustainable path it may be necessary for feminists to retrace their steps and rethink the relationship between women, their environment and nature more generally (Mellor, 1997b).

THE ENVIRONMENT AS A GENDERED ISSUE

From a feminist perspective, the most obvious way in which gender is linked to the environment is that most of the people who are in a position to affect environmental decision making are men and most of the people who are at the mercy of those decisions are women. However, this is not straightforward, as class and race cross-cut gender in this analysis. Are women excluded from decision making and put at the mercy of environmental forces *as women* or because they are overrepresented among the poor, the exploited and the colonized (Mies *et al.*, 1988)? One of the key factors that has been identified in claiming both women's differential experience and awareness of environmental issues is the way in which women interact more closely with their local environment than do men. Where an environmental crisis occurs, women may be the first to notice foul water, obnoxious smells or bodily ailments.

When Lois Gibbs began her protest over toxic waste at Love Canal, New York State in 1978, neither she nor anyone else was aware that her housing estate and the children's school had been built over an abandoned toxic waste dump that was a mile long, 15 yards wide and up to 40 feet deep (Hynes, 1985; Krauss, 1993). The first thing that Gibbs noticed was the unusual pattern of ill-health within her family and among her friends and neighbours. It took considerable investigation and lobbying to find the cause of these problems and to get the residents relocated. Interestingly, it was just this pattern of awareness that Ellen Swallow had predicted a hundred years earlier. She had been the first woman to study at the Massachusetts Institute of Technology and could certainly claim to be the founder of the science of ecology (Clarke, 1973; Hynes, 1985). Swallow's interdisciplinary approach combined water chemistry, industrial chemistry, metallurgy and mineralogy as well as expertise on food and nutrition. She established a laboratory to educate women scientifically at MIT, arguing that the home was the place where primary health and resources such as nutrition, water, sewerage and air could be monitored. Swallow's initiatives were not supported and her work became categorized as 'domestic science'. A man, the German Ernst Haeckel, is credited with inventing the subject of ecology in 1873 (Bramwell, 1989). For Ellen Swallow, as has happened to women so many times, her contribution has been 'hidden from history' (Rowbotham, 1973).

It is, of course, true that where environmental problems affect local communities men are just as likely to be affected as women and children. In the USA, for example, there have

been prolonged campaigns about environmental justice that have been based on class and race as well as gender (Hofrichter, 1993). While ecofeminists have not disputed the importance of class and race, they have pointed not only to the way in which the gendered nature of society has not only put more women under environmental stress because they are disproportionately represented in low-income groups, but to the fact that the gendered nature of western society is directly related to the increased exploitation of the environment (Mellor, 1992a; Salleh, 1994). Although many of the early publications in ecofeminism concentrated on the experience of women in the West or North (d'Eaubonne, 1974; Ruether, 1975; Griffin, 1978; King, 1983), in the 1980s the question of gender and the environment in the context of the globalization of western socioeconomic structures became increasingly central (Mies, 1986; Shiva, 1989; Mies and Shiva, 1993; Braidotti *et al.*, 1994; Harcourt, 1994). Vandana Shiva has been highly influential in her analysis of the way in which male domination of modernizing economic systems, projected worldwide in the context of the development process, has undermined more sustainable ways of life. For Shiva, male-dominated destruction has been twofold: the global capitalist market system has systematically destroyed more sustainable ways of life that were associated with subsistence economic systems, and the inappropriate application of western science and technology has destroyed biological diversity and caused catastrophic ecological damage (Shiva, 1989).

The impact of globalized development on women has become increasingly important in the critique of development thinking, particularly in the 1970s and early 1980s (Kabeer, 1994) although the link between the impact on women and environmental consequences was only fully realized in the late 1980s (Braidotti *et al.*, 1994; Harcourt, 1994). Both women's disadvantage and the environmental impact of the development process were exacerbated by western development agencies and workers who based their thinking on the gendered division of labour in industrial systems and failed to recognize the centrality of women in subsistence farming (Shiva, 1989). When common or family owned land is privatized and turned over to cash cropping, women lose their right to land use. It is not only women's subsistence production that is at stake: women are universally the collectors of fuel and water and, as common 'open access' land is lost, women have further and further to walk to secure these basic necessities (Sen and Grown, 1987). As readily accessible and fertile land is lost for both subsistence farming and resource collection, women are often forced onto more marginal (and ecologically fragile) ground. They have to cultivate thinning soils or collect green rather than dead wood. As a consequence, women, rather than the process of economic change that has forced them into this position, can sometimes be seen as the cause of environmental damage.

The first response to the failure to integrate women into the development process was a demand that women should be given the same economic opportunities as men, a campaign known as WID (Women in Development). However, as the ecological and social consequences of the development process became more apparent, a far more critical approach was taken. By the late 1980s, the campaign had shifted to a more critical stance under the influence of books and reports such as the DAWN (Development Alternatives with Women for a New Era) report (Sen and Grown, 1987) and Mies' (1986) and Shiva's (1989) work. The WID campaign began to be replaced by a WED (Women, Environment and Development) stance. This approach began to ask whether the development process was any longer desirable, certainly in its present western and male-dominated form. Central to the critique was the destructive effect on both women and the natural world (Braidotti *et al.*, 1994; Harcourt, 1994).

As in the case of the struggles over toxic waste in the USA, the question was raised as to how far the challenge to development and the global market system was based on specifically women's experience or that of colonized and peasant peoples generally (Agarwal, 1992; Jackson, 1995). Should women's involvement in grassroots campaigns around the environment be seen as women's struggles or as peasant or communal struggles in which women played a part? More contentiously, it could be argued that women's participation in these struggles was in some senses acting against their own interest, given the patriarchal nature of the traditional ways of life associated with peasant life and subsistence farming. The complexities of this situation can be shown by one of the best known of these grassroots campaigns, the Chipko movement. Based in the Himalayan hills, this movement gained international recognition for its direct action in hugging trees to prevent their logging by commercial firms. Vandana Shiva argues that, as the movement developed, it exposed gender differences in the approach to development within the local communities. Initially, men and women jointly opposed the transfer of the forest 'commons' to commercial loggers and planters. However, village men and women had different ideas about the future use of the forest. While men wanted to create local commercial development by planting trees such as eucalyptus, women wanted to maintain and plant trees for fuel wood and fodder. It was at this point, Shiva argues, that the Chipko movement became 'ecological *and* feminist' (1989: 76, italics in the original).

The second area in which Shiva criticized male-dominated development was in the green revolution. Here scientists in western laboratories trying to meet world demand for food selectively bred heavy-cropping plant species without taking account of the local social and ecological conditions in which they would be used. In particular, the position of women farmers was not addressed. As a consequence, plants were introduced that were not suitable for local conditions, requiring large amounts of water, pesticide and fertilizer. Ecological diversity was lost as local species were displaced and control of seedbanks was maintained by commercial companies through the use of sterile hybrid plants (Shiva, 1994). As only the larger farmers could afford to use the new seeds, poorer farmers, including women, became impoverished, losing their land or their access to land to richer neighbours. Examples such as these appear to point to a systematic gender difference in relation to environmental issues, although these are cross-cut by 'race' and class. Women's and men's different social position means that they have different environmental needs and experience environmental problems differently. Even in poor communities women's disproportionate responsibility for family health and family subsistence differentiates their experience from that of men.

Although more recent ecofeminist thinking around the issues of gender and the environment has taken account of the experience of women in the so-called 'developing countries', most of the early ecofeminist writing was based on an analysis of gender divisions in western society. As with a great deal of early feminist writing, there was a tendency to generalize from the experience of white, western, middle-class women and their preoccupations or at least to speak of 'women' in undifferentiated terms. However, there is an analysis at the heart of western ecofeminism that can be seen as having a global applicability, since it focuses on the model of western society that is being projected across the world in the process of globalization. This analysis directly links the gendered nature of western society to the global ecological destruction that this model is creating.

The ecological destructiveness of the western socioeconomic system has been seen by many ecofeminists as being the result of the dualist nature of western society (King, 1990;

Plumwood, 1993; Warren, 1994). Western society is seen as being divided in ways that prioritize one aspect of society through the denigration of its opposite or alternative. Scientific knowledge is valued over vernacular or popular knowledge; the public world of institutions and commerce is valued over the private world of domestic work and relations; abstract universalized thinking is valued over thinking linked to the particular and personal. For ecofeminists, these divisions are summed up in two crucial hierarchical dualisms: man, the masculine, is prioritized over woman, the feminine; and human society and culture are seen as superior to the world of 'nature'. In these hierarchical relations, woman and nature are thrown into a contingent relationship as the despised and rejected by-products (or precursors) of 'modernity'.

The origins of these dualisms are a matter of dispute among ecofeminists. For some, the divisions can be traced back to Greek society and the Aristotelian division between the public sphere of freedom and the private sphere of necessity (Ruether, 1975) and the Platonic division of the body and the soul (Plumwood, 1993). For some, it goes back even further, to the dawn of prehistory, when the benign world of the female earth-based goddess was overthrown by the destructive transcendant sky god (Eisler, 1990). For others, the division is historically closer, linked to the scientific and industrial revolutions that broke the traditional 'organic' relationship between humanity and nature. Newtonian mechanics and the philosophical approach of people such as Francis Bacon saw the natural world as something inert and available for discovery and exploitation. All the earth's mysteries and resources would be opened up for 'man'. Merchant (1983) has argued that this approach spelt the 'death of nature'.

The impact of the rejection of women and nature can be seen in the way both are devalued in commercial/industrial economic systems. Both have been treated as externalities in terms of economic accounting procedures (Waring, 1989) and in the social construction of contemporary economic theory and practice (Mellor, 1996b). The earth's resources have been seen as either free (air and oceans) or only worth the cost of extraction or the compensation paid to those who own or occupy the relevant areas. The prices of primary products are determined by the level of wages that can be set in disadvantaged countries and the vagaries of the 'casino' financial market in these products. Long-term costs or responsibility for polluted or depleted resources have not appeared on the commercial accounts of companies benefiting from natural resources or primary production. Equally, women's work has been devalued (Lewenhak, 1992). Most of women's work across the globe is either unpaid or paid at a low rate. Ecofeminists argue that this is because women's work is associated with the bodily process of life, from child care and hygiene to health provision and basic food production.

In their common marginalization, women and nature appear to have been thrown into at least a contingent relation. Does this mean that women are in an epistemologically privileged position in terms of environmental questions? Are women more responsive to nature?

ARE WOMEN MORE RESPONSIVE TO 'NATURE'?

As has been pointed out, there are two broad approaches to this question. One stresses women's socially constructed relationship to the natural world, while the other sees a much deeper affinity. Social or socialist ecofeminists see women's closer relation to the natural

world as socially constructed. Any superior knowledge women may have about the environment or the natural world stems from their social position. Affinity ecofeminists see women as closer to the natural world through their embodiment as women and/or mothers or as the representatives of a feminine cosmic force. Often, however, the division is one of rhetoric. The US writer Susan Griffin, for example, can be seen as taking a deeply essentialist position in her text, *Woman and Nature* (1978), a prose-poetic rendering of the dualist voices of 'scientific man' and 'natural woman'. It is, however, clear from her later writings that she takes a social constructionist position on gender divisions (Griffin, 1989).

One of the reasons for ecofeminism's association with an essentialist radical feminism is its emergence alongside the cultural feminist radicalization of the feminist movement, particularly in the United States, and the deepening of the green movement after Arne Naess had pointed to the difference between a shallow and a deep ecology (Naess, 1972). In North America there are particularly strong links between ecofeminism and cultural feminism and the feminist spirituality movement. Within the feminist spirituality movement, the gendered divisions of modern society are seen as representing a cosmic division between the forces of the feminine and the masculine, the god and the goddess (Spretnak, 1991). This influence, reflected in two well-known anthologies (Plant, 1989; Diamond and Orenstein, 1990), led to accusations that ecofeminism was irrational and reactionary in terms of modernist feminist aims (Biehl, 1991; Evans, 1993). However, even in these texts, the work of social constructionist ecofeminists such as Ynestra King, whose roots lie in anarchism, or Carolyn Merchant and Rosemary Radford Ruether, who adopt a basically socialist position, is also represented. However, all three see merit in the cultural feminist arguments, particularly in relation to the analysis of patriarchy.

There are also very few affinity ecofeminists who take an ultimately essentialist line on gender. Most culturally based ecofeminist writers do not see a cosmic and universal, unbridgeable difference between men and women. However, many ecofeminists see women as having an affinity with the natural world that men do not have. Petra Kelly, the late German green activist, argued that a woman could 'go back to her womb, her roots, her natural rhythms, her inner search for harmony and peace, while men, most of them anyway, are continually bound in their power struggle, the exploitation of nature, and military ego trips' (1984: 104). What appears as a biologically determinist argument is muted by the phrase 'most of them anyway' in relation to men. While women are seen as biologically connected to the natural world, men are not *biologically* disconnected. A similar qualification occurs in the work of one of the most vociferous exponents of affinity ecofeminism, Andrée Collard, who asserts that 'the identity and destiny of woman and nature are merged' (1988: 137). In her book, *Rape of the Wild*, Collard argues that women are linked to the natural world through their ability to give birth and nurture (even if they have never had children). However, men are not inherently destructive, it is patriarchy not men per se that is the enemy of nature. Collard does, however, often refer to men as if they and patriarchy were one. At the end of the book, she praises the political action of men who are ecologically sensitive. It seems that women, whether they are mothers or not, are condemned to their affinity with nature, whereas men can choose. Ynestra King argues that women also have a choice. Given that society has been socially constructed in such a way that women and the natural world are forced into an alliance, women can choose whether to reject that association or to maintain it for political reasons. Women can '*consciously choose* not to sever the woman–nature connection by joining male culture' (King, 1989: 23, italics in the original).

Most ecofeminists, whether affinity or social constructionist, take what approximates to a standpoint perspective (Hartsock, 1983). Women, having been biologically, cosmically or socially placed in a subordinated positon within western/patriarchal, dualist socioeconomic structures alongside a devalued natural world, are better placed to see the way in which social relations have an adverse impact on the natural world than men in their superordinate positon. There is, however, ambivalence in ecofeminist writings about whether women will spontaneously 'see' the woman–nature relation merely through their subordinate position, or whether the position of women is to be the starting point for an analytical framework and activist campaigning. For both affinity and social constructionist ecofeminists, the basic argument is not that women are essentially or biologically closer to nature, but that (superordinate) men are distanced from their natural environment in dualist structures. In particular, they are distanced from the ecological consequences of their actions and the biological needs and limitations of their embodied existence. The physical burden of these ecological consequences and the meeting of biological needs (physical comfort, hygiene, food and shelter, care in maturation and infirmity, and so on) are borne by others. Women who adopt superordinate positions can also lose touch with the natural roots of human existence, but it is harder for them to cast aside domestic and other caring responsibilities. Equally, men in subordinate positions may bear the burden of embodiment or suffer ecological consequences, particularly in industrial ill-health, but the sexual division of labour within households and communities still leaves women with the major responsibilities for human embodiment.

Ecofeminists argue that a green perspective is not adequate if it does not see the way in which the gendering of society produces adverse ecological consequences (Mellor, 1992b; Salleh, 1992). However, they differ in their explanations for the way in which dualist structures produce a gender and ecological 'blindness'. Those whose discipline base is in philosophy tend to point to the 'logic of domination' inherent in western philosophical systems which produces dualist structures of thought, which is generally traced back to the Greeks (Plumwood, 1993; Warren, 1994). Epistemological privilege here rests with those women (and men) who are able to break out of that framework, they form the epistemological 'bridge' between nature and culture. Those with a theological or spiritual base tend to see dualist structures as representing a more fundamental battle between cultural forces in religious structures. The struggle is more universal and cosmological, yet again men seem to be able to 'jump ship' from patriarchal ways of thinking and embrace more earth-centred spiritualities (Spretnak, 1991). For those whose discipline base is in social science, more materialist explanations are offered. Stress is put on women's work in society, particularly around human embodiment (Salleh, 1994; Mellor, 1997b). Women are seen as being placed structurally closer to the natural functions of human existence in a way that allows dominant males to 'escape' to a transcendent public world. Such a position puts less stress on the 'naturalness' and spontaneity of women's identification with the natural world and much more on the structural and material relation of women to nature as the starting point for critical analysis.

CONCLUSION

Although ecofeminists may differ in emphasis and analysis, they share the viewpoint that a gender analysis is essential if ecological problems are to be addressed. Most would extend this analysis to 'race' and some to class. Gender inequality is seen as producing male-dominated social structures which become detached from their environmental context and therefore lose awareness of the impact of human activity on the natural world. Ecofeminists see the environmental consequences of 'modernizing' global structures as being disproportionately inflicted on women, indigenous communities, marginalized and exploited peoples and on the natural world and its non-human inhabitants. If women have epistemological privilege, it is as part of a matrix of subordinated structures whose subordination creates the illusion of western, male-dominated 'modernity' and 'progress' based on economic and ecological exploitation.

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14. Environmental consciousness and behaviour: the greening of lifestyles

Karl-Werner Brand

Since the 1980s, public concern in western industrial societies over ecological problems and technological risks has grown considerably. Throughout the 1970s and the beginning of the 1980s, ecological conflict and the debate on nuclear energy were marked by a degree of high polarization and a clash of two contradictory cultural patterns: 'dominant social paradigm' versus 'new environmental paradigm' (see Catton and Dunlap, 1978; Dunlap, 1980; Dunlap and Van Liere, 1984; Cotgrove, 1982; Fietkau *et al.*, 1982). Today, nobody seriously doubts the urgency of ecological problems. Concerns for the environment have become more or less institutionalized in different fields of action: research and politics, economic management, product advertisement, education and, last but not least, private life. Even radical environmental lobbies have become accepted partners by politics and business. The ecological discourse has generated new perspectives on problems, new institutional forms of problem resolution and new standards of an 'ecological correctness'.

The institutionalization of ecological norms of behaviour is linked to various motives and interests. Nowadays, 'ecological lifestyles' have little in common with the 'simple', 'close to nature' life of long-haired, libertarian ecofreaks. The notion, 'ecological', has become technically and aesthetically sophisticated. Ecological orientations take visible shape in attractive, upper-middle-class houses decked out with with wood, glass, green material and the latest energy-saving technologies. High-tech is used for building wind energy and low-emission power plants, for the development of 'integrated traffic systems', or long-life, repairable and recyclable products. 'Efficiency revolution', 'technical and intelligent' operating systems, 'life-cycle analysis', 'ecological material flow management' and the like have become the key words for a degree of ecological reconstruction of the traditional industrial ways of life. This success story of institutionalization of ecological behavioural norms, however, is just one side of the coin. On the other side the omnipresence of ecological rhetorics, their broad diffusion in everyday life and institutional action contexts, face a continuing deterioration of the environment on a global scale with dramatic regional consequences.

This environmental situation is coupled with a long-term inability to take preventive measures at various societal levels to conserve the natural resources for reproduction of societal development. The key image of 'sustainable development', shared at a programmatic level, is refracted in established structures, interests and action routines. These contradictions characterize not only national and international politics but also individual efforts towards a sustainable lifestyle. A pronounced environmental consciousness in one field of behaviour combines with an astonishing indifference in others. The appearance of a compre-

hensive advance of the 'greening of lifestyles' ought to be replaced by a more differentiated view of ambivalence and contradictions, that present barriers to the development of more environmentally sound ways of living.

The chapter begins by presenting some comparative survey data on the development of environmental consciousness and behaviour. These general trends will then be exposed to empirical findings of social scientific environmental research which shows a more differentiated and contradictory picture. The second section ponders what role the pluralization of lifestyles, typical of postmodern, western societies, plays in dealing with environmental problems. The argument is put forward that it is not lifestyles (operationalized by research in various ways) as such which structure perceptions and dealings with environmental problems, but typical, everyday life-based environmental mentalities.[1] The empirical reconstruction of such environmental mentalities, which vary over countries, requires a multiple, graduated social and cultural contextualization of everyday and environment-related patterns of behaviour. The last section outlines such an approach and points out its advantages over traditional, sociopsychological approaches.

COMPARATIVE DATA AND EMPIRICAL FINDINGS ON ENVIRONMENTAL CONSCIOUSNESS AND BEHAVIOUR

Data on the development of environmental consciousness are collected in many countries worldwide. For a variety of reasons these country-specific data are difficult to compare. There are only a few systematically surveyed, globally comparable data sets (see Dunlap *et al.*, 1993; ISSP Environment, 1993; World Values Study Group, 1994). For the member countries of the European Union, relevant data on the perception of environmental problems are produced by the regular surveys of the European Commission (Eurobarometer) and by a survey carried out by Market and Opinion Research International (MORI, 1994). Dunlap (1991) offers a corresponding overview for the USA. However, such data have to be interpreted with caution. Results are highly dependent on the wordings of questions and the cultural context of interviewees. Taken together, empirical findings point towards a high, and globally growing, sensitization to environmental concerns. In all surveys, Germany ranks among the highest in concerns for the environment, whereas these play a less significant role in Great Britain or Spain. In South Korea, Mexico, Canada, New Zealand and Australia, however, environmental problems are taken just as seriously as in Germany. Danes, Finns and Norwegians also feel personally affected by environmental problems (Dunlap *et al.*, 1993; ISSP Environment, 1993). The different degrees of sensitization do not vary systematically either with pressing economic and social problems or with the actual environmental crisis in a single country. Rather, it seems to be people's cultural context that is the key to explaining different perceptions of environmental issues (Eder, 1995).

Thus, in Great Britain, nature protection and all problems related to the destruction of landscape experience a particularly high emotional resonance (Statham and Szerszinski, 1995). In Germany, it is the nuclear energy issue and the debate on motor cars that find the strongest cultural resonance. For some, the car serves as a symbol of a newly acquired, economy-centred national identity, based on prosperous postwar decades; for others it is a symbol of an amoral development which destroys society and prevents the unfolding of a humane, social and ecologically conscious life (Brand and Poferl, 1995; Brand *et al.*, 1997).

Calls for a profound change of existing consumption styles, prompted by reports of ecological change, carry identity-threatening messages for many Germans, and generate defensive reactions.[2] On the other hand, fear of environmental risks is more widespread in Germany than in other countries. Two-thirds of Germans view an increase in environment-related diseases as most probable, as opposed to only 45 per cent in the USA and 33 per cent in the Netherlands. Only Italians have the same degree of concern about global climate change as Germans; 68 per cent of Germans and 64 per cent of Italians feel 'personally very much endangered' by a global rise in temperatures, whereas only 45 per cent of people from Great Britain and 25 per cent of Dutch feel that way (ISSP Environment, 1993).

However, environmental consciousness, affectedness and specific cultural resonances, only provide for a general disposition towards environmentally friendly action. A high degree of environmental consciousness does not automatically translate into environmentally sound behaviour. The latter depends upon a great number of additional, individual, group and context-specific factors. In recent years, this nexus has been studied in greater detail, although the focus has been on individual readiness to behave in certain ways, rather than on actual behaviour in different contexts. Thus there are hardly any comparative data on actual environmental behaviour and, even in cases where similar data do exist (on all energy-saving behaviour, water consumption, purchase behaviour, separation and recycling of waste, noise emissions, car use, and so on), different national contexts foreclose systematic comparability. For instance, energy-saving behaviour has different relevance in northern and southern regions of Europe. A general finding, however, sheds light on the issue: there are no European countries in which the various indicators of environmental action have consistently high values (Schuster, 1992: 197). Rather, a heterogeneous picture is typical for all countries: environmental behaviour is emphasized differently in various dimensions of everyday life.

This finding corresponds with those of recent studies on the relationship between environmental consciousness and environmental behaviour (de Haan and Kuckartz, 1996; Fuhrer, 1995; Dierkes and Fietkau, 1988; Hines *et al.*, 1986/7; Reusswig, 1994; Spada, 1990; Stern, 1991; Stern and Oskamp, 1987), which can be summed up as follows.

First, a considerable number of the problems in research on environmental consciousness stem from the different operationalizations of 'environmental consciousness' in various studies, which results in the measuring of different variables (knowledge, attitudes, verbal commitment, environment-related values, mentalities, hierarchical stages of environmental consciousness, and so on).

Second, if one wishes to distinguish 'environmental knowledge' (knowledge about and information on ecological connections and problems), from 'environmental consciousness' (mental representation of public environmental debate with cognitive and affective aspects) and 'environmental behaviour' (actual ways of behaving), the classical assumption shared by pedagogues, politicians and environmental activists is that a high level of environmental knowledge leads to high environmental consciousness and, consequently, to respective environmental behaviour. This expectation is not, however, supported by empirical findings: 'The influence of environmental knowledge on environmental consciousness is small, effects of environmental knowledge and consciousness on behaviour are insignificant' (Kuckartz, 1995: 82). In the various studies, environmental consciousness does not account for more than 10–20 per cent of variance of (mostly) self-reported behaviour (see also de Haan and Kuckartz, 1996; Diekmann and Preisendörfer, 1992; Hines *et al.*, 1986/7; Schahn and

Holzer 1990; Spada 1990). This disconcerting finding is usually discussed as the 'gap' between environmental consciousness and behaviour.

Third, the fact that environmental consciousness and behaviour derive neither from specific levels of knowledge and information on environmental topics nor from mere environment-related attitudes means that other factors should also be taken into account. Thus psychological work on the environment – frequently following Schwartz's norm-activation theory (Schwartz, 1968) – points out the importance of various intermediating variables such as values, perceived consequences of behaviour, ascription of responsibility or control attribution (see Graumann and Kruse, 1990; Spada, 1990; WBGU, 1993, 1995). In economic rational choice theories, the common good dilemma and individual cost–benefit relations of environment-friendly behaviour play a crucial role (for example, Frey, 1992; Diekmann and Preisendörfer, 1992; Franzen, 1995). Although single factors are emphasized differently, there seems to be broad consensus that personal values, situational contexts, infrastructural deficits and financial incentives play a more important role than knowledge, affectedness and environmental attitudes. This perspective provides some radical insights when we look at actual eco-balances of individual behaviour or group-specific behaviour patterns, which vary to a certain degree independent of respective action orientation and motives. Environmentally friendly behaviour, measured by objective criteria, can be attributed to a variety of underlying factors: ecological commitment, financial considerations (for example, when energy saving clearly shows in bills for utilities), infrastructural contexts (for example, good or bad access to public transport), cultural habits (for example thriftiness) or simply poverty (for example, people cannot afford a car or long-distance holidays). The eco-balance of a lifestyle of a number of older, immobile, traditionally thrifty people who show no specifically pronounced environmental consciousness is, in most cases, better than that of environmentally conscious, in many ways ecologically correct, academics who are highly mobile as the result of business, or leisure behaviour.

Fourth, an important finding of recent research on environmental consciousness is that the idea of a homogeneous, environment-related pattern of behaviour should be given up. Environment-related behaviour at the individual and group levels is heterogeneous (Reusswig, 1994). The study by Diekmann and Preisendörfer (1992) considers this finding a result of very variable personal behavioural costs across the different fields of action. Above all, environmental behaviour is actualized in those 'low-cost' situations 'which do not require far-reaching changes in behaviour, do not cause considerable inconvenience, and do not require a specific additional effort' (ibid.: 240). This is far from surprising. Next to costs, time efforts, inconvenience and other everyday life barriers, cultural habits and value preferences also play a crucial role. Changes in consumption behaviour, as Dierkes and Fietkau sum up relevant studies, have their way 'where new ways of behaviour could be linked to traditional basic values, as in the cases of saving resources, economic household budgets and healthy nutrition' (1988: 132). In addition, the patchwork character of environmental behaviour provides a subjective relief from the normative exacting demand for 'ecological correctness'. It does this by subjectively overemphasizing the fields of action where one follows the postulate and deemphasizing other fields where ecological considerations play a minor role.

Fifth, with reference to group differences, empirical studies of the 1970s and early 1980s identified a core group of ecologically conscious and engaged citizens: younger, urban, well-educated and politically liberal people (van Liere and Dunlap, 1980), or respectively

'postmaterial'-oriented members of the new middle-class working in social, intellectual and creative professions (Cotgrove and Duff, 1980; Inglehart, 1990; Kriesi, 1993; Lowe and Ruedig, 1986). While this description, in general, still holds for activists and supporters of the environmental movement in the late 1980s, with the increasing institutionalization of the environmental topic, ecological orientations have long left the green–alternative movement milieu and spread across all social groups.[3] Consequently, studies on the influence of sociodemographic variables on environmental behaviour no longer result in a clear picture (Samdahl and Robertson, 1989; Billig, 1995). Whereas the interpretation was long shared that younger people are more environmentally conscious than older people, nowadays there are no findings which support significant influence by age (Billig, 1995). Higher education goes along with greater environmental knowledge but only partly with stronger environmentally responsible behaviour. Occupation and political attitudes in general are seen as having only minor influence (see Schahn and Giesinger, 1993). Research findings on gender and environmental concern are inconsistent (Blocker and Eckberg, 1989; Mohai, 1992; Schahn and Holzer, 1990; Stern *et al.*, 1993). Studies which state a certain determination by gender refer to different degrees of affectedness experienced by local (women) or national (men) environmental issues, to different valencies for environmental knowledge (men) and environmental affectedness (women) or to different ways in which environmental issues and personal values are linked. 'Women apparently are more accepting than men of messages that link environmental conditions to potential harm to themselves, others, and other species of the biosphere' (Stern *et al.*, 1993: 340).

Taken as a whole, empirical findings show that, in western societies, there is no longer a distinct sociodemographic group promoting the cause of environmentalism. Moreover, they stress that one has to reject the assumption that traditional, sociostructural features of group classification (occupation, age, residence, and so on) homogenize and structure environmental concern and behaviour. Studies on the ecological sensitization of single occupational groups, for instance industrial workers (Heine and Mautz, 1989; Bogun *et al.*, 1990), industry managers (Schülein *et al.*, 1994) or engineers and natural scientists in the chemical industry (Heine and Mautz, 1995), demonstrate that within those groups markedly different reactions to ecological criticism have emerged.

ECOLOGY AND LIFESTYLES

The decreasing explanatory power of sociodemographic features and the existing heterogeneity of environmental patterns of behaviour within all groups should not lead us to ignore completely the influence of group-specific differences in actual environmental behaviour. In contrast, our understanding is to maintain that social action is always tied up in specific societal contexts, which determine the perception of problems, standardize behaviour and generate distinct social patterns. Ties to sociocultural contexts are especially relevant for environmental problems, which in most cases are accessible only through second-hand information, by frames and symbols mediated by mass media, expert opinions or controversial scientific and political debates. While the social construction of environmental problems in public debate follows its own logic, not least determined by the selective rules of mass media production (see Brand, 1995; Gamson, 1988; Hansen, 1991), different societal groups have their own way of interpreting this debate. For instance, risk analysis points to different

cultural patterns of risk perception and risk evaluation by experts and lay persons (see Krimsky and Golding, 1992; Rayner, 1992; Wynne, 1996). Sociopsychological studies stress the norm-setting role of reference groups and group-specific 'social representations' (Moscovici, 1984) for the interpretation of environmental problems and the resulting consequences for action (see Johnson and Covello, 1987; Graumann and Kruse, 1990; Fuhrer *et al.*, 1995). Cultural analysis argues that different societal group structures – measured by degree of hierarchical differentiation (grid) and of group ties (group) – are coupled with different value systems, different concepts of nature and risks (see Douglas, 1992; Douglas and Wildavsky, 1982; Thompson *et al.*, 1990).

Although the thesis of group-specific determination of environmental consciousness and behaviour is highly plausible, the question remains: which organizing principles structure the collective problems, given current conditions of increasing individualization and plurality? In this connection, the debate on 'lifestyles' or on 'lifestyle milieux' gains special importance. As a result of social and cultural changes in the 1970s and 1980s, lifestyle concepts have gained in popularity, at first in market and consumption research, then, after a certain delay, within social science. These changes included the increasing political relevance of horizontal dimensions of social injustice (gender, age, ethnic and regional affiliation), the dissolving of traditional ties, the pluralization of subcultures and individual ways of life, and not least the neoliberal advocation of an uninhibited individualism. All these factors led to increased deoupling of forms of consciousness and social location. Existing models of class structure and social stratification lost the power to explain electoral behaviour, patterns of consumption, choice of occupation, or education styles. Approaches in social sciences reflect these processes in terms of 'destructuration' and 'restructuration' (Diewald, 1994). Whereas the first pays special attention to processes of liberation from social ties and increased individual possibilities for designing one's own life, the latter focuses on the emergence of new social configurations and forms of socialization in new sociocultural milieux and lifestyle groups. In Germany, for instance, these processes are studied under the focus of life-world research or *Lebensweltforschung* (see, *inter alia*, SINUS Lebensweltforschung, 1992; Schulze, 1992; Vester *et al.*, 1993). Such lifestyle milieux are not primarily marked by common objective, sociostructural factors. Rather they constitute a group-specific combination of social location, basic cultural orientations and social practices of life. Milieu-specific ways of perceiving and acting find their symbolic expression in distinctive 'lifestyles'. Viewed from the outside, they provide a distinctive representation of a way of living and self-understanding; from an internal view, they serve to build identity.

Evidently, the rising importance of such cultural processes of distinction and style building are of relevance to questions on environmental behaviour. Throughout the 1970s and 1980s, for a variety of groups in western industrial societies, the ecological topic became a crucial focus for a new politicocultural identity. This identity manifested itself not only in political behaviour but also in specific lifestyles, in specific nutrition habits, preferences of taste, forms of living and clothing. As a result of the diffusion of ecological orientations into society, these 'alternative', 'green' milieux lost their integrative and distinctive power. At the same time, the ecological topic gained new symbolic relevance in the everyday lives of most social groups. The question is whether, and to what extent, 'lifestyles' can be understood as the structuring principle of different, group-specific ways of integrating the new demands for 'ecological correctness'.

In answering this question, considerable difficulties exist because social sciences use the notion of lifestyles in various ways (see Bogun, 1997; Diewald, 1994). Patterns of consumption and questions of taste are subsumed under this notion, but also attitudes, value orientations, patterns of identity building, specific ways of organizing everyday life, or different technology with economic, social and cultural resources. In contrast to a holistic understanding, which views lifestyles as encompassing all facets of life, there are approaches which base their understanding on the fact that lifestyles selectively refer to those aspects of life which are especially suited to processes of self-stylization. Another question widely discussed refers to the relation between lifestyle and social structure. Are lifestyles, as Bourdieu (1984) states, the cultural practice of a 'class habitus' which is determined by the respective position in social space of economic, cultural and social standing ? Or do active performances design lifestyles, as in the theory of individualization by Beck and others (see Beck, 1992; Richter, 1994)?

Thus lifestyles represent an irridescent, variously interpreted and operationalized construct. Consequently, the findings of empirical research differ considerably according to the respective notions used. Even for the same country there exist different typologies of milieux and lifestyles (see Bourdieu, 1984; Mitchell, 1983; SINUS Lebensweltforschung, 1992; Schulze, 1992; Vester *et al.*, 1993). This situation is responsible for difficulties of systematically linking lifestyle research with research on environmental consciousness and behaviour (see Reusswig, 1994; Bogun, 1997). In current lifestyle analyses of market research, ecological aspects of behaviour play a minor role anyway. In these, specific aspects of consumption and leisure behaviour, or product-specific preferences of taste, are essential. The few existing empirical studies on the connection between lifestyle and environmental consciousness and behaviour correspondingly refer to various mixed relationships of ecological orientations with material or post-material values in single lifestyles. This contradicts Inglehart's thesis of value change which predominantly links readiness for environmentally friendly behaviour with post-materialists (Inglehart, 1990). A quantitative Austrian study (Richter, 1990), for instance, shows that in addition to the concurrence of ecological orientations with values of self-actualization – which had been typical of the post-material milieux of new social movements – a concurrence with political conservative attitudes can also often be found. A similar finding is stated by Prose and Wortmann (1991) in their study on energy saving in a big city in northern Germany. A sense of duty, savings considerations and care for personal health and the family represent points of contact for environmentally conscious behaviour as well as post-material values or an ecocentred world view. Typologies constructed on the basis of these findings, however, offer few insights on their connection with the respective dominant form of sociocultural differentiation. Do different ways of dealing with environmental problems reflect general milieu-specific schemes of reality perception, or do they vary independently?

An exploratory study (Poferl *et al.*, 1997) has recently addressed and partly answered this question for the German context. It is based on a sample of interviewees selected from West German milieux of the middle strata: the traditional 'petit bourgeois', the partly modernized advance (career)-oriented and the modernized 'hedonistic' milieu[4] (see Flaig *et al.*, 1993; SINUS Lebensweltforschung, 1992; Vester *et al.*, 1993). Qualitative interpretation of these interviews showed five typical patterns of framing and dealing with environmental problems in everyday life. If we understand mentalities as socially shared interpretations of realities which we acquired, reproduced and changed within the practices of everyday life, we can call these typical patterns 'environmental mentalities'.

In a first pattern, the claim for ecological reorientation has the meaning of a 'personal development project'. Environmentally responsible action here is closely tied to self-realization, personal development, needs to be close to nature, and a less hectic existence. Doing without or with less is experienced as personal enrichment. A second pattern is labelled 'environmental protection as civic duty'. This pattern crucially ties in with principles of correctness and feasibility, to orientations of normative obligation – as long as this is valid for everybody and does not require changes that are too radical. The third pattern is dominated by a marked 'system or state orientation' accompanied by a rather cynical attitude towards expectations for individual behaviour. Here responsibilities and competences are ascribed to institutional structures and the 'system'. Individual efforts are experienced as more or less meaningless because of barriers in existing structures. In a fourth pattern of 'indifference', environmental problems are seen without illusions but resulting expectations of individual behaviour are rejected: ecology should not spoil the fun of life. A fifth pattern can be seen in the attitude of 'business as usual'. Pressing environmental problems are denied. The claim for ecological reorientation is experienced as endangering achievements and the existing order.

In reality, these ideal-type environmental mentalities occur in mixed forms. Individuals, however, can mainly be classed along the lines of one or the other type. With reference to milieu affinities, there are only loose couplings which partly cross-cut milieux. Only the first mentality type, 'personal developmental project', is typically coupled with a specific social context, that is the more settled alternative milieu. The pattern of 'indifference' can be found, not only in the partly modernized career-oriented, but also in the modernized 'hedonistic' milieu. These two mentality patterns are typical 'young' patterns, and can be found in those aged around 40 and younger. In contrast, the 'business as usual' pattern can be found largely within the older generation aged over 40 in the 'petite bourgeoisie' and 'career-oriented' milieux. The most dispersed are the mentality types of 'civic duty' and 'system or state orientation'. These are represented in all milieux and thus can often be found in combination with other mentality patterns.

The national study's empirical findings cannot be generalized: they are context-specific. However, the study points towards general features of the connection of lifestyles with environmental behaviour. First, it shows that ecology can serve as a thematic focus for lifestyles, although a systematic alignment of everyday life to ecological criteria is a borderline case. The rule is rather for different forms of a partial and precarious integration of ecological norms. Environmental orientation relates, in a complex and manifold way, to other social and cultural orientations. Second, it shows that everyday life forms of processing environmental problems can in fact cross-cut existing milieu segmentations. Apparently, milieu-specific 'lifestyles' are not the only structuring principles of environmental mentalities. Third, it shows that these mentalities are also tied to broader patterns of political culture and perceptions of individual and collective responsibilities, and of one's own role in politics. Environmental mentalities arising out of the interplay of these factors have specific contours in different countries. Hence both dominant German patterns of 'civic duty' and 'system or state orientation' can be grasped only by understanding the deep anchoring of values of order, duty and state orientation (state-centredness) in German political culture. In general, this calls for a more context-related, cultural analysis of environmental consciousness and behaviour.

A CONTEXT MODEL FOR ANALYSING ENVIRONMENTAL CONSCIOUSNESS AND BEHAVIOUR

The call for contextualization requires precision. The context specifically relevant for environmental consciousness and behaviour in everyday life can be developed only by using different levels of relevance. Levels should be understood here as filter systems that are graded into each other. In the following, five filters are distinguished: (1) structural and cultural setting, (2) public environmental discourse, (3) milieu-specific life-worlds, (4) environmental mentalities, and (5) situational, field-specific contexts of everyday life (see Poferl *et al.*, 1997). The intermediation of the first three levels of context generates specific environment-related mentality patterns. According to the thesis represented here (see Figure

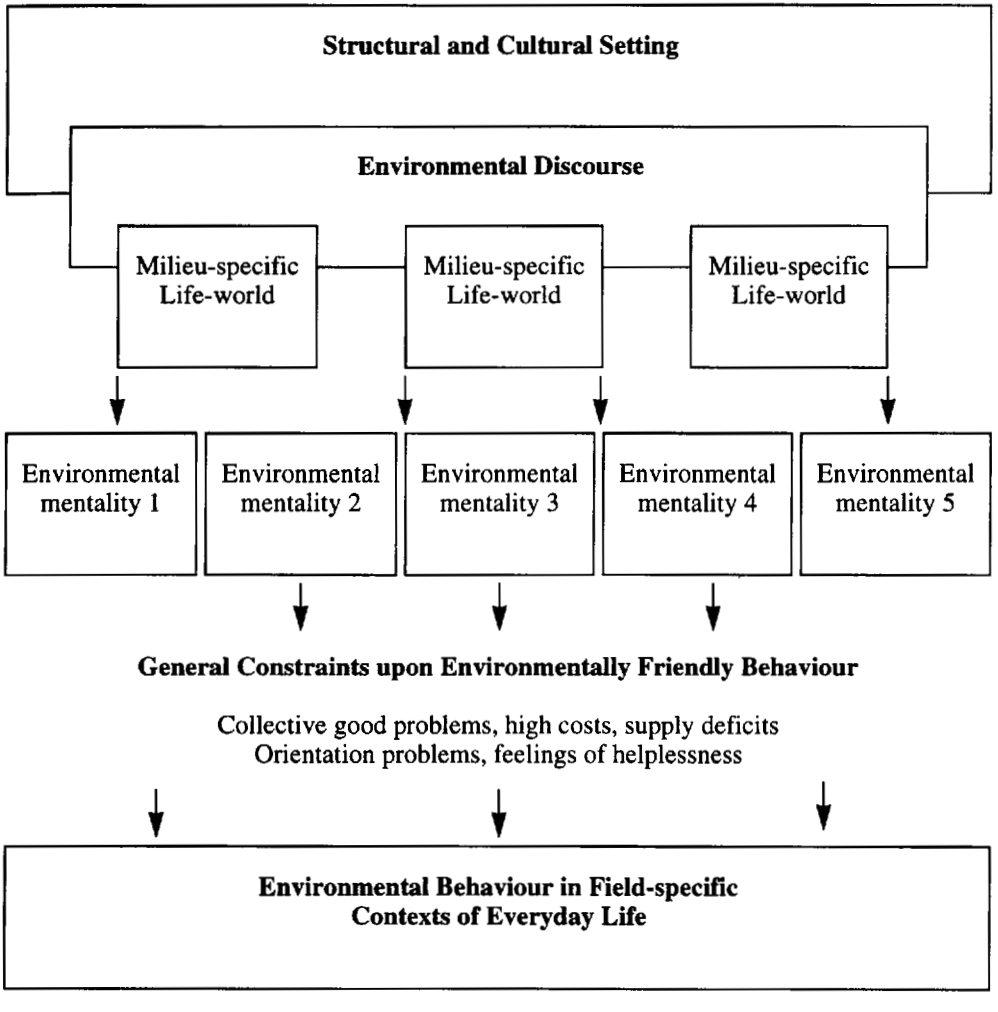

Figure 14.1 Context model for analysing environmental consciousness and behaviour

14.1), these patterns structure the approach to typical constraints upon, and opportunities for, environmentally friendly behaviour in various fields of everyday life.

1 The most general context of environmental consciousness and behaviour is the structural and cultural setting of a given society: degree of industrialization, level of affluence, cultural traditions, forms of social differentiation and integration, political order, central problems and cleavages. For every country, these various aspects of macrostructural context combine to form a specific model of society influencing ways of life and ways of experiencing reality.

2 Environmental problems are not objectively given but become socially constructed. In modern societies, the central arena for the social construction of problems is the public of the mass media. Filtered by the specific logic of media production, public environmental discourse can be seen as a field of permanent symbolic struggles between competing collective actors attempting to promote their own definition of problems. Each of these competing 'issue frames' (Gamson, 1988) or 'story lines' (Hajer, 1995) implies a specific interpretation of causes, assignment of responsibilities and proposals for 'adequate' problem-solving strategies. Which of these 'issue frames' become dominant in the public discourse depends significantly on their phenomenological resonances within a given social and cultural context (Snow and Benford, 1986; Snow *et al.*, 1988). In Western countries, nearly 30 years of public environmental debate have thus led to the emergence of specific normative standards of 'adequate' problems perception and environmental behaviour.

3 Public environmental debate is selectively restated in everyday life contexts. Milieu-specific life-worlds offer different cultural resonances for environmental debates, involving health considerations, understanding of nature, values, religious orientation, lifestyles, and so on. They also build selective social representations of general ecological behavioural norms (Moscovici, 1984; Fuhrer *et al.*, 1995).

4 Ecological norms, however, cannot be integrated into traditional ways of life without implications. At least to some degree, they require a break with routines of everyday life. This is true in particular for western, consumption-oriented societies. In reaction to this challenge, typical environmental mentalities emerge. They couple milieu-specific interpretations of reality and action routines with general patterns of political orientation.

5 Ecological mentalities structure the way people deal with constraints upon, and opportunities for, environmentally friendly behaviour in everyday life. Everyday life, however, takes place within different situational contexts. Professional work, housework and leisure are fields of action with a great variety of rationalities, expectation horizons, claims and options for action. This produces the well known heterogeneity of patterns of environmental behaviour.

This model of a multiple, selective contextualization of environmental consciousness and behaviour provides a general framework for analysis. It does not imply, however, a specific theoretical interpretation of the way these different analytical levels are interrelated. Such an interpretation is presented, for instance, by Beck's theory of transition from 'industrial' to 'risk society', or respectively from 'simple' to 'reflexive' modernity (Beck, 1992; Beck *et al.*, 1995) and also afforded by some of the cultural analyses that have already been mentioned. The former refers to the superimposition of two structural principles of societal organization and the resulting conflicts, uncertainties and ambivalences with which individual actors have to deal in everyday life. The latter aim at the identification of general interrelations between social structure and concepts of nature and risks. The approach

introduced here can work on these and other theories (Bourdieu's theory of habitus, post-Fordism, postmodernity, and so on) in a hypothetical way, in order to decode the historical patterns in the nexus of different contextual levels of environmental consciousness and behaviour.

The question is: what advantages does such a research perspective offer? First of all, it is not questioning the relevance of economic rational choice theories, or sociopsychological explanatory models for individual environmental behaviour. Of course, the dilemma between the common good and individual cost–benefit calculations plays an important role in environmental behaviour. In view of the research findings, there is also no doubt that variables such as perception of action consequences, responsibility ascriptions, control attribution or efficiency expectations influence individual readiness to act in an environmentally friendly manner. The question, however, is how these aspects are tied together and weighted in different contexts of everyday life. The 'commons dilemma', for example, tempts only part of the population to become free-riders. The statement put forward here is that the way such single factors are tied and weighted follows sociotypical patterns which are structured by environmental mentalities. These mentalities assign their own special relevance to typical barriers to environmentally friendly behaviour. Next to a general improvement of incentive systems, practical endeavours to promote the spread of sustainable lifestyles therefore have to start by taking into account mentality-specific relevance structures. The promotion of new conceptual ideas of 'sustainable life' misses the point, or generates only defensive reactions when the different symbolic resonances of these conceptual ideas and their respective measures are not considered.

NOTES

1. This concept was developed within and resulted from an empirical study on determinants of environmental consciousness in everyday life (Poferl *et al.*, 1997).
2. This possibly explains why, according to the 1990/92 World Values Survey, readiness among Germans to give up income in favour of the environment is less pronounced than in other countries.
3. In contrast, on the basis of the interpretation of longitudinal USA data, Jones and Dunlap (1992) suggest the opposite findings, namely 'that the social bases of environmental concern – at least as measured by the NORC environmental spending concern – have remained remarkably stable over nearly two decades. ... Younger adults, the well-educated, political liberals, Democrats, those raised and currently living in urban areas, and those employed outside of primary industries were found to be consistently more supportive of environmental protection than were their respective counterparts' (ibid.: 51). We assume that this finding results from the way that environmental concern was measured (by declared readiness to spend more money on the environment). Other ways to obtain data on environmental consciousness would lead to other results. It is, however, not discounted that these results reflect national peculiarities.
4. These milieux (22 per cent, 24 per cent, 13 per cent) accounted for about two-thirds of the West German population in 1992.

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15. Risk, the environment and environmental knowledges

Alan Irwin

One regular theme of environmental debates and controversies concerns the contested nature of 'environmental knowledge' – of how we identify and measure environmental destruction and environmentally related threats to our survival and ways of life. At the same time as the successful treatment of environmental issues seems to necessitate authoritative and clear definitions of risk and threat, scientific statements often struggle to achieve public legitimacy, as recent cases concerning food safety and environmental pollution amply testify. Accordingly, 'environmental knowledge' has become a diverse and contested arena.

This chapter will consider sociological arguments about environmental knowledge and the consequences of these for environmental sociology. In a situation where no single 'environmental knowledge' can exist, it becomes important to consider various environmental knowledge*s* and their social significance. More particularly, it is suggested here that matters of environmental knowledge are inseparable from the relationship between 'nature' and 'society' and the reconsideration of this which current environmental and sociological discussions seem to require. As part of the discussion, it will be necessary to consider whether the environment can ever stand apart from everyday life and action: it is possible to argue that our view of the external environment reflects our social structure and cultural understanding – including what counts as 'knowledge'. Accordingly, environmental knowledges will reflect assumptions and understandings which are inevitably *social* in character. Since science has a significant role to play within environmental discussion, it will be especially important to explore its operation in this context.

Conventional accounts by government and pressure groups of the 'ecological crisis' typically stress the need for 'society' to respond urgently to pressing environmental issues such as global warming, pollution of air and water, or species loss. These large-scale threats are presented as the undesired outcome of industrial growth and modern lifestyles or, put differently, as the 'social impact on the natural'. On that basis, social change (whether in the form of industrial, governmental or public measures) is required in order to establish a more 'sustainable' relationship with the natural environment. It also follows from this view that, since the 'natural' stands apart from the 'social', our knowledge of the environment can be neutral and objective: social action follows once 'natural science' has developed an objective analysis of the scale of risk and threat.

In contrast to this view of an external environmental crisis to which society must respond, sociological and anthropological research has for some time identified a rather different relationship between society and the environment. Thus, Mary Douglas (1980: 289), drawing largely from studies on non-western peoples, has argued that a society's view of the natural

world will reflect that society's culture and worldview. As she has expressed this point with regard to pollution issues, 'the view of the universe and a particular kind of society holding this view are closely interdependent. They are a single system. Neither can exist without the other.'

Rather than simply presenting a dichotomy between nature (which is 'out there') and society ('in here'), such a view suggests an overlapping relationship between the social and the natural, suggesting also that it is not possible for us to be 'objective' about either category. Indeed, from this perspective it may be difficult to decide where one ends and another begins. As the social historian, Simon Schama (1996: 14), has discussed with regard to European and US culture, our views of landscapes, for example, are inseparable from the 'myths, memories and obsessions' by which we live: 'Instead of assuming the mutually exclusive character of Western culture and nature, I want to suggest the strength of the links that have bound them together ... That strength is often hidden beneath layers of the commonplace.' Of course, the very 'commonplace' character of this relationship can blind us to such links. The English village or hedgerow, the Dutch tulip field, the US national park – all appear 'natural' and yet have decidedly social origins and depend upon various forms of social support for their maintenance.

This cultural blindness also applies to wider views of the 'natural'. Our very sense of getting 'away from it all' or 'back to nature' is a particular social and temporal construction (albeit one with very well established historical origins). Indeed, our whole experience of the 'natural environment' is inevitably mediated through social assumptions and social products: explorers depend upon sophisticated transport systems to arrive at their 'unblemished' destination; camera crews force their way into 'undiscovered' (at least so far as westerners are concerned) forest so that we at home can wonder at the natural world without missing supper; no trip into the 'wilderness' is complete without modern high-tech clothing, tents and cooking systems.

Going further, the 'environmental crisis' can itself be presented as a social invention. After all, environmental change is nothing new but has been a constant feature of life on Earth. Rather than a 'crisis' for the environment (animals and plant life are always in flux and the destruction of one species may create fresh opportunities for another), what we seem to be witnessing is a very human crisis in terms of the quality (and even survival) of our way of life. The very notion of an 'environmental crisis' also reflects the contemporary concept of a 'global society' (see Yearley, 1996a). The image of 'Spaceship Earth' and the sense of worldwide interconnection upon which it depends is very much a product of our social and technical civilization. At the most practical level, it is difficult to imagine the current sense of crisis without global communication and transport systems. Equally, various concepts of 'sustainability' summon up a collective responsibility for future generations in a decidedly ideological fashion (compare the 'globalist' rhetoric of sustainable development with practical actions to resolve the international debt crisis or even to protect peoples endangered by war).

Importantly, this complex relationship between the 'social' and the 'natural' can also be viewed from the opposite direction. Human behaviour is often interpreted in purely social terms (especially within the discipline of sociology) but can simultaneously be seen as 'natural' (since we are also living, breathing,[1] biological organisms – as 'natural', in that sense, as a school of whales or a nest of ants). Inevitably, we are ourselves one part of the natural environment and cannot be separated from its dynamics no matter how separate we consider ourselves to be.

Taken to its most extreme form, such an approach could suggest that, far from their being discrete entities as the conventional account typically suggests, there is, in fact, no way of distinguishing between the 'social' and the 'natural'. As Beck (1992: 81) has famously put this, 'At the end of the twentieth century nature *is* society and society is also "*nature*". Anyone who continues to speak of nature as non-society is speaking in terms from a different century, which no longer capture our reality' (emphasis in original). On that basis, a number of contemporary sociologists argue that we now live in a 'risk society'. More particularly, theorists such as Beck suggest that our current sense of being 'at risk' is as much a consequence of our way of life as of any external environmental crisis. The modern (or 'late-modern' in Beck's terminology) loss of faith in 'science, truth and progress' leads to our current sense of insecurity and external threat. Thus the 'environmental crisis' is in essence a social crisis for our institutions and for our own existential beliefs (that is, of who we think we are): 'natural destruction and large-scale technological hazards can and must be apprehended and deciphered as mystified modes of self-encounter, twisted outwards and reified. ... It is not something external but itself that society encounters in the hazards that convulse it' (Beck, 1995: 159).

This discussion of the 'social' and the 'natural' raises many questions concerning our sense of being 'at risk' and the connection (if any) between this and the existence of environmental threats. In particular, rather than simply assuming that environmental destruction is as presented to us by an unproblematic external reality, it becomes important to explore how our notions of 'risk' relate to the social construction of environmental problems. How are environmental problems defined and sustained within contemporary debate? More generally, what for us constitutes 'knowledge' of the environment?

While sociological analysis indicates that the 'social' and the 'natural' are (either partly or wholly) overlapping entities, 'official' discourses around the environment (for example, in the form of government or industrial announcements) typically revert to a notion of the environment as 'out there' and as interpretable through the language and methods of science. It is therefore important that we should next consider the problems faced by scientific analysis in this area.

SCIENCE AS ENVIRONMENTAL KNOWLEDGE

Within most discussions of risk and the environment, whether concerning BSE, acid rain or pollution, scientific argumentation plays a central role. The call for 'the facts' – and the consequent battle to establish the 'real facts' – has become a standard rhetorical feature of environmental discussions. The close connection between 'environmental knowledge' and calls for 'environmental action' makes these attempts at persuasion all the more significant.

Such a 'science-centred' approach (see Irwin, 1995) has not been restricted to government and industry but has also played an essential role within environmentalist campaigning, with pressure groups regularly claiming to provide the 'true' facts rather than the 'biased' versions of other parties. The characteristic official response to this has often been to dismiss oppositional versions of the facts as emotive and ignorant, thus setting in motion a spiralling process of claim and counterclaim. Scientific evidence has, then, been to the fore in identifying risks, measuring the extent of harm and assessing remedial actions. This has been all the more so when the scale or very existence of risks falls outside immediate human experience as, for

example, with the risks of a large-scale catastrophe at a nuclear power plant, ozone depletion as a consequence of CFCs or Creutzfeldt–Jakob Disease (CJD) through eating contaminated meat. In all these cases, science is the prime means through which we 'think the unthinkable'. For this reason, contemporary sociological accounts typically portray science as the underlying logic of modernity – even if, in the environmental context, science has often failed to deliver the kind of authoritative insight which is often claimed on its behalf.

Instead, scientific analyses have typically encountered several difficulties with regard to risk and environmental concerns, difficulties which represent areas of scientific uncertainty and ignorance but also indeterminacy. As Brian Wynne (1992) has expressed this, the concept of 'uncertainty' implies that further research will clarify the risk or threat to the environment. 'Indeterminacy' suggests a much more profound lack of certainty over theoretical and mechanistic interpretation.

As one striking example of these issues concerning scientific knowledge, we can take the debate in Britain and elsewhere over 'mad cow disease' (bovine spongiform encephalopathy – BSE) which has run from the latter part of the 1980s (the first case of BSE was reported in Britain in 1985) until the time of writing – and shows no signs of abating in the medium term. Rather than review this controversy in detail, we simply pick out some of its key features with regard to scientific knowledge. First of all, and to the annoyance of certain British government ministers but also sections of the mass media, there has been no scientific consensus over this issue so that fresh evaluations of risk have constantly appeared. Each new twist in the BSE story has reinforced the point that science struggles to offer a definitive account in situations of such scientific and social complexity. At the same time, each fresh 'revelation' has been seized upon by the press and government bodies as support for their own assessments of the level of risk. Thus science has in no sense stood apart from social conflict but – to the discomfort of some scientists – has played a crucial role in providing support for contradictory social and political stances.

Linked to this, scientific discussion over BSE has suggested fundamental indeterminacies concerning the mechanism of causation and transmission, so that basic theoretical questions (can the agent be passed through milk? how easily can it cross species barriers?) are open to question. Instead, there has been substantial disagreement over the origins of BSE, its scale, its risk to humans and its eradication. In such a situation, the call for 'further research' may appear uncontentious. However, such research will not necessarily resolve fundamental and theoretical indeterminacies, and the call can often serve as an argument for delay and hence what will be seen as procrastination. Once again, scientific arguments are inevitably loaded in social terms, and these social pressures in turn heighten the sense of uncertainty. After all, why would such an otherwise arcane issue have come to scientific attention if it were not for public pressures?

Thirdly, a critical public audience for all risk assessments has been in evidence; neither scientific statements nor those from government have automatically earned respect. Instead, a cautious and sceptical public has evaluated all new forms of evidence, so that, for example, beef sales declined from the late 1980s despite government and beef industry reassurance that the risk of CJD was minimal. Certainly, in public discussion there has been much criticism of government departments – including scientific spokespeople – for representing industrial rather than public 'interests'.

Fourthly, and in contradiction to conventional stereotypes of science as open-ended and open-minded, this case has been characterized by a very tight relationship between scientific

assessment and policy response such that it has often been difficult to separate the two. In one illustration of this, the Ministry of Agriculture, Fisheries and Food (MAFF) firmly denied in August 1996 that it had conducted research into the possibility that BSE might be transmitted through milk.[2] In scientific terms, such a denial might appear peculiar; surely it would be reasonable to test this mechanism if only to suggest (but not prove) a negative? In political terms, however, the sponsorship of such research might be seen to imply the plausibility of this mechanism, thus extending concern beyond its general focus on brains, spinal cord and BSE-infected foodstuffs.

This interconnection of scientific and political concerns has also meant that certain scientists have been publicly censured for their irresponsibility in making statements. Thus Professor Richard Lacey came under much official criticism for expressing his fear that a 'whole generation would be lost' through BSE. Of course, such criticism came not just from official sources: a cattle-farming neighbour attempted to restrict Lacey's public pronouncements one winter by dumping a 20 foot 'snowblock' at the end of his drive (fortunately for the scientist, he had an alternative exit).[3]

Finally, the BSE debate suggests the impossibility of separating 'technical' issues from wider concerns, whether these be *moral* (are the conditions of factory farming acceptable to society?), *economic* (what will different attempts at BSE eradication cost; what will be the cost of not acting?), *political* (the BSE issue has placed certain ministers in an uncomfortable position and heightened tensions within Europe) or *social* (do government departments and advisers command widespread public trust?).

Building upon this brief overview, a number of wider sociological observations concerning 'science as environmental knowledge' become relevant. Despite the claim that science is the best arbiter in such cases of risk and uncertainty, it has not actually been the case that scientific evidence could resolve the difficulties. In particular, it has been clear that the 'social', 'technical', and 'natural' dimensions have been inseparable from one another.

THE SOCIAL, THE NATURAL AND THE SCIENTIFIC: HOW TO CATEGORIZE A COW?

The BSE debate suggests that 'environmental knowledge' unavoidably draws upon all three of these elements. While science may claim to 'stand in for' nature (Yearley, 1996b: 172–90) or have this claimed on its behalf, this stance as 'Nature's advocate' generally implies that the 'social' and the 'natural' can be kept at a distance from one another. Instead, we have seen a complex relationship at work between social, technical and natural factors.

A number of particular points reinforce this argument. Apparently 'factual' assessments of risk rest in this case on 'social' assumptions about, for example, the conditions of animal husbandry and, in particular, about whether farming and abattoir precautions will actually be put into practice – or, indeed, are even achievable on a regular basis (for example, separating possibly infected parts of a cow at speed and in industrial conditions). The everyday world seems not to be identical to the 'closed' system of the laboratory, where such matters can be carefully controlled. (For a discussion of this 'naive sociology', see Wynne, 1989: 33–45.)

Of course, and as Bauman (1993: 203) has noted, the embeddedness of social assumptions within technical analyses introduces possibilities of manipulation, or at least the suspicion

of such (especially when the relevant Ministry is responsible both for the promotion and for the control of the industry in question). Regardless of this, the unavoidable social assumptions at the core of 'technical' analyses suggest the impossibility of achieving 'objectivity' in such an area of human activity.

In this, the BSE debate seems characteristic of other risk and environmental issues where the 'human' element is being modelled by 'scientific' analysis – whether future patterns of energy consumption, population increase or pollution levels in developing countries. The point is not that such 'social modelling' should be avoided (it would appear to be essential in this context) but rather that it should be clearly acknowledged so that the overlapping relationship between the social, scientific and natural can be explored as one constituent of environmental knowledge. One consequence of the current situation where social assumptions are incorporated but played down may be a public critical of the statements of science (as was apparent with regard to BSE). Certainly, other sociological studies have suggested that public groups can be very sensitive to the perceived 'interests' and 'social perspectives' operating within technical risk assessments (see Irwin, 1995).

Equally, and at a related level, the social conditions of the debate have partly structured its technical conduct so that certain lines of hypothesis (such as transmission through milk) have been ruled out of discussion and areas of uncertainty have either been emphasized or played down. Once again, the suggestion that the 'scientific debate' can be conducted apart from the 'public debate' would seem to be mistaken. At the same time, we cannot ignore the rhetorical role played by appeals to 'scientific rationality', often accompanied by accusations of 'irrationality' and 'hysteria' aimed at those who disagree with a particular stance on the issue. Scientific arguments accordingly appear as a means through which particular perspectives are defended rather than serving to resolve issues in an 'objective' manner.

Drawing upon studies in the sociology of scientific knowledge,[4] the argument here is not that certain 'social' issues have 'contaminated' a technical debate. Rather, the claim is that scientific knowledge in a case like this must function within a loaded social context which will have profound repercussions for the development of knowledge itself, no matter how much scientific and other institutions may claim science to be distanced from such factors. Issues of risk and the environment unavoidably engage with the conventionally separate realms of the 'social' and the 'scientific', despite attempts to keep them apart. Of course, this also suggests that the careful analysis of scientific argumentation should form an essential part of environmental sociology – and, indeed, that environmental sociology is central to current discussions of the sociology of knowledge and matters of scientific epistemology.

This discussion of the 'social and the scientific' has major implications for the parallel consideration of the 'social and the natural', especially since science claims to 'speak for' the natural. Risk here incorporates both social and natural elements. On the one hand, the disease in question seems like a 'natural' entity – an external threat to society. However, the conditions within which it has been identified, transmitted and assumed significance are unavoidably 'social' in character. Factory farming, mass production and capital-intensive agriculture all play a major part in the BSE story and form the context within which the risk issue has been constructed. Equally, questions of food safety represent part of a wider debate about governmental credibility – and even the status of the UK within the European Union. As has been quite clear in the persistent British press coverage on this issue, the social, political and economic underpinnings are immense.

Whatever 'natural' status is accorded the BSE agent seems to be overwhelmed by the social and economic context within which it has been scientifically identified and assumed international prominence. BSE then appears as a 'hybrid' of social, natural and technical factors rather than a series of discrete and separable elements (Latour, 1993). At this point, the categorization into 'natural' as opposed to 'social' becomes essentially a social and institutional construction. Moreover, and very importantly for the conduct of the debate, the boundary between 'social' and 'natural' is not only blurred but also shifting, so that the attempt to delineate BSE as either becomes a socially significant activity. At times, for example, British government ministers have been robust in arguing that this is a scientific issue which should be kept apart from politics. At others, it has been presented as a political challenge by Britain's European partners to national sovereignty. Either way, the labelling as either 'social' or 'natural' has been part of a political and rhetorical strategy aimed at legitimizing government decision making under immense pressure.

The relationship between the social and the natural can be considered even further: for example, by inquiring as to whether the cows at the centre of the debate are themselves natural or social products. Such a distinction seems meaningless, given methods of cattle breeding, feeding and housing which suggest an intimate and historically evolving relationship between both elements.[5] Once looked at in this way, it becomes difficult to identify the 'natural' apart from the 'social', or indeed the 'scientific', given the sophistication of modern farming techniques. Of course, this also means that so-called 'natural' farming methods must also be open to question (since they assume a disentangling of elements which we have portrayed as irrevocably entangled).

It would appear, therefore, that science is struggling to achieve social consensus at one level precisely because it cannot demarcate an area of the 'natural' apart from the 'social' in a case of such complexity (or 'hybridity') and public concern. More widely, we see the interaction of social, technical and natural elements and particularly the varying emphasis given to each within public debate. In such a situation, it seems difficult to disagree with Beck concerning the current collapse of the society/nature distinction. However, this 'collapse' may also be misleading since it does not preclude a range of contemporary social and rhetorical arguments concerning the shifting boundary between these elements, as the case of BSE strongly suggests.

DISCUSSION AND CONCLUSIONS

Analysis so far has generated a series of issues which deserve further consideration. Amongst these must be the 'generalizability' of the BSE case to other discussions about risk and the environment. At various points above, such a wider applicability has been claimed; likely parallels would include a range of pollution issues where socially shifting relations between the natural, social and scientific can also be identified. If nothing else, discussion here should have highlighted the socially constructed character of terms such as 'natural' or 'scientific' within environmental controversies. However, the central theme of this chapter has been 'environmental knowledge', to which we now return for the focus of the section. What conclusions can be drawn from the discussion here concerning the identification and prioritization of environmental problems?

One clear theme concerns the contested and divided character of environmental knowledge. While this absence of robust and authoritative knowledge is often represented as a temporary condition (to be cured by further research) – or as something to be deplored (since it implies the clouding of some objective truth) – the discussion suggests that it may be a consequence of the overlapping boundaries presented above. For this reason, controversies such as BSE seem inevitably to involve environmental knowledge*s* and their interaction within often heated social contexts.

In contradiction to the conventional policy paradigm whereby society responds to the 'state of nature' as defined by science (in other words, the 'naturalistic' paradigm), this chapter has suggested the centrality of social assumptions within environmental knowledge. This applies not just at the level of social response but also in terms of knowledge generation. This social dimension does not stand apart from scientific analysis but forms an essential ingredient of its construction. Furthermore, although this has not been discussed in any detail here, in a case such as BSE this dimension will be identified by public groups. Thus the 'objective' claims of key institutions can diminish rather than enhance levels of credibility, since they are likely to be read as serving an ideological function in defence of 'social interests'.

Crucially, this chapter has considered the 'socially shifting' barriers between the 'social, natural and scientific' with regard to risk and environmental threat. Alongside theorists such as Beck, it is possible to consider these as having 'collapsed' into one another. However, having adopted this 'non-essentialist' approach, it appears more sociologically interesting and relevant to consider the practicalities of their construction and defence within environmental discussions. In other words, rather than seeking to demarcate the 'social' from the 'natural', environmental sociology might consider the various rhetorical and tactical moves through which social actors attempt to recruit such categories to their defence. Such moves play an important part within the development and expression of environmental knowledges.

Finally, it is appropriate to consider the contribution that environmental sociology can make to current discussions around sustainability. The broadly constructivist approach adopted here might appear the very opposite of a committed and environmentally engaged perspective. After all, does not the loss of a naturalistic framework throw all environmental knowledge into doubt and thereby undermine any efforts towards environmental action? The approach adopted in this chapter certainly leads to a critical perspective on environmental claims from whatever source. It also suggests the need to face up to a world of uncertainties, and thus evokes a rather postmodern intellectual perspective or, more specifically, a call for a 'modernity without illusions' (Bauman, 1993).

However, such a suggestion does not necessarily imply either despair or cynicism in the face of environmental concerns. Instead, the recognition that environmental understanding is a matter, at its very core, of social assumption and social choice opens up new possibilities for sustainability based on the movement beyond a scientistic and naturalistic agenda. Within such a movement, central questions of human and non-human values and social/natural futures must be explicitly addressed, rather than submerged within the conventional policy framework. In that sense, a critical treatment of 'environmental knowledges' of the kind presented above suggests a truly radical approach to environmental concerns which goes beyond a 'case-by-case' treatment of the issues. As part of this, the contested character of knowledge in this area indicates the need for social and institutional fora which allow a positive engagement with environmental action, including the acknowledgement of environ-

mental doubt. Important within these fora will be knowledges and understandings which emanate from outside scientific institutions, but which can contribute fresh perspectives on the 'social, natural and scientific' (for a discussion of this, see Irwin, 1995).

Therefore, rather than turning away from matters of environmental policy and action, a critical environmental sociology can suggest new forms of engagement and activity which challenge existing intellectual and epistemological assumptions, including those of the social sciences. This in turn suggests that environmental sociology represents much more than an interesting area of 'applied sociology'. Instead, the sociological analysis of environmental knowledges raises fundamental questions both for environmental policy and for the discipline itself.

NOTES

1. As Beck (1995: 50) points out, 'To the best of my knowledge, breathing is yet to be discovered as a social activity by sociologists and social theory.' With certain obvious exceptions, such as mechanically assisted breathing during medical and surgical care, the challenge to sociologists remains unmet.
2. *The Independent*, 5 August 1996: 2.
3. *Independent on Sunday*, 11 August 1996: 19.
4. For a broad introduction to this literature, see Jasanoff *et al.* (1995), Mulkay (1991) and Woolgar (1988).
5. According to my usual source on these matters, the 'domestication of cattle began in India and the Middle East between 6000 and 4000 BC. ... There were no domestic cattle either in the Americas or in Australia until European settlers introduced them' (Collins Gem – Farm Animals, Glasgow: HarperCollins, 1983, p. 10). A closer relationship between the 'social' and the 'natural' world would be hard to find.

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16. Science and the environment

Steven Yearley

INTRODUCTION: 'PROSECUTION' AND 'DEFENCE' PRESENTATIONS OF THE RELATIONSHIP

The important yet complex relationship between scientific understanding and approaches to the environment is widely discussed. At first sight, it appears tempting to try to resolve the issue philosophically by establishing in a general way whether science benefits the environment or whether it is injurious to it. And there is some value in surveying the pro and contra views precisely because they sketch the series of levels at which the argument can be made. However, the attempt to resolve the argument in this way runs into difficulties because there seems to be more than ample evidence for each viewpoint.

Those, for example, who see science as fundamentally deleterious to the environmental cause often point first to the epistemological presuppositions of science. Science proceeds by establishing a distance between the scientific observer and the natural world. We are the subjects and the natural world the object; hence science reifies the distinction between the world and us and produces a certain form of alienation. Moreover, science has tended to proceed by conceptually dividing up the natural world, by working to understand the behaviour of the whole from the behaviours of the parts. Accordingly, it is possible to argue that the scientific world view separates mankind from nature and breaks up the organic unity of the natural world. Furthermore, some key scientific beliefs, most conspicuously Darwinian ideas about the centrality of competition and selection, appear to underwrite an antagonistic interpretation of natural relations (Wynne-Edwards, 1991).

These lofty and near-metaphysical points are compounded by more practical considerations. For one thing, science and technology are not just abstract systems of knowing but are also practical projects. Accordingly, the justification for doing scientific investigation, and certainly the justification for public funding for it, have more and more to do with practical economic and associated benefits (Margulis, 1995: 34). It is thus possible to argue that the social contract which underlies the bulk of current scientific funding is concerned with exploiting the natural world and not with understanding it for its own sake, let alone benefiting it. Moreover, certain practices central to the conduct of scientific and technological research appear antithetical to the well-being of the natural world. For example, animal experimentation, the deliberate release of pollutants, various nuclear tests and the experimental release of genetically modified organisms can all be invoked as the kind of activity which scientists have engaged in or promoted, and which have come to injure the natural world in various ways (see Yearley, 1995a).

Finally for the prosecution, one can point to those many occasions on which the lack of scientific evidence has been used to legitimate the continuation of polluting activities (Yearley,

1995a). Though this 'logic' has appeared on a large number of occasions, its current usage is most associated with debates over climate change. It was often argued by policy makers that governments would act on greenhouse gas emission reductions just as soon as the relationship between CO_2 emissions and climate change was proved. But the science is so complex, the models so subject to uncertainty and the wait for observational confirmation so prolonged that the need for 'hard scientific' evidence is commonly invoked by those eager to slow environmental reform. An exactly analogous point can be made about the UK experience of BSE, or mad cow disease. The authorities continued with only mild regulatory measures, carried on allowing the suspect rations to be fed to other species, and culled very few beasts because there was no scientific proof that these things would be harmful. Strict regulatory actions were promised as soon as firm scientific evidence became available. Strongly associated with this point is the realization that scientific and technological activity has actually produced, and failed (at least initially) to appreciate the effects of, environmentally harmful substances. This applies most notably to ozone-depleting propellants, solvents and additives and to the pesticides which so widely contaminated food chains in the 1960s, though it is also dramatically reflected in the release of plutonium and other radioactive materials from nuclear reactors and weapons programmes.

Compelling though this case may seem, the defence arguments are every bit as numerous. For example, in the case of the clear majority of environmental hazards, science can claim to offer the best available knowledge of the details of the problem and, in a good few instances, to provide the evidence that environmental problems are occurring at all (Yearley, 1992b). The clearest example here concerns ozone depletion where, because of its remoteness, people cannot see or experience the ozone layer except with the aid of scientific equipment. But the same can be said of climate change and sea-level rise: without continuing series of sea-level measurements spread over wide geographical distances, it is hard to work out whether the overall sea level is tending to rise; without a network of temperature-measuring stations, it is difficult to discern systematic changes in climate. And such scientific information is not needed only to see whether or not problems exist but also to identify and respond appropriately to the needs of the natural world. To protect fish or butterflies, for example, one needs to know what environments their young require and what foodstuffs they depend on (Yearley, 1996b). Often it is zoologists and botanists who are best placed to know these things.

Scientists, it is additionally argued, are commonly needed to take a rational view of environmental problems. Citizens' groups may well respond to a local environmental issue, but it is unclear that they will devote the most energy to the most ecologically important issue. Scientific understanding is needed to say which problems are of the greatest significance. But the role of science can be defended, not only in terms of scientists' dispassionate rationality, but also in terms of their emotional commitment. A recent press story about the lone scientist who has committed himself to the study and conservation of the freshwater dolphins of the Amazon allowed the scientist to make this point explicitly. His familiarity with and profound knowledge of these aquatic mammals has led him to develop a love for them; so much so that he claims that he cannot understand how scientists would not fight for the protection of the species they know best. And this point can be generalized: not only do scientists have a special reason for caring about 'their' bit of the natural world, but they have historically been central to the development of conservation and environmental protection efforts. For example, natural

historians in Britain were responsible for the establishment of the Society for the Promotion of Nature Reserves (which went on to become the Royal Society for Nature Conservation, latterly the Wildlife Trusts) and for pioneering nature conservation efforts in the USA and much of continental Europe (Yearley, 1992a).

Furthermore, it is argued that science can be reformed, or indeed may even be reforming itself, in such a way as to eliminate several of the supposed negative intellectual characteristics. For example, it is suggested that the subject–object relationship with nature – and the associated attitude of instrumental exploitativeness – is out of date, undermined not by environmental philosophers but by developments within science. Evidence can be adduced both from particle physics, where affirmation can be found for the inevitable interrelationship between observer and observed, and from ecology and elsewhere, where chaos theory undermines the notion of instrumental control. Furthermore, ideas developing within science, notably the Gaia hypothesis (concerning biological 'cooperation' in managing the planetary ecosystem), and more concrete proposals about the importance of symbiotic relationships in the evolution of life and in the shaping of natural environments, appear to underwrite the kind of changed emphasis which environmentalists would approve. Finally, the question of the burden of proof can be addressed through the so-called 'precautionary principle', namely the idea that action should be taken in relation to likely harms even before definitive evidence of harm has been produced. In other words, the burden of proof shifts from the environmentalist, aiming to protect the natural world, to the polluter who has to demonstrate the harmlessness of the activity.

The rest of this chapter, rather than try to pass judgement on science, will take a more informative route, looking at the way these arguments have been used and studying how they have played out in a variety of contexts. Accordingly, we will analyse them in three contexts: with respect to national environmental policy bodies, in relation to environmental NGOs and in connection with 'global' environmental problems. This approach has the additional benefit of taking in contrasting national case instances, with the focus of the first on the USA and the second on the UK.

SCIENCE AND REGULATION

One area where scientific expertise has figured largely in environmental management is in relation to regulation. As various comparative studies have demonstrated, regulatory standards and procedures differ greatly from country to country. In terms of an understanding of the role of science in regulation and some of the pitfalls which await it, the US experience is uniquely informative.

In the USA, not only were regulatory bodies such as the Environmental Protection Agency (EPA) established relatively early (at the start of the 1970s), but they took steps which were seen as radical at the time, including pressing for the adoption of scrubbers in coal-fired power station chimneys and for the fitting of catalytic converters to cars. Extensive proposed reforms stimulated rearguard action on the part of industry, which argued that suspect claims about environmental damage were being allowed to justify the introduction of commercially damaging regulation. This theme won political support at the highest levels during the Republican administrations of presidents Reagan and Bush in the 1980s and again with the Republican Congressional majority in the early 1990s.

Apart from political manoeuvring, both industry and environmental groups pursued their regulatory interests through the courts, marshalling counterexpertise to combat the judgements and technical assessments adopted by the EPA and other bodies. The availability of citizen suits and other judicial remedies meant that pressure groups in particular found themselves in a very different context from that prevailing in Europe. The obvious role for them to adopt was as a prod to the EPA, and sometimes as an explicit counterweight to industry interests.

Given the resources which industry could devote to challenging environmental regulations and the high stakes involved in these confrontations – for example, a ruling that formaldehyde is carcinogenic to humans would have affected a billion dollar industry in the early 1980s (Jasanoff, 1990: 195) – it is no surprise that disputes over scientific evidence were fought tenaciously and with great inventiveness. Since the competing sides could find either plausible enough experts to support any position or, at worst, authorities to throw doubt on their opponents' views, these trials demonstrated that scientific standards of proof do not in practice enjoy the authority which we might expect of them in principle. Since these challenges were channelled through the courts, technical disputes over health, safety and environmental hazards were all opened to judicial – and hence public – scrutiny.

These challenges to the expert views of the EPA and associated agencies were fascinating not just for their impact on the development of environmental politics, but for what they revealed about the strengths and weaknesses of scientific reasoning. Sociological and philosophical analysts of science have, for the last 15 or more years, been analysing scientific controversies to understand how accepted scientific beliefs come to face opposition, deconstruction and overthrow. Exactly analogous processes were revealed by these legal challenges. New proposed tests for toxicity faced deconstructive challenges, as with innovative experimental tests for any physical phenomenon (Collins, 1985: 2). The very same difficulty is faced by agencies attempting, for example, to carry out toxicity assessments; this is because, until some test has won acceptance, there is no separate touchstone of credibility. This problem is bad enough in 'pure' science, where the reasons for distrusting others' results are disciplinary or occasionally personal. The disagreement may turn into an acrimonious controversy but the scientific world can wait for the answer as the persuasive resources of the competing sides are marshalled and developed. In disputes over environmental safety, there is typically considerable urgency about resolving the issue; at the same time huge commercial and political motivations may also be involved, creating further incentives for discrediting the opposing side's claims to scientific knowledge.

When agencies, faced with repeated and protracted legal opposition, ran into serious problems with their public credibility it was common for a review to be instituted, the typical conclusion of which was that the agency was conflating issues of science and policy. The approved remedy was to take various administrative steps to segregate these activities. The EPA's own Science Advisory Board (put on a statutory footing in 1978 – Jasanoff, 1990: 84) became a key element in meeting these demands for segregation. However, as Jasanoff has convincingly argued, such segregation cannot be achieved because there is no 'true' boundary to be found. For example, evidence that substances are risky to humans comes – in large part at least – from animal toxicity studies. For each substance and each combination of substances, it is just possible that some aspect of rats' biology (their nasal tissues, their kidneys or whatever else it might be) differs from that of humans. Treating animals as models for the human impact of potential toxic substances is thus a practice based on a

reasonable precedent, but it cannot be relied on for any particular case. Where it works in their favour, industries are inclined to accept the validity of the test. When it does not they are inclined to query it. The validity of using data about toxicity or carcinogenicity in rats as compelling evidence in relation to humans is thus both a matter of policy and of methodology. The conundrum of how to separate (compelling) scientific arguments from (vulnerable) policy ones cannot be resolved simply by people trying to be 'more scientific'.

There are of course some peculiar features to the scientific issues which the EPA and other environmental agencies often have to determine. They deal with quantities which are hard to measure, physical phenomena which are highly interactive and diseases which occur over the course of a lifetime and for which there may be many plausible causes. The science involved in such determinations lends itself to controversy (see Collingridge and Reeve, 1986). But the point revealed in a series of legal challenges is the disputability of scientific knowledge per se, not the special disputability of the science of cancer or of pesticide toxicity.

It is only in regulatory systems which are characterized by secrecy and confidentiality that the appearance of scientific authority's impregnability is maintained. In her exhaustive studies of such conflicts in the USA, Jasanoff reveals that benign decision making often takes place when institutional arrangements offer a temporary respite from the endless, adversarial legal review. The European experience, of course, is that official agencies often are not trusted and many environmental groups hold up US standards of freedom of information as a model. Overall, therefore, the paradoxical result is that, in the one area where scientific expertise has been most often used for environmental policy purposes, neither secrecy nor competitive openness have proved to be suitable climates for science advising.

SCIENCE AND GREEN CAMPAIGN GROUPS

For its twenty-first 'birthday' in 1992, Friends of the Earth (England, Wales and Northern Ireland) published a celebratory booklet. With a large supporter base, regular coverage in influential media, strong campaign teams and widespread recognition of its name, the organization had a lot to celebrate. Yet the item chosen to begin this celebratory publication, immediately after the contents page, was a quotation from a leading environmental journalist praising the group as a 'reliable and indispensable source of information'; this was followed by a comment from the head of Her Majesty's Inspectorate of Pollution praising the quality of its 'technical dialogue' (1992: 2). Of all the items which could have been chosen to feature on the second page, this selection was surprising and telling.

What it told was of a long move from stunts and publicity seeking to a more sober style of campaigning. In the quarter-century since they were set up in Britain, groups such as Greenpeace and Friends of the Earth have moved towards an embracing of science and 'technical dialogue'. The adoption of science has allowed them to become more effective 'insider' pressure groups and has won them respect, widespread coverage for their stories and some notable improvement in their policy prescriptions. At the same time, it has consequences for the way the organizations are run and, as discussed in the next section, for the way they approach international campaigning. Of late, such groups have sometimes been accused by community-based activists and by journalists of becoming bureaucratic and inflexible (see Allen, 1992: 220–23). By contrast, their accommodation to scientific expertise is in large part responsible for their changed 'body language'.

Science has been a key element in the UK environmental movement all along. The leading nature conservation organizations in Britain have a long history of granting science a central place in their activities. As mentioned earlier, the forerunner of the Wildlife Trusts, the Society for the Promotion of Nature Reserves, actually argued for the conservation of nature primarily because it permitted the pursuit of biological research. This emphasis is reflected in the most common current designation for protected habitats, Sites of Special *Scientific* Interest. The key development has been that, in the last 20 years, the younger environmental groups have tended to converge with such conservation organizations by building their own scientific staffs. Greenpeace now happily boasts of its own laboratory facilities and more care is taken to get reports and publications reviewed by 'peers', technically proficient personnel outside the organization. In fact, this convergence has been two-way, with the more traditional groups, too, recognizing the need for political pressure and sometimes recruiting staff from the more radical groups to run their campaigns.

This move towards a scientific profile in pressure groups has had several practical implications for their work in the UK. First off, there are difficult choices – similar to those faced by any research-intensive business – about exactly how much to spend on science as opposed to other demands. For the Royal Society for the Protection of Birds (RSPB) this may boil down to a trade-off between new reserves and research; for Greenpeace it may be boats versus labs. Such groups cannot count on the research output of universities and similar public institutions to be in the right form for direct use in their campaigning work; indeed, such research may be growing less directly useful now that such public bodies are subject to the logic of 'performance indicators' (see Yearley, 1996b).

A second and more significant implication is that groups which are wary of their hard-won reputation will not happily make pronouncements on technical matters about which they are in doubt. The uproar which surrounded Greenpeace's acknowledgement of its technical error in estimating the amount of oil left in the Brent Spar North Sea oil platform in 1995 showed how controversial this could be and how quick the organization's opponents would be to draw damaging conclusions. The understandable desire to safeguard one's reputation will tend to make the organization more cautious and hence conservative.

A further implication relates to the potential for accountability and democratic control over these environmental organizations. Though the UK Green Party is famously democratic and is often satirized for being so insistently anti-hierarchical that it cannot make decisions, environmental organizations are very far from being direct democracies. Whether they are legally 'charities' or not, these bodies have boards and chief executives which direct them. Even Friends of the Earth, which has one of the most democratic structures – with largely autonomous local groups and a complex constitution ensuring that member representatives have ultimate control over the company – would not be depicted as a democratic organization. Members advise but cannot direct its board. Such distance between the professional personnel and the membership can easily give rise to complaints about ruling oligarchies. The growth of scientific expertise at the centre compounds this difficulty since staff members will not begin a campaign based on members' interests without being specifically prepared themselves. The need for technical correctness can result in an apparent lack of spontaneity and responsiveness.

The adoption of science still leaves problems when campaigners face scientific controversies or technical uncertainty. Campaigners have generally been happy to dismiss the claims of official scientists about the safety of nuclear power by pointing to the lack of certainty

and the likely presence of vested interests. Yet, in the case of global warming, they essentially fall back on claims about majority scientific opinion and have to dismiss allegations about scientists' vested interests in having politicians take climate change seriously. Disputed science offers only potentially treacherous support for environmental groups.

Lastly, although central to the green movement, science is insufficient to meet all its cognitive demands. The thinning of the ozone layer may lead observers to suppose that scientific enquiry will help both to identify the problem and to supply technical options for overcoming it. Science seems to be all that is needed. But as Wenzel (1991: 46–8) suggests in his study of the controversy over seal hunting in North America, environmentalists often have to supplement their scientific arguments with appeals to other grounds for environmental protection. In this case, green groups initially invoked scientific arguments to show that the taking of seal skins had a detrimental effect on populations, but when later research indicated that culling, at a certain level, presented no threat to populations at all, the argument was rejected and new grounds had to be found.

Scientific reasoning may seem to provide an apparently incontestable basis for handling morally complex arguments. In the case of hunting, it is hard to draw agreed *moral* distinctions between unacceptable and acceptable forms of killing. By contrast, an argument that hunting is driving a species to extinction seems irrefutable. But such scientific arguments are actually insufficient to support all aspects of the greens' case. Scientific expertise cannot tell us whether whale hunting is legitimate or whether elephant herds should be managed for ivory production. Thus, in any contested arena, scientific claims are likely to lose their credibility, not only because of the contingent character of scientific knowledge, but also because environmental controversies have moral and political components which cannot be resolved by scientific inquiry.

SCIENCE AS EXPERT GLOBAL KNOWLEDGE

An emerging area of importance for the connection between scientific knowledge and the environment is that of the global. Claims about the global nature of the world's environmental problems have been made since at least the 1960s, with the work of the Club of Rome. But, particularly since the Brundtland report (World Commission on Environment and Development, 1987) and the ensuing 'Earth Summit', it has become a commonplace that environmental problems are global, and that solutions have to be directed at the global level. In part this is because certain environmental problems are perceived to be inherently global: climate change is the clearest example here. But it is also because other problems emerge from the globalization of trade and commerce. Responses to the problems of trade in toxic materials or in tropical timbers require internationally coordinated action, not necessarily because the hazard is itself global but because the mechanisms producing it are (Yearley, 1995b; see also Robertson, 1990).

Science has become important to this emerging discourse of the global because the universalistic character of scientific assertions seems to assure them of a global validity. Science has become the accepted currency for describing global issues (see Yearley, 1996a). To take an example, taxonomic principles are taken as globally valid. Acknowledging that there may be disputed cases, it is possible for trained scientists to go anywhere in the world and count species diversity. This universality has several important implications. First, it

appears to mean that one person's views can easily stand for all. Formal issues of representativeness can be set aside because science speaks truly. Any competent scientist, of whatever cultural or national background, would make the same judgement; hence it becomes a transcendent language. Second, despite this in-principle universality, the access to scientific knowledge making about the global may be conspicuously skewed. Global circulation models (central to climate prediction), for example, can only be run on a handful of computers worldwide (Wynne, 1996: 366–78). Third, scientists have led the identification of certain things as problems at all. For example, the very notion of biodiversity as a single measure of nature conservation is a product of scientific discourse and something promoted by scientists (Yearley, 1996a; Hannigan, 1995; Mazur and Lee, 1993). This is not to question the reasonableness or validity of such concepts, but to point out that people representing one culture (albeit an intendedly universalistic one) are claiming to speak for all.

A recent topical example can be used to indicate the significance of this apparently rather arcane point that, without any apparent need to consult anyone else, taken for granted assumptions may enter the scientific modelling process. One of the most celebrated examples of this stems from the case of greenhouse gas emission figures produced by the World Resources Institute (WRI), a USA-based foundation. The WRI had established a strong lobbying position on climate change early on, and had pressed for governments to agree emissions-reduction targets. The next job was to try to assign responsibility for greenhouse gas emissions so that the appropriate countries could be made the focus of attention. The WRI proceeded by trying to collate figures for different countries' emissions and thus to identify the largest offenders. There was considerable difficulty in actually obtaining these figures and in converting the various types of greenhouse gases into a standard form; great efforts were made to achieve this. However, when the work was published, identifying Brazil and India among the world's worst polluting nations, a large international controversy ensued, provoked initially by two Indian researchers (Agarwal and Narain, 1991). Their argument was not so much that the WRI had made mistakes in its figures (though there was an element of that) but that the whole methodology was based on faulty presuppositions. For example, a key element in the calculations turned on the finding that some of the additional CO_2 and methane, rather than persisting in the atmosphere, is reabsorbed into 'sinks'; it is washed out by rainwater or taken up by plant life. The WRI methodology had taken this factor into account by allocating the sinks in proportion to emissions. In other words, if 56 per cent of emitted CO_2 were reabsorbed, then everyone's emissions were reduced to 44 per cent of their actual output, since at the end of the year, for every 100 tonnes of CO_2 emitted, only 44 would remain in the atmosphere.

The Indian researchers contested this move on the grounds that this allocation was unjust. Many Indian and Chinese people produced very few emissions. Indeed, if the whole world emitted CO_2 only at their average rate, all the emissions would be reabsorbed and there would be no net greenhouse-warming effect. In practice, they asserted, the WRI methodology used the good environmental conduct of the developing world to 'subsidize' the wasteful performance of developed countries. Accordingly, the WRI's figures greatly underestimated the polluting tendencies of the developed countries and exaggerated the pollution emitted by Third World nations.

Accordingly, while the ideal of science remains a factually validated and universally applicable description of environmental problems, there remains the possibility that – in practice – politically contentious presuppositions will enter into information gathering. In

this case, unlike many others, the complaints were not about political deals once the facts were established, but about the way that politically sensitive assumptions entered into the procedures by which the 'facts' were established. Science offers a universalistic discourse for describing the natural world, and this appears to be precisely what is needed for handling environmental problems. But with scientists in the North having typically set the terms of the science, there is a danger that such 'disinterested' science will lose its credibility.

Finally in this section, it should be noted that environmental pressure groups are not free of these troubles either. The problems of handling scientific information authoritatively but without elitism become even more insistent on the global stage. In the last decade environmental groups including Friends of the Earth, the Worldwide Fund for Nature (WWF) and even the RSPB have moved towards global campaigning, in part at least because it is increasingly accepted that many of the leading environmental problems are themselves global. If the problems are global, it is both unrealistic for campaign groups to focus exclusively on measures in the UK or Europe, since there will be spillover from elsewhere, and immoral for them to concentrate only on our 'backyard' when the need for environmental reform is as great overseas as it is domestically.

At first sight, it would appear that green groups' scientific credentials would equip them to deal with global issues. However, global environmental problems, such as global warming and the associated issue of the allocation of emissions to particular countries, are typically large-scale and complex. Rival interpretations abound and it is hard for environmental groups to identify and occupy the technical 'high ground'. The technical issues are commonly so politicized that there are no interpretations which can stand above allegations of vested interest. Usually unable to conduct their own 'independent' research on the key issues, environmental organizations find themselves in a state of dependency. The problem of identifying the authoritative scientific standpoint tends to be aggravated.

Worse still, the assumption that one should seek out the universalistic, technically correct answer can lead one to overlook the moral and distributional aspects of environmental disputes and even to ignore the local legitimacy of one's actions. In the most extreme case, the willingness of WWF at the end of the 1980s to equip paramilitary game wardens in order to protect endangered species in southern and eastern Africa shows how a technical solution can be introduced without establishing its local moral acceptability (Pearce, 1991: 74–6). Even if an action is popular with supporters in the industrialized world, that does not secure its global legitimacy. A mandate in the North does not of itself warrant action in the South.

CONCLUSION

In this chapter, rather than attempt to answer the abstract question of the relationship between science and the environment, it has been revealing to study the relationship in three practical contexts: in the work of national regulatory agencies (official national science), in the campaigning activity of environmental NGOs and in the context of transnational knowledge making at the 'global' level. It turns out in each case that science is an indispensable yet far from straightforward friend of environmental reform. Environmental policy makers in the pioneering US official institutions found that science could be mobilized by their opponents for deconstructive purposes. At the same time, campaigning NGOs have had to tread a cautious and usually pragmatic line in their invocations of scientific authority.

Finally, scientific language is currently central to the discourse of 'global environmental change' and 'global environmental management'. But science is not a neutral medium for discussing global needs and global interests; indeed, scientific representations of the global can easily become tendentious. The future prospects are for continuing tension as well as interdependence between environmentalists and the institutions of science.

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17. Trust in models? The mediating and transformative role of computer models in environmental discourse

Simon Shackley

INTRODUCTION

In his book, *Science in Action*, Bruno Latour discusses a Dutch research effort to explore whether an alternatively designed dam to that in existence at Rotterdam Harbour could prevent the further intrusion of salt water into freshwater masses (Latour, 1992). Using the actual harbour for experimentation purposes was difficult because the critical variables, such as river flow and tidal change, could not readily be controlled. Nor, as an open, real-world system for which policy-relevant knowledge was sought, could it be easily analytically reduced and selected relationships and processes investigated in the laboratory. The research group overcame this problem by developing and using a physical scaled-down model of the harbour with an accurate proportionality. Relationships could then be established between the scaled-down model and the real harbour for key variables (strength of flows) by using a range of sensors in the physical model and a limited number in the harbour itself. Latour argues that this research strategy brought 'natural reality' into the laboratory, where it could be controlled and 'tamed' and its key relationships and variables could be investigated in a way not possible by using the actual harbour itself. Alternative engineering solutions and their effects could then be explored by replacing different parts of the model with new engineering options. The appropriate scales of time and space for analysis had been reshuffled to the scientists' benefit, allowing greater control and management, or what Latour terms 'action at a distance'.

We can develop Latour's narrative because the same research group has now developed a computer model which endeavours, in mathematical terms, to simulate research sites such as Rotterdam Harbour. As well as avoiding the expense and inconvenience of building an accurate physical model, the computer model can be produced, and relatively easily copied and modified, assumptions can be changed and it can be transported to other laboratories and even outside the laboratory, for example to research sponsors and users. A wider range of different engineering solutions or 'scenarios' for improving Rotterdam Harbour could then be tested with a computer model and at much lower cost than with the physical model. In addition, problems of 'scale' can in principle be more readily addressed with the computer model. All in all, compared to the physical model, the computer model appears to offer even greater control over nature and opportunities to explore and interrogate it, hence more effective 'action at a distance'. Latour terms scientific devices which permit this level of control 'centres of calculation', and it is a useful way to perceive of models more generally.

The increasing use of computer model simulations in studies of open environmental systems, especially where policy relevance is a salient issue, should come as no surprise, therefore. Indeed, in a system with many interacting variables and feedbacks, the relative significance of which cannot be assessed a priori, many of which may realistically change on the time and space scales of interest, and which are heterogeneous in the sense that they include a wide range of natural and social processes, computer or simulation modelling sometimes seems the only viable research strategy. The 'strong' claim of computer models is that they alone of current research tools are able to provide the necessary degree of holism and complexity – hence realism – to effectively simulate processes which are highly interactive, non-linear and therefore produce counterintuitive and surprising effects. However, this chapter suggests that computer models should not be seen as a straightforward, inevitable progression within science from controlled laboratory experimentation. Instead, it will be argued that, despite their widespread development and use, numerical models have still to achieve the epistemological status within research of the controlled laboratory experiment.

This is not because of some theoretical or epistemological objections to models per se (which by implication do not apply to laboratory experimentation) but is more related to sociological, institutional and political issues of *trust* in models. In short, numerical models are not yet fully trusted by many scientists and by users and funders of science as a reliable mirror of nature, *contra* the perception of the controlled laboratory experiment. 'Trustworthiness' is therefore frequently a key issue when models are being used, as witnessed by the disputes and controversies in which numerical models become embroiled (Greenberger *et al.*, 1976; Crouch, 1987; Denning, 1990; Smil 1993; Robinson, 1990, 1992; Ascher, 1989). It also accounts for 'validation' or confirmation of models in all domains being a continuing and contested issue (Morton, 1993; Oreskes *et al.*, 1994; Checkland, 1995). This is not to suggest that the experimental sciences are somehow devoid of such disputes, of course, but rather to point out that, whereas in many instances experimental evidence is accepted at some point as 'proof' of some natural phenomenon, so that 'crucial experiments' can appear to bring closure to scientific argument, this does not appear so readily to happen when models are being used. Models are not therefore seen to provide the same level of proof.

Judgements about the validity and trustworthiness of models emerge from a complex interplay of scientific, social, institutional, policy and material factors and conditions. They are not the cause of disputes about models, nor just its effect, but rather an integral part of a heterogeneous web of decisions and practices which change over time and space. There is also no direct relationship between perceived trustworthiness and policy utility, although there is some implied effect, and in later sections some of the other policy reasons for using models will be explored.

TRUST IN MODELS AND LABORATORY EXPERIMENTATION

What may account for the lack of trust invested in models compared to controlled experimentation? A possible answer arises from historical studies which have illustrated how the emergence of experimental science in the seventeenth and eighteenth centuries was intimately related to creating a context in which trust between key actors could be nurtured. In discussing the experiments of Robert Boyle, Shapin and Schaffer (1985), for example, emphasize the role of 'visual witnessing' of the experiment and of its effects by reliable,

trustworthy witnesses, in validating the knowledge claims. Others have extended the argument by suggesting that visual witnessing in public and policy contexts is the means by which scientific knowledge has come to have its special authority and status in modern societies (Ezrahi, 1990). Philosophers and sociologists of science have also pointed out how experimentation in a controlled context involves intervening in, and refashioning, nature: in a sense it entails producing artefacts from natural and human resources which are never found as such in nature (Mukerji, 1989; Hacking, 1992; Knorr-Cetina, 1995). The emphasis in such analyses on a 'physically produced' phenomenon in the laboratory setting is clear.

In modelling, however, no physical phenomena are actually being generated; rather a representation of supposedly real processes is being simulated. This makes the task of visual witnessing rather more problematic. Convincing visual representations of the model structure, interrelationships and output can of course be presented, but the 'witness' has no direct visual evidence of the way it was produced and to what extent it was predetermined by the modellers' assumptions, judgement and even values. Whereas in experimentation, the witness can observe the research process (directly, or indirectly through the literature or spoken accounts) as an interlinked chain of events which proceeds 'logically' from some natural and sociotechnical resources, and generates a physical (or biological or chemical) response which produces 'the result', there is no physical process in the case of modelling, unless one includes electronic processes. One can only see the input and output data, and perhaps the schematic framework of the model with its maplike representation of processes and variables, not any starting materials or physical manipulations.[1]

Modelling faces the additional complication that it is usually integrating knowledge from a number of disciplines and itself draws upon experimental and empirical analyses for legitimation or validation. The modeller can never fully comprehend the conditionalities and uncertainties in all those diverse bodies of knowledge, so has to treat them to some extent either as a 'black box' input to the model or over-sceptically, in a way which prevents their use (Shackley and Wynne, 1995a). Reservations accumulate on the status of the model as a sufficient and robust representation of reality, both on the part of the modeller and on that of the disciplinary scientists who contributed the component bodies of knowledge. For the above reasons, modellers themselves often express some scepticism concerning the realism of their models, at least when one listens to their internal discourse.[2] 'Of course our models are false', one hears. Or, with a more positive slant, we hear that 'they are no more than an accounting or heuristic device'. Hence a lower-level or mundane role for models emerges (compared to the strong claim that they are predictive 'truth-machines') in which they are used to collate or impose some order upon data sets and analytical concepts, or to explore a range of possible causal relationships (hence they greatly assist the research *process,* even if they are never ultimately used in a predictive way). But the weak claim for models as accounting devices also comes under critical fire from some scientists who dislike the consequent lack of theory in models and hence inattention to theoretical issues in research.[3] The heuristic role of models seems to be widely accepted by scientists, though some have questioned whether models might not actually impose constraints upon thinking and research not experienced by other methods (Lee, 1973). Others have noted that even a heuristic role implies confidence in some quantitative relationships contained within the model (Risbey *et al.*, 1996).

Those political decision makers faced with the question of whether to trust in models or not often appear to take totally opposite stances: either they trust in them 100 per cent or

they reject them out of hand. There is precious little occupancy of the middle ground where trust in such knowledge forms is subject to more conditionality and measured consideration. In addition to political cultural factors, this is perhaps the result of the aforementioned dilemma of the absence of obvious explicit or formal criteria by which to judge the trustworthiness of models, and at the same time the persuasive identity of models as the *only* sufficient tools for analysing complex, real-world systems. Models become necessary but difficult to evaluate and, as Oreskes (1996) points out, the more sophisticated, complex and 'realistic' they become, the less able are modellers to confirm that they are indeed better or more adequate.

Those politicians and decision makers who do invest trust in models are always somewhat vulnerable to the claim that they have been 'hoodwinked' by self-interested scientists; they cannot respond by pointing to a set of 'crucial experiments' which proved 'once and for all' that a particular state of affairs existed. Within science itself, use of models is seen by some as an 'easy route', which does not require the same level of rigour, or correspondence with reality, as experimentation, and which is more open to fudging, or undeclared manipulation of the model. Or it may be that scientists are perceived as turning to models when the task at hand makes experimentation difficult, as in the case of ecology where the time and space scales make much experimentation nigh impossible without investment of huge resources (Kwa, 1993b). However, in those cases models are rarely regarded by scientists as adequate tools for the task at hand: they are second-best to experimentation, chosen as a pragmatic response, but whose output is only tentative, and used to guide further research, at least until modelling becomes established as the legitimate epistemology.

TRUST: WHEN AND IF ...

The general argument above is not meant to imply that models are never trusted outside the particular modelling community, or never facilitate scientific closure, but it does suggest that we see achievement of trust in environmental models as a major accomplishment and something to be carefully understood in social and institutional as well as scientific terms. Climate models, for example, have been highly significant in establishing the issue of climate change, caused by societal emissions of greenhouse gases, on national and international policy agendas. Yet those same global climate models have been much less influential in detailed, sector-level decision making, so their key role to date has been symbolic (putting the issue on the political agenda) and heuristic and relational (improving understanding and creating an epistemic community) rather than instrumental (Shackley and Wynne, 1995b). In addition, the prominence in the scientific, public and policy debates about climate change of empirical time series data on climatic variables such as temperature, precipitation, storminess, hurricanes, sea ice and glacial extent, and so on is still very noticeable. Single data sets which appear to challenge the models have been given much credence in the popular scientific press and media, despite their many shortcomings, such as only covering limited areas of the globe, and limited time periods, as if they could simply empirically falsify the models (Shackley and Wynne, 1996). Politically motivated scientific sceptics of climate change have made a special point of emphasizing how the empirical record of the last 100 years differs, in their opinion, from key aspects of the simulation of climate models and have pushed the viewpoint that this raises major doubts about the validity of such models (Emsley,

1996). This critique has been more influential in more adversarial political cultures such as the USA, where knowledge for policy is more typically deconstructed in public debate, than in Europe. Greenberger *et al.* (1976) note how models are frequently called upon in such adversial cultures to bring closure to political debates, but are typically unable to do so because they accentuate differences and encourage pluralism in knowledge provision, or 'when most in demand, models are least likely to be accepted or believed'.

A more striking case where models have had an instrumental effect on policy is provided by the RAINS model used to simulate the dispersion and effects of sulphur emissions in Europe. Hordijk (1995) describes how RAINS was directly used to agree upon and set national emission reduction targets under the Convention on Long-range Transboundary Air Pollution. The success of the model in this respect was, that author considers, a consequence of: its role in facilitating a dialogue between scientists and policy makers, its development at the International Institute for Applied Systems Analysis (IIASA), with its reputation as an East–West broker, and the availability of RAINS on a personal computer (PC), which allowed negotiators to use the model themselves. Especially significant, from the perspective of visual witnessing, was a workshop held at IIASA in 1991 which Hordijk describes in the following terms: 'At this workshop all delegates were invited to participate and learn how the models were operated and which scenarios could be run. The interaction between modelers and negotiators turned out to be very fruitful, not only leading to a better understanding of the models, but also producing insight into the models' limitations' (ibid.: 256).

These factors by themselves do not adequately account for the success of RAINS and especially for particular ways of framing the issue (such as an influential graphical representation of the relationship between emission reductions, economic costs and ecosystem effects) being accepted. That we cannot explain the uptake of the RAINS model solely by its objective representation of nature and the economy is witnessed by the influence upon the model's output of the chosen method of aggregation. This has not been dictated by any natural or social reality, but is a somewhat arbitrary choice of the modeller and has been shown to have rather a large effect upon the output of RAINS in certain countries, such as Spain (Castells and Funtowicz, forthcoming). In this case, the authors suggest that the RAINS model is more suited to the situation of northern European countries, reflecting its origin in research institutes there. The authors also question whether model output has been quite so directly related to policy decisions as Hordijk suggests, pointing out the different combination of scientific, economic, policy and political considerations in the agreed-upon emission reductions for many European countries.[4]

A further area where model output appears to have been directly used is the case of fisheries management, where models were used to establish the size of allowable catches. The Beverton–Holt model which was widely used to establish changes in stock size based on age profiles contained several assumptions which now appear to be incorrect and which had a major effect upon the model output and prescriptions (MacKenzie, 1995). Unfortunately, overconfidence in the model appears to have been a major contributing factor to the disappearance of cod from the Canadian Grand Banks.[5]

The role of models in the debate over the depletion of ozone in the upper atmosphere as a result of anthropogenic emissions of chlorofluorocarbons (CFCs) illustrates the difficulty of teasing out the role of models in policy debate, which is more typical than in the above two cases. The atmospheric chemistry models developed in the late 1970s and early 1980s by US and European scientists were generally trusted in the policy debate during that period

(Litfin, 1994). Modellers did not accept observational evidence which diverged from them, even following Farman et al.'s discovery of the 'ozone hole' in Antarctica in 1985 (Zehr 1994). It was this confidence which had much to do with scientists from the US National Aeronautics and Space Administration (NASA) dumping apparently 'anomalous' satellite data which, on later reanalysis, confirmed Farman's instrumental readings. Advisory scientists in the air pollution division of the UK's Department of the Environment (UKDoE) continued to side with the modellers, despite the growing retraction of trust in atmospheric models, until the more definitive experimental evidence of the role of chlorine in 1987 appears to have sealed the fate of that generation of atmospheric chemistry models. The model-derived projections of the depletion of ozone given different emission scenarios (termed ozone depletion potentials) were replaced as the dominant science for policy tool by the alternative indicator of chlorine-loading potentials, which did not rely on complex models.

However, it seems that the international negotiations on limiting emissions of CFCs were hindered by the ambiguous status of the models, especially given that some national negotiators continued to exploit the discrepancy between different model results to delay action. The modellers had also worked through the 1980s on including the missing, highly non-linear heterogeneous chemistry in their models. Once again, a workshop between policy makers and the key modelling groups was an influential occasion at which the epistemological status and consistency of the new improved models was established (Litfin, 1994). The workshop, held at Wurzburg, Germany, in 1987, was organized by the head of the United Nations Environment Programme (Mustafa Tolba) and brought together the major models. It had been specified that an identical set of inputs should be used in running the models, and the outputs were shown to be broadly similar. This rather public demonstration of the apparent convergence of models appears to have been a turning point for UNEP's credibility in pursuing an international agreement to protect the ozone layer and was, according to Litfin, an important contribution to the successful signing of the Montreal Protocol in 1987.

This example illustrates well the fluidity in the perceived trustworthiness of models, not at all surprising given the changing scientific understanding and relative contribution of different scientific disciplines, and the importance of the framing of environmental policy in interpreting the policy significance of scientific knowledge (for example, to what extent is policy founded on 'good science' as opposed to a more precautionary stance?). Policy apparently based on model results is, on closer inspection, nearly always additionally motivated by other considerations, such as the availability of alternative technological solutions, economic 'knowledge' not incorporated into the model, other concurrent international negotiations and strategic considerations, and so on.[6] But it would be inadequate to conclude from the above cases that models are only believed when there is already a political consensus pointing in the same direction as the evidence of models.[7] The UNEP Wurzburg workshop for the case of ozone (and the IIASA meeting for the sulphur emissions case) illustrate to the contrary how the presentation of models to policy makers, and their demonstrated achievement of a consensus (especially if policy makers can actually run models themselves), can be a key way of solidifying and legitimating international negotiations in consensual political cultures. (However, the overall role of models in the ozone debate may have been to reduce confidence amongst some advisory scientists and policy makers in the trustworthiness of models, at least for predictive purposes.)

A HISTORICAL NARRATIVE: FROM THE GOLDEN AGE OF MODELLING TO THE BREAKDOWN OF TRUST

Chunglin Kwa has provided a stimulating account of the trustworthiness of models over the last 50 years or so. He puts his central argument as follows:

> [Modelling] Projects which aimed at large-scale control were abandoned in meteorology, economics and ecology at about the same time [1973]. The search for models that would convey power verging on omnipotence stopped. Concepts that had informed the search for global control, such as equilibrium and stability, lost much of their intuitive plausibility. ... the relinquishment of the projects mentioned set in motion a redefinition of the idea of control, involving both the scale and the technologies of power. (Kwa, 1993a: 364–5)

As Kwa puts it, the heyday of macromodelling occurred in the 1960s and early 1970s, centring on the promise of holism and counterintuitive understanding obtainable only through a large model. There was at this time a convergence of computer technology with mathematical modelling efforts from a range of fields (especially ecology, meteorology, urban and land-use planning and applied environmental management issues such as water, forestry and agriculture, for which real-world control was more significant than theoretical understanding). Such models would, it was claimed, allow much better management, prediction and control of nature and society. Consequently, they were very much part and parcel of the modernist and technocratic dreams of a universally valid and expert-led societal control. Amongst the environmental examples of the uses of macromodels which were seriously contemplated at that time and discussed by Kwa are the following:

1. Von Neumann's idea that detonating atomic bombs in the Atlantic Ocean, close to Africa's West Coast, at the onset of the monsoon could improve the climate of the Sahel countries.
2. Weather modification plans including: cloud seeding, hurricane modification, airport fog dispersal, lightning reduction; and coating the northern sea ice with soot to warm the climate of Canada.
3. Ambitious ecosystem management plans, in which the flow of nutrients and energy would be controlled and maximized.

One of the defining features of this period of modelling was the use of cybernetic ideas developed initially for military purposes in the Second World War, and expressed thereafter in systems dynamics (SD). The focus of SD is upon interrelating processes and positive and negative feedback loops, with the frequent outcome being that counterintuitive effects can emerge, which counters and distorts many policy attempts to intervene (Bloomfield, 1986). Extrapolating trends have a tendency to overshoot in much SD analysis, causing collapse of the entire system. So, for example, the principal developer of SD modelling, Jay Forrester, argued on the basis of his World Dynamics model that attempts to control population growth would be ultimately unsuccessful in addressing ecological issues because such controls would result in a higher level of industrialization which would be more ecologically damaging than population increase. Consistent with his earlier Urban Dynamics model (1969), Forrester also suggested than humanitarian, altruistic measures – such as health and food aid – were counterproductive. They were regarded as ignoring the counterintuitive, unexpected

interaction of variables which only a computer model – not the human brain – could fathom. As Taylor puts it:

> A general characteristic of SD is that agents within a modeled system who respond rationally to their local circumstances generate, through the feedback structure of the larger system, outcomes contrary to their intentions or best interests, such as vicious cycles or boom-and-busts. Such outcomes can be overcome only when the agents are either co-ordinated by a superintendent manager or transformed by a universal change of rationality. (Taylor, 1992: 137)

Other SD modellers of this era (especially in ecosystems and econometrics) put more emphasis on the attainment of stable equilibrium and on the 'steering mechanisms' by which this was achieved. As pointed out by Kwa (1993a), it was generally accepted that one could legitimately extrapolate from a relatively small servomechanism (or feedback) to a whole open system, such as an ecosystem or the economy.

Forrester's World Dynamics model (1971) was composed of five interlinked 'global subsystems', these being population, natural resources, capital, agriculture and pollution, and suggested that there would be 'overshoot and collapse' of the world system through resource shortage, and environmental destruction because pollution thresholds would be exceeded in just 50 years. The model was developed and expanded by Donella and Dennis Meadows and formed the basis of *The Limits to Growth* (Meadows *et al.*, 1972), in which the natural limits were predicted to be reached in about a century, and which proposed immediate policy actions to slow down and eventually stop population and economic growth. Forrester and the Meadows achieved a high degree of public and political visibility for their work, partly it seems because of the close involvement of the Club of Rome – a group of high-ranking industrialists and political leaders – but also because they were the first group to use computer models of the world 'system'. According to Cole, that fact made it 'a dramatic and original forecast ... [Forrester's] authoritative-looking graphical output made front page reading in the international press' (Cole, 1978: 27). Aurelio Peccei of the Club of Rome explained the use of a computer as follows: 'What we needed was a vehicle to move the hearts and minds of men out of their ingrained habits' (quoted in Cole, 1978: 28–9; cf. Greenberger *et al.*, 1976). The model was most commonly presented in public and policy contexts as a predictive 'truth-machine', yet it was also sometimes presented with more qualifications and as an exploratory tool.

Unlike previous world modelling (for example by Kahn and Wiener), globally averaged values of the variables were used by Forrester and the Meadows, an approach which led to the criticism that it limited the technical analysis which could be conducted and forced the adoption of quite drastic assumptions, for example concerning the distribution of population in relation to production and the nature of worldwide trading patterns (Cole and Miles, 1978: 71). In response to this criticism, Mesarovic and Pestel introduced much greater regional differentiation (and hence complexity) in subsequent modelling sponsored by the Club of Rome. This follows a common trend in simulation modelling towards inclusion of greater detail whenever criticisms of unrealism are made by technical specialists.

Other serious technical problems with 'limits to growth' were soon uncovered by other analysts. For example, it emerged that virtually no empirical evidence had been given to substantiate the numbers for specific variables that Forrester had inserted into his model (Bloomfield, 1986; Cole, 1978). In addition, more extensive sensitivity analysis revealed that, if different numbers from the ones chosen, largely arbitrarily, by Forrester were used,

very different outcomes emerged from the models, some of which did not result in a global collapse at all. The model was also run backwards in time to see how well it simulated past trends and it was found that it generated quite unrealistic changes, for example in population growth rates, which appeared to be a consequence of the way the death rate was related to standard of living (Bloomfield, 1986). Forrester's tendency not to concern himself with empirical data reflected the SD philosophy according to which the model was expected to correct any initial errors in the data input. The model's structure, processes and feedbacks were effectively given primacy over data (and so analysis of the sensitivity to the initial data was not regarded as important). This reflects a deeper epistemological approach to modelling in which truth content is associated with formal structure, a view inspired by Leibnitz in the schema of Mitroff and Turoff (1973). In the 'limits to growth' debate it came into serious collision with the opposing view of econometric modellers, who tended to associate truth with empirical content (Lockean), or with a synthesis of formal and empirical content (Kantian).[8]

Such technical criticism certainly had a positive effect on the development and use of world models, many of which continued to be developed throughout the 1970s, and assisted in the development of the 'futures' field generally. Tellingly, it was the incompleteness, errors and false claims of certainty in the 'limits to growth' model which generated so much discussion and critical debate and stimulated other research approaches. Its dramatic forecasts were an integral part of the excessive publicity and critical attention it received, yet were considered by many other modellers to be the product of faulty or unjustified reasoning or modelling practices.[9] As the regionally differentiated scenarios of Mesarovic and Pestel became less dramatic, political and policy attention waned (Edwards, 1996).

Yet more radical criticism of world models was also raised, which challenged the paradigmatic framing of much of this research and suggested that, far from achieving their humanistic ends, the modellers were unintentionally contributing to the continued dominance of an instrumental and utilitarian polity, which was in large part the cause of the problem of environmental degradation, North–South inequality and other social ills. Ashley (1983), for example, drew upon Foucault's metaphor of the 'eye of power' in interpreting the social role of world models. World models claimed to have a grasp of a single objective reality which operated according to fixed structural relations, without contradiction or any major ambiguity and, hence, could in principle be viewed from a central viewpoint in space and time (see also Bloomfield, 1986). Additionally, modellers held to the view that scientific knowledge permits prediction and control over that reality in the service of humanity.[10] Ashley argues that these commitments, along with a deeply embedded methodological individualism, prevented the modellers from appreciating the key role of institutions and culture in constructing social reality and therefore they could not extend criticism to the dominant political actors actively reinforcing such social reality. For this reason, the social prescription of modellers was frequently a plea, persuasion or exhortation that individuals should change their subjective perceptions and behaviours.

Ashley's (1983) account is remarkably prescient of more recent constructivist accounts of science and environmental issues. What is lacking, however, is an account of the way world models did affect policy making and political debate in practical terms, for example through the policy institutions' construction of reality. And in more recent writings we find very different interpretations from that of Ashley, and which perceive world models as a successful critique of then existing cultural and political taken-for-granted assumptions (especially

when contrasted with the economistic orientation of global modelling in the 1990s) (van Steenbergen, 1994; Edwards, 1996). In short, the modellers may have raised the issues of the 'ecological problem' and global inequality to unprecedented visibility in public and policy domains. Furthermore, political contingency ensured that the debate was not entirely managed, massaged and regulated so as to conform to any single dominant world view. Numerous social and policy actors took up the key messages, and applied them in diverse institutions and cultures, so that the apparent intellectual limitations of the models were perhaps not all that significant in these new contexts (which were not primarily organized or justified in scholarly terms).[11]

Examples from Systems Ecology and Energy Modelling

The cybernetic view of nature promoted by systems ecology was reinforced and elevated by the common metaphor in research and political contexts in the USA of nature as a machine, with a stable equilibrium and steering mechanisms, which had to be controlled within its limits if it was not to overshoot or overreach critical thresholds (Kwa, 1987; Taylor, 1988; Kingsland, 1995). In the boxes below, several detailed case studies from the literature are described which, through microsociological analysis, open up a further set of contextual and contingent features surrounding simulation modelling in practice.

Many points emerge from these three case studies which assist in understanding models more generally. One is the common assumption of stability, found also in many complex contemporary models. Cartwright (1995) has argued that the fact that econometric models are stable and 'work' at all is not the result of using basic laws in their construction; rather stability is a necessary condition for the model to function as a 'machine' at all, an argument which applies also to other law-based physical models. As she puts it:

> Models in economics usually do not seem to begin from a set of fundamental regularities from which some further regularity to be explained can be deduced as a special case. Rather they are more appropriately represented as a design specification for a socio-economic machine which, if implemented, should give rise to the behaviour to be explained.

The creation of model stability takes place through extensive tuning of external variables and of parameters within physically realistic ranges (which are usually so uncertain as to bestow much opportunity for tuning).[12] In climate models, for example, the flux of radiation to the earth from the sun (the 'solar constant') can be adjusted to balance the outgoing radiation. The representation of clouds, and how cloudiness might change in a future climate, is highly indeterminate and this is a further parameter which has much leeway for tuning within a wide range of physical plausibility. Finally, arbitrary correction factors may be introduced to prevent the model from drifting too far away from the control state, as in the flux corrections applied to coupled ocean atmosphere global climate models. This range of model adjustments can perhaps be compared to the practice in controlled experimentation of holding constant the full range of conditions except for the few variables whose effects are being explored, with the difference that in modelling the values are permitted to change, but only within a given range. In this sense, the claimed-for holism of complex models may be somewhat illusory and to some extent constrained by the implicit reductionism of the model configuration (Young *et al.*, 1996).

Box 17.1 Modelling of nomadic pastoralists in Sub-Saharan Africa

Peter Taylor (1992) has analysed an SD model, developed at the Massachusetts Institute of Technology (MIT) and funded by the US Agency for International Development (USAID) in the early 1970s, in response to the long drought in this region. Taylor illustrates in detail how the framing assumptions of SD were applied to this case, and argues that they could have been formulated very differently. For example, whereas SD perceived there to be a set of fixed rules and system structures, they could have been changing instead; historical data could have been used, not as a source of long-term supposedly stable values, but as a means for understanding change; and individuals need not have been treated as uniform and aggregated but as stratified and differentiated. Perhaps most significantly, the nomadic pastoralists were modelled as a static, self-contained system, whereas temporal and spatial variability could have been introduced, as could the recognition that the 'external' forces could become internalized. The a priori commitments of SD modelling appear to have led to the selection of an atypical group of pastoralists (who did not engage, for example, in any farming at all) from which to obtain much of the necessary variables and data. Through being recirculated in the model, such information came to 'confirm' the starting out assumptions as to their applicability.

Taylor suggests that the research group would have had to devote much greater resources and time to the project to explore properly alternative commitments and assumptions than was the case, the research lasting only one year. He also suggests, however, that this more thoroughgoing approach would have inhibited the project's success (within its own terms of reference), because epistemic, methodological and political challenges would have arisen, for example to do with the way anthropological and cultural understanding could be quantified (see also Taylor, 1995). In other words, the closure which occurred around these difficult issues actually facilitated the project's completion in one year, and permitted the various agencies to work together. In justifying the choices that were made, Taylor notes that SD modellers appealed to the 'commonsense' logic of non-specialists: 'The rationality of the modeled individuals is validated by the listener's personal experience. Would you decide any differently in the same circumstances?' (1992: 133). No serious attention was given to the possibility that the pastoralists may have had a totally different cultural construction of reality from the individualist model of self-interest which has purchase in many policy and scientific cultures. Finally, Taylor points out that the commitments of SD imply that the potential role of the actors themselves as conscious agents of change is highly limited. The SD modellers through their special skills and techniques are supposedly able to provide insights into the system which the actors themselves are denied. Similarly, SD models dictate system-scale transformations and actors are expected to respond passively and by restraining their behaviour as prescribed by the model.

The creation of model stability is not only a consequence of the a priori understanding of the modeller, however. Also significant can be the scientists' perception of the policy role of the model. In the case of flux adjustment in climate models, for example, the policy 'need'

Box 17.2 Modelling the grasslands of the Great Plains

Kwa's (1993b) analysis of the Grassland Biome project (late 1960s to the mid-1970s) of the US component of the International Biological Programme concerns a much larger modelling enterprise than that described in Box 17.1. Large models frequently seem to demand a particular style of scientific organization. An extensive division of labour is common, given the highly compartmentalized character of the work, and a central, hierarchical form of control is in place to coordinate the activity. Such a work organization is not well suited to many universities, so such macromodels are instead commonly developed in national laboratories and agencies. The ELM model contained 1000 parameters (which remain constant) and several hundred variables, of which there were two sorts. The driving variables were abiotic, such as climatic factors (wind speed, rainfall, sunlight), and these dominated the state variables (which included factors such as 'sexually mature adult insects' or 'stable organic phosphorus'). This built-in dominance of driving variables ignored the possibility derived from evolutionary ecology – promoted by Robert May and others – that the autonomous behaviour of ecosystems could render them inherently unstable independently of abiotic factors (see also Taylor, 1989b). The chief modeller of ELM rejected these instabilities in maintaining a deterministic position. He also decided from the start only to address problems of non-linearity once the model had been constructed: hence it was 'trivially stable' though it was publicly described as a 'non-linear model'. In common with many other large models, stability was presupposed on cybernetic/SD principles.

for credible long-term climate projections appears to have been a significant factor in modellers' decision to use such adjustments (Wynne, 1996). Thompson (1984) and Schwarz and Thompson (1990) have argued that the IIASA energy modellers were heavily influenced by a dominant policy coalition in the 1970s which maintained that demand for energy would grow hugely, which could be met through major expansion of nuclear, solar and coal-powered stations. This 'cultural rationality of hierarchy' prescribed large-scale planning and central control, with local communities just having to make sacrifices for the benefit of the greater good, and it was this, Thompson argues, which led to the illusion of completeness and control in the IIASA energy model, as well as to the absence of realistic political and institutional issues within its framework.

More generally, studies of the policy use of energy modelling have illustrated how frequently forecasts have been used for legitimating policy decisions taken for reasons very different from the formal rationale of the model. Experiences in a number of countries have been reviewed at length in a book-length study (Baumgartner and Midttun, 1987) which indicates, *inter alia*, the politically driven character of much forecasting activity (to the extent that in France policy instruments were used to make energy demand conform to model projections) and the importance of behavioural responses to energy forecasts in altering their validity. The book also points to the major role of political culture. In North America, energy modelling has been more pluralized, and driven by intellectual and exploratory ambitions, compared to Europe, where forecasting was more concentrated in

Box 17.3 The IIASA Energy in a Finite World model

IIASA's Energy in a Finite World model (EIFW), developed in the second half of the 1970s and early 1980s, has become something of a *cause célèbre* in the folklore surrounding models (Keepin and Wynne, 1984; Keepin, 1984; Wynne, 1984). 250 scientists were involved in EIFW, which was intended to develop and connect three large models via iterative loops. Its findings were regarded as highly authoritative and they came to heavily influence some national energy policies. During development of the EIFW model, a mathematical analyst at IIASA (Keepin) became concerned with the sensitivity analysis conducted on the model, but was assured that a thorough analysis had been properly performed and taken into account in subsequent work. However, his investigations led him to believe otherwise and, with the support of sociologists and anthropologists also at IIASA, he analysed the 4200 parameters of the model one by one. He removed each one in turn to observe its effect upon the outcome. If it had no effect, he removed it from the model completely. He was able in this way to remove *all* of the variables, so proving that the output was fully determined by the input variables, including questionable assumptions about future energy demand. He also discovered that the three models had not been linked up in the way that they were supposed to have been, so that the iterative loop was not actually operative, even though it was this that was in large part the basis of the claimed-for uniqueness and authority of the model. The reaction of the modellers to the critique was to claim that 'of course they knew all this' and that it was common knowledge in the private confines of the expert community. Leading figures in this modelling world endeavoured to keep the controversial analysis out of the public domain and pressure was exerted on journal editors not to accept the paper for publication (successfully in the case of *Science*, but it was finally published in *Nature*).

government bureaucracies and tightly controlled, at least until the mid-to-late 1970s. The use of models in exploring scenarios of the future, and in backcasting from desired future endpoints to the present, emerged from North America rather than Europe (Robinson and Hooker, 1987). The down side of the American approach was the relative disconnection with policy making, except when energy modelling connected with politics in a contingent way, and then was likely to be contested. European energy forecasting had the advantage of closer connection to policy, but at the expense of conservatism, exclusion of certain critical voices (in hierarchical cultures such as the UK and France) or an excessive concern with reaching consensual agreement replacing critical analysis (in corporatist cultures such as the Netherlands).

A second theme from the above case studies is the frequent presumption that large models, as more complete, are therefore more realistic and provide better simulations and future projections. The rhetoric of comprehensiveness also implies that macromodels have multiple functions. Kwa notes, for example, that field biologists advocated models as a way of addressing key conceptual questions in biology – to test ecological principles or to discover new ones. The ELM modellers, meanwhile, held a more restricted view of the major contribution of the model as being in practical management issues. Macromodels

may actually be very cumbersome, lacking in transparency and less versatile for multiple uses than simpler models, or, as Kwa put it for the ELM, a macromodel is 'like the giant Irish elk, a beast viable in and of itself but too big and clumsy to survive in the long run' (Kwa 1993b: 154–5). Large models can also obscure critical issues, despite their apparent advantage of greater transparency, as in the IIASA energy model case study. This was also observed by Hajer (1995) in the case of the Dutch DAS model of the causes and effects of acidification. The attempts to use the model to develop policy-useful concepts (such as critical loads, acid equivalents and so on) obscured some of the key analytical questions and failed to confirm, or otherwise, correlations indicated by a much simpler methodology. The advantages of simple models for policy, because of their greater flexibility in exploring different scenarios and uncertainties, and in allowing policy makers to develop 'hands on' experience have also been observed in the case of models of air quality, climate models and hydrological models (Dennis *et al.*, 1984, Shackley *et al.*, forthcoming).[13] When complex models do reveal counterintuitive and surprising results – which is a major rationale for their use compared to simple models – their opacity, impenetrability and extent of tuning mean that such findings are not readily trusted by modellers, other scientists and policy actors (Ascher, 1981).

In a review of the use of models in societal forecasting, Ayers (1984) criticized the frequent assumption of determinism in macromodels and argued that the epistemological problems in the modelling of non-linear processes limit the ability of models to generate predictions 'that would have direct value in policy making as such' (307). He suggested that the role of macromodels might be to reveal 'the extreme sensitivity of outcomes to small changes in the choice of control variables when they are in certain critical ranges' (ibid.), but also noted that the models do not currently indicate where such sensitive ranges lie. In a similar vein, Kandlikar and Risbey (1996) have argued that there is an inverse relationship between the novelty of insights from integrated environmental assessment models and the policy applicability of that insight.

The Demise of Macromodels for Planning?

According to Kwa (1993a), the optimism of macromodels for control and prediction eroded in the mid-1970s, not so much because of a paradigm shift in scientific thinking, or the obvious failure of the models (contrary to the common explanation of failure at the time in terms of the need for more complexity and comprehensiveness in the model and for more computer power). Kwa suggests it was rather because of the influence of the counterculture in the 1960s, which saw such science and modelling as technocratic, and symptomatic of the industrial–government complex, which was distrusted, and anti-democratic. The icons of the failure of technical knowledge and planning were all too apparent: urban housing projects, military failure in Vietnam, the inapplicability of econometric forecasts when seen from the vantage point of the 1973 oil crisis, and so on. Kwa suggests that since then we have been moving from a 'macrophysics' towards a 'microphysics' of power in which the local and particular is given primacy over the global. The Foucault-derived terms are meant to indicate that control is still attempted and occurs in the microphysics of power, but that it emerges less by a single dominant centre imposing its will, and more through the dispersed, heterogeneous operation of many centres all following similar, standardized approaches.

THE CONTINUING LEGACY OF ENVIRONMENTAL MODELS

It was argued in the second section of this chapter that models are not especially trusted, and in the third and fourth sections this argument has been refined and placed in a historical retraction of trust in models whose ambition is prediction and control of large open systems. Kwa's analysis, while persuasive, needs, however, to address some critical questions.

First, it remains an open question just how much models *were* trusted in their 'heyday' during the 1960s and early 1970s. While some commentators writing at that time support Kwa's thesis (for example, Lee, 1973), others describe the changing perceptions of models as a learning process, in which models were finding a more appropriate and useful role (for example, Greenberger *et al.*, 1976; Mar, 1974). Kwa's analysis of trustworthiness refers mainly to the perceptions of models held by the scientists themselves, but what about the perceptions of the policy community and users of models? Were these non-scientific groups as trustful of the models in general and in practical contexts of application as the scientists?[14]

Second, a renaissance of comprehensive global modelling seems to be taking place in the 1990s, which is remarkably similar in its intellectual ambitions, if more sophisticated, than the earlier stage of world modelling (Edwards, 1996). For example, earth system modelling is linking up a range of physical, chemical and biological models; integrated assessment models are linking up physical, biological, economic and even sociopolitical models (Rind *et al.*, 1988; Dowlatabadi, 1995; Parry *et al.*, 1996, Risbey *et al.*, 1996; Rothman and Robinson, 1996). Much of this effort is moving towards greater integration and comprehensiveness – for example from an initial concern with climate change to global environmental and socioeconomic change more generally, or from the economics of a region to national and global economic modelling – and for that reason it may appear more Olympian.[15] In addition, compared to the earlier era there is a greater emphasis on uncertainty and sensitivity analysis, exploration of scenarios and even attempted inclusion of cultural diversity which goes beyond economic approaches such as game theory (van Asselt and Rotmans, 1996). There is also the more ready recognition that modelling output will not simply be translated into planning actions, but will be one amongst a range of increasingly standardized inputs.

The renaissance of modelling in the 1990s does suggest that models may be becoming more trusted in the wider world of policy and user communities. The context differs from the 1960s and 1970s in at least two important ways, however. First, the claims for the role of models by scientists and users has been toned down, sometimes massively. We increasingly discover that the prime function of models in the policy process is presented as a heuristic, learning device and there is a corresponding move away from ambitious statements about predictions and projections of the future. This is partly related to the perceived epistemic difficulties of ever adequately representing sociopolitical and cultural processes in an integrated assessment model. It is now more widely accepted, even within 'realist' scientific communities, that there are inherent limitations of any scientific methodology or epistemology of integration and modelling, given natural and social indeterminacies and contingencies (Robinson, 1991; Rothman and Robinson, 1996; Wynne, 1992). These considerations have led to the recognition that the social processes of negotiating and learning, and extended social participation in model design, testing and use, may constitute the most exciting trajectory for future research in this area (though some would see this as 'old hat'). On a

more technical level, they have also led to a new interest in validation or confirmation of models and how to express their 'pedigree' (Funtowicz and Ravetz, 1990, 1994).

The second important difference compared to the 1960s and 1970s is more catholicity in modelling style and design, partly driven by more questioning of the purpose of modelling. In the earlier period, models for policy usually attempted to simulate the 'real' physical or socioeconomic processes through deterministic and ever more complex representations (a Kantian modelling style, synthesizing formal and empirical content, in Mitroff and Turoff's (1973) typology). Simple models, and stochastic models without obvious empirical or theoretical referents, tended to be perceived as useful only in the learning stages of developing better physically based models. This judgement of relative credibility may be slowly changing, however, as the epistemic limitations of any model become more apparent and evidence of the utility of models designed with pragmatism and other objectives in mind, such as exploring how to bring about different possible future states, become more apparent (Young *et al.*, 1996). The lack of consensus on the appropriate style of modelling amongst the wider community of scientists developing and using models, and within the user community, limits the authority of any one approach, however resilient one approach may appear to be at any one time within a specific scientific sub-discipline.[16]

Part of the reason why models have stayed their ground is their significant role as *mediators* between diverse sets of scientists and, very often, policy actors. *Within science*, models come to facilitate communication and interaction between different disciplines and between theory, observation, statistical analysis and so on. They help define the 'state-of-the-art' knowledge through their *integration* of fields of enquiry, and also assist in defining future research goals. So, for example, the DAS model provided a metalanguage for allowing coordination of a diverse research programme. As one scientist in that research effort put it: 'It [the DAS model] really was what held much of the work together. It forced the programme directors and researchers to fill in the gaps, to work on understanding the missing links in the chain' (quoted in Hajer, 1995: 223, n.133).

Yet it is important to note that integration of scientific fields does not simply happen because it *seems* scientifically sensible or a more holistic approach. Indeed, in many respects science has a stronger tendency than ever to fragment and retreat into more esoteric and specialist sub-disciplines. Examples from the literature where model-based integration failed include the case of a large Swedish project developing a systems ecology model of forests (Barmark and Wallen, 1980). The field biologists could not, by and large, agree with the modellers who, as they saw it, failed to understand the skill and care required in obtaining a consistent and meaningful set of measurements, and who treated the field biologists as 'mere data-gatherers' for the model. Major epistemological and methodological issues were at stake, but the lack of attention to them led to much mutual suspicion and resentment, which in this case was never satisfactorily resolved (see also Caswell, 1988). Hence sub-disciplines do not automatically come together because it appears logical or beneficial for the progress of science. Rather, there has to be some rather clear incentive, and the integration has to be carefully and expertly coordinated and mediated. A strong policy mandate is frequently a major reason for integration, and scientific fields which become accustomed to policy-oriented 'problem solving' become those for whom integration is more routine and less threatening.

Environmental models frequently also mediate between science and policy through the model's (apparent) summation of scientific research in the provision of 'policy-relevant'

knowledge; 'integrated assessments' for policy tend to be model-based (Parsons, 1995). Hence the strong claim of models is that they funnel the basic research in a number of domains and meaningfully integrate the key insights so that the knowledge is of most use to policy makers: they are efficient 'distillation devices', as illustrated in Figure 17.1, or effective 'centres of calculation' as Latour calls them. However, this still begs the question of why policy should require the integration and distillation of scientific knowledge.

A possible answer emerges from political analysis of environmental policy which has recognized the range of policy actors, with divergent goals and interests, who have somehow to be brought into agreement, or a compromise has to be reached through negotiation, to allow environmental policy to be devised and implemented. More recent work has focused on the role of 'policy coalitions', 'epistemic communities' or 'discourse coalitions', which are all terms for loose alignments of policy and institutional actors which come together to support some policy approach and associated proposal, and in which shared knowledge and understanding plays a major role as a sort of 'social glue', helping to hold together the range of actors. Hajer, for example, focuses upon the role of commonly held 'story lines' – that is, beliefs about the causes and effects of an environmental phenomenon, about the possible ameliorative actions and policy approaches, and also about the allocation of responsibility for the issue. A key part of his argument is that, to function as the social glue, story lines must have sufficient flexibility or ambiguity. There must be a 'common core' of meaning which all can agree to, but which at the same time permits more specific, refined and detailed meanings to be ascribed to the 'same' story lines by each of the policy actors.[17] The point is that those policy actors can come to support an inevitably much simplified common story line even while they entertain a much more complex view of reality amongst themselves. Flexibility and ambiguity in the exact meaning ascribed to the story line by each policy actor permit this 'double' interpretation to occur. Now the role of models is better understood if we see them as efficient ways of reducing complexity through synthesizing and integrating knowledge, and hence of generating and legitimating a story line, while also permitting flexibility and ambiguity.[18]

Scientists and policy makers are involved during the construction of models in continually adjusting their expressed or implied expectations, requirements, opportunities and constraints so that the end result is a product of mediation (including accommodation with 'reality', through the scientists' perceptions of natural resistances). The integration process is an important means by which story lines are delineated and sculptured, and through which discourse coalitions begin to take shape. To have effective agency, the model has subsequently to be more widely re-represented by a discourse coalition as given by objective nature (see Figure 17.1); hence the rhetorical importance of ambiguity, since the model's producers have also to recognize the conditionalities and fallibilities in the later-stage use of the model, otherwise they may desert the enterprise and dissociate themselves from the model. Models are highly qualified for working as mediators at multiple stages of development and use because of their frequently ambiguous and flexible identity.[19] At the early stages of their development, models are a convenient means by which communication can occur between specialists; they are a device for facilitating a process. In the subsequent stages of their public presentation and 'use', models are more a policy tool for legitimating the environmental issue as 'real' and for deciding upon the 'optimal' policy decision. They are apparently suited to this second role because of their public identity as transparent, comprehensive representations of reality (through integrating all the relevant knowledge).

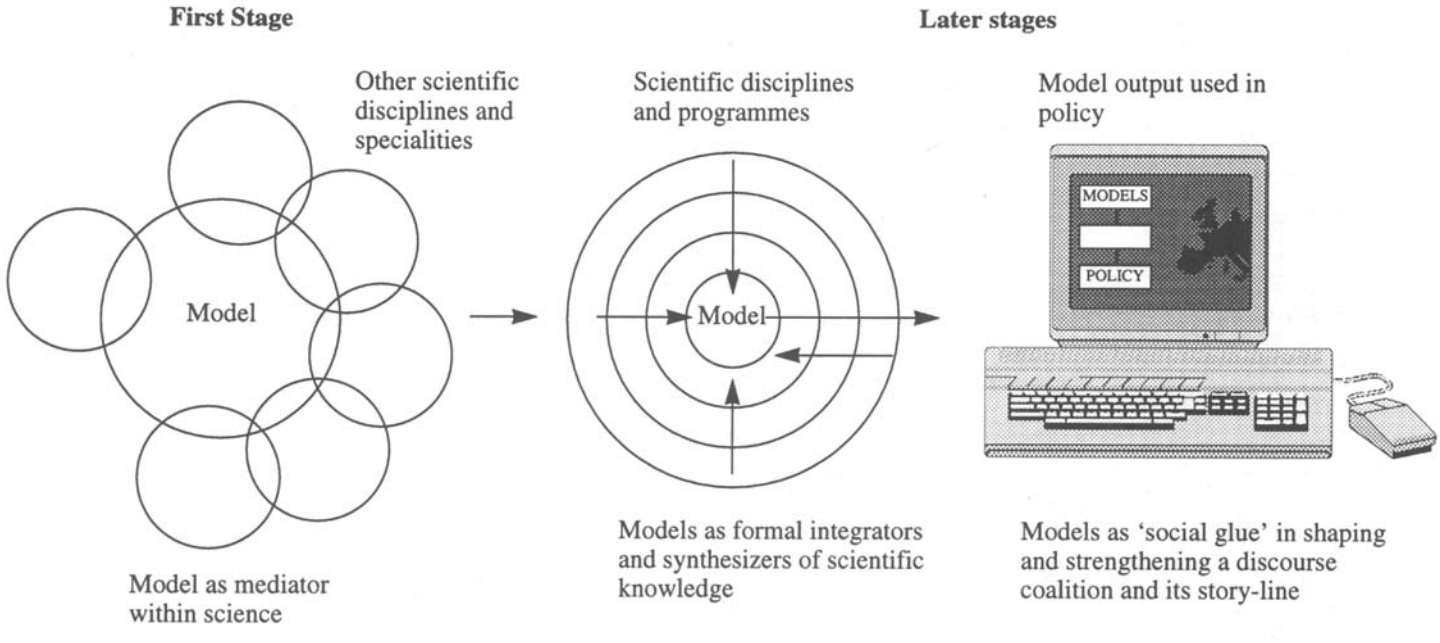

Figure 17.1 The mediative and transformative role of computer models in environmental policy

They obscure their initial process-based role rather well, while not entirely denying that earlier identity for specialists.

A key aspect of the ambiguity is captured by the distinction between models as predictive truth-machines and useful heuristics. The truth-machine identity is a more public and policy one – and helps to secure commitment to the reliability of some knowledge claims and hence story line. Meanwhile, the heuristic identity is more privately located and holds that models assist in understanding, exploring and testing hypotheses, as well as in creating a community of scientists with a common model at its core, but cannot generate robust predictions, only scenarios of more or less probable futures (given constancy in particular variables and relationships).[20]

The ambiguity and flexibility of models which permit their key mediating role come at a considerable cost, however: namely, the relative trust in models and the fluidity of their perceived trustworthiness in any given application and over time, by scientists, policy communities and the public. We are faced with a paradox, therefore, according to which the more extensive use of models as mediators results in their trustworthiness (hence effectiveness as mediators) being impaired. For example, attempts to improve the validity, hence trustworthiness, of models by defining their structures, properties and behaviours, and more generally identity and purpose, more precisely and accurately may lead to an inflexibility which inhibits the relationships between the diverse actors which the models mediate. Acceptance of a more monovalent identity for environmental models might require less social diversity and ambiguity, which raises moral and political concerns.

ACKNOWLEDGEMENTS

I am especially grateful to John Robinson, Peter Taylor, Andrew Baxter, William Ascher, Chunglin Kwa and Graham Woodgate for detailed comments on this chapter. Many of their points have far-reaching dimensions which I have not had time or space to address properly here, but which I hope to come to in the future.

NOTES

1. It could be argued that the key distinction is not between experimentation and modelling but rather between closed and open systems. Experimental work in open environmental systems may be subject to the same lack of trust as modelling, because of the inability to control all variables, while modelling systems which can be controlled, such as aeroplane simulation tunnels, may be much more trusted. It can also be argued with some validity that the physical component of computer systems does come to construct the scientific knowledge. And clearly, the direct witnessing of many experimental sciences can be difficult. Locating a discernible pattern out of a jumble of data points is by no means straightforward and involves selecting ways of seeing from available intellectual, social and institutional resources. Our point, however, is that most observers maintain a belief in their ability to witness closed laboratory experiments which they do not extend to modelling of open systems. As a generalization, they are not so easily convinced by the modeller who points to the schematic structure of a model, graphical display of its output or to the computer itself as they are by an experimental scientist who points to apparatus, graphs and physical material. I thank Andrew Baxter for discussion on this point.
2. A different point of view is that prediction is critical to the self-identity of scientists, and not just expressed in their external relations (for example, Robinson, 1988). If so, the argument that models can rarely be used in a predictive sense is more challenging to, and critical of, the role of models in policy making. The point may be most significant in understanding the emergence of social science modelling in the image of the natural sciences, whereby the desire for legitimacy resulted in wrongheaded deterministic and overly structural representations of social and economic systems which aimed at providing predictions or projections (as in energy modelling). This intellectual forecasting effort came to delimit the social and political

debate about possible futures, for example through excluding those who could not work with the medium of models, through burying social and policy assumptions in the model which were not properly debated and not subject to confirmation, through exclusion of processes and dynamics which were not included in the model, or simply by presenting the future as a *fait accompli*. Such illusions about socioeconomic modelling were severely shaken by the oil crises of the 1970s and by repeated economic recessions and depressions in the 1970s and 1980s. (I thank John Robinson for raising these points.)

3. This has been an issue for ecological models in particular (Levins, 1966). Palladino (1991) points out that Levins' criterion that a model should be 'general' equated to his prescription that models should be theoretical.
4. Hordijk and Castells and Funtowicz present very similar tables showing agreed-upon sulphur emission reductions compared to the output of RAINS. However, while Hordijk interprets this table as evidence that the policy decisions 'were largely based on results of the RAINS model', Castells and Funtowicz interpret it as evidence that non-scientific factors external to RAINS were influential. Relative to many other policy issues in which models are used, RAINS does appear to have been unusually influential, though Hordijk does overestimate its influence, and Castells and Funtowicz rightly question the source of the influence (and in particular how much lies beyond the formal model and resides more in the informal network of experts and negotiators).
5. In a wonderfully subtle and engaging account, Finlayson (1994) explores how social, institutional, cultural and policy factors came to influence Canadian fishery scientists' collection and analysis of empirical data used in estimating the size of the cod population.
6. Some of the best case studies of the policy use of models relate to non-environmental issues and are not explored in depth here. In their fascinating book-length study, Greenberger *et al.* (1976) discuss the uptake of models developed by the Rand Institute of New York City for the city government. While the Fire Department was able to make use of Rand's modelling, the Health Department was not. The differences occurred because of the strongly hierarchical character of the Fire Department, which meant that a single point of management and control could be located, hence the worthwhile task for analysis could be more readily identified and its implications implemented. The hierarchy was also relatively well defended from external political forces. By contrast, the Health Department was much more fragmented, with less consensus surrounding the character of 'the problem', and much greater external political influence upon it. Additionally, quantification of the organization's goals was much more feasible in the case of the Fire Department than for the Health Department, which lent itself to a modelling approach. (This resonates with Finlayson's (1994) finding that the data on fishing effort of the highly concentrated and corporately organized offshore industry in Newfoundland were much more compatible with the scientists' own data and cognitive constructs than the much more fragmented and locally diverse indigenous inshore industry, which are largely ignored in scientific assessments). These case studies support the prime importance for the effective use of models of good informal social networks between modellers and policy makers.
7. This is the position on the role of science in policy generally associated with Collingridge and Reeve (1986).
8. In addition, scholars found problems with the assumptions made by the SD modellers regarding technological change; in particular, the modellers had imported the neoclassical economists' treatment of technical change as a 'black box', and ignored the possibility of unexpected, discontinuous technical change. It was precisely this criticism of economics which was a key intellectual stimulus at the Science Policy Research Unit (SPRU), University of Sussex, from where emerged some of the most successful technical criticism of 'limits to growth'.
9. I thank Bill Ascher for raising this point.
10. There are strong parallels here to technocracy's aim of an optimally efficient society based on expert knowledge, and hence which would remove decisions from politics (Taylor, 1988).
11. By contrast, Ashley's political account presupposes that an intellectual critique can be readily translated into a meaningful social and political expression of that critique, a form of radicalism which seems itself partly alienated from, hence lacking purchase in, contemporary cultures. Note also that, as global modelling continued into the 1970s and early 1980s, many of the modellers themselves became highly self-reflexive about their work and its sociopolitical effects. For a good illustration of this, see the contributions to a special issue of *Futures* (1982).
12. Numerical instabilities which have nothing to do with the 'real' physical system being simulated often come to set minimum values for the time interval between successive integrations of the model and even for some of the parameters (such as ocean viscosity in global climate models).
13. Lee (1973) suggested that, in the case of urban planning models, the knowledge gained decreased exponentially as model size increased beyond a small size.
14. Kwa does deal with the US Congress's perceptions of ecological models in his 1987 paper. Indeed, he implies there that the Congress warmed to a systems ecological model as a metaphor for society and that this was a major reason why unprecedented support for such research occurred under the International Biological Programme.

15. That this process is intimately related to political culture is illustrated by Hajer (1995) who nicely illustrates the connections between the use of an integrated assessment model (DAS) in the Netherlands and the needs of that political culture for integration and coalescence, confirming an earlier similar finding from energy modelling in that country (de Man, 1987). Hajer argues that such modelling is the preferred knowledge form of 'ecological modernization'. A 'discourse coalition' centred around integrating environmental considerations into all areas of policy making is likely to find modelling a particularly suitable form. The desire for new forms of global connection, given the end of the cold war, and which transcend the old divisions of East–West, North–South, natural–social, and so on, may also help to explain the present renaissance of modelling.
16. A good example of some of these trends is numerical weather prediction using General Circulation Models (GCMs), which initially assumed that greater complexity would allow longer-range predictions. However, the work of Lorenz showed that weather prediction was limited to approximately one week because of deterministic chaos (Lorenz, 1993). Greater accuracy of the forecast through to 7–10 days was still assumed to be achievable by increasing the complexity of the GCM. Availability of exponentially increasing computer power appears to have reinforced the commitment to inclusion of greater physical realism. However, in more recent years, the argument has been made that this philosophy is redundant and that computer resources should be used to run stochastic realizations of GCMs rather than increasing their complexity (Kwa, 1993a; Shackley *et al.*, forthcoming).
17. This is very similar to the idea of 'boundary-objects' of Star and Griesemer (1989) and to Porter's (1995) argument that quantification may assist in achieving consensus between policy actors.
18. Though, as with any knowledge form, only certain dimensions of reality are synthesized and integrated and only certain things are left ambiguous and flexible: others are closed down for discussion and neglected.
19. Peter Taylor (personal communication) points out that this argument risks accounting for the rejection of a model in terms of its having too little (too much) ambiguity and flexibility, and for acceptance in terms of its having the right amount of ambiguity and flexibility. Detailed empirical studies are required to avoid the argument becoming tautologous in this way. The experience of the policy use of models in the USA suggests that model flexibility is frequently insufficient to accommodate the plurality of policy and political stances there, whereas a similar, or more likely smaller, degree of model flexibility is adequate for a European policy context.
20. In fact, scientists are frequently more discriminating in their classification of the role of models, distinguishing between qualitative schema, exploratory tools, redescriptions, exploratory heuristics and predictive identities (Taylor, 1989a), or epistemological devices (Checkland, 1995), which further enhances the flexibility available to scientists, both within their own peer group and more widely.

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18. Revealing the invisible: sociology, energy and the environment

Elizabeth Shove

INTRODUCTION

James Thurber's grandmother 'lived the latter years of her life in the horrible suspicion that electricity was dripping invisibly all over the house' (Thurber, 1962: 168). The idea that electricity might leak from empty light sockets is both bizarre and at the same time strangely plausible. Delivered in a variety of forms – gas, electricity, oil, coal, wood and so on – energy permits countless services and is embodied in almost everything we find around us. Both everywhere, and nowhere, energy remains a mysterious if not magical feature of everyday life. So the image of leaking light sockets is appealing, not just because it is a quaintly ridiculous idea conjured up by a confused old lady, but because it precisely articulates lingering uncertainty about the intangible qualities of this most pervasive resource. Taking the practical and theoretical invisibility of energy as a point of departure, this chapter explores alternative sociologies of energy and the environment.

In its invisibility, energy has much in common with other subjects of environmental concern. After all, CO_2 emissions and levels of biodiversity are no easier to detect with the naked eye. In each case, knowledge is made and mediated through modelling and measurement and, in each case too, scientific expertise is on hand to document and explain what is going on. Although the technologies of domestic energy measurement are simple and familiar – meters tick and dials spin silently behind the cupboard doors – it requires as much of an act of faith to believe in the 'reality' of energy consumption or to 'see' the energy embodied in your living room furniture as it does to believe in a hole in the ozone layer (Yearley, 1991: 120).

Further imaginative leaps are required to relate deliberate energy-saving action to conceptually remote indicators of energy use. As insulation installers are only too well aware, selling conservation is at heart a question of selling personal credibility. Without that trust, it is difficult to persuade householders that their fuel bills will drop simply because they have filled the loft with yellow fluff. In the installers' experience, talk of U-values or of thermal performance simply does not do the trick (Shove, 1991). Of course, those who have learned the formal languages of energy consumption have access to richer vocabularies of revealing terminology. Equipped with a wider repertoire of theories and associated measuring devices, trained observers can describe and detect opportunities for energy conservation in terms of thermal conductivity, kilowatts, lumens, and so on. But when it comes to 'seeing' the link between energy consumption and environmental change, further translations are required, first into units of CO_2 and then into effects on global warming.

The conclusion that energy consumption is the single most significant factor in the global warming equation, and recognition that half of all CO_2 emissions relate to the energy used in buildings, ensures that energy conservation is high on the official environmental agenda (Department of the Environment, 1993). But if it is hard for consumers to even acknowledge energy use then how much more difficult is it to make the connection between global environmental harm and the seemingly innocuous patterns of energy consumption so invisibly embedded in daily life?

Dramatic images associating boiling kettles with climate change and the ravages of hurricane damage (Energy Efficiency Office Campaign, 1991) make a simple visual connection. But evidence from questionnaire surveys and interview-based studies suggests that people persistently fail to make the link between actions and patterns of energy use, let alone between energy consumption and global environmental change (Hedges, 1991; Farhar, 1993; Kempton *et al.*, 1995). Whatever the scientific case, perceptions of environmental harm appear to revolve around polluting activities and the destruction or unacceptable modification of the 'natural' world. As we shall see, this emphasis has also marked the course of academic debate in the social sciences.

SEARCHING FOR A SOCIOLOGY OF ENERGY

Although environmental sociologists have engaged with a bewildering array of debates, they have yet to really turn their attention to energy consumption or to focus on the environmental consequences of the mundane technologies of everyday life. Higher-profile issues like acid rain, biodiversity or the threats of biotechnology (Hannigan, 1995; Yearley, 1996) have tended to dominate the agenda, as have analyses of discrete environmental controversies ranging from nuclear power to local road developments (Nelkin, 1971; Burningham and O'Brien, 1994), so much so that the practical invisibility of energy is, it seems, mirrored in its marginal status within the discipline. But it is not simply that energy is hard to place within the landscape of current sociology. The relative invisibility of the subject has other causes and consequences.

In his review of the changing relationship between sociology, energy and interdisciplinary environmental science, Loren Lutzenhiser points to 'Sociology's own theoretical unease with technology and the physical/natural world, and its insular tendencies in regard to other disciplines' (Lutzenhiser, 1994: 58). It is certainly true that analysis of energy consumption does not, at first sight, provide an instantly rewarding field in which to rehearse and extend theoretical understanding in the sociologies of science, knowledge and policy. Other areas of environmental debate are much better suited for this purpose and are, in any event, rather more closely linked to familiar strands of sociological debate (Bohemer Christiansen and Skea, 1991; Haas, 1990; Shackley and Wynne, 1995).

Meanwhile the relative insignificance of energy as a topic of public environmental anxiety excludes it from direct consideration by many environmental non-governmental organizations, as well as by those interested in social movements and the political expression of environmental concern (Beck, 1992, 1995; Eder, 1993). Actions like taking bottles to the recycling centre or saving cabbage leaves for the compost heap seem so much more deliberate when compared with the sorts of practices involved in energy conservation. Giving visible expression to one's energy-conserving behaviour is also difficult: there are no car-

stickers with which to announce such commitment (as there are for an interest in saving whales), nor are there opportunities for public demonstration (as with campaigns to preserve trees or prevent new road construction).

Despite its global environmental significance, there is nothing about energy which makes it the focus for exciting new theoretical development or for practical political action. Lacking any obvious conceptual home, and having none of the allure of high profile, controversial or contentious debates, the sociology of domestic energy consumption has largely slipped the net. But before giving up the search, let us quickly check for signs of sociological activity in other areas of energy-related research.

Studies of energy policy have, for instance, attended to the management and organization of energy supply, to energy economics, and to fluctuating anxieties about the future of finite resources. Opportunities for government intervention through regulation, economic incentives and information campaigns, together with detailed study of the relative significance of different fuels, are also central themes for policy analysis (Grubb, 1991; Manners, 1995). In addition, there are numerous evaluations of energy use in transport, manufacturing industries, or in residential and commercial sectors again typically oriented towards assessment of technical potential and of the prospects for energy conservation (Schipper and Meyers, 1993). These policy-inspired agendas are often closely coupled to economic models of change and innovation. Hence there is plenty of discussion about the causes of market failure and about means and measures to encourage decision makers to make rational, cost-effective energy-saving choices.

The difficulty here is that technical and economic studies of the 'efficiency gap' – that is, of the gap between existing patterns of consumption and those which make technical and economic sense – generally depend upon a conceptual framework in which sociocultural practices are represented as obstacles to the realization of technical potential or as barriers to the swift implementation of environmental policy (Shove, 1995). So, although these models and approaches represent a really significant force in the wider world of energy analysis, they generally depend on strikingly asocial conceptualizations both of the energy problem and of the terms in which it might be addressed. Perceptions of what the social sciences might have to offer are correspondingly limited. Defined in these terms, sociology, if it is of value at all, is useful insofar as it helps to market proven energy-saving technologies and overcome non-technical barriers to energy efficiency.

Given this dominant framing of the problem and the rather unappetizing sociological role which goes with it, and given the invisibility of energy and its distinctly unglamorous status as an environmental issue, it is perhaps not surprising that the subject has such a marginal position as a subject of sociological concern. Rather than reviewing familiar landmarks in an established and well-defined literature, the following discussion takes us into new territory, pulling together a few existing threads and outlining two possible agendas for future work.

TWO AGENDAS

The routine invisibility of energy invites one of two responses. One depends on the proposition that greater energy efficiency requires greater awareness and explicit articulation of energy use. Seen in this way, the challenge is to make energy visible and to turn energy consumption into a subject in its own right. To date, this has been the first reaction of policy

makers and researchers alike. Often influenced by the sorts of policy perspectives outlined above, and by the practicalities of actually promoting energy-conserving behaviour, social scientists have helped articulate the 'human dimensions' of energy use. Though increasingly important in the field of energy analysis, such research remains relatively invisible within mainstream sociology.

The second response takes for granted the embedding of energy consumption in a variety of products and services. Instead of isolating the energy implications of social practice, and rather than creating new specialisms within the discipline, the route here is to examine relationships between energy and the environment as they take shape across a spectrum of existing sociological concerns: social institutions, culture, consumption, family life and urban development, to give just a few examples. Tackled in this way, energy remains invisible, yet the significance of energy-related questions becomes more apparent within the discipline.

This distinction between approaches which seek to make energy use transparent, on the one hand, and those which are content to examine energy-in-disguise, on the other, allows us to sketch two rather different futures for energy-related sociology. At one end of the spectrum we can begin to imagine a sociology of energy as a bounded but evolving specialism, closely linked to applied research and policy advice, and always seeking to enhance its own visibility and with it, the visibility of energy consumption. At the other, explicit questions of energy consumption remain deliberately obscure. Though guided by a sense of the relative energy-related significance of current social practice, the challenge here is to develop sociological understanding of energy use but within existing disciplinary concerns. From this perspective, the routine invisibility of energy is both normal and unproblematic. Paradoxically, it may even be this practical invisibility which secures the long-term future of energy-in-disguise and which guarantees it a more central place within the discipline.

How might these two agendas turn out in practice? In addressing this question, the following sections of the paper consider the characteristics and qualities, first, of research which seeks to increase the transparency of energy consumption and, second, of that which presumes its invisibility.

AGENDA 1: INCREASING TRANSPARENCY

Methods of revealing energy use take different forms for different purposes and audiences, yet there is some pattern to the kinds of questions asked: how much energy is being used, how is that use distributed, which features can be changed, and how might consumption patterns evolve over time? These are the common concerns. Whether posed at the level of national energy consumption or addressed with respect to individual households, responses to such questions presume shared conventions of measurement.

Describing Energy Consumption

Coming late to the field, sociologists find that there are already a number of ways of defining and revealing energy consumption. These established recording systems reflect mixtures of technical and professional interests and, as suggested below, such interests make a real difference to the way in which energy is perceived and understood. Cast in terms of the

sociology of knowledge, careful study of the established languages of energy efficiency is long overdue. This is especially so in the building sector, where vocabularies of energy analysis focus on physical characteristics to such an extent that the social conditions and circumstances of energy use barely figure at all. Consider, for example, the methods used to represent energy consumption in the domestic sector. The tables and graphs in the UK's domestic energy fact file (Henderson, 1992) portray trends in the distribution of discrete technologies such as loft insulation or high-efficiency condensing boilers, thereby giving an impression of energy saving activity in the building sector, yet that impression fails to capture the effects of these technologies in practice. Each house is different and the measurement and understanding of energy use per dwelling requires a different approach. The thermal performance of the total building fabric is important here, variations in external climate have to be taken into account, as do indoor temperatures, hot water usage, direct energy input and so on. These interdependencies are critical, for the impact of any one energy-saving measure depends on its relative significance within the energy system of the building as a whole.

No wonder, then, that so much effort has been invested in developing computer models capable of simulating the energy performance of complete structures. The case of solar energy illustrates the point. Without such models it is impossible to 'see' – or to estimate the effects of – different elements in the energy system. Building designers have long recognized the benefits of passive solar gain, but the ability to really pin down the influence of the sun's energy requires identifying and then excluding all other factors affecting thermal performance. Addressed in this way, solar energy is a residual category: it is what remains once all other gains and losses have been accounted for (Shove, 1993).

Continuing with this example, the ability to produce a building which can be shown to make good use of passive solar energy requires yet more methodological ingenuity. To make such claims, researchers have to devise a way of comparing or simulating comparison of buildings which are equivalent in all respects other than the way they capture and use solar energy. Rather than take this story any further, it is enough to observe that there are different layers of technical analysis, each with its own language of description and measurement and each with its own conceptualization of energy use.

Of course, all this is to assume that it is buildings which use energy. While such assumptions have their advantages, it is useful to recall that real buildings are occupied by people whose actions influence the 'energy performance' of their homes. Comparative studies of virtually identical dwellings have, for example, revealed variations of the order of 200–300 per cent (Lutzenhiser, 1993) in actual patterns of energy consumption. Whatever else, this suggests that patterns of energy use are strongly related to patterns of daily life, and to people's habits and expectations.

What is at issue here is not just the fact that technological approaches to the specification and analysis of energy are selective, or that they fail to acknowledge the critical part played by building occupants. Rather, the point is that the purposes and priorities embedded in familiar languages of measurement actively influence definitions of 'energy' and with it the orientation of research and policy. Similar processes apply in the field of energy modelling.

Estimating Future Energy Demand

Efforts to explain national variation in energy use or to construct future scenarios of CO_2 emissions typically begin by looking at routinely quantified dimensions of energy consumption: at the nature of the building stock, the rate at which energy-saving technologies are 'taken up', the anticipated impact of different pricing policies, and so on. Details of household formation and demographic change, coupled with arguments about the relationship between these factors and energy use, add further layers of complexity to the emerging picture (Schipper *et al.*, 1989). But even this is not enough. Research on the energy implications of alternative lifestyles has not gone unnoticed, leading modellers to suspect that there are still more social psychological issues at stake. Now focusing on these 'variables', energy researchers are seeking to capture the key determinants of individual attitudes, values and lifestyle choice (International Academy of the Environment, 1995) in order to model their effect on energy demand.

The common pattern, repeated in macro energy modelling as in the smaller-scale representation of building energy performance, is to start with an analysis of 'basic' physical properties (the thermal resistance of the walls, the nature of the building stock, and so on) and to add further layers of complexity, up to and including the complexity of social practice. In both cases, the modellers' ultimate challenge is to find some way of incorporating 'people'. To that end, sociologists and others are constantly invited to deliver the missing values and to articulate the rules of social life. Until that happens, modellers can only develop an approximate picture of the way in which energy really works. Or at least, that is how it seems.

Implications for sociology

Conventional ways of measuring and 'seeing' energy have the double effect of defining energy knowledges and delimiting definitions of 'the problem'. Confronted by dominant technical–economic paradigms, sociologists have a number of choices. One is to take the definition and modelling of energy as a subject in its own right. Another is to go along with the prevailing agenda and seek to improve the ways in which the social world is represented within the dominant paradigm. This might take various forms. For instance, there is work to be done in documenting and explaining variation in energy consumption, in pinning down and then including 'cultural' differences and lifestyle choices within conventional energy modelling, or in really getting to grips with what people think about energy use, what knowledge they have of the effects of their own actions, and how this influences their daily practice.

These latter questions have already received some attention. The fact that people persistently refuse to make cost-effective energy-saving decisions is generally attributed to market failure and to lack of knowledge and information. Accepting this diagnosis, the route to energy efficiency depends on persuading decision makers of the costs of consumption and the environmental benefits of conservation. Sometimes hired as marketing consultants or programme evaluators, sometimes taking a more academic role, social scientists have sought to clarify the 'murky relationship between energy consumption and its costs, services and consequences' (Wilhite, 1994; Stern amd Aronson, 1984). Theoretical understanding of the links between new and existing knowledge, and of the relationship between knowledge and action, are central to this enterprise.

Studies of the ways in which alternative forms of metering and billing mask and illuminate energy consumption and have, for instance, inspired some rather deeper digging into the 'folk quantification of energy' (Kempton and Montgomery, 1982). This work has in turn opened up new questions about the characteristics and qualities of different forms of knowledge (for instance, personalized feedback on energy use, as compared with more infrequent, more formalized information and so on) and the social and conceptual contexts in which this is, and is not, assimilated. Whether focused on discrete moments of purchase (as with houses or appliances) or on the routines of heating, cooling, washing, cooking and lighting, such work is of immediate, practical value to those seeking social scientific advice on the best, most persuasive, way of dragging energy out into the open. Taking a slightly different perspective, this work also draws attention to other more abstract issues for, in modifying consumers' knowledges of energy consumption, researchers and policy makers are, in a sense, modifying what energy is. Countering this view, one can argue that new ways of representing energy consumption (through energy labels or through new methods and styles of billing) simply provide consumers with more information and a better insight into what is really going on.

Similar differences of approach arise with respect to the presumed relationship between knowledge and action. Advocates of energy labelling (for houses, refrigerators, washing machines and so on) routinely assume a strong link between knowledge and action. More specifically, they anticipate that labels and ratings – the new sign languages of efficiency – will, for the first time, allow consumers to 'see' the energy implications of their actions (Brown, 1993; Boardman, 1995) and that these newly articulated pieces of information will modify consumer choice. Others subscribe to rather more complex theories of consumer action.

As these examples suggest, long-standing debate about the social construction of knowledge, and about the relationship between knowledge and action, reappear in strange disguise. It is odd to encounter these themes embodied in analyses of something as ordinary as an electricity bill, yet such issues really do lie at the heart both of energy-related social scientific research and of the policies and practices which it seeks to influence. In this respect, the sociology of energy represents a branch of the sociology of knowledge.

Whatever their position on these questions, social scientists have had an active part to play in helping policy makers understand people's responses to information of different forms and types (Robinson, 1991; Stern, 1992; Lutzenhiser, 1993). Despite, and in some ways because of, its policy relevance, this kind of social science has failed to gain much ground even within environmental sociology. The relative invisibility of energy is in part to blame. But that is not all. A further difficulty is that such research serves to sustain (if not confirm) perceptions of social scientific investigation as an esoteric form of market intelligence.

AGENDA 2: MAINTAINING INVISIBILITY

Schemes to make energy consumption as visible as possible make sense given a particular framing of the energy problem. As conventionally understood, this is essentially a problem of market failure and ignorance on the part of individual decision makers. Alternative definitions of the energy problem and of the social organization of action generate

correspondingly different visions of the sociological issues at stake. Attending to the institutional structuring of options as much as to the views and energy-related expertise of individual decision makers, such approaches imply a rather different agenda.

From this perspective, neither the beliefs and practices of energy consumers nor the definition and measurement of energy consumption are especially important themes. Rather than addressing energy consumption as a subject in its own right, a sociology of energy-in-disguise would concentrate instead on the development and evolution of (energy-intensive) products, services and practices. This indirect strategy diverts attention away from the intricacies of individual choice and the knowledge of individual consumers. What is important here is the social organization of consumption: the sociocultural construction of preferences and demand, the decisions already embedded in existing infrastructures and technologies, in buildings, transport systems and urban developments, and in the ways of life which have grown up in and around these physical and social frameworks.

Again this reorientation has practical as well as theoretical implications. In practical terms, it suggests that the environments in which energy-related choices are made, and the options on offer, are at least as important as the energy consciousness and environmental commitment of end-decision makers. For example, people may find that they are, or are not, living energy-efficient lives for reasons which are for the most part quite beyond their control. As a result, cavalier and even deliberately 'wasteful' urban citizens may be responsible for less energy consumption than their committed and carefully environmental country cousins. In other words, making energy visible does not necessarily change the contexts in which it is used. While they may have their uses, studies of consumer behaviour only scratch the surface – other strategies are required to get to grips with the still hidden structural features shaping the social and material worlds within which choices are made. Seen in this way, there seems to be as much if not more scope for a sociology which concentrates on changing services (which depend on energy consumption) rather than on the uses of energy as a commodity in its own right.

A sociology of the hidden dimensions of energy use has other important qualities. Instead of being shunted to the margins of the discipline, such oblique energy-related enquiry would draw upon and contribute to an already familiar reservoir of themes and concepts. Ideas about the cultural qualities of consumption, the dynamics of sociotechnical change and the institutionalized structuring of choice provide ready-made starting points from which to embark upon this new agenda of energy research. But what might this kind of enquiry really look like? The two examples outlined below illustrate some of the issues at stake . The first, adapted from Golton (1994), highlights the energy-related implications of an increasingly transnational construction industry. The second points to the social processes involved in shifting towards an increasingly standardized and ever more energy-intensive indoor climate. In their different ways, these cases exemplify the sorts of questions we might expect to find on this second agenda.

Example 1: Globalization and Energy Consumption

Consider two houses, one modern, the other a hundred years old, both built in Cyprus, occupied by members of the same family. The 'traditional' house, constructed from local materials, requires constant labour-intensive servicing and in a sense locks its inhabitants into a certain pattern of daily and seasonal life. By comparison, the modern house, inhabited

by the next generation of the same family, is constructed of imported timber, processed gypsum, aluminium, cement and so on. Equipped with heating, cooling and cooking systems which run on electricity, gas and oil, this house provides its occupants with a stable indoor environment all year round. No longer tied to the locality in the same way, the second generation relates to a much more international culture and to seemingly global expectations of comfort and consumption (Golton, 1994). In environmental terms, the 'ecological footprint' of the modern house is clearly much larger than that of the traditional dwelling.

Although the concept of ecological footprint captures something of the difference between the two, it does not tell us much about the processes of social and economic change inscribed in these two buildings and in the energy they embody and consume in use. For that we need to place the story of the Cyprus houses in the context of a more encompassing analysis of tensions between global social and technological convergence (in terms of heating, cooling, cooking, product life, durability and so on) and of persistent localized diversity within and between cultural boundaries. Here, as in the next example, emphasis on the services which energy provides, rather than on energy itself, brings the social and institutional dynamics of everyday practice to the fore.

Example 2: Cultural Energy Services

The fastest growing cities are in the hotter parts of the world. In their discussion of megawatts and megacities, Tyler and Brooks (1991) take note of the energy implications of growing demand for air conditioning and refrigeration. These technologies have been the subject of a number of studies in which researchers have examined the shifting routines of daily life made possible and occasioned by the introduction of air conditioning. Whether this involves retreating from the collective social space of the verandah (Morrill, 1994) or the waning of the siesta, it generally brings with it new patterns of social interaction. Less directly, but no less significantly, acquisition of such technologies may also demonstrate membership of an appropriately 'cool' social group. Viewed from a slightly different perspective, increasing standardization of the indoor climate – which presumes the technological control of heating, cooling and ventilation – mirrors the increasingly international interests of those who produce, finance, manage and own the built environment (King, 1990).

Further exploration of the dynamics of indoor climate change depends on the way in which we conceptualize the interlocking of production and consumption and the embedding of energy use in social practice. The notion of 'cultural energy services' (Wilhite *et al.*, 1995) captures some of these interdependencies, but there is still some way to go.

Both examples present questions and challenges which are perfectly amenable to sociological investigation. Hughes' examination of the parallel evolution of institutions and electric power systems (1983), Bijker's discussion of the 'invention' of fluorescent light (1992) and Cowan's discussion of 'how the refrigerator got its hum' (1985) all illustrate the potential of an approach which focuses on evolving relationships between and within interdependent networks of policy makers, manufacturers, suppliers and designers, as well as end-consumers. Other studies, looking, for instance, at the rapidly changing balance of power between

property developer and building occupier (Guy, 1995), provide real insight into the ways in which social–organizational networks restructure priorities and in that way restructure long- and short-term patterns of energy consumption. In the world of commercial property development, 'choices' about long-term maintenance, durability, running costs and energy efficiency appear and are resolved in different ways depending on the packaging of responsibility for designing, managing and maintaining the built environment.

As with the cases discussed above, environmental issues do not reemerge as questions of energy technology or as questions about the knowledge and expertise of energy consumers. Framed in terms of the second agenda, the challenge is to 'see' the energy-related implications of quite other processes: for instance, in new approaches to supply-chain management (Lamming and Hampson, 1996), in the management of construction or in the evolution of institutions. Such an approach implies a new role for social analysis. Rather than helping policy makers to understand the 'barriers' to energy-efficient technology, and rather than developing more effective marketing strategies by tapping into more sophisticated analyses of consumer decision making, the challenge here is to understand the changing contexts and infrastructures of choice and to review policy makers and others' capacity for action within these social systems (Shove, 1995).

The idea that better understanding of energy consumption depends on explicit acknowledgement of its invisibility does not promise to generate focused studies of the type associated with concerted campaigns to make energy use transparent. As a result, sociological analyses of energy-in-disguise seem to be of limited relevance to energy-related policy makers. Of course, better understanding of the sociotechnical networks of energy consumption might well permit the identification of pathways of change and points at which policy actors have more (and less) opportunity for effective influence (Callon *et al.*, 1992). But such insights are only 'relevant' if we take a broader view of policy making and if we see government agencies (and other advocates of energy efficiency) as active players in a more encompassing social, organizational and economic system. Instead of focusing so exclusively on the provision of information and energy-saving advice, sociologists of energy might also consider governments' capacity to influence, for example, the shifting tides of commercial property development, the funding and management of alternative transport systems, the formation of households and even the temporal structuring of people's daily lives (Norgard, 1995). Seen in this way, energy policies are not the only policies which influence energy use.

HIGHLIGHTS AND SHADOWS

In defining two agendas, one of increasing transparency, the other of energy-in-disguise, we have tried to represent different ways of thinking about the relationship between sociology, energy and the environment. The first strategy is to make energy use visible. As we have seen, this involves developing and applying new languages and indicators of energy consumption. Whether we like it or not, these revealing processes in a sense constitute what counts as energy. And what counts is often what can be relatively easily counted. To date, discussion of energy consumption has been dominated by those who see energy through the mediating languages of technical and economic discourse. Sociologists have also been involved in making energy visible, and in helping to do so in ways which connect with

consumers' and decision makers' existing perceptions and priorities. However, such activity has had a very low profile within environmental sociology. This is in part because of the specialist knowledges involved (whether to do with transport, industry or buildings) and in part because it really is difficult to escape being tainted by association with the asocial models of technical development and economic choice embedded in prevailing paradigms of energy analysis and in dominant models of policy making.

The second route focuses, not on energy itself, but on the definition and management of services and practices which involve energy consumption. This reorientation opens the way for the legitimate and effective deployment of a range of sociological resources. Ideas about culture, consumption, lifestyle and the dynamics of sociotechnical change are instantly useful, and instantly at home, when it comes to the analysis of energy-in-disguise. But because of the necessary layers of disguise, it is difficult, though perhaps not impossible, to translate this work in terms recognized and valued by policy makers and others currently dealing with energy as an explicit and visible topic.

This deliberately black-and-white presentation of alternative agendas articulates what seem to be persistent differences of approach. Visibility in one domain turns into invisibility in another: when energy is in the spotlight, the services it provides are in the shadow; when services are highlighted, the energy dimensions fade. The same highlighting and shadowing applies within environmental sociology. If environmental sociologists concentrate on ways of making energy visible they are at risk of losing sight of the social structuring of consumption and of losing their place within the discipline. On the other hand, if environmental sociologists are really to get to grips with energy-in-disguise, those concerned with the explicit modelling and analysis of energy consumption will find it difficult to spot their contribution.

In conclusion, this discussion suggests that there are significantly different possibilities for future interaction between social science and energy-related policy, and for the directions in which energy-related sociology might unfold. In practice, the twin themes of transparency and disguise may be nothing like as exclusive as this review suggests, but the tensions which they point to are clear enough, clear even to Thurber's grandmother.

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19. Industrial metabolism, economic growth and institutional change

J.B. Opschoor

INTRODUCTION

The metabolism between the biosphere and the economy is putting increasingly unsustainable pressures on the environment. In this chapter this metabolism is explored especially in relation to the activities that give rise to them: the production and consumption of goods and services and all related activity that this entails (such as trade and transport). We focus on production, which has been defined by Boulding as the planned transformation of matter using energy, knowledge and technology (Boulding, 1978). Production thus defined is society's way of enabling the satisfaction of its needs.

Technological innovation and changing patterns of consumption and production may alleviate the pressure on the environment, but – as we shall see – it is to be doubted theoretically and on empirical grounds that these forces will operate spontaneously at desirable levels if sustainability is to be achieved, given the institutional structures fostering the development of economic activity. An analysis will be made of some of the forces furthering the delinking of economic growth and environmental pressure, and possibilities to accelerate this delinking will be indicated, focusing on options for institutional change.

SOCIETY'S METABOLISM

Human activities directly or indirectly imply interaction with the natural environment in several ways. It is in the environment that the sources of energy and matter are found which feed and fuel these activities. Moreover, activities give rise to material and energetic residuals that end up in the environment. The interactions between economic activity and the environment have been metaphorically labelled society's 'metabolism' (see, for example, Moll, 1993). 'Metabolism' is a term originating in biology where it is used to indicate the internal, physical and chemical processes that supply the energy and nutrients required by an organism. Society's or the economy's metabolism can be defined as: the set of physico-chemical transformations that convert raw materials and energy, plus labour, into finished products and the wastes or residuals entailed by these transformations. In the environmentalists' language this has been referred to as 'industrial metabolism' (see, for example, Ayres, 1994). This term is slightly misleading as, obviously, activities in, for example, mining and agriculture are included, but we shall use it and refer to it as *IM*.

The actual flow of matter and energy involved in *IM*, that is from nature's sources through the economy and back into the environment, has been called 'throughput' (Daly, 1991a: 36).

We will use the symbol S to indicate the environmentally relevant level of metabolism, or throughput. Again, these materials flows are made up of two main types: the materials or inputs side (including energy) M, and the environmental outputs side (emissions, waste flows), W. M could be divided into flows of renewable resources and of non-renewable ones; W is the sum of decomposable waste flows and non-decomposable ones.

IM operates within constraints set by the law of conservation of matter: matter can be transformed, transported or stored, but cannot be created or destroyed. That is, a materials balance approach should be taken at least in principle (see, for example, Ayres and Kneese, 1969) which would link material inputs, production and waste. Given this link, some researchers take the rate of change in total materials inputs as a measure (or 'proxy') of potential environmental impact, or throughput S, and hence focus on materials intensity (for example, Jänicke *et al.*, 1989; Simonis, 1989).

This focus on the materials side entails two simplifying reductions: (1) the equation of environmental impact to S, and (2) the reduction of S to M. The latter we have touched upon; the former needs some discussion. To what extent are throughput and environmental quality related concepts? In the conceptual framework underlying its indicators of the state of the environment, the OECD distinguishes between 'environmental pressure' and subsequent modifications of the 'state' of the environment (for example, OECD, 1993). Essentially, 'environmental pressure' is equal to throughput and changes in the state of the environment reflect the specific impacts of actual levels and patterns of throughput in the concrete environments where they emerge. Obviously, the impact on the environment associated with specific levels and patterns of S differs according to variations in local environmental circumstances. In what follows, however, we shall largely ignore this. In fact, this boils down to disregarding spatial or ecological differentiation – which is warranted only as a first approximation.

Let us look at *IM* and especially S in more detail, at the macro level. Following Ayres (1994), we define metabolic efficiency as the economic output per unit of throughput. Economic output is often measured by the level of net production or income, Y, so metabolic efficiency is measured as Y/S. The inverse of this, S/Y, is the 'throughput intensity' s of pollution. And s can be decomposed (or rather: disentangled) into two aspects: inputs intensity or materials intensity m (where $m = M/Y$) and pollution intensity or waste intensity w (where $w = W/Y$). Y or total income is the product of per capita income y and population P. Now by definition:

$$S = s \times Y = s \times y \times P \tag{19.1}$$

and similar expressions hold for M and W.

From an environmental policy perspective, one may be interested in the development of S over time. Equation (19.1) suggests that one should then look at changes over time in the population size, in economic welfare and in the throughput intensity. Taking the latter variables together, one could also say that this equation indicates that changes in S can be attributed to economic growth and/or metabolistic efficiency. At any given level of s, a change in economic activity levels translates into a parallel change in throughput and, to the extent that our simplifying assumptions hold, in environmental impacts. One could say that s (or m and w) provide the links between society or the economy, on the one hand, and the environment, on the other: given their magnitude, economic growth is linked to environmental degradation in a one-to-one way. We shall come back to this issue of linkage below.

ENVIRONMENTAL SPACE, OR LIMITS TO THROUGHPUT

Daly has analysed the economic process in terms of its 'scale' or the level of its throughput as compared with the ecological carrying capacity. Carrying capacity essentially is an approximation of the maximum amount of S that ecosystems can handle or be exposed to without major disturbance in the way they function. Economies operating at or within this capacity are called (ecologically) 'sustainable' (Daly, 1991b: 44). Such a notion of carrying capacity may be too simplistic in that it reduces to one dimension a more complex phenomenon, both from a natural science point of view and as seen from the social sciences.

The biosphere is a complex life support system. The systems and processes that operate in the physical environment provide society with a range of services (to which ecologists often refer as 'functions' which societies make use of to a smaller or larger extent). Two important ecological functions are the regeneration processes underlying some of those resources (the renewable ones), and absorption processes in which wastes and pollution are buffered, decomposed or otherwise neutralized, at least in part. The amount of regeneration depends on environmental quality which, in turn, is a function of throughput and the scale on which absorption processes in the environment operate as well as their productivity. If one formally analyses environmental utilization in this framework by looking at the availability of natural resources and at environmental quality over time, given the constraint posed by the link between degradation and regeneration (and disregarding, for convenience's sake the fact that some resources are non-renewable), the result in mathematical terms is a multidimensional space, the boundaries of which represent all possible patterns and levels of sustainable environmental utilization; this space has been called the 'environment utilization space' (Siebert, 1982; Opschoor, 1987, 1992) or 'environmental space'. Extracting or polluting beyond the boundaries of this environmental space will lead to lower environmental utilization possibilities in the next period. Thus, if we denote the environmental space by the symbol C, sustainability requires that:

$$S < C \tag{19.2}$$

IM AND ECONOMIC ACTIVITY: THE NEED FOR DELINKING

Equation (19.1) suggests a linkage between economic activity levels and levels of environmental degradation: given throughput intensity (s), the two (S and Y) would run parallel. Eventually, such a development linked with increasing throughput would become unsustainable at some level of income per capita. This of course would be a problem in a world in which societies have an interest in continuing economic growth and in which, therefore, sustainability considerations are to count. The Brundtland report (WCED, 1987: 50–51) assumes an economic growth of 5–6 per cent to be both possible and desirable in developing countries (where it is vital from the perspective of the eradication of poverty and the provision of minimally acceptable levels of livelihood) and expects growth rates of 3–4 per cent in the industrialized market economies. In fact, referring back to equation (19.1), population levels are likely to double globally and welfare per capita is expected to rise even more, suggesting that there is a tendency for overall levels of economic activity to rise over

the next five decades by a factor of five.[1] If this is a plausible scenario, one must fear that the associated levels of throughput are or will indeed become unsustainable.

The only way out of the dilemma is to enhance metabolistic efficiency by reducing throughput intensities. That is, by 'delinking' economic activity from environmental pressure or by enhancing metabolic efficiency (as defined above). If, for the sake of the argument, we assumed that current levels of S are on the verge of unsustainability, then s would have to be reduced by a factor of five to turn the global economy into a sustainable one. In this chapter we will elaborate this by exploring the variability – spontaneous and induced – of the throughput intensity in theoretical and in empirical terms.

A more efficient *IM* would be characterized by lower levels of materials and pollution intensities. Reduction of the materials intensities over time can be referred to as 'dematerialization' (cf. Herman *et al.*, 1989) and, analogously, a reduction in the pollution intensity could be labelled 'depollution'. Both are manifestations of a 'delinking' (World Bank, 1992) or decoupling of economic activity from environmental impacts. If $S = s \times Y$, then:

$$dS/dt = Y \times ds/dt + s \times dY/dt \tag{19.3}$$

or environmental degradation changes over time as the weighed sum of the rate of change in the throughput intensity (ds/dt) and the rate of change of economic activity (dY/dt).

We must distinguish two forms of delinking: absolute and relative. Delinking is absolute when the level of throughput drops over time or at least does not increase, whatever the rate of economic growth. A sufficient condition for this is that $dS/dt < 0$. This implies (cf. equation 19.3) that:

$$(-ds/dt)/s > (dY/dt)/Y \tag{19.4}$$

or that the rate of change in the throughput intensity must exceed the economic growth rate. Relative delinking would be the situation where there is delinking, that is $ds/dt < 0$, but where the effect of this on S is overtaken by that of economic growth. So S would increase despite an enhanced metabolistic efficiency. It will be obvious that one may speak of absolute and relative dematerialization and depollution analogously, by substituting M or W for S in the above.

It will be clear that it is of great interest how these rates of change vary over time and in relation to one another. Is ds/dt likely to be or to become a stronger force than economic growth or will it eventually fade away to levels below economic growth rate?

DELINKING AND RELINKING

Delinking may result from different sets of developments (or combinations thereof): (1) changes in production processes and product design, and (2) changes in the structure of production and consumption. Hence dematerialization and/or depollution may result from technological change leading to increased M- and W-productivity and changes in prevailing production patterns. Both may be due to endogenous forces. Economic growth will mostly lead to rising per capita income levels. This will give rise to changes in the structure of

demand for products and services, as the more urgent ones are increasingly being satisfied. In the past this has led to drastic changes in the sectoral composition of the national product. Economies have moved from extremely resource-intensive agricultural and mining stages to more industrial ones and seem to be moving towards a post-industrial, service and information-oriented stage, and it is often presumed that this in itself will lead to a reduction of *S/Y*. Furthermore, it is assumed by many economists that environmental quality is a good that will gain in priority as income levels rise so that, increasingly, environmental concerns will be manifest on the basis of pressures from within the economic process. This might accelerate the impact on *S/Y* from industrial development. Moreover, technological innovations have occurred, giving rise to changes in relative scarcities and prices also inducing shifts in the structure of demand for goods and services, leading to derived changes in the production structure. To a large degree, the environmental features of innovation may be or may have been irrelevant to the innovators, and hence the overall environmental impact of it may have been unpredictable. But environmental considerations have triggered technological change where resource scarcities and deteriorating environmental qualities became matters of concern and even urgency. And to the degree that these became economically relevant, they have given rise to spontaneous or endogenous rises in metabolistic efficiency. Sometimes these scarcities were induced or created by economic power (for example, the oil crises in the 1970s and 1980s) and the results were environmentally benign in that, whatever the source of scarcity (absolute stock reductions or monopoly power), the result of its triggering price increases is likely to be a reduction in demand. Some refer to these processes as 'structural change' (Simonis, 1989; Jänicke *et al.*, 1989), indicating that changes in pollution and materials consumption are due, not only or not primarily to economic fluctuations, but to more structural changes underlying the economic process.

To the extent that prices reflect environmental costs, markets may be assumed to generate signals (in the form of price changes) supporting the processes of substitution mentioned above, and providing incentives to innovate in terms of the development of new products, processes or inputs. If prices do adequately capture these costs and if market processes are flexible enough, then delinking may be a (near-) spontaneous, endogenous development within the economic process. Theoretical investigations, however, point to rather rigid market processes for materials as input in production processes (at least in the short run: see Malenbaum, 1978; Auty, 1985). In addition to being driven by endogenous forces, delinking may also be stimulated by exogenous influences (for example, induced by policy interventions, or new lifestyles as a result of shocks in awareness).

As we shall see below, empirical evidence goes far in suggesting that delinking has occurred in the domain of *M* as well as in that of *W* for developed economies. As income grows, consumption patterns may change in less materials and waste-intensive directions and means may become mobilized towards technological innovations conducive to $(ds/s) < 0$, even at levels where the impact of this surpassed that of economic growth, so that in fact there has been absolute delinking.

The question is whether such trends can be easily extrapolated, even on theoretical grounds. At some stage after a period of delinking the possibility of increasing energy and materials efficiency may have a technological or even economic upper limit. Or at least there may be diminishing efficiency returns to further delinking efforts, due to the fact that technologically simpler trajectories have all been exploited and/or the economic impacts of further delinking would only be possible at increasingly rising marginal costs. That would

entail, unless new, radical technological breakthroughs occur, ds/dt being inclined to fall, even given a continuing need to decouple further. On the side of changing patterns of consumption in relation to economic growth, the same may be expected to occur: increasing diseconomies to consumers to further change their consumption patterns unless radical changes took place at the level of their preference structures. Assuming economic growth tendencies to remain in force, even if we start from $|ds/dt| > dY/dt$, from some point onward, economic activity and environmental pressure S may 'relink', at least until further breakthroughs in research and development occur, or more environmental awareness alters preference structures or a more intensive application of environmental policy checks is implemented. This prediction we call the 'relinking hypothesis' and we take it that empirical manifestations of $dS/dt > 0$ in specific areas of environmental concern (M and/or W) are taken as validating it at least in part. That is what will be attempted in the next section.

Meanwhile, it is of interest to note that some researchers have suggested that, over the past decade, metabolic efficiency in terms of reductions of W may have improved at the level of some 2 per cent per annum.

ENVIRONMENTAL KUTZNETS CURVES AND THE FALL AND RISE OF THROUGHPUT

In relation to the pattern of environmental utilization or metabolism over time and with economic growth, several analyses have suggested an 'inverted U'-shaped relationship between environmental pressure (per capita) or resources use (per capita) and growth of income or GDP (per capita): the 'environmental Kuznets curve' (EKC). This relationship appears to hold for some pollutants (that is W) and several cases of resource use (that is M). Data on pollution in relation to economic development generally show reductions of pollution per unit of production/income, as income levels rise, and often even reductions in absolute levels of pollution. Such strong delinking has been reported, for example, for the Netherlands (1985–90) for emissions such as CFCs (46 per cent), NH_3 (16 per cent) and SO_2 (10 per cent), whereas NO_x remained constant and CO_2 and waste flows still increased (13 per cent and 7 per cent, respectively) (RIVM, 1993). The World Bank has reported strong delinking for sulphur oxides, lead and particulate for all OECD countries since 1970 and for NO_x since 1980 (World Bank, 1992). Several other references confirm such trends, at least for certain types of pollutants (see, for example, Shafik and Bandyopadhyay, 1992; Binswanger, 1993). Research on dematerialization to a certain degree discloses similar tendencies. Several studies reveal decreasing material and energy intensity in a range of OECD countries, especially during the period 1950–80 (see, for example, for energy, Bossanyi, 1979; Chesshire, 1986; and, for materials, Larson *et al.*, 1986; Tilton, 1990).

It is worth observing that each of these studies refers to single pollutants and single materials, but the aggregated developments of several pollutants or materials together are not analysed. It might be the case that materials substitution fully accounts for the perceived dematerialization and hence one should speak of 'transmaterialization' only: a shift from materials that the study focuses on to unobserved ones. Wadell and Labys (1988) present results that indicate that such material shifts have been taking place during the twentieth century. To exclude the possibility of transmaterialization, it is important to include a more complete aggregate of materials consumption. Few empirical studies analyse such

aggregates over time. Those that do aggregate on the basis of mass and give a comprehensive estimate of the total materials flows as inputs in an economy, albeit the results are too fragmentary to compare developments over time and among countries. Moll (1993), using a less comprehensive aggregate of materials (steel, cement, paper, aluminium, copper, zinc and plastics), finds that for the US economy, the aggregated material intensity has been decreasing since 1970. However, if volume (measured in cubic metres of materials) rather than weight is taken into account, no decreasing intensities can be found. Jänicke *et al.* (1989) have used an aggregated indicator representing the volume of throughput. Comparing 1970 and 1985 for a set of 31 COMECON (Council for Mutual Economic Assistance) and OECD countries, they concluded that economic growth seems to be delinked from this aggregate for the more developed economies. To be precise, the analysis indicates convergence of aggregate materials consumption between countries but not per se absolute delinking. Jänicke *et al.* (1989) also found that the correlations between per capita GDP and the *TI* (throughput indicator) for the whole sample was much less significant and showed a much smaller slope in 1985 than in 1970; this they interpreted as another sign of the process of delinking through structural change. If we assume that *TI* captures the developments of dematerialization satisfactorily, then strong dematerialization – that is, $dM/dt < 0$ and $dY/dt > 0$ – with associated absolute reductions in the level of materials consumption has been found by Janicke *et al.* in, for example, France, Western Germany, Sweden and the UK, whereas other countries were undergoing weak delinking with the associated decline in the M/Y ratio; some Southern European economies, such as Greece and Portugal (and all COMECON economies), would still have increasing M/Y ratios.

The overall picture these analyses suggest is a rise of the environmental burden in the low-income economies of Europe and a drop in the environmental burden in the high-income economies of the OECD. This has been further proposed as reflecting an endogenous tendency to delink with rising income or GDP per capita by Jänicke *et al.* However, more elaborate empirical investigations cast some shadows over these bright prospects. For instance, to test the delinking hypothesis, De Bruyn and Opschoor extended the analysis of throughput *à la* Jänicke *et al.* by taking a longer period of study (1966–90) and by using time series analysis. For a sample of 20 countries, the observed trend to delink is indeed manifest from 1970 until the early 1980s. However, for several countries environmental pressure appears to have been relinked with the environment since the mid-1980s (De Bruyn and Opschoor, 1994; see Figure 19.1).

The EKC could not be reaffirmed: the relationship between economic growth and environmental claims can probably better be described as 'N-shaped'. Right now the OECD countries may be entering a phase of relinking. This type of empirical work is very much in its early stages and has not been applied widely enough – nor is it verified adequately – yet others seem to be beginning to derive similar results with different data sets.

Moreover, EKC, insofar as they exist, say very little about system-wide consequences of environmental utilization. They cannot be taken as evidence for the opinion that economic growth is sufficient to induce environmental improvement or that the environmental space is large enough to support current economic growth. Even if found, ECKs would reflect a general phenomenon; they suggest a reduction of metabolism only beyond fairly high average incomes (De Bruyn *et al.*, 1994) which, given the current levels and distribution of income and people, would entail environmental utilization tending to keep on growing for at least a number of decades, with subsequent unsustainability.

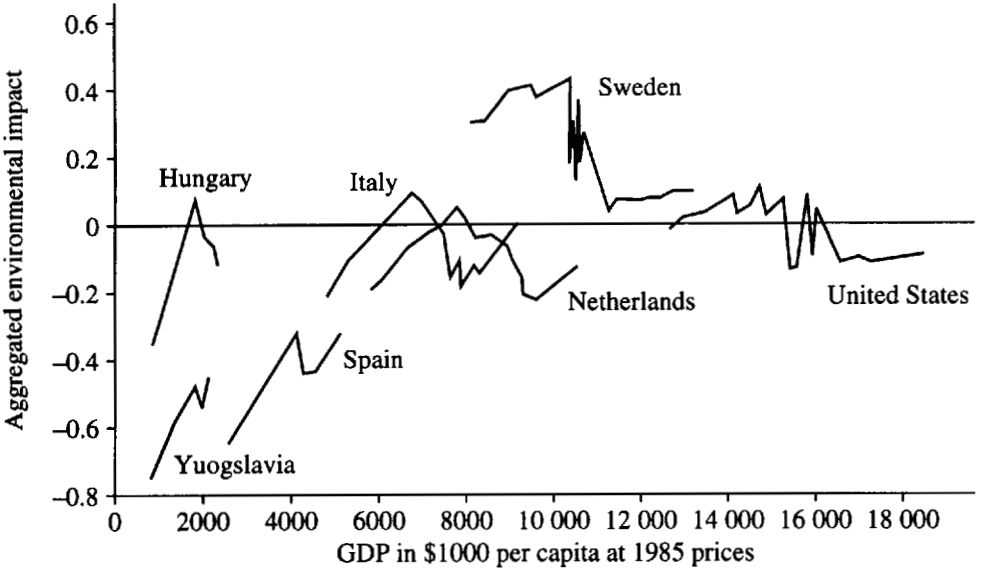

Figure 19.1 Developments in aggregated throughput index, 1966–90: three-year moving averages of aggregated environmental index for selected countries

Thus the message of recent empirical analysis may be that endogenous delinking does not appear as a process which is stable or persistent under conditions of sustained economic growth. Sustained growth is not necessarily sustainable.

ACCELERATING DELINKING

Essentially, delinking comes about through a reduction of the environmental pressure embodied in a good or service and/or through a change in the pattern of production and consumption that gives rise to a reduced overall level of metabolism. Earlier in this chapter, we saw that some forces inherent in economic development processes may actually induce spontaneous dematerialization or relative delinking, even to the extent that this may lead to situations of absolute delinking. We have also seen that there may be theoretical grounds for fearing that such periods of absolute delinking might come to an end as technological innovation dried up or became so costly that the economic process would give up investing effectively in enhancing metabolistic efficiency at levels above the economic growth rate. Moreover, even in empirically established cases of eventual absolute delinking, the turning point might be so high that extrapolating these turning points to the global economy would still not create a perspective of sustainable economic development patterns at the global level. And, if our allegedly broad-brushed predictions on the level of economic activity to be expected around 2040 are not too far off, then over the next 40 to 50 years very substantial reductions in throughput intensity will be required.

We have seen that the institutional setting surrounding and supporting factual processes of economic growth and development is important in understanding the forces underlying

the actual changes in the level of metabolism. The market mechanism drives most global economic activity with environmental significance through price signals that it generates and transmits to consumers and producers. It could be expected that to the extent that prices adequately capture all relevant environmental costs, and if market processes are flexible enough, delinking would be a (near-) spontaneous, endogenous development within the economic process. However, if these prices do not capture all relevant costs or if markets operate imperfectly for other reasons, sustainability would not be the automatic result of economic growth. In this section we focus on the institutional aspects of furthering delinking.

Key elements in any strategy to achieve, maintain and accelerate delinking have to do with (1) the stimulation of technological innovation towards cleaner and leaner processes and products, and (2) the diffusion of these new technologies to countries with positive links between economic growth and environmental pressure. These are two rather obvious and much discussed strategies and they will not be elaborated here. It goes without saying that environmentally friendly innovation will be fostered by direct stimuli such as subsidies and budgets for research and development, and by indirect stimuli such as higher charges for environmental degradation and prices for energy and materials, and rising willingness to pay for greener products. An important third element (as is shown in several examples of successful innovation) is an environmental policy that is transparent and predictable, in that it has laid down its targets for the next decade and that it shows its intention and powers to achieve those targets (for example, by using 'innovation forcing standards'). Diffusion of technologies with reduced metabolism could be furthered by international schemes for 'joint implementation' by rich and poor countries of pollution reduction, by stimulating 'leapfrogging' through the installation of new technology in developing countries, through subsidization of its purchase or enforcing its use by international companies investing in these countries, and so on. But is has to be acknowledged that many of the tactics referred to have been tried in the decades behind us and applying them gradually more intensively may not bring about the all but marginal changes that are required if current economic growth patterns are prevailing. Internationally concerted 'crash programmes' of innovation, backed up by unusually strong incentive schemes, are likely to be necessary.

Amongst the factors favourable to the generation of more environmentally friendly technologies are some that point at government intervention with market forces: subsidies, regulations and standards, and pricing policies. And such approaches are needed even more when the second approach towards delinking must also be taken: changing patterns of production and consumption. Let us look, at a more general level, at some environmentally relevant aspects of the performance of market-based approaches to economic development and how these environmental repercussions can be taken into account.

For a long time (since Pigou, 1920) it has been clear that economic activities induced environmental problems without taking them into account. This has since emerged as one of the most relevant manifestations of market imperfections or 'market failures' leading to a divergence of economic growth and social and economic welfare. Kapp (1974) saw in these, not just a divergence at the periphery of the economic system, but the reflection of a mechanism of potentially devastating significance operating in any market-based system: that of 'cost shifting'. Cost shifting is a process that economic agents are inherently inclined to use: in order to survive in competitive circumstances they must operate at minimal costs to themselves (private costs), which means that they will try to shift as much of the overall

or social costs of production onto others, as external effects. In unregulated markets and in situations where the relevant property rights are not defined well or allocated equitably, this will lead to pervasive losses of welfare. Unsustainability or environmental costs and the effects of overexploitation of natural resources are illustrations of this mechanism. Market-steered economic development in the past has indeed given rise to changes in patterns of consumption (and hence of production) that may – haphazardly – have been environmentally benign, owing to differences in income elasticities between different goods and the declining marginal utility of various materials-based products. But, unless environmental consciousness is explicitly sharpened and raised to levels where it is affecting consumer preferences and firms' housekeeping practices and choices of technologies, these endogenous forces are likely not to be strong enough, as the empirical evidence quoted above suggests.

These observations on external effects give legitimacy to intervention on behalf of society at large in market processes (as long as these interventions are effective and do not generate other costs elsewhere in society, offsetting the environmental gains) and even in processes of demand formation (for example, through education and public awareness campaigns). This is the more so when the interests of future generations are at stake (as, for example, in the case of irreversible losses of environmental resources or qualities) and/or when there are divergencies between knowledge as to the consequences of certain environmental changes and the perception of these by economic agents (the so-called 'merit good' argument). Interventions in market processes may take a range of forms, including regulation of markets or market processes (by zoning, standards, quota and other forms of government policy) and market-based attempts at addressing market failures (such as changing and articulating property rights, and charges and taxes on pollution and resources). In attempts to reduce the metabolism of economic activity and accelerate delinking especially, those instruments may be preferred that succeed in getting throughput to show up more in prices (for example, energy taxation, caps on depletion through quota, direct stimulation of innovation and diffusion of new technologies, and bans on products with toxic components). Strategies aimed at *IM* will typically be linked to analyses of materials cycles through economic and environmental systems based on materials balance models and on product life-cycle analyses. They will focus on inputs rather than pollution. A more elaborate institutional analysis of the determinants of metabolism and the processes of delinking and relinking leads to a programme of intervention with elements such as the following:

- sharply defined and internationally agreed limits to environmental degradation, programmes for the exploitation of non-renewable resources and quotas on the use of renewable resources, based on assessments using a precautionary or safe standards approach;
- instruments aimed at curbing unsustainable levels and patterns of consumption, trade in environmentally relevant goods and bads (waste), and so on; and encouraging radical technological innovation;
- charges, preferably green taxes related to major flows of materials (especially energy);
- social instruments to affect preference formation;
- policies aimed at creating an overall climate conducive to the emergence of concerns with sustainability: poverty alleviation and debt-relief programmes; mechanisms for

the transfer of intellectual property rights; mechanisms and procedures for moving towards a more equitable access to natural resources and the benefits of economic activity.

CONCLUSIONS

In order to make the economic process one that is inherently secure and sustainable, the metabolism between the economy and the biosphere must be such (in level, composition and distribution) that it is compatible with the environmental space with which the biosphere provides mankind. Given prevailing tendencies of growth of production as well as human population, this implies that the current levels of metabolic efficiency are to be reduced drastically. This process has been referred to as 'dematerialization' and 'delinking'.

As was already to be expected on qualitative grounds, delinking does not appear empirically as a process which prevails or persists under conditions of economic growth as we currently know it. So there is no reason to feel assured that future growth will induce developments such that the economic process will 'endogenously' confine itself to the environmental space – which would suggest reductions in throughput intensity of, say, 80 per cent on a unit of income level over the next 40 years. Sustained growth is not necessarily ecologically sustainable; the opposite may be more likely.

To become ecologically sustainable, delinking will have to be persistently higher than economic growth rates, which involves two things: first, a tremendous amount of eco-efficient innovation (substantially cleaner and leaner technology) and, second, a shift away from relatively environmentally demanding consumption patterns towards more ecologically benign patterns and lifestyles. This cannot be expected to come about without institutional changes allowing regulatory intervention in market processes on behalf of society at large (including future generations) aimed explicitly at accelerating delinking by focusing on the main elements of throughput and on reducing their societal relevance.

A future agenda for environmentally relevant social sciences would focus on (1) determinants of processes of innovation and diffusion of technology and impediments to innovation and diffusion; (2) determinants of processes of change of consumption patterns and impediments to such changes; and (3) new possibilities for intervention in or regulation of economic processes in a globalizing and liberalizing economy.

NOTE

1. Current population levels in North and South are at one and four billion respectively, average income levels (1990) at $US 20 000 and $US 1000, respectively, and growth rates at 2.5 and 5.5 per cent per annum. Total income in the base year would then be $US 24 000, growing to close to $US 129 000.

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20. Politics and the environment in the UK and beyond

Tim S. Gray

THE POLITICAL DISTINCTIVENESS OF ENVIRONMENTALISM

In seeking to understand the connection between politics and the environment, the first question to be answered is whether there is anything distinctive about environmentalism as a political ideology. Is environmentalism a political ideology in its own right, distinct from all other political ideologies, or is it simply an added-on extra doctrine that can be yoked to virtually any political ideology? The answer to this question depends on whether a radical or a reformist perspective is taken on environmentalism. Radical environmentalism (dark green; ecologism or ecocentrism) is an autonomous political ideology, independent of all other political ideologies. Reformist environmentalism (light green), on the other hand, can be easily absorbed into other political ideologies. Let us consider these two forms of environmentalism in turn.

Radical environmentalism, as Dobson points out, takes as its starting point the notion that 'the Good Life is much different from the one we presently lead', and that in order to achieve it, we must:

> restructure the whole of political, social and economic life ... It is in this sense that ecologism can properly take its place alongside other political ideologies; in common with other political ideologies it has things to say across the whole range of political, social and economic life. Ecologism cannot be seen as simply embedded in other political ideologies – it is a political ideology in its own right. (Dobson, 1990: 3)

In its vision of the good life, uniquely among political ideologies, ecologism dethrones humanity from centre-stage in the universe, rejects the enlightenment trust in technological rationality, and dismisses contemporary political goals of economic growth and consumerism. If ecologism is a political ideology in its own right, where does it stand on the left/right spectrum of political ideologies? Rootes, along with many other writers, associates ecologism with the left: 'In most cases, Green party members and voters alike incline, in varying degree, towards the left of the conventional political spectrum' (Richardson and Rootes, 1995: 248). Eder, on the other hand, claims not only that ecologism is on the right of the political spectrum, but that it supplies for the first time a coherent ideology of conservatism:

> As an ideology, ecology complements the other currents of liberalism and socialism ... It thus takes the place that has never been really filled by conservatism. Conservatism has never succeeded in developing its own ideology – it has never been an ideological current. Rather, it reacted to other ideological currents ... This open position in the field of ideological currents is going to be

> filled for the first time in modern history ... This conservatism is no longer pre-modern, looking back into a past, and trying to restore it. It is a modern conservatism (and probably the first modern conservatism), based on the principles of keeping a lifeworld threatened by man's use of nature, defending the lifeworld against the bureaucratic and technocratic rationality of organized systems and defending people against the risks the environment poses for them. (Eder, 1996: 207, 208)

Other writers argue that ecologism is impossible to situate on the left/right spectrum. Richardson, for example, asserts that 'Greens cannot be seen in conventional left–right terms since it is impossible to place a biocentric philosophy or party on an anthropocentric spectrum' (Richardson and Rootes, 1995: 9).

If radical environmentalism is difficult to place on the conventional left–right political spectrum, reformist environmentalism can be located at any point on that spectrum. Reformist environmentalism takes as its starting point the notion that the good life lies in progressively extending to everyone the benefits which can be obtained from exploitation of the bounty of the earth. It adopts the anthropocentric notion that the earth is available for human purposes and that we must carefully protect it from damage in order to ensure that it can sustain and enhance human life for the foreseeable future. This instrumentalist view of other species and natural objects leads reformist environmentalism into a '"managerial" approach to environmental problems, secure in the belief that they can be solved without fundamental changes in present values or patterns of production and consumption' (Dobson, 1990: 13).

Reformist environmentalism paradigmatically embraces the notion of 'sustainable development', popularized by the Brundtland report, which requires that 'development ... meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987: 8). Whether this is a right-wing or a left-wing position depends on what interpretation of sustainable development is adopted. Pearce *et al.*'s (1989) interpretation is right of centre; Redclift's (1992) interpretation is left of centre. In its right-wing guise, reformist environmentalism endorses the notion of 'ecological modernization', developed by Weale, which postulates that economic growth is not only compatible with environmental protection, but is actually enhanced by it: 'Instead of seeing environmental protection as a burden upon the economy the ecological modernist sees it as a potential source for future growth' (Weale, 1992: 76). This is because a protected environment provides a better context for long-term economic development. For example, a protected environment bequeaths less cleaning-up costs to future generations; there are new market opportunities in environmentally friendly products; and the best workers want to live in clean environments.

In its left-wing guise, reformist environmentalism embraces the concept of 'environmental justice'. This signifies a recognition that, as Gare puts it, 'It is the poor who suffer most from pollution, in their workplaces, where they live and even where they holiday' (Gare, 1995: 82). Tracing the origin of the environmental justice movement in campaigns in the USA against the siting of polluting plants in black ghettos, Hannigan shows how this 'environmental justice movement has expanded its charter to incorporate the exploitation of Third World peoples'. Using the ethical language of rights, this manifestation of reformist environmentalism applies it to 'civil rights' or the rights of minorities, by contrast to radical environmentalism, which applies it to the 'rights of nature' (Hannigan, 1995: 125, 126).

WHY HAS THE ENVIRONMENT BECOME SUCH A SALIENT POLITICAL ISSUE IN RECENT YEARS?

Having discussed the first basic question – is environmentalism a distinctive political ideology? – we must now discuss the second: why has the environment become such a salient political issue in recent years? Evidence that the environment *has* become a salient political issue is provided by opinion poll data, electoral results, environmental pressure group activity and consumer behaviour.

First, opinion poll data shows that in many western countries public concern about the environment rose dramatically during the 1980s. For example, in the UK in 1989, 18 million people classified themselves as environmentally conscious shoppers (Garner, 1996: 65). Similarly, in the USA, the 'all-time' high in 17 years for public opinion supporting environmental protection was 1987/8 (Portney, 1992: 26). However, opinion poll evidence also shows that public interest in the environment waxes and wanes rather sharply. For example, 'between May and June 1989, the proportion of people rating the environment as the most important issue rose from 17 per cent to 35 per cent' (Garner, 1996: 65). Downs (1972) and Solesbury (1976) have offered convincing explanations for these fluctuations, arguing that there is an issue–attention cycle, which has the following phases: (1) the public's attention is grabbed by some environmental event or crisis; (2) the public demands some action; (3) the government responds, if only by pointing out the expensiveness of environmental solutions; (4) the public's attention wanes; and (5) the issue slides off the political agenda, until the next environmental event or crisis occurs. On this interpretation, we can expect such cyclical fluctuations in public interest in the environment to continue in the future. In other words, the environment will always vary greatly in salience as a political issue. However, Burke (1995) argues that we should distinguish between 'salience' and 'latency'. While it is no doubt true that the environment moves up and down on the immediate political agenda (salience), he claims that there is a constant, if slow, long-term increase in popular concern for the environment (latency). If this is so, this bodes well for environmentalists since it means that, despite day-to-day fluctuations in public attentiveness, environmentalism has now become a permanent imperative bearing down on politicians. As Burke puts it,

> This means that, although the immediate pressure on the government for environmental improvement may vary, there is a general feeling among the public that the government's action is too little and too late. Polling evidence indicates that the public sees a big performance gap between what they are encouraged to expect and what they actually get. I think that in the near future – say, over the next five years – a great deal of what will shape governmental environmental policy will be the pressure to close this perceived performance gap. (Burke, 1995: 14)

Second, the evidence from electoral results is also mixed. It shows that, although several dozen national green political parties have been formed since 1972 in First World countries, only 14 of them have succeeded in obtaining one or more green MPs between 1979 and 1989. Moreover, the level of electoral support for green candidates at national elections during the 1990s has varied between only 0.5 per cent (UK) and 8.3 per cent (Iceland). Furthermore, in the 1994 elections to the European Parliament, the green groups obtained a disappointing 23 MEPs (in 1989, they had obtained 27): the British vote was only 3.2 per cent, compared to 14.9 per cent in 1989 (no green UK MEPs were elected on either occasion).

At local levels, it is true, green parties have often performed better than at national level. For example, in the UK local elections of 1994, green candidates in contests involving at least four candidates polled 8 per cent on average in London, and 5 per cent on average in England outside London. In Germany, the Greens (Die Grünen) held the balance of power in the Hesse Parliament in 1983–7, in coalition with the SPD. Other examples of green power balancing include Liège in Belgium (1982–8); Nord–Pas-de-Calais in France (1992–4); and Tasmania (1989–91), while in Sweden in 1990, greens held the balance of power in 40 of the 284 local councils (Young, 1993: 32–3, 40). But there is little sign of this local success translating to the national level.

Third, the environmental movement has grown rapidly during the last 30 or 40 years. This has occurred on a worldwide scale, but especially so in the UK, where membership of the eight biggest environmental groups during 1971–89 rose from 218 000 to 3 147 000 (nearly a 15-fold increase), that is, to over 5 per cent of the entire population. In the 1990s, it is true, there has been a decline in membership of some environmental non-governmental organizations (ENGOs), though Garner (1996: 65) argues that 'there is nothing to suggest that this is anything more than a transitory phenomenon caused, perhaps, by the recession'. The enhanced activity of ENGOs has also been evident at the international level. Indeed, Buttel and Taylor (1994: 247) argue that ENGOs have now replaced social justice NGOs in combating developmentalism.

Fourth, consumer behaviour is another guide to the salience of environmental issues. For example, in the UK the success of the Body Shop, selling cruelty-free cosmetics, was a symptom of this shift towards ethical shopping. Another symptom was the interest in organic farming. These shifts were galvanized by the sell-out success of *The Green Consumer Guide* (350 000 copies sold in 1988). As a result, many manufacturers and retailers sought to cash in on this trend by launching green products such as CFC-free refrigerators, unleaded petrol and recycled paper handkerchiefs. Moreover, they tried to improve their green image by conducting environmental audits, informing the public about how environmentally friendly their productive and marketing policy processes were (Young, 1993: 72–3). Although much of this was short-lived media hype, it did have some residual impact upon commercial practices. Moreover, as Young notes, ENGOs were not slow to recognize that green consumerism was a powerful weapon for them to exploit:

> Groups like FoE saw this interest in green consumerism as an opportunity to influence company behaviour by persuading people to buy environmentally-friendly goods. Their greatest success concerned CFCs. They encouraged people not to buy aerosols containing CFCs. Consumption of CFCs in Britain halved between 1986 and 1989. (ibid.: 71)

This completes the first step in answering the question posed at the beginning of this section, reviewing the evidence on whether the environment has in fact become a salient political issue. We have seen that, although the evidence is not conclusive, it broadly supports the assertion that the environment is now permanently on the political agenda of western electorates, if at a variable level. The second step is to examine the reasons for this having occurred.

The most obvious explanation is the public's growing awareness of environmental degradation as the result of much-publicized media coverage of environmental disasters and near disasters, such as the nuclear fall-outs from Chernobyl (1986) and Three Mile Island (1979), pollution caused by oil spills such as those from the *Torrey Canyon* (1967) and the *Exxon*

Valdez (1988), industrial explosions such as Bhopal (1984) and holes in the ozone layer (1985), together with the publicity given to scientific evidence of acid rain, and air pollution caused by transport. This growing awareness of environmental degradation is in part also due to the increasing effectiveness of environmental groups in stimulating public interest.

However, lying behind these factors there is a deeper explanation for the rise in political salience of environmental issues – that of post-materialism. Originating with Inglehart, the post-materialist thesis holds that, since 1945, there has been a shift in values amongst members of the middle class, who have enjoyed international peace and growing rates of prosperity in western societies, from material to non-material goals, including the wish to enjoy a clean environment: 'Once an individual has attained physical and economic security he may begin to pursue other, non-material goals' (Inglehart, 1977: 22).

How convincing is the post-materialist thesis? In its support, we can point to a higher degree of environmental concern during periods of prosperity and a lower level during periods of recession. For example, in Britain during 1988–91, there was a surge in environmental concern, culminating in a wave of green consumerism, which coincided with an inflationary economic boom. After 1991, the subsequent recession saw a sharp downturn in the public's concern for the environment. Inglehart's thesis could account not only for these short-term fluctuations in salience, but also (and perhaps more convincingly) for what Burke (as we have seen) has described as the long-term secular rise in latency of environmental concern in increasingly prosperous, postwar western societies. It may also help to explain the different levels of environmental concern in different countries of the developed world. For example, in Europe there is a contrast between the prosperous northern and the less prosperous southern countries with a higher degree of environmental concern in the former (Richardson and Rootes, 1995: 14–15).

However, the post-materialist thesis has been heavily criticized. First, why should growing affluence lead to a shift in values to non-material ends, rather than to an increased demand for more affluence (Garner, 1996: 68)? Second, even if a shift to post-materialist values has occurred, is this necessarily due to increasing affluence? Writers such as Cotgrove and Duff (1980: 340–44) have argued that it is due more to occupational changes, such as the postwar expansion of public-sector employment, where the ethos is less materialistic and more idealistic than in the private sector. Third, the post-materialist thesis cannot account for the growth of environmental concern in countries outside the First World. For example, it cannot explain the growth of environmental consciousness in the Third World (Hannigan, 1995: 25–6; Buttel and Taylor, 1994: 233); nor can it explain the growth of environmental consciousness in the Second World, that is, East European states, before 1989. Such countries were not affluent, yet in them there was during the 1980s a high degree of environmental awareness – so high, indeed, that it contributed to the unrest that overthrew some of the communist regimes. As Rootes explains, the reason for environmental movements generating so much support in pre-1989 Eastern Europe was political, not economic factors; it was a 'safe' form of political protest (Richardson and Rootes, 1995: 233). Fourth, the post-materialist thesis has been criticized by writers such as Beck (1995), for overlooking the fact that it is greater insecurity rather than increased affluence that has fuelled more recent interest in the condition of the environment.

IN WHAT WAYS HAVE POLITICIANS RESPONDED TO THIS INCREASED SALIENCE OF ENVIRONMENTAL ISSUES?

In this final section, we consider three ways in which politicians have responded to the increased salience of environmental issues: (1) by espousing green rhetoric, (2) by greening their parties and (3) by enacting green policies. First, politicians everywhere have adopted the language of environmental concern. For example, Prime Minister Thatcher, who was not previously known as sympathetic to environmentalism, declared in a famous speech to the Conservative Party Conference at Brighton in 1988:

> we Conservatives ... are not merely friends of the Earth – we are its guardians and trustees for generations to come. The core of Tory philosophy and the case for protecting the environment are the same. No generation has a freehold on this Earth. All we have is a life tenancy – with a full repairing lease. And this Government intends to meet the terms of that lease in full. (McCormick, 1991: 60)

Similarly, Richard Nixon, also not previously noted for his pro-environmental credentials, said, when signing the US National Environmental Protection Act in 1970, 'the 1970s must absolutely be the years when America pays its debt to the past by reclaiming the purity of its air, its waters and our living environment. It is literally "now or never"' (Dowie, 1991/2: 69).

Second, politicians have responded to the increasing salience of environmental issues by adding green elements to the political programmes of their parties. This has occurred in many European countries, where mainly left-wing parties in particular have responded sympathetically to environmental overtures, as a result of which they have drained away support from erstwhile green political parties (Richardson and Rootes, 1995: 17–18, 242, 246).

In Britain, during the 1980s, the two major political parties (Conservative and Labour) explicitly set out to green their agendas (Robinson, 1992). In the case of the Labour Party, the greening process took the form of policy documents and conference resolutions on the environment, including support in 1986 for a new Ministry of Environmental Protection. But neither this proposal nor many others found their way into Labour's General Election Manifesto of 1987. Labour's environmental image was for many years stained by having a staunch pro-nuclear figure – Dr John Cunningham – as Shadow Environmental Secretary. Moreover, the Labour Party remains constrained by its unreserved adoption of the goal of economic growth and by its close links with trade unions who are suspicious of environmentalists as middle-class threats to working-class jobs.

Labour's 1989 policy statement, *An Earthly Chance*, was more a knee-jerk response to Mrs Thatcher's green conversion than a genuine commitment to green principles. In the 1992 Labour Party Manifesto, scattered references to the environment made up less than one page out of 28, and although some specific environmental pledges were made (such as the creation of a new Environmental Protection Executive and a Green Book auditing the environmental impacts of all government policies) the Manifesto also contained plans for an economic recovery programme which made no reference to its potential environmental impact (Carter, 1992).

In the case of the Conservative Party, the greening process took the form of a dramatic about-turn by Mrs Thatcher in 1988, when she announced (as we saw above) that Tories were conservationists and the natural guardians of the environment. Building on the few

environmental initiatives that she had taken earlier (such as the creation of Her Majesty's Inspectorate of Pollution in 1987, her agreement in 1988 to implement the EC acid rain directive, and the Agriculture Act (1988) which set up the Environmentally Sensitive Areas (ESA) Scheme whereby farmers were paid to protect the environment rather than to produce food) Mrs Thatcher's conversion to environmentalism led to a spate of environmental initiatives in the late 1980s and early 1990s (see below) and to the replacement of Nicholas Ridley (who was notoriously unsympathetic to environmental issues) by Chris Patten (who was an enthusiastic environmentalist).

However, many of these initiatives were seen by critics as mere window dressing, in that they failed to address the central issue of establishing a genuinely strategic and integrated approach to environmental management. Moreover, like the Labour Party, the Conservative Party remained constrained by its links with its patrons – in its case the industrial, business and farming communities, which vehemently opposed environmental restrictions. Critics noted that Patten's reformist zeal was thwarted by the combined opposition of industrial lobbies (especially transport) and Whitehall (especially the Treasury and the Department of Transport), who were particularly worried by his advocacy of a carbon tax (Young, 1993: 59). And when it became clear that the environment issue had lost its potential salience among the electorate in 1991/2, the Conservative Party downgraded its significance in its campaign strategy for the 1992 General Election, restricting it to half a page out of 50 in its Manifesto (Carter, 1992: 444).

No such constraints limit the Liberal Democratic Party, however, and partly as a result, the Liberal Democrats' programme is greener than that of either of the two main parties. Its greener image is also due to its inheritance of environmental principles from the Liberal Party, although these were much diluted in the 1983 and 1987 General Election Manifestos by Dr David Owen, the leader of the Social Democratic party, who 'regarded Liberal radicalism on environmentalism in general, and on nuclear issues in particular, as electoral handicaps' (Garner, 1996: 140). However, the efforts of the Liberal Democrats to raise the profile of environmental issues at general elections has signally failed, and in 1992 it virtually abandoned its strategy of featuring the environment as one of its three main campaigning issues (Carter, 1992: 444). Indeed, says Garner, despite the increased party political interest in the issue of environmentalism, 'the environment has not figured prominently in any general election' in Britain (Garner, 1996: 146).

The third way in which politicians have responded to the increasing salience of environmental issues is by enacting green policies. We can see this response at four different levels: local, national, regional and global.

Local Politics

At local level, in Britain, the picture is very varied. The power of local authorities to protect the environment has been significantly increased by the Environmental Protection Act 1990, and enterprising councils such as Kirklees, Lancashire, Leicester and Sutton have been quick to take advantage of their enhanced powers, producing environmental audits and developing processes for ESAs. Some councils have even joined forces with EU environmental groups to press national governments for action. Following the Rio Earth Summit, UK local authorities were asked by the government to draw up local Agenda 21s by 1996. However, in many local councils, few of these initiatives have been pursued with much vigour.

National Politics

At national level, a plethora of environmental legislation has been created in many countries across the world. For example, in the 1970s both the USA and Japan added scores of major laws to their statute books – on air, water and land pollution. In America, the most important of these laws were the very strong Clean Air Act 1970; the National Environmental Protection Act 1970, setting up the Environmental Protection Agency (EPA) and requiring environmental impact assessments (EIAs) for all federal programmes; and the Clean Water Act 1972, which imposed national standards on effluent discharges. In Japan, 14 pieces of pollution legislation were introduced in the diet by Prime Minister Sato in December 1970 alone; in 1971, the Environmental Agency (EA) was set up; and in 1973, the strict Chemical Substances Control Law was enacted. By 1980, both the USA and Japan were world leaders in environmental policy making.

In Britain, the equivalent period of legislative activity was in the late 1980s and early 1990s. In 1989, the National Rivers Authority was created and Mrs Thatcher hosted an international conference on the problem of ozone layer depletion and insisted on putting the issue of the environment on the G7 Economic Summit agenda. Also in 1989, the government produced a landmark White Paper setting out a new strategy on environmental policy that led to the Environmental Protection Act 1990, which both rationalized much previous legislation and established it on the basis of new principles (integrated pollution control; polluters require authorization; and BATNEEC – best available technique not entailing excessive cost). In 1991, a mode of environmental impact assessment (EIA) was enacted in Britain, implementing an EC directive of 1985 whereby all major projects, such as motorways, open cast mines, power stations and oil refineries, were to be subject to EIAs and would not be approved unless they satisfied stringent tests on their impact on air, water, land, human and natural habitats, and even cultural heritage. In 1996, a new Environment Agency (EA) was established, combining Her Majesty's Inspectorate of Pollution (HMIP), National Rivers Authority (NRA) and waste disposal activities of local authorities.

However, critics have pointed out that claims by national governments of environmental success are often misleading. In the first place, much environmental policy making is of comparatively recent origin – especially in Britain. Second, much environmental policy is deliberately vague and imprecise, lacking specific targets and goals. Again, this is characteristic of Britain's approach, which avoids making firm commitments, preferring a more flexible and pragmatic style of environmental managements. Typically,

> the government's much-heralded White Paper on the environment – *This Common Inheritance* ... listed more than 350 measures already in place. It made various proposals but few new commitments. It did not really address global issues and was criticized for its unimaginative approach by *The Times* and many others. Environmentalists saw it as a missed opportunity. (Young, 1993: 58–9)

Third, the opposite extreme is also evident, in that some governments deliberately set overambitious targets or impose unattainable restrictions in an effort to placate public opinion, knowing full well that extensions of time will subsequently have to be granted when public pressure has eased off. As Cahn (1995: 78) wrote of US environmental policy makers, 'both air and water policies were enacted with strong standards and strict deadlines – even though few legislators expected compliance'.

Fourth, much environmental legislation is poorly enforced because of lack of political will and inadequate resources given to enforcement agencies. It is notable that, in the USA's EPA, Japan's EA and Britain's EA, staffing levels are seriously below the level necessary for them to perform their enforcement role satisfactorily.

Fifth, much environmental legislation is initiated for non-environmental reasons. For example, in the case of the UK, most environmental measures taken by the British government during the last 10 years have either been adopted to 'dish the greens' or have been imposed by the EU, rather than enforced for their environmental value. Moreover, in Britain there is little evidence of a considered attempt to view the environment strategically and to develop a fully integrated policy for its protection. Political expediency, not environmental commitment, has been the driver of British environmental policy making.

Sixth, in some cases, environmental targets have been met accidentally, rather than as a result of government policy. For example, Britain is likely to meet its SO_2 emission targets set by the EU for the year 2003 mainly because of the switch from coal-fired to gas and oil-fired power stations, which has been brought about partly as a result of Mrs Thatcher's revenge on the miners and partly because natural gas and oil have become cheaper than coal. Environmental considerations played a very minor part in this switch.

Seventh, in some important areas of policy, little or no environmental improvement is discernible. For example, in the case of Britain, until very recently, the transport ministry stubbornly resisted the greening process, insisting in its 'Roads for Prosperity' programme on spending £12 billion on road building in order to relieve congested motorways. There has been little or no attempt to address the fundamental question of how to reduce the expected growth in road traffic of between 83 per cent and 142 per cent from 1989 to 2025.

Regional Politics

At regional level, the most important body enacting green policies is, of course, the EU. Now into its fifth Environmental Action Programme, the EU is by far the most effective generator of environmental legislation in the world: nearly 300 pieces of environmental legislation have been issued by the European Commission, all of it binding on member states. Part of the original intention of the Action Programme's environmental legislation was to preserve environmental protection for its own sake, and part was to preserve the economic level playing field:

> by the early 1990s, environment had become one of the fastest growing areas of European policy. EU environmental legislation had risen from a mere five directives a year in the mid-1970s, to over thirty by the 1990s, with DGXI (Environment Directorate) being characterized as a legislative factory. (Ward, 1996: 11)

The Single European Act (SEA) 1986 introduced qualified majority voting (QMV) into environmental decision making, thereby making it more difficult for a small group of states in the Council of Ministers to block environmental measures. It also gave more influence to the European Parliament (EP) since, under the cooperation procedure, the EP has to consider council decisions reached by QMV. The EP has a greener complexion than does the Council of Ministers and, although it cannot reject council decisions, it can delay them to give a longer period of time for ENGOs to organize more effective opposition to them (Garner, 1996: 121–2).

However, as Ward points out, 'the period since Maastricht has been a disappointment in the environmental sector. The optimism of the late 1980s and early 1990s seems to have waned. Since 1993, doubts have emerged about the effectiveness of EU environmental policy and the motives of polity actors dealing with environmental policy. In short, environmental policy seems to be on the defensive, marked by a steep decline in the amount of new environmental legislation, the comparatively poor implementation and enforcement of existing legislation, the failure to integrate environmental concerns into other areas of the Community policy as has been required since the SEA, and the lack of progress in implementing the goals of the Commission's guiding environmental policy document, the Fifth Environmental Action Programme Towards Sustainability' (Ward, 1996: 12).

The endorsement by the Maastricht Treaty (1992) of the principle of subsidiary has meant that some environmental issues will go back to the member states to deal with. Furthermore, little progress has been made with the vexed questions of implementation and enforcement. Member states have the duty to introduce EU environmental directives into their domestic legislation and then to enforce them, but there are many hundreds of cases of failure to do so, not only because of wilful obstruction, but also because of genuine difficulty in reconciling EU legislature with domestic legislation (for example, in Germany and the Netherlands). Britain's record of compliance is above average (contrary to popular belief), though the UK is often strenuously opposed to the Directives in the first place (Garner, 1996: 122–4).

Global Politics

At the global level, we have seen an explosion of international environmental regimes (IERs) established during the last 25 years, all seeking to persuade nation states to take steps to protect the global environment. One of the most successful regimes has been the Vienna Convention on ozone layer depletion, through which nearly 60 states have signed up to an agreement to phase out CFCs by the year 2000. This is only one of 152 international environmental agreements now in force, most of which have been established during the last 20 years.

How effective are these IERs? They vary. Some of the more specific ones (such as the Vienna Convention, the Convention on the International Trade in Endangered Species (CITES) and the International Whaling Commission (IWC)) have been successful, but the more open-ended ones (such as the Climate Change Convention, only ratified by 14 states so far, though signed by 160) have been less successful. This is partly because, in the open-ended cases, there is less consensus about environmental causes and effects (for example, global warming is still a highly problematic concept). Moreover, all IERs must deal with the problem of the differential level of sacrifices of states required to make the regimes work. They also face a dilemma over strategy: either they make the rules and targets very strict, which results in very few countries complying with them, or they make the rules and targets very flexible ('lowest common denominator' approach), which results in little progress with the problem. The solution is generally to adopt the latter approach at first, but then gradually to ratchet up the rules and targets in successive years.

Many writers are very critical of IERs. For example, French notes the 'growing discrepancy between apparent success as measured by the increasing number of international environmental treaties and other agreements and the deteriorating state of the biosphere itself'. She also points out 'the wide gap between official rhetoric and actual implementation' (French, 1995: 8).

CONCLUSION: CRITIQUE AND PROSPECT

Our conclusion is the rather pessimistic one that the relation between politics and the environment is one in which the former has largely subsumed the latter in order to protect itself from subversion. That is to say, traditional political institutions have succeeded so well in 'managing' the environmentalist threat that it has become too emasculated to mount a serious challenge to mainstream politics. The result is what Gare calls 'cosmetic environmentalism' (Gare, 1995: 162).

Grove-White explains that while, on the surface, it appears as though government and industries have absorbed the demands made by environmentalists, they have only addressed the physical, not the deeper, social and cultural, dimensions of environmental problems:

> Modern politics, in responding to public concerns about the adverse *physical* impacts of these trajectories, have found the wider critique largely unpalatable. Indeed, as a reading of almost any official statement of environmental policy will confirm, the very *definitions* by government and industry of how 'environmental' issues are to be understood exclude, deliberately, any sense of that critique. One result is that, over the past decade, NGOs and Green parties have found themselves drawn ineluctably to become part of the body politic – but (for the most part 'innocently') on terms which have largely neutralized the wider important messages their original emergence implied for society, about the chronic cultural tensions of 'late modernity'. (Grove-White, 1996: 281–2)

Hajer makes the same point: 'Behind the official "rhetoric" of ecological modernisation one can discern the silhouette of technocracy in a new disguise that stands in the way of implementing "real solutions" for what are very "real problems"' (Hajer, 1996: 253). For example, by issuing endless policy documents with the words 'Sustainable Development' in their title, the UK government may have succeeded in persuading the public that it has a serious environmental agenda. But the often bland and opportunistic nature of the contents of these documents is deeply unsatisfactory, even to light green, let alone dark green, critics. In the view of such critics, the UK manifests only the political rhetoric of environmental policy making: gesture politics. As Young (1993: 65) puts it, 'Britain has no policy for the environment. During the late 1980s and early 1990s, it added an environmental gloss to different aspects of policy.'

Many writers note the great contrast between the widespread recognition of environmental problems, on the one hand, and the failure of both people and their government to be willing to take the necessary steps to deal with those problems, on the other. Garner concludes, pessimistically: 'The spark that seemed to ignite widespread concern for the environment in the mid-to-late 1980s has failed to keep the fire alight as we approach the end of the century, and yet the problems remain equally acute' (Garner, 1996: 188–9).

A similar interpretation is given by Cahn in relation to the USA. Cahn argues that American environmental policy makers are engaged in 'symbolic politics' – they design environmental policy more to reassure the public than to improve the environment.

> Environmental policies are consciously engineered both to create and to satisfy public demand. The public articulates vague needs, which are then adopted by policy makers who respond with specific goals, cueing public opinion into 'attainable' policy options. Public demand is then satisfied with relatively soft regulation ... As such, environmental policies are designed to deal with problems that have been consciously oversimplified. It is in this sense that the policies are symbolic'. (Cahn, 1995: 2)

The same charge has also been levelled at international environmental regimes:

> It is true that there are an increasing number of environmental organisations, institutions, protocols, agendas and charters, yet all this should mostly be best understood as purely symbolic action. Environmental regimes provide an opportunity to legitimize a world order that, despite the idealistic hopes of some, remains resolutely wedded to the productivist paradigm of the industrial revolution. (Maynard, 1995: 2)

It is difficult to believe that we are likely to see, at least in the near future, a significant diminution of this tendency to play politics with the environment.

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21. The evolution of the relationship between ecologism and nationalism

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INTRODUCTION

This chapter on the relationship between ecologism and nationalism has three different approaches which, in turn, correspond to three successive historical periods. In the first section we adopt a somewhat *static analytical perspective*, which corresponds to the birth of the ecologist movement in the 1960s, in order to investigate the similarities and differences between the central paradigms and movements of both ecologism and nationalism. The second part focuses on the confluences between the two movements, situating us at the transition point between the 1960s and the 1970s. Finally, beginning with the 1990s, we attempt to generate some *hypotheses* regarding the relationship between both movements, centring on the symbiosis between them.

THE 'STARTING POINT'

In Table 21.1, the features of the two movements are defined and compared. Before we explain the variables (those which we consider to be the most relevant ones) in the table, we must first make some observations. The table provides a static vision of the two movements, describing the panorama of a hypothetical moment at the beginning of the 1960s, what we could call the starting point for the confrontation and convergence of the two movements, and in which earlier developments are not highlighted. On the other hand, we also have to make clear what type of ecologism and what type of nationalism are described in the table.

From within the three cultural references, or discourses, into which the ecology movement is divided (subordination of people to nature: deep ecology; separation of people and nature: conservationism; constructive relationship between people and nature: political ecology)[1] we have chosen the characteristics of the dominant current political ecology, although certain of its characteristics undoubtedly apply to the other two tendencies. In the case of nationalism we include both positions or orientations: the nationalist movement which rejects the legitimacy of the existing state because it demands for itself, and for the community it claims to represent, another definition of 'national' and 'political loyalty'; and the nationalist movement which, from within the existing state, tries to construct and maintain the legitimacy and corresponding national loyalty to that state.[2] As we shall see, the most interesting confluences between ecologism and nationalism are found in the first model of nationalism, the model of opposition.

Table 21.1 Definition and comparison of the main features of ecologism and nationalism

Variables	Ecology	Nationalism
Historical period	1960s–20th century	18th century
Origin, basic structural tension	Nature–society conflict	New–old legitimacies of political power
Main objective	Harmonious relationship between people and nature	Change of community and political loyalties
Space–time strategy	Universal, final outcome undeterminable	National limits, end determinable
Constituent and divergent features	Defensive reverential attitude towards nature	Identification of a territory and its natural or transformed surroundings
	Defence of diversity	Selection of ethnic features (language, religion, history)
	Oriented to putting pressure on political power	Oriented towards the exercise of political power
	Tendency not to identify the movement or group with the society that is proposed	Tendency to identify the movement with the national community
	Tendency to inclusivity	Tendency to exclusivity
Confluent cohesive features	Interclassism	Interclassism
	Group feeling and affirmation	Community feeling and affirmation
	Flexibility, informality, 'egalitarianism'	Organizational flexibility, 'egalitarianism'
	Alternative shared daily life	Practice of collective rituals
	Defence of local natural environment	Defence of national natural environment
Ideologies and dominant cultures	Modernity, progressiveness, libertarian thought	Enlightenment, romanticism, modernity, conservatism, pro-development

Going on now to analyse the variables in the table, we have to begin by setting out what we consider to be the four paradigmatic axes. *Historical origin and causes, basic aim and timescale* are differences which seem resistant to change. The ecology movement is comparatively recent. Its aim is to change the relations between man and nature, to search for universal ecological harmony, and in principle it has no deadline for its activities, given that

degradation of the environment, or at least the risk of it, will always exist. Nationalism is a movement which has been in existence for centuries. Its field of play covers the relations between state and community (the community which constitutes itself and demands a state or the state which converts its community into a nation) and in principle, once their spatially limited national conflict is solved, the nationalist movements disappear.

If we examine *the constituent and divergent features*, we can see that, although these movements are divergent when they emerge, it would not be impossible for them to evolve towards convergence. It is necessary to distinguish ecologism's positive attitude towards nature in general from nationalism's identification with a determined territory and the particular nature contained within it, regardless of its degree of degradation or conservation. However, it is perfectly possible that certain ecological movements, although they might hold to a universal discourse, actually focus their demand-centred activity on a space with defined boundaries (it should not be forgotten that, for ecologist movements, local conflict constitutes a first cause in a chain), just as nationalism evolves from identification with a determined territory to the defence of a determined natural environment. In these new situations, there is an emotional identification with the natural harmony, the environmental balance, of a territory. The nation is not only a physical space. It is a beautiful immaculate space, because nature, virginal since the beginning of time, physically and symbolically expresses the pure eternal character of the nation. Thus a momentum towards ecologism is produced insofar as the nationalism incorporates the protection of a particularly defined nature into the identity of the nation to be constructed.

On the subject of diversity, ecologism defends biodiversity, it considers as something positive the existence of multiple and diverse natural species, while nationalism defends 'autodiversity', the right to be different. These are different strategies, given that nationalism does not set out to stand up for the other differences (though it may consider them to be legitimate): it just defends its own. In any case, it seems that there might exist a common philosophy in the two movements: rejection of the levelling perversion of the universal and defence of the particular as a diversifier.

Key differences are drawn in their orientation towards political power, but it is not clear that these are of a permanent nature. Ecological movements can base themselves upon parties which exercise some quota of power (see the case of the European green parties), and nationalist movements opposed to the established states are, in many cases, closer to constituting fighting social movements than to being drawn into party political electoralism. Areas – or moments, to be more exact – may, and do, appear where there is confluence.

The last two features (non-identification/inclusion and identification/exclusion) remind us of dominant but not inevitable tendencies in both movements. In nationalist movements, while identity boundaries tend to be relatively permanent, objectives may become more flexible, whereas ecologism appears to have fixed objectives but more dynamic identity boundaries.

There are also coincidences – *confluent cohesive features* – in both movements, although we do not believe that coincidences of this kind are important enough to determine confluence at an operative level. Many of them seem to be rather of a cohesive kind, with the function of 'lubricating' or propelling the maintenance or increase of group or community cohesion, previously defined in its constitutive features. Nationalism's defence of the 'national natural environment' operates here as a characteristic which is in origin only secondary, of a cohesive type. But, as we have seen, it could also be the result of a

development and transform itself into a constituent feature. We can say, therefore, that these features make the relationship easier, but they are not sufficent to achieve a meaningful confluence. That will only come about through the transformation of those features we have defined as constitutive.

Finally, the cultural frameworks – *ideologies and dominant cultures* –which have nurtured the two movements reveal important differences. Thus, in the two great currents which converge in the coming together of nationalist doctrine, the objective–traditional line has been more successful than the subjective–democratic one. The romantic discourse proved to be more 'seductive' than the connection with the Enlightenment. In contrast, ecologism, in its historically dominant options, is historically aligned with libertarian anti-traditional culture, a defender of individual autonomy. Historical nationalism, on the other hand, identifies modernity with the state. The state, already achieved or sought after, is the instrument with which national development will be achieved. For ecologism, modernity is expressed in societal will, in the willingness of the subject to construct an environment tailored to man. However, as we shall also see, certain ideological developments of nationalism have made specific convergences possible.

CONFLUENCE BETWEEN ECOLOGISTS AND NATIONALISTS

Confluence arises because a new political context makes it possible, and at the same time gives it impetus. There is a change in the structure of political opportunity and, most importantly, a new cycle of protests begins, which favours the relationship between the two movements. And this happens because they both have a keen awareness of the crisis of the nation-states that arose in the postwar period, and also feel themselves to be particularly implicated in and affected by that same crisis. The ecology movement comes into being because, among other reasons, the pro-development policy of both eastern and western states proves to be ecologically unsustainable. The nationalist movement gains new vigour, and acquires new forces, in resisting the attempts of the state to homogenize and to create uniformity, or, more probably, as a response to the failure of those attempts. The two movements have a common enemy, the state. And they share the same criticism of the state: its structure or its anti-democratic attitude.

It is the state that prevents the ethnic communities from forming themselves into nations. It is the state that stands in the way of a pacific and harmonious relationship between nature and society. In the East, it is even the state which blocks the demanding of such rights. Thus, even though democracy is the demand that brings both movements together, the call in the East was for democratic liberties (liberal democracy) and in the West for greater effective capacity to take part in political decisions (participatory democracy). This conjuncture was to favour and to give impetus to the coming together of the two movements. At the same time, as we shall see in the examples studied later, this grouping takes on different forms.

There are two political dynamics which have favoured the confluence between the two social movements. First, in the different cases studied we can observe convergence in the process of conflict with state elites. Opposition to the regimes in Madrid, London or Paris, in Moscow or Belgrade, had powerful effects. The discourses and campaigns directed against central governments were reciprocally reinforced by the success of nationalist and environmental movements elsewhere. The existence and the mass public confirmation of nationalist

demands, demands which were no longer just memories and which were taken up in the street, brought about, or in some cases, as we shall see, cleared the path for, the coming together with the environmentalists. Lack of democracy was the thread which linked the two movements together.

From the 1960s, the West entered a strong cycle of social mobilization (Tarrow, 1994), a result of wide-ranging discontent with the results of capitalist development. The exaggerated preponderance of 'economics' in thought and action, as well as of technological and commercial development and productivism, led, on the one hand, to critical social and political imbalances with associated responses and, on the other hand, to ecological catastrophes – the result of seeing the environment as merely the container of great riches and economic resources. Indeed, the commodity culture and the 'goddess productivity' produce an abstract cosmopolitanism, where the quality of diversity is replaced by the uniformity of quantity (Mendizabal, 1995). This holds true in the capitalist West as well as in the 'socialist' states.

Second, the dismemberment of the Soviet Union and later that of the Yugoslav Federation meant the opening of a 'Pandora's Box'. In some of the republics which achieved their independence in 1991, it was nationalist winds which blew with the greatest force to bring down the one-party regime. In other cases a resurgence of nationalism was not the first impulse for confrontation with metropolitan Moscow or Belgrade. Rather, these demands were formulated after other democratic or ecological conflicts, and a new social discourse, not previously held by the majority, was elaborated.

This bipolar concept, which groups together respect for and recovery of the environment and the capacity of a people or ethnic group for self-determination, has spread powerfully throughout the new states and republics of eastern Europe. For the 'new' ecologists, the notion of sovereignty is linked to the natural image from the ethnoecological principles of variety and identity of ecosystems. This is also expressed in the right to life and the self-determination of ethnic groups and nations, in order to be able to determine their ecological responsibility, destiny and environmental approaches towards survival and development.[3]

NATIONAL AND ECOLOGIST PROTEST IN EUROPE: THE CASES OF ESTONIA AND EUSKADI[4]

We have chosen Estonia and Euskadi because, of the different countries in which there has been a confluence between nationalism and ecologism – in the former republics of the East, the Ukraine, Slovenia, Georgia, Latvia, Lithuania and Bulgaria, as in the stateless nations in the West such as Catalonia, Corsica, Brittany, the Canarics or Scotland – these two cases seem to us the most representative.[5]

Estonia

The transition process in the Baltic republic of Estonia was faster than in other countries in the East and relations between Estonian nationalist forces and the new ecological movement consisted of a mutual acceptance of positions and obvious parallels or convergence in their public discourses.

Estonia was an independent republic from 1918 to 1940 and that historical experience, alongside the legacy of the German and Soviet invasions and the repression and massive

deportations ordered by Stalin at the end of the Second World War, was to be etched indelibly into the Estonian collective memory. A great part of that memory was kept alive in exile.

When, in 1985, the taps of *perestroika* were turned on and certain actions and social practices were allowed, it was the ecologist movement (Eesti Roheline Liikumine – Estonian Green Movement) that first organized civil protest against Moscow's energy plans for the open-cast bituminous oil-shale mines which put at serious risk the water reserves of the Estonian plain. Right from the start, the ecologist discourse was charged with an implacable nationalist logic which laid each and every one of their misfortunes and ecological problems at the door of the authoritarian one-party system imposed by Moscow. In Estonia, the popular movements which appeared in1987, led by the ecologist movement – or to be more accurate by the environmentalist mobilization of a movement with national tradition, culture and features – meant the restoration of previously absent structures of civil society. It meant the renaissance of the free Estonian nation and the restoration of democratic values via the non-violent road that led to the setting up of a new independent state in summer 1991.

Today that high cycle of mobilization, when national aspirations moved in tandem with ecological ones and were voiced in unison, amplifying the effects of its pressure, is now over. The Estonians have achieved national independence, but social demobilization and a lack of alternative movements to the new national bureaucracy are part of the political panorama. The most important politicosocial conflict is the integration of the Russian minority, conditions of access to nationality and the political rights of Estonians. To quote, 'before it was the Red Army with its nuclear submarine bases and its armaments industry which was the greatest anti-ecological factor. Now the most dangerous source of pollution is the "Russians" who live in Estonia'.[6] In short, the new situation makes it clear that the previous alliance between ecologists and nationalists in Estonia was tactical. In the new era of national independence, it has been given a wide berth.

Euskadi

From the multiple examples in the West, the Basque case seemed to us the most revelant. The establishment of a liberal democracy in Spain after Franco's death in 1975, unlike events in certain ex-Soviet republics (among them, as we have just seen, Estonia), did not solve the unsettled national questions within the Spanish state, or answer the demands of the Basque nationalists. Thus the Statute of Autonomy for the three Basque provinces (Gipuzkoa, Bizkaia and Araba), which was passed in November 1979, channelled but did not resolve the national question. Indeed, the conflict remained, and still remains, open. This is not only because a significant section of Basque nationalism radically rejects the Statute of Autonomy and demands full sovereignty for Euskadi (the armed organization ETA is one of the groups of this nationalist conglomerate, the self-styled Basque National Liberation Movement – MLNV), but also because wide sectors of the population consider it insufficient.

Within this context of nationalist confrontation, at the end of the 1970s different social movements came onto the scene. One of these was ecologism which, using the dominant cultural frameworks available in Basque society (nationalism, an anti-repressive culture resulting from the Franco era, participatory/democratic ideology), along with others 'imported' from developed, post-materialist Europe, confronted the autonomous and central authorities, in alliance with other left-wing and nationalist organizations. Thus, for example,

the campaign against the nuclear power station in Lemoiz is symptomatic in that the slogan chosen by the Basque ecology movement was '*Euskadi ala Lemoiz*' (Euskadi or Lemoiz). This makes explicit the conjunction of the anti-nuclear question with nationalist discourse. Closing the power station meant reaffirming the sovereignty of Euskadi against the nuclear and centralist Spanish state.

Moderate Basque nationalism (represented by parties involved in running the Regional Government) has basically opted for a pro-development model, which means that environmentalist policies have, as a consequence, been marginalized and always subordinated to projects of infrastructural development. In contrast, what is quite particular to radical Basque nationalism is that, from its beginnings, its choice has been to incorporate within its ideological framework certain cultural references and particular demands which come from the progressive camp (socialism, defence of the workers' movement, new social movements and so on). As a result of this, the Basque ecological movement looked for an alliance with left-wing nationalism since its wide social base offered the social networks and the necessary alternative discoursive resources for it to be able to have a certain social success.

This is not to say that the ecological organizations and groups think and act in a way completely subordinated to the national project of the MLNV,[7] rather that the majority of them support two of the basic postulates of radical nationalism: that there is a lack of national sovereignty in Euskadi and that that leads to a strategy of open social and political conflict.

From this convergent perspective, in ecologist campaigns against the development of infrastructure (motorways, reservoirs, the high speed train, the superport and so on), discoursive resources can be observed which similarly condemn the contempt shown for Basque national feeling (the lack of sovereignty – the submissiveness of their own authorities in the face of the dictats of Madrid or Brussels) and the ecological impact that would result if such plans were imposed. We could say that the lack of a resolution to the national conflict in Euskadi means that ecologists and left–nationalist organizations take part in united action and with harmonized discourses because of the accumulative resonance which they bring to each other.

The confluent relationship between the nationalist and ecologist discourses has amplified the mobilizing capacity and the reach of the discourse of both these social actors, even though it is the ecologists who have benefited most from this convergence. The national conflict is permanently latent in Basque society and that allows it to serve as an effective amplifier for ecologist demands coming from post-materialist, anti-development or anti-capitalist positions.

The differences between the cases of Estonia and Euskadi could be represented as depicted in Figure 21.1. In the Estonian case, the deep nucleus of collective identity is strictly nationalist and Soviet state repression forces the nationalist message to be delivered in a 'hidden' form within the ecologist discourse. The environmentalism is explicit and the unity of discourse of the two movements makes it easier to use the ecologist package of demands as a starter motor or to open up the road along which nationalism can ride. In this sense we may say that the principal 'master frame' – the nationalist one – both from the beginning and in a conjunctural way acts with an implicit resonance. The population of Estonia mobilized against Moscow, not just over some anti-ecological plans, but because in this way, through its collective action, it was defending itself aginst the supreme enemy of the Estonian nation, the Soviet state.

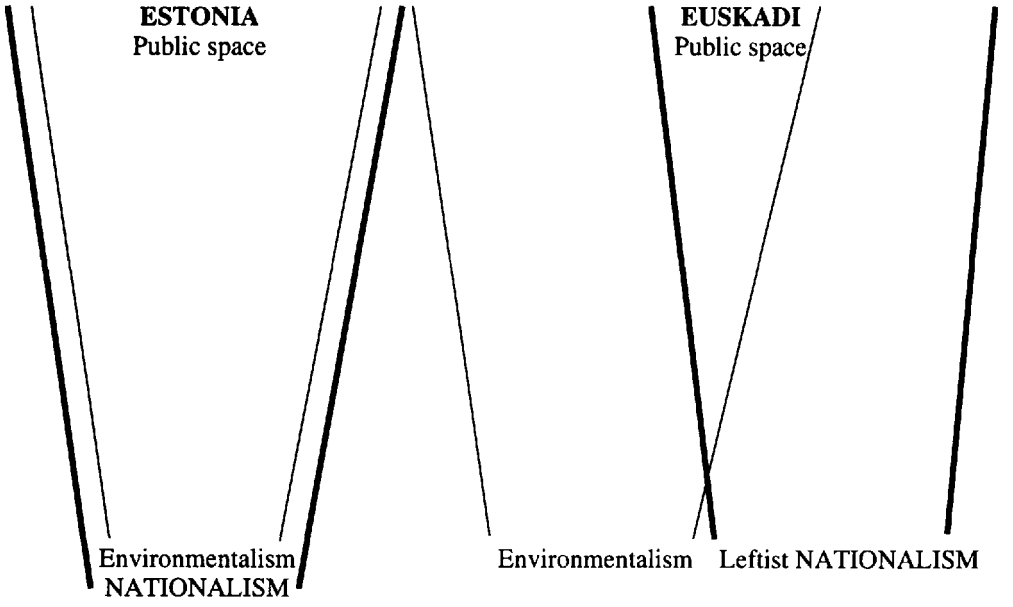

Figure 21.1 The different relationships between environmentalism and nationalism in Estonia and Euskadi

In Euskadi, the most important organizations and campaigns of the ecology movement, as a result of a series of coinciding factors, connect up with the identity or, in some cases, simply the strategy of radical nationalism, while preserving, at least in part, their independent discourse and their autonomy. What is different here is that the proposals of Basque ecologism penetrate the leftist nationalist movement, and in turn come to form a distinguishing mark of that movement's identity.

The fact that, in the Basque case, the transition is unfinished and that nationalist demands have not come to an end makes possible the continued existence of a broad area of confluence between nationalist and ecologist demands. Although there is no guarantee that the movements will be fellow travellers within a future scenario of national sovereignty, the long period of time during which they have acted together reveals a greater level of harmony than that achieved in countries like Estonia where, after a brief coming together, environmental discourse was displaced by the powerful national discourse of the new state.

To sum up, as we have seen in the examples chosen, it can be stated that, in the East, any confluence is born more of political expediency than any real coincidence of content. There are tactical coincidences but, at the heart of things, the constitutive features of the movements remain uninfluenced. In contrast, in the West, insofar as the case selected serves as a representative sample, a deeper confluence can be observed. The fact that this is greater in the West than in the East is due as much to the longer period of cohabitation the movements have experienced while fighting the state as to another relevant circumstance: in the West certain ecological movements converge more deeply with nationalist ones, because some of the latter opt for a progressive anti-capitalist (or, at least, anti-development) ideology, a choice that is not made among nationalist movements in the East. The point is a relevant one

because it makes us aware that nationalism does not naturally drift into taking up the constituent postulates and features of ecologism. Beyond favourable coincidences and conjunctures, in order for there to be confluence, an express will, a specific and in no way inevitable ideological option must exist.

Lastly, it must be stated that this confluence does not imply symbiosis, in that the differences in chronological and structural origins remain. This is true even though their contours may become more flexible or less rigid under the influence of the interpenetration of constituent features. But for a symbiosis we have had to wait for a new, more recent phase.

THE SYMBIOTIC PHASE: ECONATIONALIST SUBJECTS AND DISCOURSES IN THE 1990s

The fundamental essence behind the gradual integration of nationalism and ecologism resides in the way that the process of modern historical development has driven forward the confluence between the social, political and ideological elements that they may have originally had in common. Each and every one of the cold waves of modernization has forced human beings to look for protection in a kind of a warm and intimate thought, so as to be able to give reassurance to the remains of a destructured identity. And basically, ecologism and nationalism are part of that comfort.

Nevertheless, today the panorama is more complex. Now that the last phase of modernization has been opened up, the process of internationalization and globalization has multiplied the discourses within the ambit of interrelation between ecology and nationalism. Not only are the integrating responses of the previous phases maintained and reproduced, but also new solutions arise for the existential vacuum and tangible damage produced by modernization, in the shape of thought systems and subjects that interrelate ecology and nationalism in an even more intimate, almost symbiotic way.

Although we will describe the most typical characteristics and discourses of all the subjects who operate in the space of 'econationalist' interaction, we devote special attention to the new offshoot born from the fusion of the two ideologies, ethnoecologism, and one of its political expressions, popular radical ecologism. Ethnoecologism, understood as an ideology or a system of thought, is a result of the evolution of ethnoecology, a theoretical discipline developed from anthropological, ethnobiological and agroecological approaches whose principal objective is: 'The ecological evaluation of the intellectual and practical activities that a certain human group executes during its appropriation of natural resources' (Toledo, 1992).

Starting from this principle, ethnoecology considers the theory and praxis which each human group constructs in its relations with nature (ultimately, its identity); it respects myths and sets of beliefs; it has abandoned a Eurocentric perspective and has tried to see with the eyes of the human group being analysed. For these reasons, ethnoecology has gone from being merely one more facet of scientific knowledge to having an ethical, moral and political edge. Finally, the objective seems to be, not simply to study, but to introduce and defend those productive systems which favour 'sustainable' rural development. To a certain extent, ethnoecologism already existed; ethnoecology met up with it, and has become its main champion. In this way, ethnoecologism has both become a system of critical thought and has given a name to a new radical, popular and resistant subject.

Characterization

What could the following have in common: the indigenous movements of Latin America, the Jharkand people in India who defend their depleted woods, and the African tribes in Zimbabwe, who are recovering traditional survival methods? Basically, as Taylor (1995) points out, they may coincide in three areas.

1. The same understanding of diagnosis and denunciation. Environmental degradation poses a threat to their cultural and physical survival. The next step is to decry the abuse of land: in the first instance, their land.
2. The same understanding of the causes: the effective cause is disproportionate economic growth and industrialization. Those objectively responsible are the foreigners who misuse other people's land, and the nation-states which, in their own country, embrace the same short-term philosophy.
3. The same understanding of the solution: 'New Rationality', a combination of tradition and modernity. Recovery of the land and the administration of it according to local ecological wisdom, complemented by modern knowledge. In the political sphere, a new scale of government based on local autonomy, as opposed to the restrictiveness of national and international powers.

Ideological–discursive References: Deep and Political Ecologism, Global and Local Thought

Ethnoecologism, in its most generic reading the sum of neonationalist postulates and a certain popular ecologism, has at least two quite different ideological bases. Such ideologically diverse influences inspire it with a specific conception of two symbiotically united elements: popular ecologism and 'neonationalism'.

In our initial characterization, we highlighted a referent which could be considered progressive, left-wing or, for certain authors, radical. The analysis according to which identity, along with the land one is settled on, is sacked by international traders and financiers and their allies in the national elites, shares the description which the left have traditionally used of capitalist and imperialist exploitation. Moreover, the left, which for some time has known that capitalism and development did not treat workers fairly, has recently learnt that long-term growth is unsustainable, and that there is not even any guarantee that it will benefit ordinary people in the future. This 'ecologization' of the left,[8] reinforced by political ecologism, gives way to ecosocialist positions, which easily come together with ethnoecologism.

Where the neonationalist discourse is concerned, it is intrinsically linked to the ecologist one, and ethnoecologism gives it support in its radical referent. This discourse will in many cases be based on identity, local, even rural, but rarely xenophobic. It will be liable to connect up with a progressive globalism which it is perhaps better to call, accepting classical terminology, 'solidaritist internationalism'. Nevertheless, we cannot deny that ethnoecologism also takes on (or may do), other ideological components which are nearer to more traditionalist positions, both in its reading of ecologism as a local/global dilemma, and in its acceptance of nationalism. As to the content of its popular ecologism, we must not forget that, from its conception, the religious–moral element has been essential, and not a mere

justification. The ethnoecologists, as partisans of deep ecology, prefer natural communities, as autonomous and decentralized as possible. The intimate, almost mystical, spiritual bond with the earth is also a common element.

Moving on to the reading that ethnoecologism makes of the claim for identity, a certain kind of ethnoecologism, or indeed any kind, may find itself influenced by discourses with an anti-modern content, and on occasion feel in tune with localist and exclusivist positions that reject human rights or base themselves on a certain planetary ecocentrism, such as the Gaia hypothesis, according to which the Earth is defined as a single biological organism.[9] In fact we may find ourselves faced by a curious mixture in which ideas of liberation, characteristic of modernity in general (self-determination, democracy, human rights) and of the left in particular (anti-capitalism, justice, egalitarianism), fuse together with a quasi-religious, naturalistic mysticism via ecological claims for ancestral space, for the survival of a collective identity (neonationalism).

Other Discourses between Ecology and Nation

Apart from ethnoecologism, these times of postmodern chaos allow us to appreciate the discursive competition in the area of ecologism and nationalism. Figure 21.2 sets up six different discourses, contiguous in a certain way, and therefore related. Based on their essential characteristics, they adopt different perspectives in an ecologist key (political,

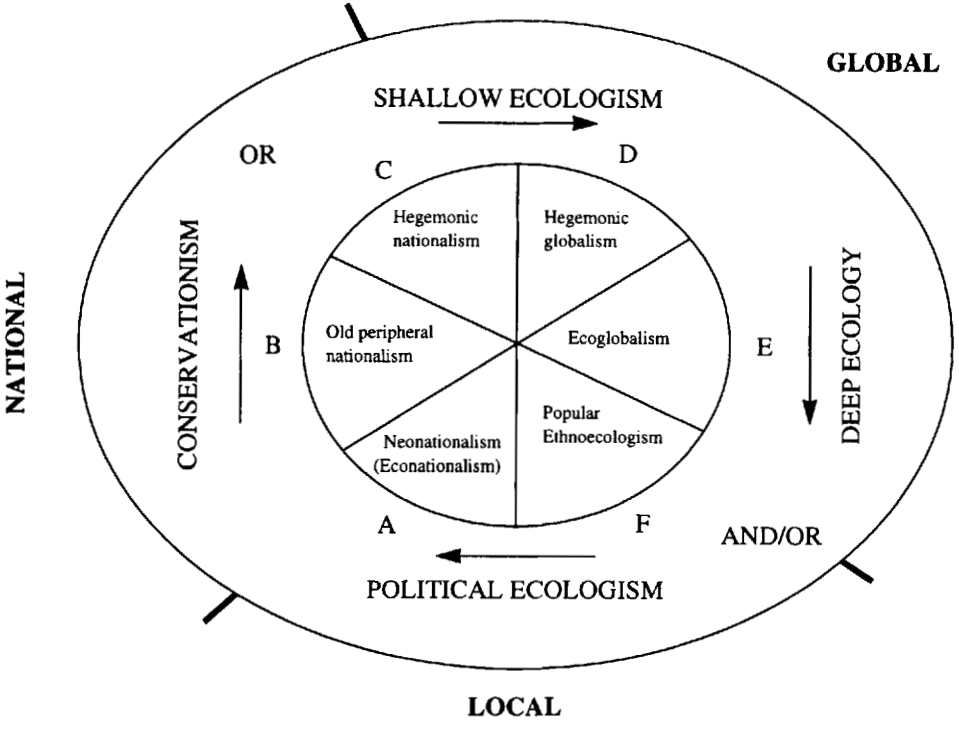

Figure 21.2 Discursive competition between nationalism and ecologism

deep, shallow and conservationist) and a spatial one (local, global and national). We have already discussed the characteristics and perspectives of 'popular ethnoecologism' in the preceding pages and therefore intend only to elaborate on the remaining categories in the rest of this section.

Old nationalism renewed

We refer here to the ideological positions or movements which, based on a classical nationalist conception that was genuinely left-wing, were led by new social movements to adopt new values. Amongst these was ecologism, whose content was assimilated to such an extent that the movements could be described as 'econationalist'. As we highlighted in the second section of this chapter, generally these are nationalist movements within Europe, and their 'ecological sincerity' has not been able to be tested in practice, once it has become state doctrine. This could also be the position adopted in the future by those old nationalisms of peripheral states or of states in a process of peripheralization, who adopt pro-development ideology in favour of the survival of identity. They generally tend to interact with the political type of ecologism, and their discourse moves to and fro between the local and the national (as the starting point or the finishing point, depending on the case). The Basque Country, Scotland and Corsica are cases in point. But, in the future, there will also be other less likely subjects.

Old peripheral nationalism

It is generally the South which does not renounce development, whether sustainable or not. In general, countries with the greatest debts are the most unsustainable and, despite their differences, they all denounce the new 'ecological colonialism'. There are some which still have something to exploit (Brasil, Malaysia, Thailand), others which are beginning to be affected by disaster on their own territory, but which cannot give up the degrees of development they have already reached (India, Pakistan), others which want to become developed powers at any cost (China) and yet others that want to move over from the nearest periphery towards the hegemonic models (the old eastern-bloc countries, regionalist administrators on the European periphery and so on). As far as the ecological discourse is concerned, in the majority of cases they have not gone beyond the conservationist point of view or mistrust towards political ecologism. In spatial questions the kind of discourse they use is based on national territory, with scant reference to the global (their main friend/enemy) or the local (normally viewed with contempt, when not subjugated by them).

Hegemonic nationalism

This is the ideological position of the most mature social, economic and political sectors within the great developed powers: USA, Japan, some European countries, and so on. These are the countries or sectors which still run the world order, for whose benefit the Rio Conference (UNCED) was held in 1992. If it is said that the globalization of environmental issues threatens the nation-states, for the moment it is the peripheral nation-states that are adversely affected, hardly ever the hegemonic ones. They move comfortably between national and global discourses, bent on the maintenance of their policy of hegemony: internal legitimization, control of the competition coming from the developing countries, demographic control, international distribution of production and work, and so on. The type of ecologism they put forward combines a conservationist content with that characteristic of

superficial, light or frivolous ecologism (shallow ecologism). Growth continues to be the solution and, as Beckerman (1995) says, 'Small is stupid.'

Hegemonic globalism

These are the First World trans-frontier sectors that are in the vanguard of the globalization process: industrial, financial, cultural and political sectors in the service of the global market, whose dynamic expansion is both the main threat to the global environment and an agent of modernization.[10] This type of ecological discourse is usually what we call 'shallow ecologism', in which the global pseudo-ecologist pose barely hides the ruthless voracity of all modernizing vanguards. The political discourse is clearly globalist, anti-local and anti-national, these two perspectives being seen as selfish and already overtaken by history. Global agendas are being set, to an ever-increasing extent, by its communicative power.

Globalist ecologism (ecoglobalism)

As a counterweight to the previous category, transnational ecologist elites also make a vanguard appearance. Depending on the particular case, their function can be seen as that of greening the capitalist vanguard. To take the case of Greenpeace, its insistence on acting at the level of the dominant public ideas, convictions and feelings distances it from real social transformation on a material level. Nevertheless, when it manages to detach itself from 'frivolous' ecologism, and gets closer to a global ecologism of a political type, it can be very effective in its denunciation of hegemonic nationalisms and the spurious alliances between peripheral elites and hegemonic globalism. Let us not forget that its 'radically soft' actions enjoy great prestige in the media. Not to leave anyone out of the party, some of them do not hesitate to take on board certain perspectives of postmodern deep ecology, generally on a global scale.

As far as the special referent of ecoglobalists' discourse is concerned, it is almost exclusively global, although it does show a certain consideration for local spaces. The implantation of criteria on a global level means that they are sometimes displaced at the lower levels. In general, they mistrust nationalist messages.

CONCLUSION: ECONATIONAL CONFLUENCES

One of the theoretical guides used to analyse the relationship between ecologism and nationalism is that put forward by K.W. Brand (1992), when he characterizes a great part of the popular movements of recent centuries as anti-modern responses to different waves of modernization. Every cycle has its response, each historical response is different and, despite the contagious nature of social processes, each country may live out its modernizing cycle in different historical moments, and therefore different anti-modern reactions, both old and new, are able to coincide in time, and even in space. That does not stop us, however, from making a superficial attempt to provide a chronological guide to these different cycles.

The Emergence of Econationalism in the 1960s

The new nationalism of the 1960s was not initially characterized so much as a state doctrine of national construction, but rather as a separatist claim from within already established nation-states. However, the nationalism of the new states which emerged from such processes did not hesitate to adopt the western development style of previous years. Their 'new national doctrines' did not differ substantially from the old idea of the nation as a modernizing/industrializing agent. Nevertheless, movements based on national claims which had been, relatively speaking, frustrated – especially in the West – were able to witness the rise of a real political ecologist movement. To be sure, after the Second World War, the western nations became agents of development, in such a way and to such a degree that the unwanted and dangerous effects of the manipulation of nature as well as the degradation of the environment began to make themselves felt.

The ecologist movement came into being apart from nationalist thought and its associated movements, but a political relationship was established to the extent that, in many cases, they took action against the same enemy: a pro-development nation-state which is also an oppressor of nations or communities without a state. The econationalist relationship is political and, as such, is based on separation and interest, the latter being more or less balanced and well-intentioned. A catchphrase to sum up this econationalist culture would go, more or less, like this: 'Our nation is mistress of her natural space, hand it back!'

Econationalism Redefined: the 1990s

From a position of power or dependence, the established nation-states are accomplices in a process of globalization which, paradoxically, will bring about their end. The nationalist doctrine coming from the state endures, but is in a state of irretrievable decline. Neonationalism comes from peoples who have not had to build their collective identity ideologically, and have seen the modern hordes reach the edges of their forest, or from the small local/rural communities in the developed nation-states which are not defended by their old masters, the states, and who see their old ways of life beginning to collapse. Against multicultural urban identity, which is defined by mass consumption, local identities define themselves in terms of their direct relationship with nature. Ethnoecologists are at the same time their natural ecosystem. In this case the catchphrase would be: 'We are our land and, if it lives, we shall survive!'

NOTES

1. In Eder's most recent work (1996: 177–80) these three cultures or symbolic packages of environmental comunication are described synthetically.
2. Nationalism is for us a movement directed towards and from political power, following in this sense both the positions of Breuilly (1993) and of other 'classical' authors such as Tiryakin and Rogoski (1985) and Gellner (1994). From this perspective we do not consider movements of cultural ethnic defence to be nationalism.
3. 'Joint Statement of The Green Parties of Georgia, Lithuania, Ukraine, Estonia and of the Greens Alliance of Armenia', pamphlet, Kiev, 28 August 1991.
4. The terms 'Euskadi' and 'the Basque Country' are both officially recognized and are used interchangeably in this chapter.
5. The observations we make below concerning these two countries are a synthesis of a number of empirical

works carried out by the authors (Barcena, 1993; Barcena, Ibarra and Zubiaga, 1994, 1995, 1996) regarding the relationship between nationalism and ecologism in both countries.

6. Our interview with a leader of the Eesti Roheline Lükumine (ERL), Tallin, December 1994.
7. There is one exception: the group Eguzki. In this case it is better to speak of a total symbiosis rather than of a confluence. Eguzki is part of the organizational framework of the MLNV.
8. Note also, as we highlighted earlier, the 'ecologization' of a certain renewed left nationalism, where the process has been even more rapid and effective; see the case of the Basque MLNV. For information on the bases of ecosocialism, see 'Manifiesto ecosocialista' (1991).Other related concepts include 'Southern Egalitarian Ecology' (Ram Guha, 1988).
9. It is possible to monitor the progressive or reactionary drift by measuring the reach and content which more recent discourses hold for each ethnoecologist movement. They are the 'witness concepts' which, like biodiversity or bioregionalism, permit the weight of progressive or reactionary referents to be gauged.
10. Leslie Sklair, 'Global sociology and global environmental change', in M.R. Redclift and T. Benton (eds), *Social Theory and the Global Environment*, London: Routledge, 1994.

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PART III

International Perspectives on Environment and Society

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22. Environmental movements and green parties in western and eastern Europe

Christopher A. Rootes

INTRODUCTION

What is an environmental movement? A vast range of phenomena have at one time or another been referred to as environmental movements or as part of *the* environmental movement. This imprecision reflects a general difficulty in the study of social movements; as well as collective mobilization, 'social movement' is a term which has been applied to phenomena as diverse as climates of opinion at one extreme to formally organized pressure groups and political parties at the other. Most attempts to impose restrictive definitions have, as we shall see, unfortunate consequences, but common sense dictates that limits must be set somewhere. For reasons which I hope will become clear, I am disinclined to include as social movements 'climates of opinion' where these are not accompanied by actual mobilization, but I include as part of the environmental movement a wide variety of organizations of varying degrees of formality as well as the 'movement parties' which have emerged from or accompanied the development of less formally organized environmental collective action. Consistent with this rather catholic approach, this chapter will, at least when considering the experience of a single country, avoid referring to competing environmental movements and instead refer to *the* environmental movement as a syndrome of movement activity embracing a wide range of often apparently disconnected forms of collective action focused upon environmental issues.[1]

This chapter considers the nature and forms of environmental concern, its cross-national distribution, its relationship to the mobilization of environmental protest, the forms of collective action to which modern environmentalism has given rise, and the varying fates of those forms of action. It attempts both to map the landscape and also, especially, to offer explanations for the patterns of variation which this mapping reveals.

The empirical focus of this exercise is Europe. Although our understanding of the pattern in western Europe is more secure, by extending the discussion to embrace eastern Europe as well, it is hoped to raise questions which will advance our understanding of these phenomena globally. The European experience of environmental movements is, of course, unique as well as varied, but certain rather obvious differences between Europe and the 'new world' of North America and Australasia, on the one hand, and 'Third World' countries, on the other, should not blind us to the fact that there are also similarities in the forms and conditions of environmental mobilizations and their outcomes. It would be instructive to reflect upon these similarities and differences, but that is a task for another occasion. Nor do I consider here the extremely important question of transnational environmental politics and the question of whether there is – or can be – a *global* environmental movement.[2]

FROM ANXIETY TO ACTION

Patterns of Environmental Consciousness and Action

Environmental consciousness in Europe appears divided about two intersecting axes, one running north–south, the other east–west. It is not, however, simply that people are more concerned about environmental issues in the north and west than in the east and south – environmental concern is nearly universal and at very high levels; where they differ is in the *kinds* of concern they voice, the *priority* they attach to environmental issues and the *forms of action* they are prepared to take in the expression of their environmental concerns.

If consciousness of environmental deterioration is a necessary condition of collective action of an environmentalist or ecological kind and/or support for environmental movements and Green parties, it is by no means a sufficient one; there is no simple correspondence between the state of environmental consciousness in a country and the level of development of its environmental movement or the electoral fortunes of its Green party. Of the countries where environmental consciousness has been most consistently high and where the environment has regularly ranked highly as a salient political issue, the Netherlands and Denmark have produced only tiny and poorly supported Green parties and, in the Netherlands, although environmental movement mobilizations have been significant in the past, the number of activists is now small even while the 'conscience constituency' prepared to give money to environmental causes is vast and growing.[3] Sweden, which does have a modestly successful Green Party, has virtually no autonomous environmental movement despite generally high levels of environmental awareness (Jamison *et al.*, 1990). Yet in other countries where environmental awareness is less highly developed – such as Belgium and France – green parties have been relatively successful even though environmental movement activity is at relatively low levels by comparison with their northern neighbours. In Italy, where levels of both general concern about the national and global environment and 'personal complaint' about the state of the citizen's own environment were higher even than in Germany (Hofrichter and Reif, 1990: 134), the environmental movement is relatively underdeveloped and Greens have made only very modest electoral progress. In the newly democratic countries of southern and eastern Europe, environmental degradation is often extreme and levels of concern and complaint are high, but the political saliency of environmental issues is low, and environmental movements and green parties, where they exist, have made little progress (Jehlicka and Kostelecky, 1995; Demertzis, 1995).

In both southern and eastern Europe, although large majorities profess concern about the environment, their environmental consciousness is more likely than in northern Europe to take the form of 'personal complaint' rather than 'global concern' (Hofrichter and Reif, 1990). The distinction between 'personal complaint' and 'global concern' environmentalism parallels, albeit imperfectly, that made between concern with the 'brown' issues of pollution and environmental hazards, on the one hand, and the 'green', even 'leafy green', concern with the preservation of what remains of relatively pristine natural environments, on the other. Crook and Pakulski (1995), examining the Australian survey evidence, found 'brown' concerns to be more widespread, but much less likely than 'green' concerns to be associated with environmental activism. The distinction also parallels that which Inglehart (1977) has proposed between materialism and post-materialism. Inglehart included the rise of environmentalism as one of the consequences of the increasing prevalence of post-materialist

consciousness, but in fact the correlation between the environmental item in Inglehart's battery and the index of post-materialism was weaker than for any other item. This suggests that the materialism–post-materialism distinction is especially problematic since environmental concerns embrace both the aesthetic and principled concern with environmental protection and the essentially materialist concerns with safety and security; even global environmental concern might be represented as an ultimately materialist concern. Nevertheless, it is post-materialism which is more highly correlated with activism.

It would clearly be wrong to assume that there was any very close correlation between the relative salience of environmental issues and people's preparedness to take practical action which can be construed as environmentally friendly.[4] In Britain, even as the relative salience of the environment as a political issue has declined dramatically (from the 35 per cent who ranked it as the most important issue in July 1989 to the 5 per cent who ranked it 'among the most important issues' in 1995),[5] the proportion preferring environmental protection even at the expense of the economy has risen (36 per cent in 1994 placed environmental protection above the economy, compared with 10 per cent who preferred the economy even at the expense of the environment). Even more remarkable is the rise in the proportion classed as 'environmental activists' because they reported taking five or more environmentally friendly actions 'in the last year or two': 14 per cent in 1988, it rose to 20 per cent in 1989 and was 29 per cent in 1995.[6]

Dimensions of Environmental Knowledge and Concern

Among the more important antecedents of concern and action is knowledge. The International Social Survey Programme in 1991–2 devised a battery of 12 (not particularly good) environmental knowledge questions which required simple true or false answers and a battery of six questions designed to measure perception of environmental threat. The results for the 1993 survey in Britain are presented by Witherspoon (1994). Levels of knowledge rose monotonically with educational qualifications, but levels of concern were more generally high. Interestingly, the most scientifically knowledgeable respondents appear, at first sight, to be less concerned than average about the threat to themselves and their families posed by environmental dangers[7] *and yet* they were more likely to be politically active on environmental issues. The explanation lies in part in the fact that it is those whose perceptions of nature are most romantic and those whose views of the environment are most pessimistic who voice greatest concern about environmental threats to themselves, their families and the environment; yet romanticism about nature correlates only modestly with support for green policies; environmental pessimism does not correlate at all. When their lesser tendency to both romanticism and pessimism about the environment was discounted, the more knowledgeable actually appeared also to be more concerned about environmental hazards (Witherspoon, 1994: 122) as well as most supportive of environmental policies and most likely to be active in environmental movements. Moreover, 'green political activists seem to have a worldview or ideology that links their environmental activism with resistance to a preoccupation with economic growth, and with sympathy for strong welfare provision. Thus ... green political activism ... is much more likely to be found among people who have a coherent ideology linking social and environmental problems and solutions' (ibid.: 128). Support for green policies even at some personal cost 'depends not only upon knowledge but upon social values ... Those who place a high value on the welfare of others and on a

collective approach to solving social problems are more likely to be willing to support environmental policies than those who do not' (ibid.: 135).[8]

Rüdig (1995a) reports cross-nationally comparative data for knowledge and concern about global warming. At first glance, the pattern of the results is paradoxical: in 1993, about one-third of southern Europeans had not even heard of global warming, yet their levels of concern were relatively high (all above EU average). In Denmark and the Netherlands, however, the pattern was reversed: levels of knowledge were high but concern was relatively low. This paradoxical finding fits British evidence of anxieties about various potential hazards.

Witherspoon and Martin (1993), analysing data from the 1991 British Social Attitudes Survey, distinguish three kinds of attitudes towards the environment: global green awareness, concern about pollution, and concern about nuclear power and hazardous wastes. Concern about pollution is spread quite evenly through the population, whereas it is especially the less well-educated and women who voice concern over nuclear power and hazardous wastes; in both cases, scientific, technical and medical professionals exhibit *less* concern than average. Global green awareness, which best approximates to an ecological world view, has a quite different social profile: scientific, technical and medical professionals are not underrepresented, while those most overrepresented are the middle-aged, the highly educated, women and people living in the south of England.

What this suggests is that there is an inverse relationship between knowledge and anxiety: people who are confident in the knowledge that they understand an environmental problem are less likely to be so diffusely – and disablingly – worried about it that they feel unable to do anything practical to contribute to its mitigation. The confidence of the scientifically and technologically educated may be misplaced, but this finding is nevertheless entirely consistent with the long-standing political sociological finding that knowledge is positively correlated with a sense of personal efficacy, and it may help explain why those countries where environmental problems are objectively greatest and 'personal complaint' environmental concern is predominant are not places in which either scientific knowledge about or action to redress such problems is widespread.[9]

But perhaps the relationship is more indirect, with knowledge about environmental issues a product of higher levels of education and/or social status, and relative lack of anxiety about environmental problems a side-effect of the generally enhanced levels of personal efficacy that flow from higher levels of education and/or social status.[10] It seems reasonable to suppose that there is a fairly close association between 'post-materialism' and 'global green awareness', on the one hand, and between 'materialism' and 'personal complaint' and fear of environmental hazards, on the other. The connection would seem to be education and, presumably, knowledge: the more highly educated have an enhanced cognitive capacity to comprehend complex environmental issues, to assess risks in relation thereto and to conceive of practical remedial action, either individual or collective. The British data (Witherspoon and Martin, 1993) confirm this: the simpler and less sophisticated forms of environmental concern were most likely to be found among the less well-educated, whilst attitudes approximating to an ecological world view were more likely to be found among the higher educated (cf. Jehlicka, 1994).[11]

However, that still leaves us with the problem of explaining the cross-national variation, both in levels of knowledge and in the incidence and forms of collective action on environmental issues. Levels of education are, broadly, higher in northern than in southern Europe

(although the differences for younger generations are now relatively small), but they are arguably at least as high in eastern Europe as in the north and west. Clearly the differences in *levels* of formal education do not suffice to explain the patterns of cross-national variation in knowledge and action. The *kinds* of education may have more to do with it.[12] The upshot, however, is that whatever we are able to say about the antecedents and correlations of the environmental consciousness of individuals does not help very much in explaining the pattern of cross-national variation. This suggests that the determinants of both consciousness and, especially, action may be highly contingent upon situation and circumstance.[13]

Knowledge and Environmental Movements

Knowledge and concern are not simply antecedents of environmental activism. Touraine *et al.* (1983: 4) described the anti-nuclear movement as 'the spearhead of the ecology movement' which transformed 'a scientific and cultural apprehension into a specifically social conflict'; a movement which began as a defensive reaction was transformed in the course of its confrontations with technocracy and ended by challenging the 'dominant image of modernity' and proposing an alternative model of development. Similarly, Blühdorn (1995) argues that a comparable shift has occurred in the course of the development of the German environmental movement, away from an alarmist and romantic concern to protect 'nature' and towards a practical and constructive ecologism.

There is a considerable body of evidence that most people do not have, and probably do not have the means to develop, systematic world views such as ecologism (Converse, 1964; Klingemann, 1979). Rohrschneider (1993), however, suggests that, where the issue domain is clear and where active environmental movements maintain the visibility of the issues, mass publics are quite capable of developing consistent ecological attitudes. Rohrschneider interprets 1980s Eurobarometer data as showing that mass publics exhibit more consistent and internally coherent ecological beliefs and attitudes in Germany and the Netherlands than they do in Britain and France. The reason, he suggests, is that in Germany and the Netherlands active and visible movements and parties have kept environmental issues high on political agenda, whereas the more moderate British environmental movement and, especially, the smaller and less visible French movement have failed to exercise a comparable constraining effect upon public opinion.

Eyerman and Jamison (1991: 66) identify three dimensions of knowledge interests: cosmological, technological and organizational. These three dimensions of the knowledge interests of the environmental movement – an ecological world view, a small-scale alternative technology and a democratic 'science for the people' – were developed separately in the 1960s and were promulgated by conservation societies, critical scientists and science students in more or less established ways. 'It was, however, only when the three dimensions were combined, in the early 1970s, in a new set of organizations by particular "movement intellectuals" that environmentalism could grow into a social movement.'

Modern environmentalism is seen by Eyerman and Jamison as a set of knowledge interests around which a social movement might be mobilized, but whether that potential is realized depends upon the interplay of knowledge interests, the political strategies of activists and their opponents, and the cultural and institutional milieu within which the interaction takes place. If, as it seems reasonable to suppose, at least at elite level, the separate constituents of the 'knowledge interests' of environmentalism have by now been diffused,

albeit unevenly, across Europe, why is it that they have been diffused *beyond* those elites to such different degrees, and why have the forms of environmental action and its degree of success varied so much from one country to another and over time?

Eyerman and Jamison distinguish sharply between traditional conservationism and modern environmentalism. This is legitimate at the level of world views but is more problematic at the level of movement organizations, their members and supporters. As Dalton (1994) discovered, even by the mid-1980s the differences in the strategies, tactics and styles of action between organizations originally animated by one or other of these world views were surprisingly muted. Clearly, a process of convergence was under way within the broad environmental movement sector, and it was by no means simply a product of the progressive institutionalization and incorporation of more radical organizations such as Friends of the Earth (FoE) and Greenpeace; if FoE and Greenpeace were learning the etiquette necessary to smooth dealings with the powerful, so more traditional conservationist organizations were becoming more ecological in their world views and more radical in their tactics.

What Dalton found, contrary to his expectations, was that, although there was evidence of the effects of environmental movement organizations' values upon their strategy and tactics, there was more – and apparently increasing – evidence of the effects of the pattern of opportunities and constraints inherent in the structures and contingent features of the various national political systems within which those organizations operated (cf. Rootes, 1997a).

WHAT IS 'THE ENVIRONMENTAL MOVEMENT'?

Brief consideration of the concept of social movement is necessary at this point, because there is a tension – and hence room for confusion – between the very precise and delimited use Eyerman and Jamison make of the term and its more usual employment in the discussion of environmental movements. Eyerman and Jamison (1991: 103–8) conceive of the modern environmental movement as that relatively brief period between the constitution of the 'knowledge interests' which define the movement and their institutionalization in university departments of environmental studies, the environmental departments of industrial organizations, law and journalism, professionalized campaigning organizations and in professionalized environmental pressure groups such as Greenpeace and political parties, including Green parties. The emergence of the movement is only possible when a new public space which allows the autonomous development of such a movement is created (in this case as a result of the new form of cognitive praxis developed in the course and as a consequence of the student revolts of the late 1960s); the movement has all but ceased to exist as a relatively autonomous public space when 'its movement intellectuals have grown into new kinds of established intellectuals'.

Eyerman and Jamison (ibid.: 59–60) explicitly caution against identifying a social movement with its organizations. A social movement is, by definition, impermanent:

> it withers away as its cognitive project disintegrates into its various component parts and they become either adopted or discarded ... And although movements usually involve the creation of organisations or the renovation of institutions, it is important not to mistake the one for the other. Organisations can be thought of as vehicles or instruments for carrying or transporting or even producing the movement's meaning, but the meaning ... should not be reduced to the medium. The meaning, or core identity, is ... the cognitive space that the movement develops ...

For Jamison *et al.* (1990: 197–8), 'to be a social movement, a collection of organizations, groups and individual activists must develop and attempt to realise a collective project, based on specific knowledge interests. It is this which gives identity to a movement and which makes it a potential force for fundamental social change.' The fragmentation of the movement into specialized groups with problematic relationships one to another raises the question of whether it is any longer possible to refer to it as a social movement (ibid.: 10), as does the tendency to the incorporation of movement intellectuals and concerns. Clearly, for Eyerman and Jamison, the notion of the institutionalization of a social movement, even in the form of a political party, is a contradiction in terms.

It is here that their conception of social movements parts company with that of Diani (1992), for whom social movements need not embody anti-institutional styles of action or attitudes, while political parties may themselves be part of a social movement. What appears most to divide Diani from Eyerman and Jamison is the latter's radical insistence on the preservation of the movement's autonomy: movements must resist incorporation, not merely in order to safeguard their status as social movements, but 'to remain an alternative source of knowledge and a force for fundamental social change' (Jamison *et al.*, 1990: 198). One suspects, however, that their characterization of even Green parties as a form of incorporation is the result of a perspective heavily influenced by their long residence in Sweden, a country whose Green Party has been unusually moderate (Bennulf, 1995a); by contrast, however, the German Greens, the disputes and defections of recent years notwithstanding, still appear to preserve something of the radical movement party and to defy thorough incorporation.

The approach Eyerman and Jamison recommend appears better at dealing with the emergence and early development of a movement – the stage at which the paramount question is what distinguishes it from other pre-existing arrangements – than with its subsequent development and outcomes. Since we are no less concerned with the latter, the more inclusive conception advocated by Diani is to be preferred. There remains a complication, however. Diani is no less insistent than Eyerman and Jamison that collective identity is a necessary condition of the existence of a social movement.[14] In the case of the environmental movement, however, the groups which comprise the network are so diverse in their understandings of environmental, social and political matters that there is little that is common in their outlooks and which might, therefore, be recognized by them as constituting their collective identity as a movement. There may be – and frequently are – conflicts among groups and individuals concerned to draw tight boundaries around themselves and to define rivals as being outside the movement but whom a social scientific observer might nevertheless regard as part of the same movement.[15] Diani's insistence upon the importance of shared identity appears to assume or to require a degree of consensus which is unusual in the fractious milieu of movement politics. It seems, then, that unless we accept a much more relaxed conception of its collective identity ('knowledge interests') than Eyerman and Jamison – and Diani – insist upon, and focus instead upon the network links, we should be compelled by definition to abolish the present-day environmental movement.

Efforts to define social movements restrictively sit uncomfortably alongside commonsense understandings of what the 'environmental movement' is. A social movement is not, however, a natural object but a social construct. For the social scientist, a social movement is a theoretical construct whose purpose is to aid explanation. Following Weber, an ideal type is an abstraction from or approximation to social reality; its relation to that social reality is

necessarily not one of precise identity. Diani suggests that there are many environmental protests which are not part of a social movement because the protesters do not recognize their shared identity with other such protesters; there may, as Touraine (1981) puts it, be many *luttes* (struggles) but not yet a *mouvement*. Yet the social scientific observer might detect the latent connections and the potential which the actors themselves at any point in time do not.

Diani's insistence upon the centrality of networks is, at first glance, less problematic. But Diani insists that social movements *are* networks. Where networks have disappeared leaving only organizations, Diani argues, there is no social movement. The problem with this essentialist approach is that organizations and networks are generally symbiotic. The fact that there may be periods of latency or quiescence in which mass mobilization is slight or absent and only the organizations are visible does not ipso facto signify the death of the movement; the British Campaign for Nuclear Disarmament survived for 15 years as a formal organization and virtually the only visible legacy of the peace movement, but its existence was crucial in providing a focus for the revival of peace movement activity in Britain from the late 1970s. Our definition should be flexible enough to accommodate such periods of latency.

Rather than adopt a very restrictive definition, it is probably more fruitful to accept that the environmental movement is a (very loose) non-institutionalized network which includes, as well as individuals and groups who have no organizational affiliation, organizations of varying degrees of formality and even parties, especially Green parties, and which is engaged in collective action motivated by shared environmental concern, but that the forms and intensity of both action and concern may vary considerably from place to place and from time to time (cf. Rootes, 1997b).

To have conceded the role of environmental movements in the construction of environmental knowledge and concern is not, of course, to have explained the pattern of variation in the incidence and development of those movements. It is to that problem that we now turn.

THE IMPACT OF CONTEXT: ENVIRONMENTAL MOVEMENTS AND GREEN PARTIES IN WESTERN EUROPE[16]

It has been estimated that, in terms of the proportion of population who are members of environmental organizations, the Netherlands and Denmark lead the way (17 per cent and 10.9 per cent, respectively) from West Germany (7.5 per cent), Britain (4.7 per cent) and Belgium (3.4 per cent) with the other western European countries some way behind (van der Heijden *et al.*, 1992: 18).[17] The number and kinds of environmental organizations vary considerably from one country to another, but in most countries long-established conservation organizations exist alongside newer organizations such as Friends of the Earth and Greenpeace, which began as bearers of a more radical and wide-ranging environmental and ecological critique (Rucht, 1989; Finger, 1992). If these newer organizations today look less dramatically different from the older ones than they did (Dalton, 1994), it is both because, as they have grown in numbers and influence, the new organizations have become at least semi-institutionalized, and because the old have learned something in both world view and, especially, tactics from the new.

Towards the Institutionalization of the Environmental Movement?

The degree to which environmental movement organizations have become institutionalized varies a great deal, both according to the degree to which authorities perceive and take seriously mass public concern about environmental issues and according to the ways in which movement activists respond to the patterns of opportunities and constraints which confront them in their efforts to pursue their objectives. Activists' values appear to influence the patterns of their actions rather less than the prevailing pattern of opportunities and constraints. The degree to which environmental movements are 'domesticated' and behave with moderation depends principally upon the extent to which they are incorporated into the process of official decision making, by consultation or by formal representation, and upon the availability or absence of alternative avenues of effective political prosecution of the environmentalist cause.

The British case represents one extreme in its combination of formal and informal administrative access and de facto political exclusion. Institutional arrangements in Britain have generally favoured the 'bureaucratic accommodation' of environmental interests (Jordan and Richardson, 1987) and environmentalist organizations have tended to adopt a posture of negotiation and consultation with officialdom rather than protest and confrontation. Even Friends of the Earth and Greenpeace now enjoy the status of expert witnesses, consulted by government departments and agencies on matters of mutual concern (McCormick, 1991; Doherty and Rawcliffe, 1995). However, 'bureaucratic accommodation' may be a two-edged sword: if it implies consultation, on the one hand, it may also characterize a process whereby bureaucrats 'cool out' environmental campaigners by merely appearing to take their concerns seriously.[18]

Access to administrative decision makers has been the main route by which British environmentalists have sought to influence policy; they have found the mainstream political parties less accessible and less responsive. Environmental campaigners, reckoning that manifesto commitments are taken lightly and that environmental issues transcend party political divisions, see no advantage in attaching themselves to any one party and prefer to deal with the holders of decision-making power rather than with the contenders for political office (McCormick, 1991: 41). The greater activism of traditional environmental organizations in recent years may have balanced this strategy somewhat, but British environmentalists have quickly adapted to more conventional modes of activity when the opportunity exists (Rüdig, 1995b). Ironically, only the Green Party, itself effectively excluded from serious political contention by a peculiarly inhospitable majoritarian electoral system (Rootes, 1995b), has a strong value commitment to democratic mass participation; the rest of the British environmental movement is more narrowly success-oriented.[19]

Thus, in striking contrast to Germany where the electoral successes of the Greens have been one of the principal levers with which the institutions of government have been prised open to an environmental movement which grew up outside and in opposition to them. In Britain environmental activism has tended to be restricted to the conservationist and environmental reformist end of the spectrum by the institutional framework within which it operates. This is in striking contrast to Germany, where the electoral successes of the Greens have been one of the principal levers with which the institutions of government have been prised open to an environmental movement which grew up outside and in opposition to them. In Britain, on the other hand, radical ecologism has been left to a Green Party whose comparative weakness is in

part both the product and a reinforcement of the tendency of an historically well institutionalized environmental movement to seek alternative means of access to decision makers and to cultivate relationships with bureaucrats rather than politicians.[20]

This 'institutionalization' of 'the environmental movement' is, however, neither complete nor without anomalous consequences. Recent events have highlighted the changing character of environmental protest in Britain and elsewhere in western Europe. Organizations such as Friends of the Earth and Greenpeace which have generally been regarded as the radical, activist end of the environmental movement have, as a result of their past successes, increasingly been admitted to policy-making circles, but maintaining the expertise necessary to produce informed criticism and constructive alternatives is expensive and requires an ever-increasing flow of funds, and both FoE and Greenpeace have become large and cumbersome organizations. Each has in the mid-1990s suffered stagnation or decline in the numbers of its members/supporters (albeit from very high levels) and each has sought to address the problem of how to involve rank-and-file supporters in campaigns which are centrally directed. However, because of their dependence upon access to policy makers and to funding, and their vulnerability to legal action, each has been increasingly concerned to demonstrate that it is 'responsible'.

This has resulted in both FoE and Greenpeace being outflanked by more radical ad hoc groupings composed of local objectors, national campaigners of various affiliations and what might rather loosely be described as 'green anarchists'. Several campaigns initiated or coordinated by FoE or Greenpeace have, in effect, been taken over by these more radical protesters, with the result that FoE and Greenpeace are left in the uncomfortable position of having publicly to distance themselves from actions of which many of their supporters at least privately approve. The irony of this is that FoE and Greenpeace are increasingly put in a compromised position analogous to that in which their own rise had earlier placed older environmental organizations.

There are three particularly interesting dimensions to these developments:

1. the rise of a new generation of environmental protesters with no loyalty to established environmental movement organizations (in Britain, this is most obvious in the case of anti-roads protests – see Doherty, 1996);
2. the difficulties of hitherto radical campaigning organizations such as FoE and Greenpeace in coming to terms with such developments and balancing their own interests in deepening constructive links with governments and businesses with the need to retain the support of an environmentalist constituency at least some elements of which are increasingly disposed to activism;
3. the uncertainties these developments create for environmental policy makers who fear they can no longer rely on organizations such as FoE and Greenpeace either to act as barometers of activist environmental sentiment or as negotiators on behalf of environmental interests.

These developments have parallels in a number of other western European countries, including Spain and France, and they await systematic social scientific investigation. Their outcome is a matter for speculation, but it seems probable that what we are now witnessing is a phenomenon well established in the traditionally more activist polity of the USA: local, informal action gives rise to new formal organizations which are in turn challenged by new

local, informal action, and so on ad infinitum. If there is an iron law of oligarchy which dictates that organizations become increasingly cumbersome and hierarchical, there appears also, as Alvin Gouldner (1955) suggested, to be a correlative iron law of democracy which dictates that cumbersome bureaucratic organizations are sooner or later – or perennially – challenged by new, uninstitutionalized forms of collective action.

If the rise of informal environmental radicalism is a recent development deserving of more attention, the conditions of the institutionalization of environmental political action nevertheless bear closer consideration. In particular, we need to consider the circumstances which have led, in some countries but not in others, to the development of Green parties as the political vanguard of the environmental movement.

Anti-nuclear Movements

Although in some countries environmental movements and Green parties have been able not merely to coexist, but to reinforce one another's activities, Green parties have not usually begun simply as party political translations of less directly political environmental social movements. One reason is that political ecology, which is the political philosophy which guides Green parties, is a more radical and inclusive world view than environmentalism. Where Green parties have grown directly out of social movements, it is more often out of specifically anti-nuclear movements than from more diffuse environmental movements.

Environmental movement organizations often have long histories, are well institutionalized and well embedded in relationships with official conservation agencies and may involve a wide range of constructive and reformist practical activities that only rarely spill over into direct political confrontation and mass mobilization. Anti-nuclear movements, on the other hand, are more novel and their concerns more urgent.[21] Because they are usually organized around attempts to prevent the construction of new nuclear installations, the timescale for possible success is relatively short, so intense but relatively short-lived mass mobilization seems more appropriate. Moreover, because anti-nuclear movements are usually conceived as single-issue campaigns, they are typically organized as broad coalitions[22] of pre-existing groups, very often including small left-wing parties whose members are attracted not merely by the opportunity to proselytize, but by the fact that the anti-nuclear issue involves considerations of international relations and a critique of the forms of the state.

Thus the way the anti-nuclear issue combines environmental concern with issues of concern to other political groupings builds in the likelihood that anti-nuclear movements will be broad coalitions of environmentalists, ecologists, political radicals generally and the radical left in particular. Under the right conditions, the contacts forged in such movements may, as they did in West Germany, evolve into Green parties. Both the Austrian (Haerpfer, 1989: 23) and Swedish Green parties had their origins in referendum campaigns against nuclear power, and anti-nuclear movements made important contributions to the early development of Green parties in Finland (Paastela, 1989: 81), Luxembourg (Koelbe, 1989: 131) and France (Prendiville, 1994).

Movements, Parties and Structural Opportunities

In many countries, Green parties exist alongside and in uneasy alliance with more organizationally diffuse green movements. In Belgium, Agalev drifted into the status of a political party and coexists with a movement of the same name. In France, where political ecology

emerged as early as anywhere, Greens, sharply critical of the prevailing political order and forms of organization, resisted the lures of party status more determinedly than elsewhere. Even at the height of their popularity, neither Les Verts nor Génération Écologie was a conventional party *comme les autres*.

Similar reservations were famously prominent in the early development of the German Greens, and continued throughout the first decade of their existence as a party. The very formation of the party was essentially an opportunistic response to the possibilities for publicity presented by the European elections of 1979 and to the prospect of gaining from the funding provided by the Federal Republic to registered political parties. In an unusually clear-cut way, the existence of laws and procedures governing the registration of political parties was both a constraint upon the political organization of the Greens and a spur to their reconstitution as a political party.

Institutional structures have enabled French ecologists to make some electoral impact despite the weakness of the French environmental movement. Elections for the National Assembly are, like parliamentary elections in Britain, conducted on the basis of single member constituencies. Unlike the British system, however, a two-ballot arrangement means that French voters are, in the first round, offered a relatively riskless opportunity to cast a symbolic vote. Moreover, the personalized contests of presidential elections offer unusually favourable conditions for a movement better known for its personalities than for its organization. Nevertheless, it is especially at local level and, since the decentralizing reforms of the last decade, at regional level, that the Greens have enjoyed most electoral success. Their great leap forward came when the Socialist government introduced proportional representation for the 1983 local elections: ecologists gained over 750 council seats, despite attracting rather fewer votes than in 1977, when they had captured just 30 seats. The translation of those successes and their good results in the 1989 European elections (also under conditions of proportional representation) into votes and seats in national elections was thwarted by the majoritarian system and the quite different conditions of political competition which that system dictates. Indeed, the absence of realistic prospects of national political representation has been one of several factors discouraging stable party formation among French ecologists.

The Belgian case offers an instructive contrast. Even before the recent adoption of a federal constitution, Belgium was a quasi-federal state in which elections were conducted by an unusually permissive system of proportional representation. The linguistic divisions of the country, reflected in the existence of separate Green parties based in the Flemish and French-speaking populations, are substantially institutionalized in the structure of regional government, with the result that the separate political arenas are small. Thus it was relatively easy for Ecolo and Agalev to move from modest local and regional successes to representation in the national parliament.

The importance of political institutions in opening or foreclosing opportunities for the development of Green parties can be emphasized by contrasting the cases of two countries with reputations as pioneers in environmental awareness and reform, Sweden and Switzerland. In Sweden, a relatively centralized unitary state, elections are conducted by proportional representation with the whole country voting as a single electorate, and a 4 per cent threshold discourages voters from experimenting with small new parties. As a result, despite some success at local level, the Swedish Green Party struggled for nearly a decade to translate its opinion poll rating into votes sufficient to enable it to surmount the 4 per cent threshold in national parliamentary elections.

If, in centralized states, even moderately successful Green parties have difficulty in surmounting thresholds of visibility and credibility to gain seats in national parliaments, it is not surprising that Greens should have done relatively well in that most decentralized of European states, Switzerland. There a predominantly ecological 'dark' Green Party enjoys a measure of electoral success in a confederal system in which the national parliament is unusually marginalized both by regional autonomy and by frequent recourse to referendum. But moderate electoral success in a radically decentralized system has its frustrations too. As Church (1995) indicates, a Green party still too small to have broken into the 'cartel of power' of national governments formed from the 'magic circle' of more established parties finds it difficult to influence decisions, to agree to the compromises required by a peculiarly consensual political culture and to garner the resources necessary successfully to initiate referendum campaigns.

The fact that Green parties have usually done better at local, regional and European levels (Harrison, 1995) can, in part, be explained by the relatively relaxed attitudes of voters to 'second order' elections in which lower turnouts amplify the voices of agitated minorities. For Green parties which have already established local or regional bastions, direct elections to the European parliament have provided stimuli to national-level organization and are, in effect, *national* second order elections conducted (except in Britain) by proportional representation. The Green group's use of the resources of the European parliament has assisted wider diffusion of the Green message in a more systematic way than did the earlier 'diffusion by example' of the German model.

Nevertheless, even the impact of European Union institutions and the examples of successful Green parties elsewhere are mediated by national political structures. In countries with federal constitutions and proportional representation electoral systems, the institutional matrix is much more favourable for the development and success of Green parties, and for the development of mutually beneficial relationships between Green parties and the environmental movement, than it is in centralized unitary states with majoritarian electoral systems. But such relatively temporally invariant factors as institutional structures fail to explain why Green parties sometimes do surprisingly well even in the least hospitable systems; or why Green parties are more successful in some countries with facilitative political systems than in others with similar political structures.

Political Competition and the Development of Green Parties

In both Denmark and the Netherlands, despite high levels of environmental consciousness, well-developed environmental movements and low-threshold electoral systems, Green parties have failed to flourish. The explanation lies in the state of political competition. In both countries, fragmented party systems produced by highly proportional electoral systems have made mainstream parties, especially those of the left, relatively accessible to environmental movements and so have defused some of the momentum which Green parties might otherwise have channelled.

In both countries, New Left parties which emerged out of the political upheavals of the 1960s survived to occupy political space which in other countries has been captured by Greens. In Denmark, the Socialist People's Party has proved both responsive to new issues and electorally successful, leaving little room for a Green party (Jamison *et al.*, 1990: 115). The strict proportionality of the Dutch electoral system presents even fewer barriers to

political innovation than does the Danish one but, because it imposes fewer constraints toward the aggregation of interests, it has produced an even more fragmented and intensely competitive party system in which minor parties find it difficult to attract or retain the attention of the electorate. The Greens emerged belatedly on a political stage already crowded with bit players hungry for larger roles. The relative success of the German Greens in due course encouraged the electorally marginal 'small left' parties of the Netherlands to cooperate and, after campaigning together under a 'Green Left' banner in the 1989 election and producing a modest gain over the combined total of their separate results in the 1986 election, Groen Links was formalized as a unified party in 1990.

In Italy, as in Denmark and the Netherlands, high levels of environmental concern and a permissive electoral system produced only modest gains for the Greens. The relative weakness of the Italian environmental movement, despite Italians' professed support for it (Fuchs and Rucht, 1994; Ashford and Halman, 1994), suggest that in Italy it may be especially difficult to convert diffuse goodwill into mobilized allegiance. Until recently, domination of the political landscape by parties of the Catholic and Communist subcultures and the fragmentation of the centre and radical left confined the Greens to a minor supporting role. The fact that the Greens were able to make any impact at all, despite their own fragmentation, owes much to the decentralized character of the Italian political system and the fact that, although national elections were conducted by an exceptionally permissive form of proportional representation, the country was divided for the purpose into regional constituencies. It was thus possible for Greens to organize on a purely local and regional level and yet still to secure the election of deputies to the national parliament.

If the collapse of traditional political subcultures can be argued to be potentially beneficial for the Italian Greens, it is, paradoxically, the *persistence* of traditional political subcultures which Rihoux (1995) suggests has created opportunities for the Greens in Belgium. Because the traditional Belgian parties are so tightly bound to their 'pillars', it has been difficult for them to respond to new issues. Despite the dissimilarity of their origins, the changing balance of political competition in Belgian national politics has encouraged increasingly close cooperation between Agalev and Ecolo and, until very recently, rewarded them with increasing shares of the vote.

The conditions of political competition in West Germany were uniquely propitious for the development of a Green Party. The socialist and Marxist left was marginalized by the deliberate centrism of the SDP, with the result that there was, especially in the wake of the extraparliamentary opposition of the late 1960s, a relatively large minority of leftists unattached to any of the parties represented in the Bundestag. Largely independently, the Citizens' Initiatives of the 1970s developed a substantial pool of environmental activists. The conjunction of these two forces was encouraged by an electoral system which financially rewards parties in proportion to the votes cast for them but which restricts parliamentary representation to parties which attract at least 5 per cent of the vote. Such a system in effect offers financial inducements to party formation and electoral participation, but also presents an unusual incentive to cooperation among interest groups and parties which separately could not hope to surmount the 5 per cent threshold. Furthermore, the federal constitution means that modest success in the smallest state was sufficient to propel the Greens into parliamentary politics. Thus it was that the Greens, despite being a loose and fractious coalition of environmentalists, ecologists, Marxists and anarchists, took the form of a political party and in 1979 entered the parliamentary arena by its least defended gate, the

city-state of Bremen, and went on to secure representation in the federal and other state parliaments.

Their subsequent progress has not been monotonic, but both their greatest setback (their failure in the 1990 'unification' election) and their triumphs in state and European elections since 1992, can be explained by prevailing conditions of political competition. In response to the shock of losing their Bundestag representation in 1990, and after completing the merger with the East German Bündnis 90, the Greens 'emerged as a New Politics party of a more moderate and pragmatic kind with an unambiguous aspiration towards government' (Poguntke and Schmitt-Beck, 1994: 110); their reward was a spectacular recovery of their standing in the opinion polls and a record nationwide vote (10.1 per cent) in the 1994 European elections.

The effects of political competition are still evident. The spectacular recovery of the Greens, both at national level and in most state elections, has been in the west, whereas in 1994 they fell below the 5 per cent threshold in all but one of the new eastern states and, in the federal election, in all five (Jesinghausen, 1995: 111). One factor in this disparity was that in the east, but not in the west, the Greens faced competition for protest votes from the ex-Communist PDS. However, the fact that the PDS succeeded in almost doubling its representation in the federal parliament has had the effect of making the resurgent Greens more acceptable, even as coalition partners, to the established parties (Jesinghausen, 1995: 113; Scharf, 1995: 178). Political competition again worked to the advantage of the Greens in the March 1996 state elections; an opportunistic campaign in Baden-Württemberg by the SPD, which opposed both European monetary union and further immigration, is credited with having fuelled the further rise of the Greens among voters disgusted by the SPD's tactics.

The French case is quite different. Although political ecology emerged as a national political phenomenon in France even earlier than in West Germany, a less favourable electoral system and quite different conditions of political competition have prevented ecologists from translating diffuse local support into national parliamentary representation. The successes of Les Verts in the European elections of 1989, and of both Les Verts and Génération Écologie in the 1992 regional elections, owed much to proportional representation but at least as much to a state of political competition in which the left and the traditional right appeared equally discredited at a time when a resurgent Front National demonstrated that there were prospects of success beyond the confines of mainstream politics. Local and regional successes combined with the unpopularity of the Socialists to encourage Les Verts and Génération Écologie to join forces in an attempt to overcome the effects of the majoritarian electoral system in the 1993 National Assembly elections. In the event, the renovation of the traditional right, the deepened unpopularity of the Socialists and the opportunistic intervention of six other purportedly ecological 'parties' (Holliday, 1994) so changed the balance of political competition that the Greens' results were disappointing.[23] Internal wrangling and the failure to revive the electoral alliance between Les Verts and Génération Écologie, resulted in the collapse of their vote (to a combined total of just less than 5 per cent) in the European elections of 1994.

Nor was the balance of party political competition favourable for the development of a Green party in Sweden. In the 1970s, the one environmental issue of great contention, the opposition to nuclear power, found advocates within the established party system in the shape of the Centre Party and a Communist Party which had so successfully transformed itself into a new Left Party that its electorate was more solidly anchored among the higher educated than among the working class.

The Miljöpartiet de Gröna was formed in 1981 in reaction to the disappointing outcome of the 1980 nuclear energy referendum and out of disillusionment with the performance of the Centre Party while in office (1976–8). The anxiety of other, better established parties, especially the Social Democrats, to recruit environmental activists and to proclaim their environmentalist credentials left little room for the Greens (Jamison *et al.*, 1990: 59–60). Nevertheless, in 1988, because the impact of Chernobyl and a summer of media bombardment about pollution problems combined to raise the profile of environmental issues upon which the Greens were uniquely well placed to capitalize, the party succeeded in surmounting the 4 per cent threshold to secure parliamentary representation. By contrast, in 1991, the Greens succumbed to political competition transformed by the intervention of a new centre-right party and lost their place in the Riksdag. They regained it in 1994 because, of the more established parties, only the Left Party embraced opposition to Sweden's membership of the European Union (Bennulf, 1995b). The Greens, who had long opposed Swedish membership, were thus able to increase their support sufficiently to surmount the 4 per cent threshold and in the 1995 European elections to achieve a spectacular 17.5 per cent.

In most cases, Green party members and voters alike incline towards the left of the conventional political spectrum and Green parties have often made progress where established left parties have been in government or have been otherwise disabled from performing effectively as an opposition. Yet, as the French Greens' failure in 1993 shows, the existence of a vacuum of effective opposition on the left has not always advantaged the Greens. Clearly, the Greens are not inevitable beneficiaries of the decay of traditional party alignments. The nationalist right may appeal to a different and less well educated constituency, but other new parties might, by appealing especially to the young, divert votes from the Greens, as Rossem did from Agalev in Belgium in 1991. If novelty was an asset for the Greens, it is clearly now a wasting one.

From Palazzo to Piazza?

If there has been a general tendency for the entry of ecologists into party politics to be the predominant direction of development for ecological collective action, it may be that the period in which it was a nearly universal strategy is now drawing to a close. There is evidence that environmental activists in those countries in which opportunities to advance the cause by electoral means appear most limited are considering refocusing their energies upon direct action. Thus the Italian Greens, forced into the Progressive Alliance by the recognition that they could not by themselves hope to maintain their parliamentary presence under the new, primarily majoritarian, electoral system introduced in 1994, frustrated by their subordinate position within the Alliance and dismayed by their declining electoral fortunes, are divided about abandoning the palazzo of parliamentary politics in favour of a return to the protest politics of the piazza (Rhodes, 1995).

Similarly, it has been suggested (Doherty and Rawcliffe, 1995: 246) that the British Greens, in reaction to continuing electoral marginality and declining membership, are likely in future to concentrate on extraparliamentary protest activity. Such a shift of focus would not, however, be a radical departure for a party which has never sought to confine itself to electoral politics. Green Party members have been active in recent protests against new roads and the export of live animals, and there are signs that Green Party membership has, as a result, begun to increase. However, despite calls for the party to abandon fruitless electoral

contests, its 1996 conference committed it to fielding candidates in the next parliamentary election. It is part of the flexibility of the 'movement party' that it can redirect its energies from one arena to another in response to changing opportunities, and it would be surprising if British Greens did not adjust the balance of their efforts in light of their experience and assessment of their prospects of effecting results.

The impact of recent electoral failures is likely to be less dramatic upon the strategies of committed Green Party members than upon the wider constituency of the environmental movement whose members will be increasingly difficult to persuade of the practical relevance of Green parties to the pursuit of their goals. Whether they turn their backs upon electoral politics altogether, or whether they transfer their allegiances to other, more electorally successful parties will depend largely upon the policy commitments of those parties; if other parties do offer credible policies on the environment, then in countries like Britain and Italy the prospects for Green parties are bleak.

ENVIRONMENTAL MOVEMENTS IN EASTERN EUROPE

It is clear that the objective severity of environmental degradation is not highly correlated with the incidence of environmental protests, the formation of environmental movements or the successful development of Green parties. Rüdig (1990: 21) suggests that we need 'to look at the issue-making process and the emergence and course of protest movements dealing with the new issues'. Nowhere is this process more intriguing than in eastern Europe.

The failure of environmental movements to remain prominent or to issue in successful Green parties after the collapse of communism in eastern Europe is especially puzzling in view of the widespread environmental degradation in the east and the prominence of environmental protests in the development of movements of opposition to state socialist regimes. Part of the explanation lies in the fact that such protests enjoyed a unique degree of licence under state socialism; green became a protective colouring for all manner of opponents and critics (Jehlicka, 1994) and environmental protests became, as well as vehicles by which reformists within the regimes could test the political water, training grounds for activists.[24] Either because they were never devoutly green, or because they saw the problems of the construction of democracy and the reconstruction of economic and social life in the wake of the collapse of state socialism as requiring other political priorities, many such activists soon became prominent in more mainstream political parties or were absorbed into the ministries (Waller and Millard, 1992: 170–71).

It is important, however, not to overstate the role which environmental protest played in the final years of state socialism; the fact that it was by 1989 an almost universal theme of the critique of communist power does not mean that it was everywhere central or that it ran very deep. Of the opposition movements which developed from the late 1970s in Czechoslovakia, the GDR and Poland, 'only the GDR's Evangelical churches included environmental issues in their early appeals' (ibid.: 165). Nevertheless, by 1989 the main opposition movements in all three countries embraced defence of the environment, along with peace and human rights. This inclusion of environmental defence may have owed more to the desire to maintain the broadest possible front of critique of and opposition to the regime than to any profound commitment to environmentalism; for instance, in Poland environmentalists were

marginalized within Solidarity, despite – or perhaps because of – the fact that, by the late 1980s, there was a well-developed pluralistic and independent environmental movement (Glinski, 1994a) ranging across the spectrum from dissident, through autonomous, to government-sponsored organizations (Waller and Millard, 1992: 167).

However, in Hungary, where no single movement emerged with a comparable overall aggregating function, dissent clustered around the Danube Circle, a single-issue movement with the limited environmental aim of opposing the proposed construction of the Nagymaros dam on the Danube.[25] Only in Bulgaria did the principal challenge to the regime take the form of an environmental protest, and only there was it an environmental movement which stimulated the development of an aggregative movement capable of challenging the communist monopoly of power (ibid.: 165–6; Baumgartl, 1995).

The failure of Green parties in the first free elections was not always attributable simply to the defection of environmentalist activists to other parties. Jehlicka and Kostelecky (1995) describe the curious case of the Czech Green Party. The Czech party, unlike its Slovak counterpart, was started by people who were neither environmental activists themselves nor had any substantial contact with environmentalists. The party drew its electoral support chiefly from a cross-section of the population in the most environmentally devastated lignite-burning industrial region of northern Bohemia and, in an attempt to surmount the 5 per cent electoral threshold required for parliamentary representation, entered a form of union with a party which represented the interests of the collective farmers widely blamed for the devastation of the Czech countryside. The Czech case, however, is unusual in that it demonstrates the perils confronting Green parties which attempt to survive by aggregating their interests with those of erstwhile political competitors. More usually, as in Slovakia, Poland and Bulgaria, the story of Green parties in the post-transition period is one not of fusion but of fission.

Green parties, starved of the political skills of experienced activists and competing in an arena dominated by the agenda of economic reconstruction and democratic consolidation, generally did badly in the first free elections, and even worse in the second. Scarcely surprisingly, the voters of central and eastern Europe are more concerned with the achievement of a measure of economic security than they are with the effects of global warming (Doktorov *et al.*, 1993); even where environmentalist candidates do secure election (as they have in various parts of Bulgaria, Romania, Russia, Estonia and the Ukraine), it is usually in response to very localized and essentially materialist grievances about the direct and immediate threats environmental degradation and, especially, industrial pollution pose to the health of local populations.

Given that, it might be thought surprising that environmental *movements* have become so much less visible since the collapse of state socialism. Even anti-nuclear movements, which were (weakly) stimulated by the revelations following the Chernobyl explosion of 1986[26] and enjoyed a brief flowering during *glasnost*, have collapsed as the break-up of the Soviet Union has deprived environmentalism of the reinforcement of nationalism (Dawson, 1995).

What sense can we make of this? It is clear that movements flourished under state socialism to the extent that their existence was tolerated whilst that of opposition parties was not. Pickvance (1996) argues that, in general, the democratization of authoritarian regimes has a depressant effect upon levels of social movement mobilization; the peak of mobilization appears to be in the early stages of democratization, but as political opportunities increase, so grievances decline or become disentangled from critique of the regime and activists are drawn into more institutionalized forms of political activity.

This account appears to make sense of the experience of countries such as Hungary, the Czech Republic and Poland, but it can scarcely suffice to explain the decline of environmental mobilization in Russia because there the process of democratization has barely begun. This suggests that, for social movements to flourish, there is an optimal degree of regime openness and responsiveness; more or less fully liberal democratic regimes offer too many opportunities for conventional participation and normally generate too few political grievances, but regimes which are consistently unresponsive but only moderately repressive, as the Russian one is, offer too little incentive for collective action (since the prospects of securing favourable results are so low) and generate only moderate levels of political grievance.

Russia

The weakness of movements (and parties) in Russia in part reflects the implosion of political authority which accompanied the collapse of state socialism. Yanitsky (1994) suggests that, in the reform period, the state *created* instability in order to preserve its monopoly of power; subsequent chronic instability has produced conflicts which are mostly 'a cruel struggle for power' or resources.[27] Whether or not chaos is deliberately created, it clearly has consequences for movements. Where the state is coherent, there is some point to movement activity. Where, however, the state appears chaotic and where state agencies lack the necessary authority, will, motivation and/or means to act effectively in response to the demands of protesters, activists will, as they did in Russia, channel their energies into highly localized exercizes in self-organization and community organization which make demands at the level of the municipality or industrial enterprise, both because protests at this level are more manageable, and because these are the least ambiguous loci of whatever power remains in an apparently fragmented system.

In Russia before *glasnost*, the ecological movement was represented principally by student nature protection teams whose contacts with the wider population were discouraged by their scientistic ideology, their small numbers and their purely conservationist orientation. Neither conservationists nor ecopatriots opposed the regime: 'In their struggle against the corresponding ministries and departments they rested upon (and thereby defended themselves from the latter) a doctrine of "planned and careful use of nature" officially declared by the CPSU' (Khalii, 1994: 2). Even at the start of *glasnost*, the orientation of conservationists was still the protection of nature rather than human interests in the environment. Yet 'hundreds of thousands of people could be mobilized to take part in mass [environmental] protest campaigns'; this mobilization was, however, mainly a result of the heightened popular disposition to protest in general, and of the mobilizing effort of the mass media 'which, in turn, resorted to the authority and charisma' of leaders of the ecological movement. The period 1987–91 saw the emergence of a totally new – and entirely separate – mass movement based on local initiative groups and urban committees for public self-government (Yanitsky, 1994: 10).[28]

Conservationists, who had no urban experience, were at first wrong-footed by this development but soon drew on their organizational experience and put themselves forward as candidates or advisors to ecologically oriented candidates in the elections of 1989 and 1990. Khalii (1994: 3–4) is probably exaggerating when she claims that, in the 1989 elections to the parliament of the USSR, 'all 40 well-known leaders of the ecological movement became

people's deputies ... while the total number of ecologically oriented deputies elected to this highest representative body amounted to 200'. To the extent that this is true,[29] it almost certainly reflects the fact that the ecological movement was at the time almost the only organized grouping relatively untainted by previous tenure of power.

Thus contact was made between the two movements, but conservationists failed to understand the social demands of the mass civil initiatives protest movement; local ecoactivists lost leaders to the democratic movement and were left with neither leaders nor a programme for future action. In the years immediately following 1990, conditions worsened and links between the environmental movement and the population weakened: 'democratic' politicians forgot their promises and openly embraced the pro-nuclear lobby; privatization removed much of the material resource base for environmental organizations (Yanitsky, 1994: 10–11).

Changes in the external political environment created problems within the movement: nationally, Greens wished to keep their distance from communists, whom they regarded as apologists for the old order, but locally, environmental groups were obliged to deal with local holders of power, while at the same time being influenced by the perspectives of their international sponsors. As ecological groups were increasingly drawn into collaboration with the local holders of power, so they became increasingly professionalized and bureaucratized, with the result that a movement which originally had its base in the local initiative groups has become increasingly organized from the top, and has lost its grassroots base. Western aid exacerbates the process because it is inevitably channelled through the leaderships of existing organizations, and because it increases bureaucratization and hierarchy as recipients become distributors of aid; moreover, because aid donors only finance 'constructive' projects, the movement is drawn further away from mass protest. All this enhances the tendency to think and act locally: 'to "think globally" becomes too great a luxury' (Yanitsky, 1996a: 75). Environmentalism in Russia today is isolated from other social movements, demoralized by the absence of the solidarity which comes from mass protests, suffers a growing resource deficit and is totally alienated from its social environment in a political climate in which ecologism is aggressively attacked (Yanitsky, 1994: 13–14; 1996b).

In Russia, in the brief period of turmoil which followed the collapse of the USSR, the absence of stable, legitimate institutional structures was paralleled by the absence of stable organizations capable of the aggregation and mediation of interests. The result was the proliferation of informal associations which were as unstable as they were conflictual. But, to draw on the distinction Touraine (1981) makes between *luttes* and *mouvements*, although there were many struggles, there was little that attained even the modest degree of cohesion required of a social movement. Thus the collapse of environmental movements which had begun to develop in the Gorbachev era was succeeded by the proliferation of local environmental protests and housing 'movements' (Pickvance 1994). Social movements which extended beyond the neighbourhood scarcely existed because the institutional structure was either too fluid or too inhospitable and because the habits and skills of interest aggregation were too little developed.

Recognizable social movements were hard to identify for the same reasons that real political parties did not exist. The Soviet regime encouraged collectivist sentiment while discouraging collective action, not least (and especially in those states where state socialist regimes were Soviet-imposed) by so atomizing society as to destroy the bases of interper-

sonal trust among citizens (Marody, 1994; Seligman, 1994; Yanitsky, 1991). The collapse of the Soviet regime into a condition that veered between chaos and confusion thus stimulated a whole range of actions, from individualistic bribery to local collective action, but little that extended beyond the block or the neighbourhood.

If pre-transition social movements were characterized by a higher level of aggregation (if not of organization), it is because the state and the Communist Party of the Soviet Union (CPSU) provided a coherent object for protest. In other words, the aggregation of interests in social movements was, paradoxically, encouraged by the cohesiveness of state power. In the pre-transition Soviet era, environmental protests were usually at a general and symbolic level that often appealed to the protection of the national patrimony in terms that were not intrinsically offensive to the regime's rulers and which attracted activists, often scientists, who were by no means root-and-branch opponents of the regime (the Baikal protests in the USSR and the movement against the Danube dams project in Hungary are just two examples). Since the collapse of state socialist regimes, symbolic, even 'post-materialist', environmental protests have mostly yielded to altogether more practical and essentially materialist local environmental protests and housing 'movements'.

If the fate of the environmental movement in Russia stands at one extreme, that of Poland and, especially, Hungary is quite different. The chief difference is in the institutional context with which environmentalists must contend.

Poland[30]

The early development of the Polish environmental movement was, if anything, less auspicious than that of its Russian counterpart. Although a well-developed, autonomous and pluralistic environmentalist movement emerged in Poland during the 1980s, it was not an active participant in the new, post-communist political institutions and it had no connection with the self-styled 'Green' parties which contested the first free elections. A major factor in the rejection of the opportunities presented by the regime change was the movement's commitment to values inimical to institutionalized, bureaucratic politics. Another was the habit of protest rather than constructive political action developed in the decade of opposition to the state socialist regime; as the costs of mobilization and resistance fell after 1989, so protest appeared even more attractive.

But if the values and habits of environmentalists led them to decline political opportunities, it is important not to exaggerate how great those opportunities actually were. Solidarity, which dominated the anti-communist opposition in Poland to an extent unparalleled elsewhere in central and eastern Europe, expressed virtually no interest in environmentalism, and so the environmentalist movement, marginalized within the anti-communist opposition, continued to be marginalized after the regime change, even to the extent that environmental protests were repressed in much the same ways as they had been under the former regime. As a result, the movement's alienation from institutionalized politics was etched yet deeper.

The political vacuum that existed during the 1991 parliamentary election presented opportunities that ecologists, because of the internal structural weaknesses of their movement, could not exploit. The Polish Green Party – faction-ridden, opportunistic and tainted by its embrace of former communists – did not attract ecologists. Nor did the pseudo-parties, invented as vehicles for the political ambitions of their candidates, which adopted 'green' names and slogans. Nevertheless, even the formal institutionalization of free and autonomous social and

political activity marked a transformation of the context for movement activity, as did the decentralization introduced by the reform of local government and, at a more informal level, increasingly stable social conditions. In the early 1990s, in the course of two major and sustained campaigns – against the construction of a nuclear power station and a dam – the movement developed diverse and sophisticated campaign methods, including an unprecedented willingness to lobby officials and to mobilize experts. Such pressures, and favourable changes of personnel at the ministry, led to an intensification of contact and ultimately to the institutionalization of consultation 'intended to lead to permanent forms of participation by non-governmental organizations in the ecological decision-making process' (Glinski, 1994b: 8).

But if the development of ecological action is shaped by its social and political context, Glinski's account makes it clear that such action may itself contribute to the *transformation* of that context. The environmental movement in Poland has, as an increasingly mature interest group, contributed to the development of civil society by introducing substance to the formal shell of democratic politics. In its practice, the movement has increasingly demonstrated the civic virtues of tolerance, cooperation and responsibility as well as helping to fill the void of middle-level social organization between state and individual left by decades of state socialist domination (Glinski, 1994b: 9; Glinski, 1996). The movement thus performs a dual educational function, tutoring its supporters in the practices of responsible and effective interest group politics and setting an example to the rest of Polish society, and so contributes to the self-reinforcing spiral of civic virtue necessary to the consolidation of participatory liberal democratic politics.

Hungary[31]

Even more than in Poland, the environmental movement in Hungary has enjoyed considerable success: it has won many of its battles, succeeded in spreading awareness of environmental issues, achieved political influence at local level and continuous access to the mass media, and it is courted by politicians eager to ensure their own re-election by being seen to be attentive to environmental issues or who see the movement as a useful ally in their own pursuit of environmental reforms (Pickvance, 1997). This is in stark contrast to the situation in Russia where the environmental movement is divided and demoralized by its failure to achieve any but the most local political influence. The fact that Russian environmentalists are, unlike their Hungarian counterparts, united in a national federation is less a source of strength than a response to their isolation, fragmentation and powerlessness.

The reasons lie less in any disparity of material resources or organizational entrepreneurialism between the Hungarian and Russian movements than in the political environments in which they operate. In Hungary a measure of pluralism long predated the final collapse of state socialism, and the subsequent development of normal parliamentary liberal democratic institutions and practices has been relatively smooth. Stable democratic political parties have developed, and social movements have been content to remain outside party politics, in the realm of civil society, even to the extent that there are no significant links between green parties and the environmental movement. Thus the environmental movement has been able to achieve success in interaction with actors in a party political realm it has not sought – and does not need – to enter.

In Russia, on the other hand, the flowering of 'independent associations' in the brief era of *glasnost* has been replaced by an increasing centralization of power in the hands of an

erratic executive presidency whose counterpart is a weak parliament in which stable democratic political parties have yet to develop, and which permits the persistence of power in the hands of bureaucratic apparatchiks better able to obstruct than to act constructively. Moreover, the distinction between social movements and political parties is relatively weak, and there are links between parts of the environmental movement and the left-wing Green Party. As a result, elected politicians, who are themselves largely powerless, are apt to see movement activists as actual or potential rivals rather than as partners in a political transaction, and environmentalists are divided between those who choose to fight on the terrain of civil society and those who, by forming political parties or standing for elected office, seek to enter the party political realm.

In Russia before *glasnost*, environmentalism took the form of protests rather than a social movement, partly because of the scientistic, nature-focused character of Russian conservationism, and because the repressive character of the regime could not countenance a genuine social movement. Now, however, despite the fact that repression is only moderate, and despite the freedom of association which permits environmentalist organizations to function, popular environmentalism still takes the form of protest rather than a social movement. The principal reason is that the institutional environment and conjunctural context remains inhospitable to sustained collective action, and to the successful environmental action which would encourage more such action. The level of social movement activity in Hungary may be low, but Hungary, by contrast with Russia, presents a picture of a remarkably normal liberal democracy.

Environmentalism in Eastern Europe Reconsidered

The variety of eastern European experience and especially the contrasting fates of environmentalism in Poland, Hungary and Russia clearly show the impact of changing political structures, but also indicate that the effects of such changes are still mediated by political conjunctures and the strategies of actors. Pickvance (1995: 138) suggests that social movements in eastern Europe have followed a three-stage pattern of development similar to that seen in transitions from authoritarianism in southern Europe and Latin America: '(a) a period of *quiescence* with sporadic and quickly repressed movement activity; followed by (b) the *rapid upsurge* of social movements in the period prior to free elections, followed by (c) a *decline* as political parties form'. This may be true of protest activity generally, but the picture is, in respect of environmental movements, more complicated, both because of the special character of the environmental movement which gave it an unusual degree of licence under state socialism and because the nature of environmentalism's practical claims means that it needs to find a *modus vivendi* in the new order. But the extent to which there is order, and the accessibility of authorities varies considerably.

What is most striking about eastern Europe before 1989 is that environmental issues were almost never raised in pure form but instead came packaged with human rights, peace and nationalistic concerns, the mix, and the priority of environmental claims within it, varying from case to case. The opposition movements were, in effect, coalitions and, as Diani (1992) points out, coalitions are not social movements because, in the interests of achieving the limited shared goal and minimizing conflict within the coalition, coalition partners refrain from the strenuous articulation of those elements of their own programme which are not shared by the other partners; as a result, they fail to develop the collective identity which

Diani regards as the *sine qua non* of a social movement. Environmentalists seldom had the autonomy under state socialism fully to develop an ecological movement,[32] and the precipitate collapse of the communist regimes and the urgency of the new agenda of democratic stabilization and economic reconstruction almost everywhere pushed environmentalism to the sidelines. There was never the opportunity to develop the 'knowledge interests' of modern environmentalism and, with them, a potent environmental movement.

Thus, although environmental concerns contributed to the formulation of a list of grievances which were believed to be beyond the capacity of state socialist regimes to redress, environmental issues were only ever *part* of those grievances and environmentalism never attained the status of the 'master frame' which might, as the perspective of political ecology in principle could, put those other grievances into a political package other than the conventional liberal democratic market economic model presented to eastern Europeans by the West. Thus, in the circumstances of a thoroughgoing political and economic transformation, failure to achieve the hegemony of green philosophy in the crescendo of opposition to the old regimes condemned environmentalists to marginality in the new. Of course, given what we know about both the conditions of environmental awareness of east European populations and the generally precarious status of environmentalists within the opposition coalitions, it was never realistic to expect otherwise.

Environmental concerns in eastern Europe before 1989, where they were not straightforward materialist protests against pollution dangerous to human health, were largely assimilated to human rights concerns or suffused with nationalist/patriotic protests against the degradation of the national patrimony. Certainly, there was little if any evidence of global environmental concern. If ecologism has had only a limited independent existence since the advent of liberal democracy, it is because the kinds of concerns most common in the east were those most easily accommodated (or converted) by parties other than Green parties.

STRUCTURES, CONTEXTS AND OPPORTUNITIES

The diversity of experiences of environmental movements and Green parties in Europe is such that generalization is difficult. A fairly advanced level of economic development appears to be a condition of the development of heightened environmental awareness, and particularly of global environmental consciousness, but the remarkable thing is that the levels of environmental concern as revealed by surveys are very high for all the European countries for which we have data. However, the salience of the environment as a political issue and the priority citizens are prepared to accord it vary considerably. It is not merely the level of economic development and standard of living which influence citizens' political priorities, but also the perceived stability or otherwise of democratic institutions and, among other considerations of political culture, questions of identity, cultural, regional and national.

Even where citizens do accord high priority to ecological issues, whether that priority is translated into activism in an environmental movement, support for one or another established political party, or votes for a Green party will be greatly influenced by the impact, actual and perceived, of the pattern of opportunities constituted by social and political institutional arrangements, and by the altogether more contingent balance of political competition – competition among parties for votes and for the allegiance of activists, and

competition over issues, to capitalize upon ascendent issues, to turn issues of broad popular concern to partisan political advantage, to dominate a particular 'issue space'.

Despite the great differences which exist between the histories and levels of economic development of the countries of western and eastern Europe, the same apparatus of concepts and theories serves to make sense of the diversity of environmental movement development across Europe.[33] Environmental action, wherever it is attempted, is obliged to negotiate a complex environment of institutions peopled by other, often rival, actors. The impact of peculiar contexts of action is etched upon the movements and parties which result. If theorizing and prediction is difficult it is because, although one can point to the ways in which social, economic and political institutional considerations create the framework for political competition – and hence for political action – the outcomes of the complex processes of political competition ultimately depend, as the contrasting fortunes of the French and German Greens clearly demonstrate, upon the actions and reactions of environmentalists themselves.

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NOTES

1. For a more developed justification of this approach, see Rootes (1997b).
2. That is, however, a question we have begun to address elsewhere (Rootes, 1996b; 1997c).
3. I am grateful to Bert Klandermans for pointing this out to me. Blühdorn (1995: 168) reports a similar phenomenon in Germany.
4. The data in the next two paragraphs are all drawn from Worcester (1995). The interpretations are my own.
5. The decline was rapid: it fell to under 10 per cent by November 1990 and has stayed there since.
6. The same questions have been administered in a variety of other countries (unfortunately not the same ones in both surveys) at the behest of WWF in 1991–3 and Greenpeace in 1994. Among the European countries included in 1991–3, 64 per cent of the Dutch claimed to have taken five or more of the list of environmentally friendly actions, followed by Swedes 35 per cent, Germans 29 per cent, British 27 per cent, Swiss 23 per cent, Austrians 17 per cent, French 15 per cent, Italians and Poles 8 per cent, and Spaniards 5 per cent. In 1994, the Scandinavian countries ranked highest (Sweden 36 per cent, Denmark 33 per cent, Finland 29 per cent, Norway 26 per cent), followed by Britain 26 per cent, Greece 23 per cent, France 21 per cent, Belgium 21 per cent, Italy 19 per cent, Ireland 12 per cent, Spain 8 per cent, with three east European countries (the Czech Republic, Ukraine and Russia) at 6 per cent.
7. Cf. the similar finding in the USA by Ladd and Laska (1991).
8. This, incidentally, runs counter to arguments (see, for example, Rüdig, 1990) that there is a new 'ecological cleavage' in mass publics. It is not necessary to denigrate the seriousness or novelty of environmental issues to suggest that they appear to add a new dimension to the old collectivist–welfarist versus individualist cleavage.
9. Cf. Witherspoon (1994: 135): 'Scientific knowledge probably leads people to adopt a less apocalyptic view of nature, but it is positively associated with environmental concern and activism.'
10. In the case of the minority, usually highly educated, who become environmental activists, the activity itself may generate, or at least enhance, the sense of efficacy. Touraine *et al.* (1983: 35), discussing the anti-nuclear movement in France, observe that, while fear of a world out of control was frequently articulated by

new recruits to the movement, fear as a motive was increasingly fiercely rejected as these activists became more involved in the movement. This, Touraine *et al.* suggest, is because those whose initial motivation for involvement was essentially psychological and reactive developed, as they became more involved in the movement, a sense of personal and collective political efficacy that transcended their original motivations and led to the search for a social definition of their action. No longer content with appeals to such a socially indeterminate emotion as fear, activists developed an aspiration towards an alternative form of social organization.

11. This may help to explain why the correlation between post-materialism and support for Green parties is generally only modest (Rüdig, 1990: 14; Franklin and Rüdig, 1991, 1995): amongst the people who vote for Green parties and support environmental movements, as well as highly educated 'post-materialist' ecologists who are not so much fearful for their own security as concerned about global environmental problems whose effects are more remote, there are people, usually less well educated, who are motivated principally by fear of the threats that pollution and nuclear waste pose to their own material security.
12. We have deliberately sidestepped the question of deep-seated cultural differences among European peoples, not because of a belief that they do not exist, but rather because explanations in terms of culture are apt to be indiscriminate, and it would be preferable to leave recourse to them only as a last resort.
13. It emphatically does not suggest that, simply as a matter of rational choice, some people focus their environmental concerns upon matters of personal complaint rather than global issues. For the most part, issues of personal complaint are so overwhelmingly pressing that they crowd out any concern with other more global issues. It is not, for example, as a result of rational choice that factory workers prefer employment and modest prosperity to clean air and an uncontaminated environment so much as that the overriding practical concern to find and retain employment crowds out concern with the environment.
14. Eyerman and Jamison accept that social movements are networks but operate with a restrictive conception of collective identity as 'knowledge interests'. Diani is more ambiguous but appears to accept that, for collective identity to exist, it is sufficient that actors 'define themselves as part of a broader movement and, at the same time, be perceived as such, by those within the same movement, and by opponents and/or external observers' (Diani, 1992: 8–9).
15. Gunnar Grenstad (in remarks to the Green Politics workshop, E.C.P.R., Oslo, 1996) reports that in Norway there was a greater reluctance by environmental groups to reveal their strategies to one another than in any other area of voluntary association activity; this would appear to indicate that, to an unusual degree, environmental groups see themselves as being in competition with one another, rather than forming part of a broader movement. Similar rivalries have existed among British environmental groups: in 1994, local FoE groups in the south-east of England were explicitly warned by the FoE regional organizer against embarking on joint actions with members of other groups such as Greenpeace; however, the fact that, little more than a year later, FoE and Greenpeace agreed, at national level, to mount joint campaigns suggests that such exclusionary attitudes may be highly contingent, not least upon the personalities involved.
16. This section draws on and updates the more detailed discussion in Rootes (1995a).
17. Given the variety of organizations involved and the varying meanings of 'membership' and the varying accuracy with which it is recorded, the precision of such percentages might be open to dispute, but the rank ordering is probably right.
18. A Department of the Environment official is reported as having told a 1995 Chatham House briefing for foreign diplomats that the British practice was for government to go through the motions of public consultation and then to go ahead and do what it had intended to do in the first place.
19. The distinction between 'value orientation' and 'success orientation' in the discussion of social movements is made by Smelser (1962) and applied to environmental movements by Jamison *et al.* (1990). On their account, the Danish movement is relatively 'value-oriented', whereas the Swedish one is almost exclusively 'success-oriented'.
20. This is not to say that organizations such as Greenpeace and FoE were not (sometimes stridently) critical of government environmental policy. See Statham (1996) for an account of their 1990 'Britain: Dirty Man of Europe' campaign.
21. Interestingly, Eyerman and Jamison regard the anti-nuclear movement as crystallizing the knowledge interests of modern environmentalism.
22. The process whereby, in some countries but not others, these coalitions issued in radical environmental movements and/or Green parties appears to be mainly a matter of historical conjuncture (Rüdig, 1990: 27–8; see also Flam, 1994).
23. The opportunity which lured these very dubious 'ecological' 'parties' to present candidates in 1993 was the introduction of state funding for political parties. The prospect of state funding was not, however, sufficient to encourage organizational pragmatism or even sustained electoral collaboration among French Greens (Holliday, 1994).
24. See Castells (1983) on the role of the Madrid citizens' movement in the late days of the Franco regime.

25. It is, however, questionable whether this movement was a major force in a process of regime transformation that had been under way for almost a decade and was essentially elite-initiated.
26. Yanitsky (1993) remarks how *little* popular protest emerged in response to Chernobyl.
27. Such a strategy is not without parallel: compare that of the Apartheid regime in South Africa during the period of transition to full democracy.
28. This and the next three paragraphs rely heavily on Yanitsky (1994).
29. Katy Pickvance informs me that it is more plausible for Estonia than for other parts of the former USSR.
30. This account of developments in Poland relies heavily on Glinski (1994b).
31. The account of the situation in Hungary and Russia which follows is based mainly on Pickvance (1997).
32. Poland is a partial exception (Glinski, 1994a).
33. Most obviously relevant is the concept of 'political opportunity structures'. We have avoided using the term here because its use in recent literature has typically been too catholic. For a discussion and critique, see Rootes (1997a).

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23. Environment in eastern Europe

Bernd Baumgartl

INTRODUCTION

A chapter on Eastern Europe should not attempt to adopt one single approach, and to draw overall valid conclusions. Even before 1989, national particularities had to be taken into account, when referring to the 'Eastern bloc' and it is even more difficult to squeeze all of the countries between Gdansk and Varna, or Maribor and Kyiv, or Praha and Skopje into one analysis in 1996. 'Eastern Europe' has drifted apart with at least as many speeds as it has parts. If we attempt to find common ground concerning the interaction between environment and society/societies, the above caveat should remain in the back of our minds at all times.

As a matter of fact, in most of central and eastern Europe (CEE) the process of economic and political transition is far from complete. In the aftermath of the events of 1989, the time horizon for the establishment of a new economic and political system seemed, at the most, a question of a couple of years. The euphoria has now been replaced by soberness and recognition that it will take years or even decades before the new market structures are working fully. The problems of privatization and property ownership have restricted the pace of reform. The relatively small numbers of industries privatized and restructured underlines the slowness of change. The idealistic short-term view of the phase immediately after the fall of communism has been replaced by a realistic long-term perspective, forced upon the reconstruction by external and domestic complications.

Environment as an issue has suffered from these developments. It is currently as unimportant as it was in communist times. It is understood as a luxury which CEE cannot afford. Any considerations of environmentally sustainable policies seem to be untimely and futile. Win–win strategies, that is environmentally beneficial projects which also pay off economically, as advocated by the World Bank, seem to make sense in theory but their impact on the actual direction of economic and political development seems marginal at the present time. However, after the current transitional recession, a growth period is extremely likely and therefore it is not too late to underline in the present chapter the importance of environmentally sound industry and politics in the long term.

First, the concepts of 'sustainable development' and 'transition' are analysed with a view to their operational strength. It is argued that, in the context of the eastern European transition, environmental concerns play a crucial role when compared to the meaning of sustainable development in industrialized or developing countries. Next, four sets of actors are introduced (social movements, national policy makers, the international community and firms), each of which offers a different viewpoint – and a different sociological explanation – for the 'environmental' issue. The question, 'What does sustainable development mean in Eastern Europe?' guides the following section. Next, each set of actors is looked at in more

detail by describing the domestic constraints which curb such developments; environmental movements and transition; environmentalism as a (possible) determinant of East–West relations; and the (potential) impact of firms on environmental awareness. In conclusion, two main findings emerge: on the one hand, the non-contemporaneous and temporary time of relevance of these environmental actors, and thus their relative weakness, and, on the other, the limited use of new instruments of environmental policy such as the inclusion of all relevant actors in policy formation, joint implementation efforts or the increasing role of firms in these processes.

DIFFICULTIES IN TRANSITION AND DEVELOPMENT

Eastern Europe: a Case of Environmental Development

Eastern Europe demonstrates the difficulties of initiating sustainable development in industrialized societies. In many ways it is in a similar situation to the Third World and it is no coincidence that the German Ministry for Development aid took over the task of dealing with the 'Commonwealth of Independent States'. Eastern Europe does not face problems completely identical to those of the developing countries, but some of the questions mentioned here are, or will be, on the decision-making agenda of Third World countries.[1] In other aspects Eastern Europe is confronted by even more difficult challenges: the more advanced degree of industrialization makes solutions more complex, and possibly more costly, than in comparable Third World countries. Above all, the concepts of marginal costs and risk apply even more to Eastern Europe. The effects of a given level of pollution are worse than at earlier periods of industrialization because it comes 'on top' of the present global rise in energy use and industrialization.[2]

The Environment as an Example of the Difficulties of the East European Transition

The environment can be seen as one aspect of eastern European 'transition'. Hopes were high, after the collapse of communism, of establishing a really new, 'third' way of 'development'. In the end, not only has the communist heritage been difficult to overcome, but even the western model of an ecological market economy has proved far out of reach. Part of the problem is that the declared example to follow – the western system – owes its (admittedly limited) success in moderating environmental degradation to the fact that it is not a pure market-driven system: state regulation plays a considerable role in western environmental policy. In fact, such radical capitalism, with a marginal role for the state, as introduced now in eastern Europe does not exist in the West, and was clearly avoided after the Second World War.

On their transition path, eastern countries are now forced to repeat western errors in the environmental field: that is, to follow a general emphasis on economic growth without taking into consideration its long-term environmental impact. Some of these errors have stronger negative effects now because of dynamic progress, not only in benefits, but also in damage. Moreover, technology change has added to the size of units of production and therefore to the extent of their capacity to cause environmental damage. However, technology has also added to the possibilities – at a certain cost – of repairing or moderating environmental damage.

Sustainable development – finding a specific meaning in the context of transition

Many different definitions have been given for the term 'sustainable development', since it became world famous through the 1987 report of the Brundtland Commission. Interpretations vary from conservationist approaches, which suggested a complete failure of the capitalist and market system and the need for a post-technological society, to technocratic views, which underline the necessity of development in order to achieve a sustainable society. Although no coherent definition has yet emerged from this discussion, there is an unspoken consensus that both development and environmental goals have to be harmonized in order to make development sustainable, above all in the long term. Even more, as Redclift (1989) points out, the ambiguous content of sustainable development made it a useful meeting point for diverging opinions and therefore enabled otherwise impossible discussion.

In the eastern European context, the meaning of sustainable development has to be seen in relation to the development these countries went through under the communist regime, and to the necessary changes and adjustments the transition period brought about. In ideal terms, a sustainable development in eastern Europe would have meant a considerable jump ('leap-frogging') to western European standards and practices of implementation. The aim of avoiding the mistakes made by western industrial countries was based on a difficult concept: using the reconstruction of the economic system (from centralized planning to a market economy) as a means for achieving a new ecologically sound system.

One of the main differences between a pure market approach and a sustainable development view is the time factor.[3] Whereas conventional economic reasoning is used to evaluate economic performance in yearly time periods, a sustainable view would look to future gains, ranging from five to 10 years ahead, to issues of intergenerational responsibility.

FOUR ACTORS, FOUR VIEWS, FOUR EXPLANATIONS?

This study is based on the conviction that environmental policy is constrained by a whole range of different factors. Basically, there are influences from four different actors: society (especially social movements), national decision makers, international institutions, and transnational and national firms. Analysing environmental problems in terms of single-issue approaches fails to appreciate their complexity, therefore, four different types of influence will be considered here:

1. sociological considerations on the role and development of the population and social movements and their (declining) influence;
2. national politics and economic considerations on the capacities of eastern governments to tackle environmental problems, in a recession and transition period, with shifting priorities;
3. international relations dimensions of these issues: whether there is an environmental regime for eastern Europe, and whether it is characterized by integration or dependence – or even negligence; and questions about the effectiveness of western institutions both in dealing with the eastern environment, and with regard to influence on eastern policies;
4. the reasoning and dynamics of transnational and national firms when they consider investments, privatization and takeovers in the region.

Social Movements as Actors

Environmental movements had a prominent role at the beginning of the Eastern transition. Most notably in Bulgaria, but also in Hungary, Czechoslovakia, Poland and the GDR, environmental movements gave a significant impetus to change. The most convincing explanatory factor is the low political potential assigned to environmental movements by the ruling communist parties. However, it is evident that this initial importance was not followed by a sustained political role. This is probably because environmental issues were a feasible way of opposing the communist regime; once political liberalization had been achieved, however, the interest in environment decreased and other policy issues gained importance.

Domestic Politicians, Parties and Government as Actors

During the period in question, there were many constraints on the political and economic framework in CEE: debt repayment, dissolving Council for Mutual Economic Assistance (COMECON) trade, the main trade partner USSR breaking apart, the Gulf and Yugoslav wars, the emigration problem and the inability to restrict communist power and emerging nationalism. Therefore the political and financial capacities of the newly installed post-communist governments and elites were severely limited. What was the role of environmental issues in this political struggle and economic adjustment process?

The answers expected are that the environment was mainly seen as one more policy field, where high expenses without immediate results would be economically and politically unfeasible. Instead of being part of the economic transition process, environmental issues were understood to be an impediment to the fast establishment of market conditions. The installation of governments run by former communists in most countries showed that the countries' political capacities were not sufficient to absorb the economic consequences of the transition. It was also a sign that the population and politicians were reluctant to accept new and radical solutions.

International Institutions as Actors

The main institutions influencing environmental policy in CEE – from outside – are the multinational development banks (the World Bank (WB) and the European Bank for Reconstruction and Development (EBRD)), the European Community/Union (EC/EU) and bilateral donors. Every two years since 1991, the environmental ministers of all European countries have met in what is called the 'Environment-for-Europe' process. Above the state level, various NGOs, political parties, universities, interest groups and firms developed their own 'foreign' policy in Eastern Europe. Although their accumulated importance is significant, it is close to impossible to evaluate their impact in general, because of the great amount of diversity and inconsistency amongst them.

Firms as Actors

The firms which exert an influence on the environment in CEE have mainly suffered from two facts: a harsh recession and high degree of uncertainty. The new criteria for economic

relations meant a deep restructuring and re-evaluating of economic priorities and unclear legal, property and financial situations slowed down the rate of new investments. Why have firms not yet responded to the idea of an environmentally sound economy? Firms often act separately from state reasoning or rules and follow their own interests. This diverging role is linked to technology change, their transnational ownership and transnational markets. Firms which produce for the western or world market mostly respect western standards, even if the host countries' standards are less stringent. Firms which want to avoid western legislation tend also to neglect eastern laws. After 1989, the message to firms was clear: east European states were not willing to create a common framework with legal guidelines, security aspects, liability guarantees, property relations, privatization, and so on. Firms therefore were more reluctant than expected originally to invest in eastern Europe. If they did invest, their environmental performance followed the firm's reasoning rather than the legislation.

Why Has There Been No Environmentally Sustainable Transition to a Market Economy?

The existence of environmental degradation in Eastern Europe is a commonly accepted fact and its repercussions are also felt in the West. Possible solutions to address this problem are offered (in particular, sustainable development strategies) and their economic feasibility is demonstrated for a series of proposals in which necessary and sufficient conditions are explained. However, observation of more than half a decade of transition suggests that these solutions are generally not applied.

By analysing the view of the relevant environmental actors in the CEE context, specific issues can be identified which will be shown to be responsible for the failure to introduce large-scale environmental policies. On this basis, in the conclusion, some policy recommendations and potentially successful strategies will be suggested.[4] The likelihood of the realization of these recommendations, however, is dependent on a number of conditions, which go far beyond the scope and goal of environmental policy.

SUSTAINABLE DEVELOPMENT IN EASTERN EUROPE?

In order to start thinking about the value of sustainable development in eastern Europe, it is illustrative to glance at the 33-point programme on industrial development which came out of a conference sponsored by the United Nations Development Program (UNDP) and held in November 1991 in Zaborow, Poland. The emphasis of this document is a double one. Elaborated mainly by economists, it suggests a detailed step-by-step scheme for the rapid *economic reconstruction* of eastern Europe. The basic problem is the lack of capital for investment. This cost–benefit analysis is therefore tightly connected the principle of *environmental sustainability*, in order to ensure minimal expenses for energy needs, protection of natural resources, removal of toxic and dangerous components and a high recycling efficiency.

The document also points out the *benefits of sustainable development*, which range from immediate financial savings through efficient energy use, and a shift to environment services and technology sectors with higher product quality, to socially oriented education and research. A central role is given to the dissemination of information about these concepts.

East European authors underline the special meaning of sustainability. For Genov (1993: 7) sustainable development 'implies also a substantial change in knowledge, values and attitudes'. In contrast to the less developed countries (LDCs), in various respects eastern Europe is more 'developed'. After all, eastern European countries are industrialized countries; they have established – more or less – democratic governments; they can rely on an educated population, with thousands of engineers, technicians and scientists; their population growth is negative and, finally, they have many links with the western world, be they of an economic, business, cultural or (through emigrants) human kind.

Nevertheless, in many respects, eastern Europe also shares the problems which characterize LDCs. They lack efficient structures for the implementation of laws; environmental consciousness and awareness is low; economic problems result in austerity budgets, where little attention is paid to environmental expenditures and up-to-date environmental technology is not available, or only through expensive imports from the First World.

Finally, eastern Europe suffers from some additional problems, which are not present in the Third World: the consequences of large-scale industrialization. In this respect the problems resemble those faced by the industrialized countries – but without the growing potential of the rich countries to mediate the negative impact on the environment. Some cities and industrial areas are highly polluted; there is a high dependence on energy for industry, transport and households; increasing waste production (especially toxic industrial waste); there is decreasing agricultural activity; the communist heritage left inefficient structures and a lack of sensitivity regarding environmental values; and there is little private initiative. If development only means increasing GDP, money will flow to sectors where growth can be achieved, and profits can be made – both quantitative increases. If development is understood, as Herman Daly puts it, as 'a qualitative improvement or unfolding of potentialities' (1990: 1), the pathway will be a different one.

Policy Measures

Even in western Europe, environmental sustainability has not yet become a mainstream policy strategy. Various approaches have been suggested to reform or otherwise change the present economic system. Environmental economists have concentrated on ways of accounting for ecological values as resources and capital (Daly and Cobb, 1989). In a similar way, tax reforms have been mooted in political discussion.

Environment and International Political Theory

Environment has also gradually become a more important issue in international policy, and the interdependence of countries and issues has resulted in an inclusion of new actors and values in diplomacy and international relations: sustainability, in simple terms, aims at ensuring survival not only in (eastern) Europe, but in all countries, not only today, but also tomorrow.

It is becoming increasingly clear that any notion of sustainability needs for its dissemination and application the support of important economic sectors. Indeed, some industrial areas have already started to include such long-term reasoning in their planning. There are now several international business groups which have adopted and which are trying to promote further the economic benefit of this ecological view.

Sustainable Development and Social Science

Since its beginning, natural science has been closely linked to the emerging awareness of environmental degradation. More recently, the social sciences also, by using long-term programmes, have started to tackle these questions, on a broader scale. Nevertheless, policy responses to the global environmental crisis first came from the technical side. The second important component, according to the Brundtland report, human activity itself, has remained far behind. Without a deeper understanding of the causes and solutions of environmental degradation, social scientists will not be able to understand the impact and importance of the 'human dimension' for the environment.

DOMESTIC CONSTRAINTS

Privatization

The slowness of the legislative machinery results in a preservation of the status quo. According to many observers, such delay is sought for by the former communists, who have begun to convert their former political monopoly into economic power. It is they who dispose of the financial capacities to buy the soon to be privatized enterprises. The longer the current state of affairs is prolonged, the more this strategy is successful. Because of the deep economic crisis and inflation, the price of these enterprises is in decline and potential competitors are vanishing. Through joint ventures with western based firms, and often thereby laundering 'dirty money', the new economic elite is creating a new monopoly (Paskalev, 1994: 5–7). Time is on their side; as a matter of fact, the privatization process in CEE is well behind the expected rate. In 1993, most countries in CEE only produced about a third of their total GNP in the private sector (see Table 23.1).

Table 23.1 Share of private-sector production in percentage of GNP, 1993

Poland	50
Hungary	25
Czech Republic	37
Slovakia	36
Romania	26
Bulgaria	16

Source: UN–ECE (1993), *The Central and Eastern European Economics in 1993*, New York: UN–ECE; OECD (1994), *Main Employment Indicators*, Paris: OECD.

Private business is undertaking risk in order to grow. In contrast, the state sector continues to be risk-averse and passive. But state-owned enterprises traditionally have good connections and are able to lobby the government more efficiently than small and medium enterprises. Economic restructuring, although a declared priority of all governments so far and supported by international aid programmes (for example, the structural adjustment loans), has gone little further than producing various implementation studies.

A further serious problem is the lack of an experienced banking sector. Although private banks have mushroomed in the CEE since 1989, many of them went bankrupt and closed.

The Macroeconomic Situation

Although commonly described as a transition to a market economy, in some countries there is as yet no certainty where this transition will lead. As a matter of fact, they lost their traditional markets within COMECON (now CMEA) and its advantages without being able to convert and immediately take advantage of a functioning economic system. A number of parameters of economic activity were changed and GNPs declined as a consequence (see Table 23.2). The introduction of a floating exchange rate changed many eastern countries from medium-income to low-income nations (in terms of $US/capita). According to newspaper reports, a significant share of the population lives below the bare subsistence level (*La Stampa,* 20 December 1994). Further devaluation has added to this development.

Table 23.2 Growth of GNP in eastern Europe (percentage of previous year)

	1990	1991	1992	1993	1994
Poland	–11	–8	+1.5	+4	+4
Hungary	–3.3	–12	–5	–2	+2
Czechoslovakia	–1.4	–15			
Czech Republic			–7	–0.5	+2
Slovakia			–6	–4.7	0
Romania	–7	–13	–15	–8	–2
Bulgaria	–9	–13	–15	–8	–2
CEE	–8	–13	–8	–3	—

Source: UN–ECE (1993), *The Central and Eastern European Economies in 1993*, New York: UN–ECE; UN–ECE (1994), *The Central and Eastern European Economies in 1994*, New York: UN–ECE.

Unemployment

At the same time, unemployment continues to rise throughout eastern Europe (see Table 23.3).

With the exception of the Czech Republic, unemployment is likely to continue to rise, as continuing economic change is expected to have little effect on the employment market. Many of the unemployed do not receive any state compensation.

> We cannot make it alone!' was thus the cry of most observers in – for example – Bulgaria, in November 1994, and indeed the countries are hoping for a closer collaboration with the West in most sectors. The desire to join Western institutions, however, is contrasted by an extremely cautious approach from the Western side. ... The EU summit in Essen in December 1994 was called an 'historic hour for Europe'. (*The European*, 16–22 December 1994)

The summit was seen as 'historic' because of the participation of six eastern European countries. However, there was also the blunt warning of the German chancellor and host,

Table 23.3 Unemployment (per cent)

	1990	1993	1994
Poland	6.1	16	17
Hungary	1.7	13	13
Czech Rep.	1.0	3	3.5
Slovakia	1.0	13.5	16
Romania	2.0	10	11.3
Bulgaria	1.7	16	18

Source: As for Table 23.1; also *The European*, 4–10 November 1994 (for 1994, data for October) and Wiener Institut für Internationale Wirtschaftsvergleiche (cited in *Der Standard*, 25 March 1995).

Helmut Kohl, 'against false hopes' and 'harbouring overly high expectations regarding an early membership for those countries in a period of transition' (ibid.).

External Factors

Apart from these domestic problems, most eastern Europan countries had to face severe common *external* influences, which increased the difficulties of their transition:

- the break-up of CMEA trade, which reduced the revenues from foreign commerce for most countries by half;
- the break-up of the USSR, which meant the end for several barter agreements, oil delivery, technical advice and spare parts;
- the Gulf War, which further decreased foreign trade, energy source supply and – for some countries – debt repayment (when being a creditor of Arab countries);
- the Yugoslav war affected the south eastern European countries most, increasing transport costs, mostly through longer alternative channels, and decreasing the absolute traffic and trade volume;
- inflation and the inability to deal with growing state expenses (unemployment, pensions, social costs), making the possibility of achieving western environmental technology even more remote;
- the foreign debt, the share of the debt repayment in their hard currency balance, was sharply rising.

Neither in the East nor in the West is fresh money for environmental reconstruction in eastern Europe likely to be available in the near future. Therefore, eastern countries are forced to spend their funds (and achieve loans) domestically, according to a tough ranking of priorities and, where any action has been undertaken, western countries, have taken care of transboundary pollution.

Finally, the recent successes of successors of the old communist parties in literally all CEE countries have dramatically underlined the unease of populations with the reform process so far. In environmental terms, this may well translate into shifting the rate of transition into a lower gear. Although most of these parties have now adopted a more 'social

democratic' profile, environment generally does not rank high amongst their priorities. Especially when trade-offs are to made between environmental measures and continuing the production of polluting industries, the latter is likely to prevail, given the severe social implications which the closure of these industries implies.

ENVIRONMENTAL MOVEMENTS AND TRANSITION

The reaction of the Communist Party to the environmental–political protest was a hesitation between two extreme solutions: on the one hand, it was impossible to admit general political opposition, as this strategy had produced unexpected results in other countries, such as Poland. On the other, a complete denial of opposition seemed to be equally unfeasible. The decision taken was to permit and support the supposedly weakest opposition in order to avoid a more dangerous one. The green movement, in the eyes of the communists, was a more restricted circle of intellectuals, more likely to be easily controlled. This section will explore two concepts: social and political opportunity structures.

Social and Political Opportunity Structures

Social opportunities are cultural reasons for a movement shaping its identity in a certain way and not differently. They define the way a movement frames its discourse. In the eastern European context, part of the social opportunities are the individual motivations for a collective mobilization against the communist regime.

The *social* opportunity structure (Crawford and Naditch, 1970: 215, cited in Rüdig, 1990: 33) defines the type of action chosen by discontented activists. A high level of relative deprivation and a high level of subjective efficiency favour the success of a movement. A narrow range of choices for successful framing brings about instrumental behaviour, or 'planned purposeful implementation of means to achieve desired goals'. According to Kitschelt (1986: 58ff) the *political* opportunity structure (POS) is a 'specific configuration of resources, institutional arrangements and historical precedents for social mobilisation, which facilitates the development [of the movement] in some instances and constrains them in others'. It can explain a good deal about variations in different social movements and influences the choice of protest strategies and the impact of social movements on their environment in three ways:

1. mobilization depends on the coercive, normative remunerative (for example, the legal framework) and informational resources;
2. access to the public sphere and political decision making allows for the acknowledgement, response to and shaping of the demands of social movements that are not (yet) accepted political actors;
3. opportunities change over time, and movements also appear and disappear, exerting a kind of 'demonstration effect' on other movements and encouraging them to follow suit.

The POS has both a national and an international level. Some authors prefer to define social movements and their political structure within a national context alone (for example, Diani, 1988). The special situation within the 'eastern bloc', however, suggests that the

international dimension must also be considered. In similar systems, diffusion and imitation have an important impact on the national level. For example, some of the favourable opportunities for the environmental movements in eastern Europe derived from the international political situation. *Perestroika* in the USSR and oppositional movements in other socialist countries also created a certain potential for an opposition movement in other countries.

Eastern European movements emerge when the social and political opportunity structures give space for a possible framing of opposition ideas. Social opportunities are favourable when expectations of success are high and framing of messages occurs close enough to the people's experiences and expectations. Choosing the right moment is crucial for the extent of social opportunities the challenge might provide. Political opportunities depend heavily on the stability of the governing regime; they do not exist when the regime is still in complete possession of power.

Successful framing therefore occurs between the borders set by the structures of social and political opportunities: *social opportunities – possible frames – political opportunities.* The boundaries of the choice of frames which promote a movement's success exist in two areas. On the one hand, the tolerability of the frame by the regime has to be borne in mind; overstepping this border will mean open repression. The second limitation on the framing is the acceptability of the movement's messages and aims by potential members. An attempt has been made elsewhere to link this theoretical background with certain elements of descriptive analysis (see Baumgartl, 1994).

Social and Political Opportunities of the Environmental Movements

The following aspects of social opportunities constitute the main reasons for the development of environmental movements.

- The *environmental situation* in eastern Europe had been neglected by the governing system. Although not all countries and certainly not all regions were badly polluted, some 'hot spots' reported desperate conditions.
- The *range of possible frames*: the environmental problem was a possible issue in public discourse, and especially in the last few years before the fall of communism. It is therefore not too far from the people's experience and has a resonant message. A certain influence of diffusion from western Europe has to be taken into account, too.
- *the characteristics of environmental issues* differentiate ecological from other social movements or cleavages (see Hegedüs, 1989: 270–75).
  (a) The ecological movement does not have a direct opposition or 'enemy' (national, religious, ideological). Rather is it defending everybody's interests.
  (b) There is no easily visible minimal consensus about solutions. The aim is an abstract, complex goal, which can be agreed with by everybody. It is a clean, human goal, difficult to neglect or oppose.
  (c) There is near certainty that, without significant changes to the whole system, life will be impossible for a high number of affected people. If this general idea is accompanied by existing, perceptible environmental damage, as for example in Ruse (Bulgaria), people feel they have to do something about it.

Western Theory and Eastern Movements

Political groups in eastern Europe can only be described with difficultly using western terminology. Although the terms 'right' and 'left' are used here, following western common usage, their relativity is borne in mind. Nevertheless, one clear difference in political convictions between western and eastern Greens cannot be denied. A diverse characterization of the Greens is given by Bobbio (1994). He rejects the view of the Greens as a movement which is horizontal – transversal – to the traditional vertical cleavage of 'left' and 'right'. After all, both right and left parties have taken over the ecological issue 'without changing anything of their usual package, at the most adding a little bag or suit-case' (ibid.: 13). Nobody would dare to take a position against the necessity of taking account of the rights of nature, and the ensuing obligations of man towards nature.

The difference is in the justification which is given to this consideration: is nature to be protected because of people's responsibility towards all other non-human entities, or rather because of a debt towards other humans, in particular future generations? According to the answers given to these questions, Bobbio defines 'right Greens' and 'left Greens'. Right Greens respond to a problem posed to man from outside, left Greens to a problem man poses to himself (ibid.: 14).

In opposition to communist regimes, eastern European Greens often take up positions that seem to resemble those of the political right in western Europe, to generalize in this way is too simple. Bulgarian Greens clearly relate their economic ideas to a free market economy (as opposed to the 'left ideology' which caused the environmental degradation). Hungarian Greens have tended to be very sceptical towards liberal and capitalist influences, and have preferred a more 'left' policy.[5] In a more abstract way, one should not attempt to include all political groups in this narrow left/right scheme. Green politics are opposed to systems which stress economic and technical progress, whatever their ideological background might be. Potentially, their protest against a ruling system resembles the positions of the opposite ideology, but actually their opposition is not due to the ideological differences which are expressed in the left/right scheme, but is a *compulsively reactive opposition.*

ENVIRONMENTALISM AS A DETERMINANT OF EAST–WEST RELATIONS?

Globalization and the International Dimension of Environment

Environmental issues are a perfect example for testing the growing globalization of politics. Environmental damage in one region may have its effects in other regions, sometimes thousands of kilometres away, while various environmental threats, such as global warming, the destruction of the ozone layer or the loss of biodiversity, affect all countries of the world. At the same time, however, another feature of 'globalized' issues is becoming evident in international environmental affairs: the puzzling number and diversity of preferred solutions to these problems. The outcome of the struggle between divergent conceptions is often unsatisfactory for all of the parties involved.

The establishment of a new economic system and the shift to new property relations during the privatization processes are highly dependent on ecological conditions. Liability

for existing environmental damage and the costs for environmental reconstruction interfere in the cost–benefit considerations of potential (both foreign and domestic) investors. Social and political implications consist of a declining quality of life and an insistence by the population on some quick positive results from the new system.

The neglect of the environment in eastern Europe is not only a result of a lack of awareness. The main reason for the failure of environmental protection was the lack of practical implementation. The contradictory tasks of, on the on hand, maximizing production by plan fulfillment and, on the other, respecting the legal provisions concerning ecological goals made the latter a second order – and therefore unrealizable – constraint. At the same time, increasing globalization, and thus interrelations between geographically distant regions and countries, has acquired a crucial importance. For the potential recipients of aid in Europe, events like the Rio conference meant a distraction of interest and attention from their own grievances. Also western European countries now feel responsible for the serious environmental degradation in Africa, South America and Asia, and thus eastern Europe has lost the primary attention it had gained in the very first years following the fall of communism.

A Determinant in East–West Relations?

The transnational character of environmental problems is not only evident when transboundary pollution is at stake. Interrelations with western countries and the introduction of a western-style system also brought a new set of dangers for a sound environment. Economic decisions, in particular, imply environmental consequences, whether intentionally or not.

The no longer questioned principles of capitalist and free market conditions are being introduced in eastern Europe without the mediating influence of adequately developed state regulation and without effective pressure from the population through non-governmental organizations (NGOs). It is precisely state regulation which has been the most decisive factor for environmental awareness in the West, and it is likely to increase. As far as the environment is concerned, there is a strong contradiction between neoliberal laissez-faire in the East and growing regulative intervention in the West. The Fifth Action Programme of the European Community, for example, calls for an integration of environmental concerns in all other policy areas (CEC, 1992b). Reduction of the state's regulating role is certainly a characteristic reaction of states which see their backwardness resulting from a centrally planned economic system, but it is also promoted by western assistance. In the case of radical reform programmes, the danger exists of 'throwing the baby out with the bath water', particularly when governmental measures are badly needed. In fact there is a stark contrast between the position of environmental issues on the international agenda (where they are high and in ascendence) and on the national agendas of the CEE countries (where they are low and in decline).

Environmental cooperation per se, nevertheless, does not explicitly favour either liberalism or dependence. In theory it could be based on either of the two types of inter-state relation. Future ecological preconditions can be seen either as a consequence of integration into the western framework or as eastern dependence on foreign decisions.

Social Constraints

Any consideration of the environmental clean-up and reconstruction in eastern Europe, however, must bear in mind that such matters are likely to be of secondary importance on the eastern political agenda of urgent problems. There are other social problems which require immediate solutions, and sometimes environmental demands might even worsen existing difficulties. When the closure of highly polluting industry is in question, for example, the affected population sees a contradiction in the benefits of ecological measures: unemployment for them is a more direct and perceivable danger (Nissen, 1991). Thus close cooperation between east and west is put forward as the only way of coping with environmental problems which affect Europe as a whole.

Bachmann (1993), in his study on environmental reconstruction after German reunification, points out how an exogenous approach (in this case by the Federal Republic) neglects the existence of previously existing expertise. The inefficient ecological policy in the East does not mean that eastern experts did not know how to solve the problems: it tells us more about the difficulties these experts had in implementing their knowledge. The exclusion of this available domestic knowledge is one of the biggest dangers involved in dependence on western ecosolutions.

However, environmental policy imposed from outside might also be thought to be the only way of ensuring that environmental problems are faced up to in the East. Both environmental clean-up and protection are long-term goals; eastern governments are at present occupied with immediate challenges. Their failure in crucial areas (inflation control and unemployment) may deprive them of the support necessary among the populace. With this priority of urgent reform being the main political preoccupation, the environment is likely to be left behind.

Several areas can be named where western governments influence and support eastern governments in transition: eastern governments cooperate with western governments for mutual benefits; they try to influence public opinion of western societies in order to obtain more support; and western and eastern governments cooperate with international organizations (especially the IMF, WB and EBRD) in order to realize the above-mentioned political aims of integration. Free trade and exchange are seen as mutually beneficial.

However, a complete integration into the western system in the short or medium term is impossible. The example of the GDR shows that problems tend to be underestimated and costs are likely to rise throughout the process (Bachmann, 1993: ch. 1). Moreover, the amount of money, concern and political willingness present in the German case is far from being matched in the other eastern countries.

Donors of Environmental Assistance

The main actors in environmental assistance to eastern Europe are multinational development banks (MDBs), the European Union (PHARE programme) and bilateral donors (sometimes within G-24, sometimes separate). In general, the main share of assistance to eastern Europe is distributed through loans by the MDBs, notably the WB and the EBRD). This is also true of environmental assistance. Influence by the MDBs is not only exerted through lending activity; as huge international organizations, they also maintain policy dialogues with the concerned countries. Through the elaboration of conditionality on their loans, they

have a considerable insight into and impact on a country's internal economic mechanisms and policies.

The MDBs are not principally engaged in environmental projects but, despite this, they do have specific strategies and procedures in their activities. Their main strategy is to integrate environmental aspects in their overall policies: the financing of free-standing environmental policies is only secondary. Consequently, the banks have created similar internal environmental assessment procedures. Yet, as Connolly *et al.* (1995: 16) note, 'the fact that these environmental mandates are embedded within broader objectives, and the fact that loans are the main form of financial transfers has created clear structural problems that make it difficult for the Banks to carry out their environmental policy goals'.

Given the EBRD's activities so far, however, it seems that the range of sustainable development within its activities is extremely narrow. It has not been, as environmentalists hoped, a positive force on environmental issues (Reed, 1991, called it an 'environmental chance'), but rather behaves as a merchant bank, whose first priority is to make money. EU aid, within the G-24 aid programme, PHARE (the EU programme for eastern Europe), is only distinguished from other aid programmes through being founded on grant-based funding. One of its main goals is to ensure a growing market for EU companies. The environmental share in PHARE has fallen from about 20 per cent in 1990 to barely 6 per cent in 1992.

The ministerial conference on the 'Environment for Europe' process reflected the state of concern for environmental reconstruction in central and eastern Europe. The urgency of investment to combat environmental degradation was well recognized, but the financial back-up failed to materialize. The lack of commitment, however, reflects the declining interest in eastern Europe – and especially its environment – in western societies. Only those environmental measures which are feasible, which can be achieved without financial input or which bring with them a considerable economic benefit are considered.

The Continuing Western Influence

The political, economic and ecological transformation of CEE has proved more difficult than either the West or the new democratic elites expected. Some of these difficulties may simply need more time to be overcome (the western post-Second World War reconstruction was far from being completed in 1950). Moreover, a number of difficulties which arose in this transition are home-made, and can only be explained by intensive sociopsychological and economic–historical research.

Nevertheless, as far as the western role is concerned, it is evident that the West has had a huge shaping power in the transition of CEE countries. Today, the latter find themselves in a new relationship somewhere between what was initially conceptualized at the beginning of this chapter in terms of integration and dependence. Even if not conclusively summarized, the theoretical framework of 'integration', 'dependence' and the theoretical umbrella of 'ecology' does help shed some light on the new quality of East–West relations. The Western aid regime provides considerable financial, technical, legal and political support for economic reconstruction and the integration of CEE with the West. However, the relative neglect of social and ecological factors and the deep recessions hint at growing, rather than diminishing, dependence.

The following conclusions can be formulated with respect to environmental policies. As far as the environment is concerned, duplicating western environmental policy would bring

a lot of short-term improvements for eastern countries, but it would mean duplicating western environmental problems too; and despite advanced environmental technology and policy having had some success, the West is far from being an environmental paradise. The interest of western Europe in the East can be partly explained by a transnational NIMBYism (not-in-my-backyard). Both a specially designed approach for Eastern environmental problems and a generally more cooperative procedure would be the real first-best choice for the future. A specially designed institution, similar to the institutions which have been planned as a follow-up to the decisions of the UNCED conference in Rio, with the task of coordinating environmental programmes, would help to harmonize efforts and facilitate the exchange of know-how.

When evaluating environmental assistance to the East, the following lessons become evident: inconsistencies between intentions and results call for an improvement of existing transfer mechanisms. The level of aid is only part of the story: equally important is the existence of institutional arrangements in the recipient countries. Despite the attention given to this issue after 1989, both resources available in the West and the value attached to environmental issues have been low, compared to the necessary measures.

The analytic lens of environmental relations between the West and East identifies a need for more strategic planning, more coordination of aid programmes and greater involvement on the eastern side. Only if these shortcomings can be overcome is integration of both an environmental and political kind likely to bring more evident fruits. In particular, the EU should live up to its own rhetoric about European integration with increasingly balanced support. It should be possible to think of a clear timetable for political and economic (with intermediary protective measures) integration, based on conditionalities that look, not only at economics, but also at democratic (for example, considering minorities), social (especially unemployment) and ecological criteria. This could also enhance the links between social, political and environmental groups in East and West, thereby strengthening East–West integration – and weakening the dependence character of East–West relations.

THE (POTENTIAL) IMPACT OF FIRMS ON ENVIRONMENTAL AWARENESS

In those countries where development and establishment of a market system are now on the daily agenda, awareness of environmental impacts is not sufficiently widespread to have had significant influence on industrial and political decisions. The prevailing attitude is a loosely conceived determination to 'grow now and clean later'. Little in the way of thorough analysis has gone into this attitude, which relies mostly on 'common sense' and wishful thinking. However, different actors in these countries can have considerable impact on the development of effective environmental awareness. As was argued at the beginning of this chapter, sustainable development, in fact, depends on the cooperation of all these players. Measures aiming at the improvement of the environmental situation should include the establishment of an equilibrium among the actors. This section will analyse the role of firms and emphasize their potential positive impact on the environmental situation.

Getting Collaboration Started

As far as environmental awareness is concerned, the past role of firms has been characterized by low input. So far, environmental plans and strategies have mostly been elaborated by the public, in collaboration with NGOs and scientific experts. Private actors and businesses have often been seen as the opposition – the objects of regulation. In western countries, firms were traditionally seen as the 'bad actors', creating problems and resisting solutions. Both social movements and states found reason to denounce the environmentally unsound processes or products of private firms. Cast in the role of villains, firms developed a general scepticism towards any environmental regulation, law or restriction. Environmentalism was often seen to be allied with a general opposition to progress and hostility towards technological solutions – and, indeed, sometimes it was.

If firms engaged in negotiations with environmental groups or state authorities at all, it was mainly a public relations exercise. If NGOs had the opportunity to enter into discussions with firm representatives, they often presented irreversible demands and extremist opinions. Their own constituency and *raison d'être* impeded their ability to compromise. Collaboration was unthinkable. No serious exchange of opinions could take place. This position construed the short-term objectives of commercial interests as antithetical to sustainable long-term considerations for the environment. However, this construction of the problem is inaccurate for transitional and developing countries. In these nations, it is often the private firms which are adopting the long(er)-term views, while governments struggle with immediate, short-term problems. Inflation, the economic crisis, social pressure and nationalist conflicts force them to rule literally on a day-to-day basis. As paradoxical as it sounds, sometimes governments in former planned economies have to learn a great deal about long-term planning from 'capitalist' corporations. Environmental planning is a case in point.

In fact, it can be very much in the interest of firms to shift from a reactive to a proactive role in environmental management. The private sector can be a critical ally for environmental NGOs and policy planners in developing strategies for sustainable development. The inclusion of firms as equal planning partners, and the recognition of the private sector as an active player in environmental management, reflect an important new level of collaboration.

Including Firms in Policy Making

The Rio conference was the first major international meeting on the environment in which business and NGOs were included. Nevertheless, planning, decision making and voting remained the province of public entities, specifically the ministers of participating governments. This division of tasks reflects the long tradition of government in industrialized countries in which firms are regulated by a framework of laws which are respected and implemented with reasonable reliability and predictability. It is a paradigm in which powerful national entities dominate and control less powerful, private, market-driven firms.

However, this paradigm does not hold for all countries. In other circumstances, the roles may change considerably. Big firms can easily dominate small countries, shaping national agendas and influencing policy to reflect the firms' needs. This relationship between powerful companies and weak governments has been seen heretofore as inimical to environmental goals, comparable to the way in which the dominance of firms over democratically elected

structures may threaten democratic mechanisms or power distribution, or in which the influence of seductive but foreign cultural values may overshadow indigenous national or regional characteristics. This effect may no longer hold true for the development of environmental awareness, however. On the contrary, firms can have a positive impact on environmental awareness in countries where the environment is now low on the public priority list. If we choose to consider this effect a universal good, rather than a foreign cultural bias, we can surely consider such an influence beneficial and desirable. This will help distinguish between 'green' and 'dirty' firms.

So far, so good. Let us assume that firms could function positively in the transfer of environmental awareness. Unfortunately, recent history has not produced many cases of proactive firm involvement in sustainable policies, but has come up with infinite examples of environmentally unsound, unsustainable and destructive performances. In the former Second and Third Worlds, not only were domestic firms responsible for regionally devastating pollution levels, but also big international companies based in the industrialized countries took advantage of poverty, ignorance and need in other countries. Though it may be possible to include firms more actively in the creation of environmental policies, the current state of affairs demonstrates that many of them have not yet shown themselves to be worthy of such responsibility. Firms which are forced to respect environmental standards in their own countries still continue to violate export regulations and other countries' environmental laws; they damage the health of their own workers and of consumers by exporting pesticides to Latin America, outdated pharmaceutical products to Africa and dangerous waste to Asia.

The first task in finding a way to include firms in policy making is therefore to distinguish between these culprits and environmentally aware firms willing to play by the rules, and to contribute to rules that are fair to all stakeholders. At present there is insufficient information on which to compare firms' behaviour. One example is the proactive effort of the Responsible Care Program of the US Chemical Manufacturing Association, which is pursuing joint activities with numerous national associations all over the world. NGOs and policy makers must continue to observe the individual performance of firms more closely, and distinguish between 'green' and 'dirty' companies. Academia has also started to collaborate with green firms, learning from their experience and contributing to their efforts through research and teaching. The public's part is also integral to this society-wide effort. 'Dirty' firms should be clearly identified, criticized and eventually boycotted by an alert public. Environmentally proactive firms will be valuable partners in the promotion of sustainable development and environmental awareness if these concepts can be translated into growth for their businesses, and the alternative is a decreasing market share.

Firms as Actors in the Environmental Reconstruction

Policy analysis so far has concentrated on states and multi-state organizations, but firms are often the really decisive factor when positive or negative impact on the environment is at stake. It is by the engagement of firms that economic decisions are taken, and firms decide how far political and legal frameworks are implemented. This applies both to big, often international, trusts and to small and medium-sized firms, which mostly act in a national context.

International firms have various possiblities to deviate from state legislation and measures. Often states do not have the capacities or the will to interfere in the 'internal' affairs of

their best taxpayers. In the context of East–West relations, the influence of big firms can be both positive and negative. They can be the vanguard of cleaner technology and production processes, exceeding a state's requirements in order to meet the needs of their market and consumers; at the same time, if they decide to take advantage of bad implementation control, there is little a weak state can do to have its standards respected.

National firms have an even stronger influence on the overall consequences for the environment. Although the single firm is likely to be small and its output insignificant, it is their large number which makes them important. In Bulgaria, these indigenous firms account for more than 90 per cent of the turnover, and more than 95 per cent of the existing pollution (Paskalev, 1994).

CONCLUSIONS AND NEW POLICIES

Since the end of the 1980s, the limits of traditional strategies in environmental policy have become more and more apparent. Traditional 'command-and-control' policy in the environmental field has been challenged in the EU by other means of policy implementation. Amongst the drawbacks of the traditional array of quality product and process standards, usually implemented with the help of licences and legal enforcement methods, were the low commitment of regulated actors, inappropriate policy measures due to a lack of knowledge and information, and the occurrence of substantial implementation deficits in many cases. These drawbacks were increasingly regarded as barriers to the development of effective and efficient environmental policies.

Without going into detail, it can be said that whoever is in the position of being 'controlled' generally does not feel part of a common activity. It has thus proved to be more effective to link actors into processes, and thereby – as the slogan goes – 'make them part of the solution, and not part of the problem'. Therefore new ways for the formation and implementation of environmental goals and measures are developed and slowly introduced, particularly the use of economic instruments and market dynamics, and the more interactive, participative and cooperative approaches to polluting actors (Liefferink, 1995).

If implementation of environmental regulation is a problem in rich countries, with a high level of environmental consciousness, long-experienced, efficient institutions and a high degree of transperency, it is even more difficult in a highly unstable, weak system, with emerging new institutions, and a low degree of legitimacy. As Majone writes (of policy fields in general), 'when cognitive complexity is high, outcomes ambiguous and quality difficult to evaluate, the collegium (of joint environmental policy intiatives) has definitive advantages over alternative modes of co-ordination and control' (1986: 446). This is especially true of environmental policy as a specific policy field. But the characteristics mentioned here of complexity, unclear outcomes and difficulty of generalized evaluation, apply even more to eastern Europe.

Market Instruments

Market instruments for environmentally friendly action by polluting actors are a way of shifting the attention away from 'quantities' (the usual target of 'command-and-control' policies) to 'prices'. Two main variations are possible: imposing costs on polluters through

'green taxes' or creating a market – that is, emissions can be bought and sold like any other marketable good. By providing incentives, and thus effecting an indirect influence, market instruments aim at the same outcome as standards: a decrease in emissions and, at the end of the day, a cleaner environment.

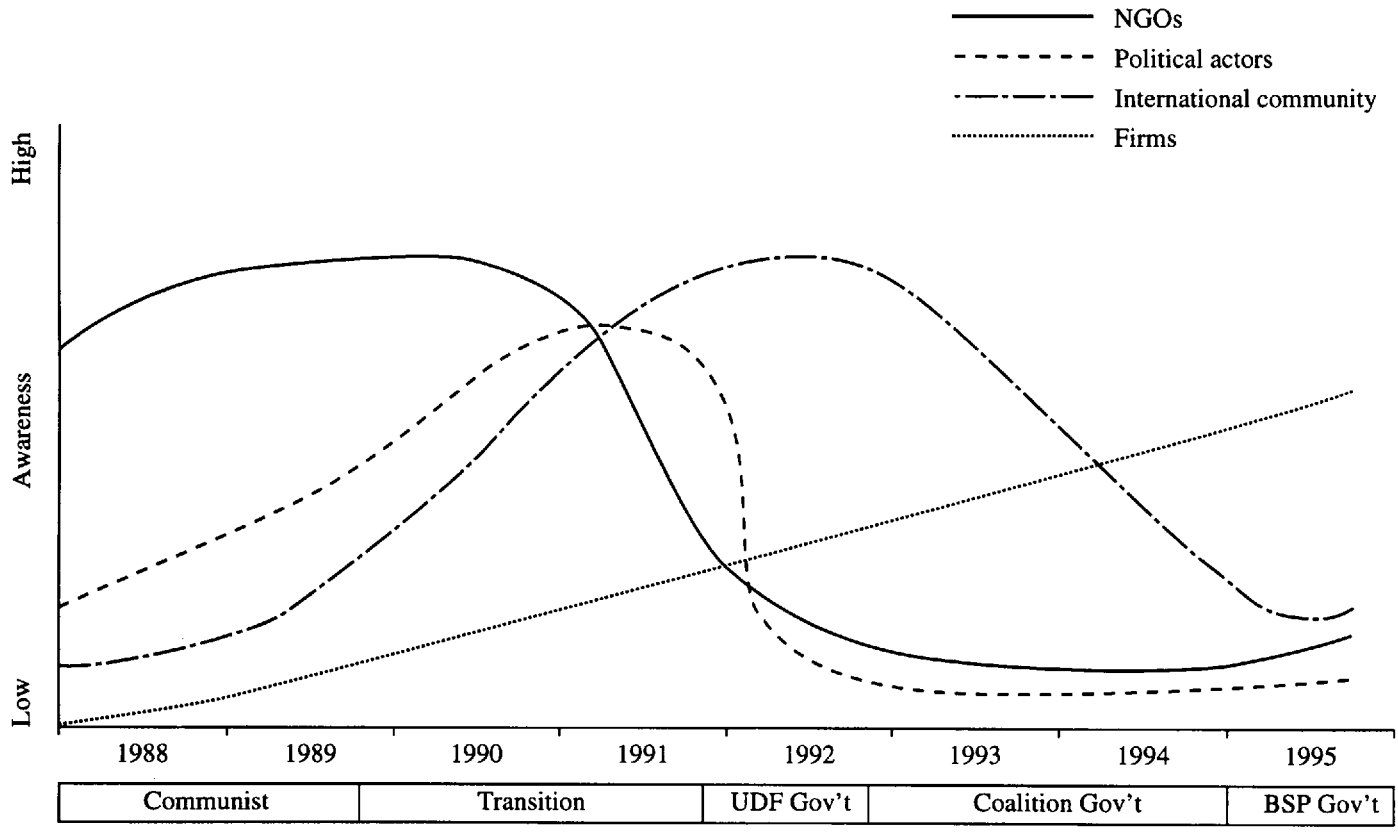
When introduced, economic instruments help integrate economic and environmental decision making. These instruments provide the prices and other market signals that help decision makers to recognize the environmental implications of their choices. These incentives will possibly have a limited role in the beginning, mainly because many pressing investments and other economic activities will have a higher priority (see 'Domestic Constraints', above). According to a study by Peter Hardy (1994), the former director of the REC in Budapest, 'after a decade or more, however, when the economies are expected to come out of recession and national incomes to have risen to a sufficently high level, these incentives will show their desired effects' (ibid.: 22). It is thus already vital today that clear institutional frameworks and meaningful, well elaborated plans be put at the disposal of policy makers.

Voluntary Agreements

'Joint environmental policy making' refers to a rather broad variety of new initiatives in a variety of political institutional systems. Notwithstanding their diversity, the basic ideas, principles and characteristics of joint environmental policy making can be summarized. It is a model of collective decision making and coordination distinct from the two traditional modes: state and market regulation. Joint environmental policy making is based on communicative regulation that uses mutual information exchange, consensus building, co-responsibility and self-regulation, and frequent consultation (of interest groups and experts) as important mechanisms for decision making and coordination on the regulation of environmental problems. The contribution of private interest groups is essential, as these groups are given responsibility for policy outcomes, implementation and policy results. Consequently, the variety of modes converge in a cooperative manner of environmental policy making in which those regulated negotiate and jointly decide the goals of environmental policy, the main strategies and the conditions under which modification of goals, strategies and time paths are allowed. Finally, this involvement ensures the commitment of all actors for a successful implementation stage.

Neocorporatist Approaches

Environmental awareness is difficult to measure. However, its results may be defined as the elaboration, adaptation and implementation of sound environmental policies. Environmental awareness brings about sustainable environmental policy and action. Generally, the following actors influence the emergence of environmental awareness: social movements, national decision makers, the international community and firms. Though each of these actors demonstrates a completely different pattern of interests, the behaviour of each reinforces the impact of the others on the level of environmental awareness throughout a society. The necessary precondition for such joint effort is, however, contemporaneous action by the various actors. As is shown in Figure 23.1, the level of awareness has not been temporally coordinated. When a second actor could have reinforced the awareness of the first, the latter



Note: UDF (Union of Democratic Forces) and BSP (Bulgarian Socialist Party) are the leading political parties in Bulgaria.

Figure 23.1 Temporally uncoordinated awareness among environmental actors: the case of Bulgaria

had already experienced a decline of interest in environmental issues. As was confirmed during interviews with members of NGOs, government and international institutions, in the end, firms are at present the most likely promotors of sustainable environmental action (see Figure 23.1). The criterion for the tentative ranking of awareness was the impact an actor had on the increase in awareness of the environmental situation, in the opinion of the interviewees. The short-lasting peaks of high environmental awareness reveal the underlying fact that none of the four actors had a continuing interest in the environment as a priority issue. Although by no means a sufficient condition, a high environmental awareness by several actors at the same time can be considered a necessary precondition for efficient environmental reconstruction. Experience from western countries also shows that it is the simultaneous activity of several critical players, rather than the influence of any one of them, which produces the most visible effects. Given the present situation as described under 'Domestic Constraints', this eventuality seems further away at present than it was in the aftermath of the disintegration of the USSR.

Interests and Bargaining Positions of Environmental Actors in Eastern Europe

Below, a schematic listing of the four environmental actors identified will be attempted. In principle, all of them have legitimate interests which condition their decisions. Each of them is thus screened using the same questions on its motivations to support or impede the adoption of sustainable environmental policies: what they can do, what their other interests are, why they adopt steps to favour sustainability, and why they do not undertake other or more proactive steps.

NGOs

NGOs as environmental actors have as their main means of influence the mobilization of public opinion through protest and information campaigns. Moreover, they can influence voter behaviour when indicating or denouncing the specific positions of political parties on their environmental programmes. In direct contact with politicians and institutions, they are also able to exert a lobbying activity and can thereby influence decisions at a preparatory stage. In relations with firms, NGOs can significantly influence the behaviour of consumers through public accusations against individual firms, if firms are responsible for environmentally damaging procedures or products.

Their interest and power to use these potential tools, however, is seriously limited by constraints which affect NGOs as organizations or their individual members. A broader interest in taking part in the distribution of political power and in taking over political positions, can deflect their principal concern with environmental issues. Moreover, individual members of environmental NGOs can change sides when they see their personal career and survival put in jeopardy by their continuing membership of NGOs. Several former activists of environmental movements are now employed by big firms or investment funds, have become members of political parties or the government, or have even left the country.

NGOs' support for sustainable environmental policies is mainly driven by direct health consequences of a polluted environment, or by a higher degree of environmental consciousness. The latter is linked to the individual value rankings individuals hold and thus is highly dependent on the relative importance other values have. In certain situations, external

influences such as the employment situation, standard of living or economic difficulties can have a significant influence on this ranking.

In contrast, impediments to pro-environmental activities in eastern Europe are the lack of knowledge (about their consequences), lack of experience (how to publicize an issue, and which rights NGOs are entitled to), lack of information (on environmental conditions) and – last but not least – the lack of resources when trying to start their activities.

Governments

The government as an environmental actor has the principal responsibility and duty to develop and enforce coherent environmental policy. Environmental policy, however, is not its only goal – indeed other interests are frequently more important. The overall main goal of governments is to be re-elected, and they tend therefore to neglect important environmental issues when they are opposed to the (perceived) majority opinion amongst the population. Issues like unemployment, budget constraints, inflation or social poverty are likely to enter into conflict with the environmental tasks and programmes of governments. When distributing resources, governments in eastern Europe are also often limited by the preconditions set by the IFIs (international financial institutions). The international standing of governments (crucial to continuing to receive loans) thus becomes a constraint which may diminish their environmental expenses and activities.

Nevertheless, the reasons for governments in eastern Europe to support sustainable development seem obvious: they would thereby lower health damage, avoid long-term clean-up costs and improve the actual state of the environment in their countries. By dealing with environmental issues seriously they would also ensure aid flows from the West which are linked to such commitments.

Seen from an environmental perspective, it seems unlikely that governments would leave environmental concerns aside. These governments, however, also have to deal with severe constraints and other priorities. A general lack of resources, which affects all policy fields, and heavy lobbying against efficient environmental control are factors which are diametrically opposed to sustainable policies. Often there is also a general lack of information on the state and the consequences of ecological damage, and limited knowledge about the benefits a sound environment can bring. In the same way, too little is known about low-cost solutions with quick return of investments.

In conclusion, it seems that those governments in power in eastern Europe have opted for other priorities, and have followed above all a short-time reasoning. The general political instability has definitely added to this lack of environmental commitment.

The international community

The third actor, the international community, has an important role to play, given the limited domestic resources in the East. Through environmental aid, in the form of money and technical assistance, it can initiate important projects, which would not only improve the environment in the East, but would also bring a broader benefit for Europe as a whole. A reduction in trans-boundary pollution, (environmentally caused) migration, decreasing economic power and political stability are some of the potential consequences of financial transfers in the environmental field.

Since the post-1989 euphoria, however, interest in the East has declined significantly. National interests of western states, and increasingly limited resources for development and

environment aid, have diminished the impact of the West on policy choices in the East. The attention of western donors is attracted by a new regionalism and changes within the EU, and also by other regions and issues which attract public interest and resources, such as the Third World's environmental crisis (witness the marginal role eastern Europe played during the Rio conference) and other current world events in other areas (the political crises in Somalia or Haiti, or the wars in the Middle East or Yugoslavia). At a time when social expenses in most western countries are indeed decreasing, public opinion in the West has less sympathy for giving aid to foreign countries, even if they are fellow Europeans. Rather than helping the East, the western countries are struggling with their home-made problems and only accept cooperation with the East, if at all, on the basis of dependency. The main motivation for the West has so far been western interest – something which holds true even of aid to the East.

Firms

The last environmental actors observed, firms, have an often neglected role in the positive or negative impact on the environment. Through investment in eastern Europe, complying with laws and standards, proactive activity could be 'exported' to the East. Firms would not only support the country in an economic sense, they would also create, educate and influence their future clients on western Europe's borders. They would at the same time exert a considerable pressure on less environmentally aware firms in the East and break monopolies which, at present, allow for continuing pollution – with the argument of both a necessary supply and the threat of impending unemployment for their employees.

Nevertheless, in a more narrow, economic accounting, firms have no automatic interest in environment (which is often understood as one more additional cost). The violation of regulations to protect the environment and the possibility of selling products which are forbidden in the West are strong incentives for environmentally damaging activity. To avoid such excesses, state regulation still has an important role to play.

However, transnational firms today are no longer in a position to separate their activities in national markets. Their image is a single one and badly viewed practices in one country would undermine their image and reputation in other countries. The potential effect of consumer reactions in the West has to be taken into account. Producing according to world standards, in any case, firms can gain a comparative advantage over domestic firms by their proactive environmental behaviour and thus create a new market, preparing for future gains.

Cooperation between Environmental Actors

Possible overlaps and areas of cooperation between specific actors[6] have so far been lacking because of the different timing of interest in the environment among environmental actors. The above discussion indicates that several issues could, theoretically at least, be put together in joint action. It is a matter of finding the forum which allows for the active participation of each actor.

Unfortunately, the results of these different viewpoints on the environmental policy question in eastern Europe show that none of the factors necessary for a coherent development of a sound environmental policy and its ensuing implementation was present.

1. Movements and society used the environmental issue exclusively as a vehicle to mobilize against the communist government.

2. Post-transitional governments were busy dealing with issues that were considered more important: privatization, liberalization, land restitution, inflation and so on.
3. The international community (that is, the western industrialized countries) had to combat internal problems, recession and a declining interest in eastern Europe on the part of their populations.
4. Firms had to rely on their own reasoning, because there was no coherent framework for environmental performance.

What were the Impediments to the Realization of Efficient Environmental Stategies?

Both in the West and in the East the transition was expected to be easier than it turned out to be. On the eastern side, a distorted perception of market economies failed to see the negative consequences and distributional deficiences markets create. The lack of understanding of the state's role in so-called 'capitalist' systems meant a general anti-state attitude, whereas state intervention was crucial in the West – and is crucial in the East – for environmental action. Moreover, an overestimation of the availability of western financial support induced an underestimation of the dependence on local initiatives, resources and capacities.

On the western side, a general lack of thorough knowledge about the real conditions in eastern Europe, both in politics and as regards environmental degradation, prevailed for years, even after the changes of 1989. The assumption that projects and policies which were developed abroad could be introduced into the eastern European reality without friction and tension proved wrong in most cases – with bitter consequences for the exposed populations. Finally, there was an oversimplification of transitional and environmental solutions and the overestimation of western solidarity with the East. Bit by bit, with the necessary readjustment of strategies and the consequent reduction of expected fast and positive effects, western interest in the environment in the East declined. In other words, other issues now dominate the discussion and headlines in the West.

It should be emphasized that the non-contemporaneous rise in awareness and the superficial interest in environmental problems among the environmental actors has been the most significant factor in the absence of a sustainable environmental policy in eastern Europe. Although several actors had a brief 'window of interest' in the environment, this interest was short-lived, and such instances occurred at different times.

NOTES

The opinions expressed here do not necessarily coincide with the official position of the European Training Foundation.

1. Findings concerning the specific situation of transition from authoritarian to more democratic structures might be particularly comparable to the one of African states passing from dictatorship to political pluralism.
2. Similar conditions can be observed in South East Asia, particularly in China.
3. Another main (economic) factor is the (non-) consideration of 'externalities'; that is, the failure to consider costs caused by an economic activity when calculating its profitability, and therefore shifting them to other parts of the society.
4. After collecting most of the data and analysis, a comparison was possible with the preliminary results of a two-year project carried out at the Center for International Affairs of Harvard University, which looked at the 'promises and pitfalls' of environmental assistance, partly based on eastern Europe (Keohane, 1995). As the results mostly coincided, little reference is made to this project, but the joint discussions in 1993/4 had an important impact on the argumentation of the present study.

5. Interview with Janos Vargha, Budapest, 21 November 1991.
6. Another environmental actor which proved to have an influence on the initiation and adoption of environmental policies is the academic community. As is shown in Haas's study of the Mediterranean (1990), it did have a significant impact in constellations, where traditional motivations for cooperation were not present. However, the role of academia as such in Bulgaria was negligable. Two reasons can be mentioned: first, it faces a deep crisis of legitimacy because of its strong involvement with the past regime; second, it does not have the forum and resources to do so; and third, if individuals within the academic community are interested in environmental policy, they usually voice their position through a political party or NGO. An exception is the firm stance against the nuclear power plant at Belene made by the Bulgarian Academy of Sciences (Tsvetanov, 1990).

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24. Between commitment and implementation: tensions in sustainable development policy of the European Union

Susan Baker

INTRODUCTION

This chapter examines sustainable development policy within the European Union (EU) and, in particular, focuses attention on the goals and aspirations of the Commission of the European Communities (the Commission). The EU is legally committed to the promotion of sustainable development and has publicly declared its intention to see that commitment translated into successful implementation (CEC, 1991). While recognizing that, in the EU, member-states play a crucial role in shaping sustainable development implementation, this chapter will focus on the EU as a whole. This perspective is justified by the increasingly important role that the EU now plays in shaping environmental management strategies, not only at the international level, but increasingly also at the member-state and subnational levels.

The first section of the chapter explores the notion that sustainable development is a contested concept. The second section begins by examining the rationale for EU commitment to the promotion of sustainable development. It then explores two key changes that the Union has made with respect to (1) terminology and (2) the policy imperatives associated with the implementation of sustainable development. This includes an examination of the Fifth Environmental Action Programme, which represents the Commission's translation of its commitment to sustainable development into concrete policy aims and objectives. An appraisal of EU achievements with respect to these aims and objectives is also presented. The conclusion explores the future direction of EU sustainable development policies, in the light of current political change.

SUSTAINABLE DEVELOPMENT: THE IMPLEMENTATION IMPERATIVES

Sustainable Development as a Contested Concept

The popularization of the concept 'sustainable development' owes much to the publication in 1987 of the World Commission on Environment and Development Report, *Our Common Future*, commonly known as the Brundtland report (WCED, 1987). Sustainable development was there defined as

> development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organisation on the environment's ability to meet present and future needs. (Ibid.: 43)

Since the publication of the Brundtland report, the concept of sustainable development has become popular and there has been considerable broadening of its meaning.[1] Sustainable development, for example, acted as a central organizing theme in the 1992 Rio 'Earth Summit'. By operating at a high level of generality, the Brundtland report easily lends itself to a wide range of interpretations. However, while this has proved politically expedient, it has nonetheless given rise to ambiguity and lack of consistency in the use of the term. As a consequence of this, a large body of literature has emerged exploring the meaning of the concept of 'sustainable development', which is often aimed at the elaboration of a unified or precise definition of the term.

However, it has been argued that the search for a unitary and precise meaning of sustainable development may well rest on a mistaken view of the nature and function of political concepts (Lafferty, 1995: 223–4; Jacobs, 1995: 5; O'Riordan, 1985: 52). These authors have argued that sustainable development is best seen as similar to concepts such as 'democracy', 'liberty' and 'social justice', where there is both a readily understood 'first level meaning' and general political acceptance, but, around a given set of core ideas, there lies a deeper contestation. Sustainable development is thus seen as, by its very nature, a contested concept. In liberal democracies the debates around these contested social and political concepts form an essential component of the political struggle over the direction of social and economic development. As Baker *et al.* have argued, such substantive political arguments are part of the dynamics of democratic politics and the process of steering social change. Furthermore, they argue:

> By focusing attention on sustainable development as a social and political concept, attention can be turned away from the increasingly sterile debates about the precise meaning of the term, and focused instead on the contemporary process of implementing sustainable development policies and the alternative conceptions that are developing concerning how sustainable development should be interpreted *in practice*: it is through this process of implementation that the nature of the interface between environmental protection and economic development is being constructed. (Baker *et al.*, 1996).

The Policy Imperatives Associated with the Implementation of Sustainable Development

In focusing attention on how the concept of sustainable development is mediated through practice it becomes crucial to examine what Lélé has referred to as the 'operational objectives' of sustainable development (Lélé, 1991: 611). These refer to a range of imperatives associated with the implementation of policies aimed at the promotion of sustainable development. The Brundtland report, for example, linked the achievement of sustainable development at the global level with a number of major political and social changes: elimination of poverty and exploitation, equal distribution of global resources, an end to current patterns of military expenditure, new methods of ensuring just population control, lifestyle changes, the use of appropriate technology and institutional changes, including democratization, achieved through effective citizen participation in decision making (WCED, 1987: 8–9).

Focusing attention on developments since Brundtland, Baker *et al.* have characterized the policy imperatives associated with the promotion of sustainable development in terms of a ladder, ranging from those associated with the promotion of a weak form of sustainable development to those aimed at a stronger, or ideal model (Baker *et al.*, 1996). As policy makers move from the weaker end of the ladder to the stronger end, the range of such imperatives is broadened to include adopting a new understanding of the role of the economy and the nature of growth, which can involve policies aimed at moving from initial changes in patterns of consumption to changes in both patterns and levels of consumption and production; moving from very limited dialogue between the state and environmental interests to bottom-up community structures and participation in all stages of the policy-making process; extending the geographical focus of policy from the needs of the global market to bioregionalism; developing new policies towards nature that move from those based on resource exploitation to the promotion and protection of biodiversity; institutional adaptation and reform, extending from minimal reform to radical decentralization; adopting new policy tools which, at the weaker end of the ladder, would concentrate on the use of market-led tools, while the stronger form of sustainable development would involve a more flexible approach and require a much wider range of policy tools. This, in turn, is accompanied by a broadening of sustainable development indicators to encompass the social dimensions of change.

The concern of this chapter is to explore the range of imperatives that the EU, and in particular the Commission, sees as critical for the promotion of sustainable development. This involves exploring the EU's explicit engagement with the idea of sustainable development, how it has integrated it as a norm in its decision-making process and the attempts it has made to adopt policies aimed at its promotion. This will enable us to appraise the prospects for, and barriers to, the successful implementation of sustainable development policies by the EU.

SUSTAINABLE DEVELOPMENT IN THE EU

EU Involvement with Sustainable Development: the Rationale

The European Union became interested in general environmental management for a number of reasons, but mainly because of the belief that the pursuit of independent environmental protection policies by member-states could conflict with the goals of EU competition policy (Baker, 1993). In other words, there was the fear that different environmental protection standards could give firms and industry in some member-states a competitive advantage over those in others. This would conflict with the principle of free trade and fair competition embedded in the Single European Market (SEM) (ibid.).

However, despite the central role that economic considerations have played in shaping EU environmental policy, the latter cannot simply be reduced to this. That the EU has a broader rationale is evident by the commitment that it has now made to the promotion of sustainable development. While granting this, we are nevertheless left with the question as to whether, and to what extent, the new EU commitment to the promotion of sustainable development is weakened or limited by these prior economic considerations. We may begin to answer this question by exploring the rationale for the Union's commitment to the promotion of

sustainable development. A number of reasons can be put forward. First, sustainable development has emerged as a specific focus of government activity and, following both the Brundtland report and the Rio 'Earth Summit', it has become a central concern of international policy makers. It is here that the EU sees itself as playing an important high profile role. The Commission has explicitly stated its interest in being seen to be at the forefront of international efforts to promote good environmental management practice (CEC, 1992: 4). Signing the Rio Declaration provided an excellent opportunity to translate this wish into practice.

Second, because it involves the integration, rather than simply the balancing, of economic, social and environmental considerations (Kinrade, 1996: 86) sustainable development is seen by the Commission as capable of overcoming the tensions that have arisen between its environmental protection policies and those aimed at the promotion of economic development. In this sense the commitment can be seen as part of a strategic response by the Commission to the resistance it has encountered with respect to its environmental policy. This resistance operates at the member-state level, as is evident by member-state intransigence with respect to the provision of the appropriate institutional, administrative, scientific and financial resources necessary to fully implement EU environmental legislation.[2] At the subnational level, especially in peripheral regions, it is evident from the persistence of the belief that a trade-off exists between environmental protection and employment creation (Baker *et al.*, 1994). It is found, furthermore, at the level of the firm, particularly the small and medium enterprises, which have proved reluctant even to adopt adequate pollution control measures (EEA, 1995: 8).

Finally, the promotion of sustainable development is seen as involving participation from a wide range of actors, especially those operating from the bottom up. As well as being in keeping with the spirit of Brundtland, such participation is also in keeping with new trends towards the greater salience of the subnational, particularly the regional, dimension in governance and policy making in the Union.

Implementing Sustainable Development within the EU

While drawing upon the Brundtland definition of sustainable development that was so central to the Rio process, the EU has nevertheless introduced two key changes with respect to the original Brundtland formulation: first, with respect to terminology and, second, in relation to the policy imperatives that are associated with the promotion of sustainable development practice.

The use of novel terminology

The EU has introduced a number of 'novel' formulations in relation to the concept of 'sustainable development', including 'sustainable growth' and 'sustainable progress'. The Maastricht Treaty, as well as speaking about sustainable development in relation to Third World countries, also speaks about 'sustainable growth' and also about a concern to promote economic and social progress which is sustainable (Verhoeve *et al.*, 1992). The Fifth Environmental Action Programme (see below) also links sustainable development with growth, stating that environmental protection is aimed at providing 'optimal conditions for social–economic well-being and growth for the present and future generations' (CEC, 1992: 3–5).

The introduction of this novel terminology is significant for two reasons. First, it could considerably restrict the scope of environmental policy objectives. The separation of

'sustainability' from the broader concept of development, and its linkage with growth imposes limitations on environmental policy (Baker, 1996a). Growth usually refers to the narrow economic sphere, to increased economic activity, especially in production and consumption. Development, like the term 'progress', normally has a wider connotation than growth, and can include social and political reform as well as economic redistribution, all of which may or may not be accompanied by growth. Sustainable growth as a policy goal would seem to uncouple environmental management from the more radical social, economic and political changes envisaged by the Brundtland report.

Second, it can give rise to inconsistency in the implementation of policy. On the one hand, the use of the term 'sustainable development' would seem to indicate a commitment to the adoption of a more integrated approach to environmental management. This involves incorporating environmental considerations into the design, resources and management of policies not only in the environmental field but across all economic sectors. This, in turn, may involve forgoing growth in order to achieve environmental protection. On the other hand, the novel terminology can allow for a continuation of the older approach towards environmental management, whereby environmental considerations are merely grafted onto traditional growth-oriented economic development models. In other words, the multiple terminology opens up the way for greater flexibility, particularly at the member-state level, but also the possibility of greater inconsistency, in the interpretation of the aims of policy. This can lead to uneven implementation of sustainable development policies across the Union as a whole.

Changes in the range of policy imperatives associated with sustainable development

In order to examine the EU interpretation of the range of policy imperatives associated with the promotion of sustainable development, and to compare this interpretation with that found within the Brundtland tradition, we will turn our attention to an examination of the environmental action programmes of the Union.

In EU policy making, action programmes play a specific role: they form the main means whereby declarations of commitment are translated into policy. In the environmental policy arena there have been five environmental action programmes to date. It is the fifth programme, *Towards Sustainability: A European Community Programme of Policy and Action in Relation to the Environment and Sustainable Development* (1992–7) that is the most relevant for our discussion (CEC, 1992). Here we find the most explicit translation of the EU's commitment to the promotion of sustainable development into concrete policy targets. However, this commitment is not totally new: policy making in the EU is incremental in style and the commitment to sustainable development embedded in the Fifth Programme should be seen as a development from the previous four programmes. This allows us to recognize that the Fifth Programme is framed within the context of, and limited by, the previous programmes (Baker, 1996a.)

At least two immediate factors influenced the decision to place the concept of sustainable development at the centre of the Fifth Action Programme. First, there was the Rio 'Earth Summit' and the Agenda 21 process. The Fifth Programme is part of the EU's response to both Rio and Agenda 21 (CEC, 1995: 2). Continuing reviews of the Fifth Programme form part of the Union's submissions to the Commission on Sustainable Development (CSD), the UNCED body established to oversee progress made after the Rio summit. The involvement of the Union in the CSD/UNCED process is closely associated with the desire of the Commission to play a leadership role in relation to international efforts to promote

sustainable development. Second, there was an acknowledgement that existing environmental policy was incapable of dealing with the burden that the deepening of the integration process, in particular the completion of the Single European Market, posed for natural resources and the environment (CEC, 1992: 3). Because of the more integrated approach towards environmental management embedded in sustainable development policy, the adoption of this policy was seen by the Commission as a way of overcoming the severe criticisms that it has encountered in relation to its failure to take account of the negative environmental consequences of the SEM (CEC, 1989).

The Fifth Programme singles out six key targets for action, which can be seen as constituting the core of the policy imperatives that the Commission sees as essential to the implementation of sustainable development policies within the Union.

1. the integration of environmental considerations into other policy fields;
2. the elaboration of new policies designed to change existing patterns of consumption and production;
3. the strengthening of the international environmental role of the EU;
4. the reliance upon partnership and shared responsibility to effect change;
5. the broadening of the range of instruments used to bring about more environmentally friendly economic and social behaviour;
6. new emphasis on implementation and enforcement (CEC, 1995: 3–6).

These six targets provide a key insight into the Commission's understanding of sustainable development in policy terms. They overlap with the imperatives outlined by the Brundtland report as well as those agreed at Rio. They link the promotion of sustainable development with the principles of partnership and shared responsibility and with behavioural changes, particularly on the part of consumers. However, the Fifth Programme also presents a new range of policy imperatives, which differ in an important way from the Brundtland Report: absent from the EU formulation are the key *critical* components of sustainable development which link it with issues of justice and equality in access to and use of global resources.

The six targets can be divided into two groups: those which aim at the promotion of sustainable development (numbers 1–3) and those aimed at the management of sustainable development policies (numbers 5 and 6). Target (4) falls between these two. The first group aim at behavioural changes, while the second group is concerned with the tools used to bring about behavioural changes. We will make a brief overview of the EU's achievement with respect to these six targets.[3]

With respect to (1), *the integration of environmental considerations* into other policy fields, the Commission has selected five sectors for specific focus: agriculture, industry, energy, tourism and transport. The aim here is to ensure that environmental considerations are built into the design, the resources, the administration and the implementation of policies in these five sectors. While some progress has been made, the speed of integration differs across the sectors, with integration at a more advanced level in manufacturing and less developed in agriculture and tourism (CEC, 1995: 3). EU environmental legislation has existed for 20 years in the manufacturing sector and, furthermore, many of the larger firms quickly saw the economic advantages of pollution control measures. However, in the agriculture sector, it has proved very difficult to introduce policies and, as a consequence, nature conservation measures have remained largely isolated from EU agricultural policy develop-

ments. Tourism is a highly fragmented and diverse sector where action from a large number of economic and other interests is needed before progress in the promotion of sustainable development can be made. Such action has not been forthcoming (CEC, 1995: 4). Environmental NGOs have been particularly critical of the Union's failure to integrate environmental considerations into sectoral policy, pointing in particular to the Common Transport Policy, the Common Agricultural Policy (CAP) and the Structural Funds (Climate Network Europe: 1995: 6).

With respect to (2) the *elaboration of new policies designed to change existing patterns of consumption and production*, little has been achieved (CEC, 1995: 14–15). Furthermore, there is a tendency for policy to concentrate on changing patterns of consumption through recycling, reuse and repair, rather than changing the level of consumption. In a global context, a reduction of consumption levels within developed, high-consumption societies is a crucial step in the creation of greater equality in the use of and access to global resources and through these to the elimination of poverty-driven environmentally destructive behaviour.

Regarding (3) the *strengthening of the international role of the EU*, we can see a three-stage evolution of EU policy; first, the focus of Union policy was mainly on the solution to particularly acute environmental problems; second, there was a recognition that pollution did not stop at its frontiers and thus the Union intensified its cooperation with third countries; finally, recent years have seen an acceptance that issues of a global nature, such as climate change, ozone depletion and diminution of biodiversity, also need to be a addressed (CEC, 1992: 4). Here the Union sees itself as exercising its 'position of moral, economic and political authority to advance international efforts to solve global problems and to promote sustainable development and respect for the global commons' (ibid.).

Climate change policy provides a good example of EU involvement in the international environmental policy arena. EU climate change policy began ambitiously in 1990, when the EU and its member-states decided to stabilize their emission of CO_2 at 1990 levels. However, according to Vellinga, when in the following years it became clear that the USA as one of the most important emitters of CO_2 did not follow the initiative, the EU's enthusiasm decreased (Vellinga, 1993: 1). Less than two years later the proposal for an EU-wide energy/carbon tax to support the stabilization policy failed to be adopted owing to member-state pressure and despite strong Commission backing. However, following the Rio 'Earth Summit', both the EU as a whole and its individual member-states agreed to return the level of CO_2 emissions to 1990 levels by the year 2000. Since then, despite the fact that many member-states are taking measures to reduce emissions levels, these measures have remained ineffective. Furthermore, proposals by the Commission, such as the carbon tax, and the SAVE Programme continue to be blocked by the member-states (Baker and Young, 1996).

The second group of targets, as we have said, are concerned with the elaboration and enhancement of tools that can be used to bring about behavioural changes. Target (4), placing greater reliance upon the *principles of partnership and shared responsibility,* can be seen as aimed both at the promotion of sustainable development and at the management of sustainable development policies. Participation was originally seen as a means of ensuring more effective implementation of policy. Following the Agenda 21 process, however, participation has come to be seen, not merely as a tool of implementation, but as an integral part of the promotion of sustainable development at all stages in the policy-making process.

The principles of partnership and shared responsibility involve widening the range of interest groups who participate in the promotion of sustainable development and, in particular, it involves greater participation at the subnational, that is regional and local, levels. As such the principles are in keeping with the spirit of the Brundtland report and, furthermore, the Commission has explicitly stated that these principles are closely associated with Agenda 21 (CEC, 1995: 2). Bottom-up participation is also important for the democratization of the EU, which is especially necessary given that the EU institutions, other than the European parliament, despite the fact that they play a key role in shaping sustainable development policy, are not directly elected by, nor are they directly accountable to, the citizens of the Union (Baker, 1996b).

However, the danger is that reliance upon partnership and shared responsibility will become a means whereby the Union withdraws from, or diminishes its involvement with, the promotion of sustainable development. This is because, first, partnership and shared responsibility can lead to a great deal of unevenness in policy take-up. Such unevenness is already a problem across the EU as a whole (EEA: 1995: 17). For example, by 1994, only seven member-states had set up sustainable development strategies or plans aimed at implementing the Fifth Environmental Action Programme (EAP). Second, sustainable development not only requires bottom-up participation, but it is becoming increasingly evident that it also requires top-down planning (Meadowcroft, 1995). While the old centralized planning models may offer policy makers some guidelines in respect to macroeconomic coordination, there is clearly a need to develop new models of planning that not only are appropriate to the new emphasis upon environmental management but can also offer new forms of interfacing between top-down planning and bottom-up participation. Given its commitment to the promotion of sustainable development, it is here that the EU can play a leading role.

With respect to (5) *broadening the range of policy instruments*, the Commission has been particularly keen to move beyond the use of legislation, seeing overreliance upon this policy tool as one of the causes of the implementation deficit in environmental policy. Instead, a new emphasis is being placed upon the use of market-based incentives. As Eckersley has argued, the task of choosing the 'technologies of governance' has never been merely a technical matter (Eckersley, 1996: 2): in the EU case the new choice of policy tools is in keeping with the market-led economic ideology prevalent in many member-states and within the Single Market programme.

However, progress in relation to broadening the range of policy instruments has been slow both at the EU and the member-state levels (CEC, 1995: 4). The Commission has found it difficult to define, on a unanimous basis, the framework within which they can operate without disturbing the working of the internal market (ibid.). To date, legislation still remains the main approach towards environmental management. Furthermore, broadening the range of instruments cannot, on its own, lead to more effective and efficient policy implementation of EU sustainable development policy. This is because the causes of the EU implementation deficit in the environment field are multifold and include lack of political will, weak institutional capacity and policy priorities incompatible with the promotion of sustainable development. Institutional structures are important in that the capacity of institutions (including for example, their financial resources, expertise and legal competence) and the nature of their bureaucratic culture and the policy style they typically use all play a key role in determining the success or otherwise of efforts to move from a declaration of commitment to the principle of sustainable development to actually putting that commit-

ment into practice. Adherence to other policy priorities, particularly in the economic sphere, may be in conflict with the promotion of sustainable development. In the EU, these include the road-building priorities of the Common Transport Policy, infrastructure developments funded through the Structural Funds and, most importantly, the creation of the SEM. In the peripheral regions of the Union the contribution that these factors make to the implementation deficit are most pronounced (Baker *et al.*, 1994).

The achievements of the EU with respect to their final target and the placing of a new emphasis upon *implementation and enforcement,* are not easy to assess. Within the EU, policy implementation takes place at the national, and in particular, the subnational levels. It is difficult to appraise the extent to which member-states have fulfilled the aims of the Fifth Programme, because the targets and actions in the programme are not well defined in operational terms. The Commission's own Progress Report has found some evidence of progress at the implementation stage, but has concluded that 'a great deal still remains to be done to move towards sustainability' (CEC, 1995: 3).

CONCLUSION AND FUTURE PROSPECTS

In this review of the actions taken to date by the Commission to promote sustainable development, we have presented a picture of some, albeit limited, activity. Despite these developments, however, Union attempts to promote sustainable development remain limited in two crucially important ways. First, the Union has adopted a limited view of the imperative associated with the promotion of sustainable development. The key critical component of sustainable development as understood by Brundtland, that is, the emphasis upon justice, equity and the elimination of poverty through the implementation of policies aimed at increasing equality of access to and use of global resources, is absent from the EU formulation. The failure of the Union adequately to implement policies aimed at changing patterns and levels of consumption, given that the member-states are high-consumption economies, here takes on a particularly important significance. The Union has adopted a range of imperatives that are more easily placed at the weaker end of the ladder of sustainable development than they are at the stronger end. However, even with respect to these limited targets, progress has been, as we have seen, limited. Second, many of the efforts of the Fifth Action Programme are directed towards increasing the effectiveness of policies that were put into place before the commitment to sustainable development was made. While some of these policies can be important for sustainable development, they should not necessarily be equated with it. Sustainable development is not the same as environmental protection policy. It requires a wider vision of change while also focusing on *how* policy is to be achieved and *to whom* the benefits are to accrue.

The future of the EU commitment to sustainable development remains uncertain. First, following the Maastricht Treaty, there is the new emphasis upon the subsidiarity principle. While the principle of subsidiarity can facilitate greater bottom-up participation, this new emphasis has also had negative consequences. In particular, it has led to calls for the scaling-down of EU involvement in environmental policy, especially from Britain, a member-state not noted for its commitment to the environment. Second, there is the possibility of future enlargement of the EU, with new membership from east and central Europe. The twin imperatives of marketization and democratization, which are driving the reforms of former

Soviet Bloc economies, do not lend themselves easily to the promotion of sustainable development. Third, member-state reluctance to embrace the changes needed if sustainable development is to be promoted is also of importance. Even so-called 'lead' states have begun to show reluctance when it comes to the implementation of policy aimed at sustainable development. Germany, for example, is increasingly placing priority upon post-unification reform and development, on the one hand, and ensuring it meets the conditions necessary for Monetary Union, on the other. These policy priorities are not necessarily compatible with the promotion of sustainable development. At both the EU and member-state levels, it would appear that the commitment to the promotion of sustainable development is weakened by both economic and political considerations. With these factors in mind, we are left with the opinion that the chances of the EU entering the next century firmly placed upon the path of sustainable development remain slim indeed.

NOTES

1. For further elaboration, see Baker *et al.* (1996), upon which the discussion on the meaning of sustainable development is drawn.
2. There are, of course, what can be referred to as 'lead' and 'lag' states. The Netherlands is regarded as a lead state in that it shows a strong commitment to the implementation of sustainable development polices. In contrast, some southern European member-states, Greece, for example, have noticeable implementation deficits. See G. Pridham 'National Environmental Policy-Making in the European Framework: Spain, Greece and Italy in Comparison', in S. Baker *et al.* (1994: 80–101) for a fuller discussion on this.
3. For a more detailed review of the achievements of the Union with respect to the six targets, see Baker and Young (1996).

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25. Environment and society in Latin America[1]

Tim Allmark

In Latin America the relationship between environment and society has always been intimate. In Tierra del Fuego the diet of the Yamani consisted exclusively of fish. Language and settlement patterns developed in relation to their wetlands environment (Chatwin, 1977). The mountain dwellers of the central Andes also adapted to their environment. Their bodies evolved greater lung capacity. Some developed nomadic societies, following the food cycle of the llamas and vicuñas, or colonizing the desert oases of the Atacama for a few months a year. Social institutions followed suit. On the Altiplano the miners worshipped the earth while the farmers worshipped the sun. The plants of tropical forests were exploited for food and medicine but also served social functions to mark rites of passage or to reinforce authority. The size of communities within the rainforest was regulated by the exigencies of migratory cycles whose effect was to maintain overall population density and ecological equilibrium.

When looking for a way to characterize how the environment has conditioned society in a continent that is so physically fragmented and diverse, one of the most useful concepts is that of fragility. Fragile lands are those which are 'potentially subject to significant deterioration under agricultural, silvicultural and pastoral use systems' (Denevan, 1989: 11). Fragile land types include tropical forests and savannahs, wetlands, arid lands and mountainous terrain. The principal stress factors to which they are susceptible are poor soil fertility, pests, flooding, desertification, slope and frost. Fully 87 per cent of Latin America's total land area has been categorized as fragile (Denevan, 1989). Only the temperate lands of southern Brazil, Uruguay, southern Chile, the Argentine pampas and pockets in the lowlands of Bolivia, Colombia and Venezuela do not fit into this category.

Fragile lands can always sustain human settlement under extensive farming systems. Shifting cultivation in the rainforest and low density grazing in the highlands are examples. Yet there is no automatic correlation between low productivity and fragility. The *chinampas* in central Mexico and the irrigation systems of the Peruvian deserts are highly productive. To institute systems capable of sustaining large populations, landscape and soil modification are necessary in the form of terracing, irrigation canals, reservoirs and embankments. Traditionally such modifications were labour intensive and required a high level of social organization. The great civilizations of Mexico and Peru were societies formed in response to the fragility of their environments.

Understanding the mechanisms of human dependence upon ecosystems illuminates not only how society is structured but also the way it evolves. Latin America is endowed with an abundance of natural resources. Home to only 8.5 per cent of the world's population, it contains 46.1 per cent of the world's tropical forests, receives 30.8 per cent of the world's useable rainwater and contains 23.1 per cent of the world's potentially cultivable land, of

which only 23.2 per cent is under cultivation (UNEP–IADB, 1990: passim). This bountiful land today sustains many times more people than in the times of Atahualpa, Lautaro or Montezuma yet the environment fails to feed or house half of these people adequately, sustenance frequently being a euphemism for poverty (CEPAL, 1990). The paradox is that social disruption and environmental crisis have emerged in the midst of a cornucopia.

At the heart of this disturbance has been migration. For centuries the dominant demographic changes had been the decline of the indigenous peoples, the enforced migration of enslaved Africans and the immigration of Europeans. In the last 70 years massive migrations have occurred within Latin America. Across the continent the pact with ecological fragility was broken. The localized breaching of critical thresholds became sufficiently widespread for environmental degradation to assume a major role in determining the structure of human settlement and quality of life of its inhabitants. Deforestation and drought drove the grandchildren of slaves away from Bahia. As desertification encroached upon the Chilean *secano*, falling wheat yields squeezed the descendants of the *colonos* from the land. In the Peruvian highlands, grid-like traces are all that remain of ancestral hill terraces engraved on the mountainsides.

The environmental history of Latin American society has yet to be written. The role of ecological variables such as soil structure and rainfall in shaping the patterns of human development has been underestimated, especially among sociologists. But ecological concepts and language are now being used to describe the relationship between nature and society. The currency of the term 'agroecosystem' bears witness to this. The use of notions such as 'carrying capacity' envisages human environments first as intervened ecosystems and attempts to describe their behaviour accordingly. Likewise, 'fragility' extends the ecological concept of resilience to ecosystems containing humans.

The essence of ecology is in the relationships between the components of a system. Any application of ecological principles to the study of society will naturally assess the impact of human activity on the environment. In the case of migration this means considering not just why people leave, but where they go and what they do when they get there. In Latin America fertile areas apt for intensive cultivation, such as the hinterland of São Paulo or the Central Valley of Chile have long since been intensively cultivated. This left the migrants with two choices: to fill the cities or colonize the remoter, fragile lands. They did both, and the percentage of the land area corresponding to administrative districts with a population density below one per square kilometre fell from a third in 1960 to 7.7 per cent in 1980 (Baquedano, 1988). In each case the environment was ill-prepared to receive the new arrivals.

Ecology models the interaction between the organic and inorganic components of a system defining its metabolism in terms of the flows of energy and matter. Beyond emphasizing the ecological basis of society or the relevance of ecological terminology and concepts, society itself has been incorporated into these models, with human beings joining the ranks of the organic components and economic activity contributing to its metabolism. Energy now takes centre-stage. Traditional land-use systems used the power of people's labour to make the environmental modifications necessary to manage natural factors such as soil fertility or slope. As labour power is fuelled by food, its capacity was directly related to the food production that resulted from the manipulation of the environment. Human communities were attached to land whose carrying capacity was limited by the availability of energy. Breaking these limits entailed tapping into alternative energy sources. The irrigation

systems of Andean cultures made use of gravity, utilizing the potential energy of stored water. Modern agricultural systems are increasingly based on the energy stored in hydrocarbon fuels. The preparation of the ground, the sowing, harvesting, pest control, fertilization, processing and transport all occupy machinery and materials whose manufacture and use are energy-intensive. As fossil fuels supplant much of the need for human labour, the link between communities and the land is broken. The function of agriculture becomes the supply of urban consumers. The resulting pressure on productivity establishes a dependence upon energy intensive methods.

As the immediate connection between production and ecosystem is severed the diverse functions of hydrocarbon societies have transformed the way the environment is used. Large sectors of the economy are devoted to the mining of raw materials needed for the production of industrial goods. The industrial plants themselves dominate the skylines of cities from Cubatão to Veracruz. Supplying the energy required to fuel these plants and their products has led to a massive growth of the energy sector. Agriculture becomes devoted to the production of raw materials for industry and of food and commodities for urban consumers.

At an individual level, the weakening links between ecosystem and livelihood have also brought a transformation in what people do and how they relate to each other. A glance through the yellow pages of any Latin American city show its inhabitants to be involved in a myriad of activities – from the production, processing, transport and selling of goods to the multiple tasks of a mushrooming service sector. The chain connecting society to nature has extended (Woodgate and Redclift, 1996). Immediate environmental impact used to come through direct interaction with the ecosystem; now environmental impact is mediated through an individual's economic activity. So while the functional diversity of the hydrocarbon economy has led to unrivalled levels of social complexity, the growing abstraction from nature has enabled the immediate impact of each individual to be assessed in metabolic terms, as the sum of their material inputs and outputs. The total effect of a society on the environment is then reduced to being the compound effect of the combined levels of consumption and production.

In natural ecosystems, organisms function as producers, consumers and decomposers (or recyclers). Most materials flow directly from producers to recyclers and back again. Only a small proportion of this flow is appropriated by consumers and material cycles consume low levels of energy. The metabolism of industrial societies functions quite differently. First, the volume of materials being cycled increases with the mining of subterranean matter which would only otherwise enter ecosystems through volcanic eruptions or the gradual shift of tectonic plates. Second, consumers play a far more significant role in the system, appropriating a greater proportion of the material flows than in natural systems (Husar, cited in Woodgate and Redclift, 1996). Third, both production and consumption result in large quantities of waste materials: those which humans cannot or do not use. Fourth, there are few human recyclers and few products are devoted to recycling. These functions are delegated to ecosystems. When ecosystems confront new materials which they have not evolved to process or when their metabolic rate is incapable of dealing with the increased flow of materials, waste accumulates. When such accumulations transform or destroy ecosystems in a way which is harmful to human health or well-being, they are described as pollution. Fifth, with the increasing exploitation of raw materials and non-renewable energy sources, the metabolic rate of industrial societies is accelerating.

No comprehensive attempt to model the precise path and ultimate destiny of key elements undergoing the conversion from biomass, fuels and minerals into goods and waste has yet

been made for Latin America, but the analytical framework provided by industrial metabolism (Ayres and Simonis, 1994, cited in Woodgate and Redclift, 1996) successfully encompasses and pinpoints its major environmental problems. The extraction of raw materials dominates much of the region's economy. Countries such as Chile and Venezuela depend on the exploitation of single minerals and the environment of entire regions is affected. The Atacama desert and Maracaibo Bay are dominated by the physical presence of copper mines and oilfields. Not only do they scar the landscape, they poison it. Tailings from the Salvador mine, in the form of 120 million tons a year of iron sulphate, destroyed fisheries and agriculture at Chañaral one hundred kilometres distant. Oil seepage and pipeline leaks have had a similar effect on the Maracaibo. Systematic underinvestment in the processing industries has allowed copper smelters to coat towns like Copiapó and Antofagasta with sulphur dioxide and arsenic. Poorly refined petroleum destined for local markets has contributed to urban air pollution. Maintaining the growth of extractive industries reinforces the pressure on finite resources. In 1990, the mines of northern Chile used 15 per cent of the region's available water. By 2000, this proportion will rise to 35 per cent. Meanwhile the equivalent figure for agriculture will fall from two-thirds to a half and the search for water sources means that highland lakes sustaining unique ecosystems are threatened with drainage (Quiroga, forthcoming).

The growing awareness in Latin America of the ecological basis of society and the environmental impact of human development has been a gradual process. Environmental issues first intruded against the background of the development debate. In the middle part of the century policies promoting industrialization, urban subsidies, protection and nationalization not only sought to meet social needs through economic growth but were also an assertion of national identity and national sovereignty. Much of the theory behind economic policy was home-grown, based on the works of writers such as Raúl Prebisch and Aníbal Pinto. By contrast, news of environmental clouds on the horizon came from outside, with the 1972 Stockholm Conference and the Club of Rome's *Limits to Growth*. In the 1970s, the Bariloche model developed an analysis of ecology according to dependency theory (Mansilla, 1987) which suggested that environmental limits were socially and politically defined and that the ecological equilibrium could not be attended to until people's basic needs had been satisfied by continued growth. This response was part of a cross-political consensus which suspected the emergence of environmental concerns of concealing a neocolonial agenda. International action against deforestation and fossil fuel emissions was a challenge to sovereignty over natural resources. The right to industrial development was being questioned by countries which, apart from colonization and slavery, had accumulated their wealth by exploiting materials and felling trees. Environmental preoccupation was a by-product of this wealth, a luxury good. At best it was irrelevant to Latin American conditions and at worst environmental regulation diverted limited resources from development objectives. So awareness of the environment has occurred in the context of enduring official faith in growth-based development; governments were predisposed to ensure that environmental policy is not allowed to jeopardize economic objectives.

The basis of this faith was challenged by events as the incidence of environmental breakdown grew. From the mid-1970s, chronic air pollution started to afflict mushrooming cities such as São Paulo, Mexico City and Santiago. Urban growth also led to water supply crises in Lima, Buenos Aires and Bogotá. It was becoming clear that environmental side-effects of economic expansion had the capacity to threaten the welfare of its intended

beneficiaries. Standard of living indices which incorporated environmental variables confirmed deteriorating conditions from the mid-1980s onwards. In Chile, a network of NGOs created after the 1973 coup, entrusted with mitigating the effects of the dismantling of the welfare state, documented how environmental degradation was affecting the poorest sectors with disproportionate severity (Rojas, 1994). Throughout Latin America available land upon which the poorest urban immigrants have settled is commonly located on floodplains (Belén, Manaos, Guayaquil, Resistencia, Asunción, Formosa and Buenos Aires) or hillsides (Bogotá, Quito, Rio de Janeiro, Caracas, Mérida, Medellín, Guatemala City, Tegucigalpa and Mexico City) (Gligo, 1995). With the frequent assistance of deforestation, floods and landslides in these districts have become commonplace in recent decades. It has become evident that many of people's most basic needs are contingent on environmental services which were not postponable luxuries. Waste disposal is a case in point, with 90 per cent of urban waste being discharged into rivers or the oceans and 60 per cent of urban inhabitants having no access to sewage systems (Guimarães, 1992a). Meanwhile the collapse of some fisheries, increasing input costs and declining productivity of agricultural systems, not to mention the rising costs of pollution, provided evidence that economic growth itself was indeed subject to environmental constraint.

Phenomena such as these led to the realization that social and economic goals cannot be achieved without reference to the environment. Yet the institutional response by which the environment was formally integrated into policy-making structures has been notoriously piecemeal. At the beginning of the 1990s in Costa Rica, there were 27 state institutions involved in planning, monitoring and protecting the environment and natural resources, and 1500 different laws concerning environmental mitigation were in force (Carriere, 1992). Areas of jurisdiction overlapped and laws contradicted each other: a situation repeated throughout Latin America. This state of affairs reflected long-standing ignorance and neglect of the environment, with new problems being delegated to existing departments. Policy interventions have been reactive, responding to the symptoms of environmental breakdown as discrete incidents.

Such an approach is consistent with ecological models which understand the environment as a complex physical system whose dysfunction can be expressed in terms of material or chemical imbalances. Its maintenance becomes an engineering problem. Environmental policy is thus reduced to technical intervention: if there is an energy shortage, build a dam; if there is desertification, plant a forest; if there is air pollution, instal smoke scrubbers.

Human beings are incorporated into this mechanistic vision by considering the aggregate physical effects on the environment of their daily activities. Each individual is considered as an economic unit whose impact is assessed as a function of his or her consumption and production. The emphasis is placed on those types of economic behaviour whose compound effect produces ecological imbalances threatening to our well-being or survival. For instance, the adoption of industrial technology frequently leads to 'blind commitments' resulting in unintended consequences unrelated to its primary function. The poisoning of Amazonian rivers by mercury used for gold mining or ozone depletion in the Southern Cone caused by CFC use are examples. Traditional activities also bring deterioration, as when the continuous planting of subsistence crops exhausts and erodes the soil. In this grazing of the commons, humans are equated with any other organism; just as the cyanobacteria once produced enough atmospheric oxygen to poison themselves to near extinction, car owners too are busy making their own atmosphere ever less habitable. The emphasis on humans as

unwitting or helpless agents of their own doom focuses attention on those policy instruments which act as external stimuli to invoke changes in behaviour. To this end, the natural counterpart of technocratic intervention has been the advocacy and increasing use of economic policy instruments to correct the environmental externalities of human behaviour. The process of establishing a market system for water rights in Chile is an example (Bauer, 1995).

It has been suggested that insistence on the dualism of nature and culture has alienated sociology from the environment, with serious consequences (Woodgate and Redclift, 1996). Environmental research has become the domain of natural scientists and instrumentalist disciplines such as economics, geography and information sciences have had a dominant influence on the setting of environmental policy. Exclusive emphasis on the environment as a cultural product whose meaning is socially constructed has reinforced the separation between sociology and the physical environment. By removing their attention to exclusively symbolic territory, sociologists have been complicit in abdicating responsibility for humanity's fate in the face of environmental threats. Although it is not unique in doing so, the experience of Latin America clearly demonstrates that natural and social sciences have much to learn from each other and that neither in isolation is able to explain the relationship between environment and society.

In the most fundamental sense society and the culture it generates are physically dependent on the environment. Air, water, food, shelter and energy are all environmental products. Beyond this, the environment conditions society in a multiplicity of ways, as can be seen in the case of Chile. The temperate forests of southern Chile helped the Mapuche peoples to resist colonial encroachment for four centuries while their plains-dwelling cousins in Argentina were largely exterminated. The racial homogeneity of modern Chileans was brought about by centuries of miscegenation, itself due to the country's status as a colonial backwater, physically isolated from the rest of the continent by desert to the north and mountains to the east. Today the overwhelming presence of those mountains colours the national psyche. Present in nearly every picture drawn by a child, they contribute to the characteristics of independence and insularity. In a country which never sees the sun rise at dawn, the crepuscular sun setting over the ocean acquires a spiritual importance which is marked in the poems of Pablo Neruda. Meanwhile, because of the concentration of mineral riches in the sparsely populated northern deserts, successive mining booms entailed great migrations to and from the populous Central Valley. These had a cohesive effect on national cultural identity, in contrast with the strong variations in regional culture to be found in physically fragmented countries such as Colombia, Bolivia and Mexico. They were also instrumental in spreading the experience of political organization throughout the land, an enduring inheritance which can be witnessed in the deep-rooted strength of political parties. A systematic exploration of the environmental roots of society remains to be made, although a more serious omission is an examination of the influence of social structures upon the physical environment itself.

Latin America has now lived through two decades of environmental alert, the second of which has been spent adopting the paraphernalia of environmental management from tradable pollution permits to environmental impact assessments. Perhaps the most notable feature of the nascent ecotechnocracy has been its failure to remedy any of the major ailments it has identified (Gligo, 1994). Most policy initiatives have failed to address many of the structural causes of environmental problems, so reflecting the limitations of the

reductionist conceptions upon which they are based. While instrumentalist disciplines are good at explaining the mechanics of environmental degradation, they are less successful at explaining why it happens in the first place: a geographer can point to the role of deforestation in changing climate patterns; an ecologist can identify the threat to biodiversity to come from the destruction of native forest; an economist can measure the effect on continuing deforestation rates of subsidizing reforestation with exotic species. But understanding why the subsidies were introduced requires an analysis of their beneficiaries, the landholders, of the political coalition through which they gained influence and of the division of the land itself. The very real effects that humans have on ecosystems are determined by social, economic and political structures and, once society has been incorporated into ecological models, explaining the feedbacks produced by human agency is within the realm of the social sciences. Restricting the analysis of human impact on ecological systems as a function of its material exchange amounts to a quixotic exercise in modern archaeology.

Any glimpse at the political economy of sustainability should start with the following list, comprising Latin America's principal exports: petroleum, petroleum derivatives, coffee, refined copper, oleaginous seed cake and flour, and other vegetable residues, motor vehicles, iron ore, internal combustion engines, soya beans, crustaceans and shell fish, unrefined wheat, unground corn, bananas, unrefined sugar cane and beet, cotton, lubricants with 70 per cent or more of petroleum products, natural gas, blister copper, footwear, beef and frozen fish (Gligo, 1995). Machine parts, pharmaceuticals, compact discs and computer software are nowhere to be seen. The economy of an entire continent is dependent on the exploitation of raw and semi-processed materials, a situation reinforced by global integration and free-trading blocks. In Chile, the regional paragon of successful export led economic growth, 88 per cent of exports consist of unprocessed and slightly processed goods (Quiroga, forthcoming). Indeed, since the beginning of European colonization, the *raison d'être* of Latin American development has always been the exploitation of its natural resources. Enduring features of Latin American society such as the predominance of port cities, enclave development, the division into countries, the poor communication between countries, the lack of infrastructure and the land-holding structure are products of this inheritance.

Since these early times the commoditization of the economy has produced direct impacts on the environment. In central Mexico and the Caribbean islands, the major cause of mortality in the indigenous populations was starvation caused by what ecologists would now call habitat destruction as slave labour for mining and the proliferation of introduced cattle decimated the highly intricate and labour intensive agricultural systems. The modern equivalent can be seen in Costa Rica. The consolidation of large land-holdings enabled the establishment of extensive cattle ranching, which has an annual labour requirement of six days per hectare as compared to 37 for beans and 60 for rice. The result has been to reduce both the area available for subsistence agriculture and rural employment opportunities (Carriere, 1992).

But perhaps the most important aspect of commodity production is the capitalization of the land which has been at the core of environmental change in Latin America. The correlation between the value of the land and the market price of its produce has affected its distribution as the less fragile lands become dominated by large farmers, haciendas, plantations and corporate farms (Denevan, 1989: 11). Commercial farming systems are capital-intensive, attempting to maximise productivity in order to realize the land's value. The

abandonment of traditional risk-minimizing strategies such as fallow periods and crop diversity entails replacing ecosystem functions with hydrocarbon fuel inputs where possible. Any investments in natural services are determined by their effect on productivity; those not directly improving output are minimized. The result is that the economy and environment are frequently to be seen in crude opposition, whether it is Central American mangroves being destroyed by the pesticide run-off from banana plantations or Chilean crop sprayers with chronic breathing difficulties. The traditionally brazen disregard for such consequences also springs from the arrogance of the colonial tradition. From the Cuban sugar plantations to today's land grants in Amazonia, the passage of the land into private ownership and commodity production went hand in hand and the nascent environmental agenda has been rejected because it threatened, not national sovereignty, but the private dominion over natural resources.

The depth of this mentality can be seen in the case of the native forest in southern Chile which was donated and sold into private hands only a century ago, following the final defeat of the Mapuche peoples. Despite clearing for agriculture and the use of some trees for furniture making, the temperate forest was never systematically exploited until the Japanese market for wood-chips opened a decade ago. The forest is clear-felled and colossal mountains of sawdust overlook the port city of Puerto Montt, waiting to be shipped. Conservation is legally entrusted to the Forestry Commission, CONAF, yet a spokesperson made it clear that felling trees constituted the enjoyment of private property, a right upon which conservation could only be expected to make marginal encroachments. As land is capitalized the environment becomes subsumed into the economic system and any environmental decision, including absolute non-intervention, involves the opportunity cost of not maximizing its productive potential.

The tendency for capitalization to concentrate the ownership of the best land in a few hands was bound to have a dramatic effect where seven-eighths of the total area has been categorized as fragile. In a region least able to cope with it, the distribution of wealth is the most unequal on the planet (Bulmer-Thomas, 1996). Under these circumstances, the migration of peasant families onto marginal lands was inevitable. Cycles of degradation arising from the incapacity of the poor to avoid damaging the environment in search of precarious livelihoods are well documented, especially in the Amazon rainforest and Andean highlands. Yet emphasizing the role of poverty in environmental degradation, as many official analyses do, is to miss the point. For poverty itself is essentially a measure of the distribution of environmental resources over time (Arenas and Sabatini, 1994).

Latin America has been transformed from an agrarian and mercantile economy into an industrial and capitalist economy without undergoing a corresponding change in the patrimonial social structure and oligarchic political systems which have controlled the distribution of these resources (Guimarães, 1994). So pronounced is this state of affairs that poor distribution is really a misnomer for total exclusion, whose visible expression is the physical segregation of poor suburbs and the absence of basic environmental services. The paradox of poverty amid plenty reflects a long-standing institutional failure to recognize, let alone deal with, social needs. Over centuries of authoritarian government, centralism and bureaucratic inertia, social demands have been met by cooption, patronage, repression or simple neglect. Closed structures persist in the new Latin American democracies wherein the most crucial decisions are taken with scant regard for the people's interest (Gabaldón, 1991).

Once the environment is perceived as a distributional issue, its fate becomes subject to the same political processes governing the control of resources in general. An example is power generation in Chile. On the eve of the return to democratic elections in the late 1980s, the electricity company, ENDESA, was privatized, in part to limit the incoming government's influence over strategic areas of the economy. Subsequently, the plans to build dams along the upper reaches of Chile's largest river, the Bío-Bío, provoked opposition and resulted in a landmark environmental impact study. This juxtaposed national development needs, as represented by projections for energy demand, and the preservation of unique montane habitats and the culture of its Huillinche inhabitants (Quiroga, forthcoming). The first dam is now built but doubt was cast on the energy projections produced at the inquiry when it was subsequently revealed that it was planned to sell part of the electricity generated to Argentina. Five years on, attention turned to the proposals to build two trans-Andean pipelines to import Argentinian gas for electricity generation. The new impact assessments compared the dangers of building pipelines along the feet of active volcanoes and storing volatile gas in heavily populated Santiago communes, with the benefits to an asphyxiated capital of closing its main coal-fired power station. Against predictions, the government approved the construction of both pipelines and the prospect of competition promptly reduced the market value of the private electricity companies. Once again, the environmental consequences were inseparable from and subordinate to the political struggle over resources.

In such circumstances it is hard to imagine that autocratic political systems which have consistently failed to confront endemic poverty should start to do so now because there is evidence that it is structurally linked to environmental degradation. Indeed, the attempt to impose bureaucratic control over environmental conflicts aims to suppress distributional issues. Sabatini gives the example of Til-Til, a poor suburban commune to the north of Santiago, which was chosen to house a new waste disposal site for the city. With guidance from ecological groups, the mayor entered into open negotiation with the waste disposal company which resulted in a series of compensatory measures, including permanent contributions to the municipal budget and help for local students. On the grounds that there was a risk of subterranean water pollution, the preferred site was rejected by the central government and with it went the side agreements. In reality, the authorities were resistant to the idea of compensation and particularly the public way in which it was negotiated. They were against conversations moving beyond the strictly environmental. Private negotiations involving the government and a rival company were promptly instituted for an alternative site on the other side of the main road (Sabatini, 1996).

This was both technocracy and environmental managerialism in action. Resistance to the environmental agenda sprang less from its being an alien imposition undermining the right to national development than from the implicit threat it represented to the prevailing distribution of resources and autocratic control of the political process itself. The preferred responses, centralized management solutions based on scientific understanding and systematic information and, latterly, market solutions based on reinforcing private property rights, act to counter these threats.

However, official attempts to contain emerging environmental issues via bureaucratic means have failed to neutralize environmental activism. The orthodox view that social needs in Latin America are so great that economic objectives must not be threatened by environmental considerations remained essentially intact at the Rio conference in 1992. Subsequent adoption of the rhetoric of sustainability at government and corporate level has subtly

transformed its meaning to cover any environmental measures which do not threaten short-term growth rates. The putative foundation of such orthodoxy is that social needs will be met by achieving economic goals. Yet economic growth has pushed more poor people into environmental squalor and closing frontiers have exposed the struggles for environmental resources as naked social conflicts with clear winners and losers. Liberalization measures have tended to harm those most in need and GNP growth has had a negative impact on wealth distribution (Bulmer-Thomas, 1996). Meanwhile, oligarchic governments have frequently represented precisely those economic interests which stand to gain most from pollution and degradation. Environmental rhetoric has been insufficient to subdue the dissonance provoked by these disturbing realities and the past two decades have seen the proliferation of environmental investigation and protest.

That this should have been the case is an indication of the crucial role played by consciousness. Overemphasis on the physical elements of ecological models underestimates the reactive capacity of human beings. Not only will they respond to changing environments, but they will change their behaviour according to their conception of the environment and what is causing it to change. What happens to the environment depends on how it is perceived. The myriad environmental campaigns and organizations of the last 20 years have sought to influence collective conceptions sufficiently to change behaviour and policies. This activity is part of an ideological struggle within which the defence of technocracy serves a political function. By assuming a technically optimum course of action which can be determined by appropriate expertise, the participation of non-expert stakeholders is delegitimized from the outset. The prevalence of conflicting interests is also concealed, thereby forestalling political debate defining the criteria for deciding between those interests.

The 1995 Chilean central bank study on the deforestation of native forest is a case in point. The report was ostensibly commissioned to provide the raw material for sustainable development policies and to address environmental concerns by providing an official inventory of remaining native forest. Its finding that, at present rates of exploitation, the forest will be gone in 25 years was met by a barrage of criticism and vitriol as landowners and academics set about the report's premises and its authors. The government promptly disowned the report and quietly abandoned plans to publish the equivalent surveys for mining and fisheries. This report had effectively made explicit the conflict of interest between the nation' s environmental patrimony and the economic benefit of a few landholders. It also threatened to undermine the political will to maintain existing subsidy levels by widening the political debate. It was not the destruction of the forest which mattered, but the fact that information would be used to change people's consciousness. The fact that it was indispensable technical information produced in line with the official commitment to sustainability was of secondary importance.

That this incident happened at all is evidence of new levels of plurality under which no hegemonic view of the environment prevails. While the outlook is bleak in terms of absolute levels of resource degradation and scarcity, biodiversity loss and pollution, the resolution of environmental conflicts is increasingly taking place within the political arena. Whether it be successful campaigns against toxic waste dumping in Honduras, the negotiation of shared water rights in Peru or the inclusion of the right to an environment free of pollution in national constitutions, it is clear that, across the continent, the environment is being perceived of and fought for as a human right whose attainment has become an integral part of the struggle for the democratic control of society.

NOTE

1. While most of the examples used in this chapter relate to the Chilean case, they illustrate processes common to the Latin American region.

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26. Biosphere, history and conjuncture in the analysis of the Amazon problem[1]

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INTRODUCTION

When the Europeans first arrived in what is now known as Brazil, in the sixteenth century, they discovered two major tropical forest complexes: the Atlantic Forest, originally measuring some 1 090 000 square kilometres, and the Amazon Forest, which at that time encompassed some 4 275 000 square kilometres in Brazil alone (the whole South American Amazon Forest comprised almost 7 000 000 square kilometres).[2] The different fate of these two forest complexes until three decades ago reveals a lot about Brazilian environmental history.

Colonial economic activities, particularly export-oriented single crops, livestock and gold and diamond mining, were concentrated along the seaboard, the domain of the Atlantic Forest. Even after Brazil gained political independence, in 1822, the Brazilian economy and population continued to concentrate along the coast. New economic activities such as coffee plantations and timber production, and later iron smelting and pulp production, were responsible for further losses of Atlantic Forest during the nineteenth and twentieth centuries. The result is that 91 per cent of its original area has now been destroyed.[3]

The Amazon Forest was left in a very different situation until quite recently. Until some 25 years ago, only about 1 per cent of the original forest had been destroyed. This phenomenon's historical causes are complex and include many elements that cannot be discussed within the limits of a single chapter. However, a few specific points are in order. As a reserve of tropical forest products per se, the Amazon was not particularly relevant to the Portuguese colonial enterprise. Portugal could easily tap the Atlantic Forest's vast resources. Other colonial powers had command over huge reserves in other tropical areas such as Asia, Africa and the Caribbean. In addition, there were difficulties of access to the Amazon, endemic diseases and other similar factors hampering extensive settlement in the region. Yet the main reason was that there was no economic compensation in the Amazon for the costs of occupation, or at least none that could not also be found in other available tropical forests.

It is widely know that this situation has changed great deal in the last two decades. During that time a massive and predatory occupation of the region began, a period that has come to be known as the 'decades of destruction'. In a relatively short time, the level of deforestation increased to 469 978 square kilometres (around 11 per cent of the original forest).[4] The region became the stage for a painful social and ecological drama and the fate of the Amazon Forest became a major national and global problem.

The Amazon problem presents a number of challenges for concerned analysts, policy makers and social actors. This chapter seeks to present a comprehensive picture of the issue,

considered in its essential aspects. The argument is that, in order to produce effective policies and social practices to confront the Amazon problem effectively, we need first to design a broader and renewed conceptual framework for its understanding. The failure of many of the policies and practices produced until now had to do with the lack of a broad conceptual orientation. Fragmented views tend to orient partial initiatives that do not touch the heart of the problem. Of course, to build a holistic view of such a complex issue is not an easy task. Moreover, it is not sufficient. This kind of general view can only be a necessary and positive starting point for more detailed and specific steps (both in terms of analyses and policies). However, since this kind of holistic conceptual orientation is quite absent from the debate, we do need to work towards this goal, even given the risk of simplification.

CONCEPTUAL KEYS TO UNDERSTANDING THE AMAZONIAN ISSUE

In order to understand the complex Amazonian issue, one should always bear in mind that the Amazon is experiencing a typical, even an 'archetypal', frontier situation, characterized by widespread conflict, or at least a high degree of poorly structured social interaction.

Conflict and social shock are universally present in social life, yet there are societies where traditional, well-established historical contact has occurred for a long time in a single geographical and social space. The behaviour and mechanisms for interaction between social actors are more predictable and conventional. Knowledge of the possibilities and limits posed by historically drafted social rules is shared in a more uniform fashion and assimilated by the various segments of society. This is true, not only of relations within societies, but also of relations between societies and natural space. In such cases, nature has already been intensely altered and there are few surprises regarding the way nature is exploited economically or occupied socially. This is particularly true of societies that have a long-standing relationship with a relatively small geographic space, such as several countries in western Europe. Yet, while a given social order may be historically mature, it is not necessarily socially just, much less sustainable. It only means that social behaviour is more predictable.

All of this is in sharp contrast to the frontier situation in the Amazon. Social actors in the Amazon are fluid, constantly moving from place to place. New alien actors enter the scene every day, most of the time coming from abroad, creating a social order where protagonists with different interests are juxtaposed. Such actors come from completely different sociocultural contexts and historical timeframes. In fact, very often they are living in different levels of reality and perception of the world (just consider the traditional Yanomami people and the owners of aeroplanes controlling the goldmining business). Occupation of natural space is also relatively limited, and there is a huge marginal space of ecological exploitation where it is still possible to encounter surprising natural realities, virtually unknown to science (one of the factors making the Amazonian frontier particularly tragic from an ecological point of view).

Intense conflict in the Amazon today is thus not only between social segments and classes. There is a conflicting or immature relationship between the various interests, social proposals, world views, historical timeframes and even perspectives on dimensions of reality. It can often be difficult to find a common language to unite such diverse perspectives.

The same concrete element can mean radically different things for the various social actors or at the various levels of reality. Consider gold. In the Amazon, gold exists as a natural element, a part of geological processes. Gold also bears a mythical meaning for many indigenous nations. Gold means a hope of potential fortune for a legion of the destitute and excluded. Gold is a tool for quick, easy money for a handful of swashbuckling 'entrepreneurs' acting totally outside the law on the frontier. Gold is a means of contraband and profit for Brazilian and foreign financial agents. And gold is an object of desire in consumer society. All of these meanings and many others are present in the same interaction surrounding gold, one result of which is mercury pollution, contaminating the food chains in the rivers and destroying the nutritional basis of an entire riverine population not directly involved in the issue.

Within such a complex context, finding a common focus on reality is hard. Yet we should not give up the analytical effort, since this fragmentation of meanings is no mere anthropological curiosity, but a veritable social drama. These fragmented actors are not isolated, but interacting chaotically in the same time and place. This same fragmentation also blocks more direct channels for communication and negotiation between social actors, hampering democratic agreements on rational, non-predatory settlement procedures. Occupation of the Amazon continues in a haphazard, highly degrading way, creating a process of serious proportions.

Because of this, any policy of sustainability for the region must seek a broader, more encompassing vision that resists such fragmentation and chaos. Building this vision is obviously a necessary condition, but not a sufficient one, for dealing with the Amazon issue. The first step must be sought in the political struggles of the legitimate, relevant social actors, especially the ones whose historical and social interests are compatible with the sustainability imperative. It is essential to create social and political arenas where these last actors can establish some common ground for the building of concerted alternative projects in order to promote their interests in a way that is compatible with a sustainable future. Moreover, it is equally important to create even wider social and political arenas where all the different social actors – even the most antagonistic ones – may establish a certain level of dialogue. The simple definition of clear rules for non-violent social interaction and consensual enforcement of the existing laws represents a basic step in this direction. The simple acceptance of the fact that members of one social sector cannot kill leaders of another sector – as is still common, especially against leaders of the peasants, extractive workers and Indians – would be an important advance in such a problematic environment. Of course, we are using the term 'dialogue' in a wide sense. We are talking about the need for social processes, not abstract discussion (even though face-to-face discussions between social actors may also be very relevant).

In this wider sense, it is also important to mention the need for a greater government presence in this interaction, to serve as both a barrier against violence and a channel for negotiation and implementation of changes. This obviously presupposes the growth of governments committed to the collective good and controlled by organized democratic participation (both at the federal and the local levels). This condition is important because, historically in the Amazon, the so-called 'public' sector has been little more than a tool at the service of dominant interests, the real perpetrators of social iniquity and ecological destruction. Since the end of the military regime in 1984, however, we can observe a certain renewal in the political leadership of the region as a natural outcome of more open and

participative elections. This fact produces certain hopes for more positive behaviour from the public sector in the future.

The role of analysts and researchers is also quite important for this process. The broader conceptual vision that we are suggesting is scientifically and politically important. The same fragmentation that hampers any analysis of the problem also impedes political initiative. Appropriate global views can thus help establish guidelines for political action by social actors. On the other hand, it is true that any synthetic perspective will necessarily be limited. We should see any attempt in this direction as a work-in-process that must be improved by intellectual and social dialogue.

A necessary step towards building a more holistic view is to try to aggregate the many social actors and levels of reality interacting in the Amazon into a reduced set of essential categories that can be used to define a workable synthetic view. After many years of participant analysis of the problem, we arrived at the conclusion that an appropriate conceptual framework for better facing the issue would be one that combines conflicting social and ecological interaction in the Amazon into three major dimensions. Drawing freely on categories used by the French historian Fernand Braudel in a different context,[5] we have classified these as the *biospheric*, *historical* and *conjunctural* dimensions. These three categories represent different dimensions of Amazonian reality that interact in the same time and place in the regional complex, despite the fact that social actors are often unaware of it. These dimensions do not exist in an isolated way. In fact, they all overlap all the time in a mutually influencing way. However, we can also say that each one has its own rationalities, movements and timeframes. Of course, these three dimensions are analytical tools created by the observer in order to build a comprehensive picture of the problem. In the objective reality, everything is mixed in a single process. This kind of creative interaction between the subjective classifications and the objective movements lies at the heart of any analytical work.

First, we have the Amazon as a biospheric space, that is, as a bioregion included in the larger context of the 'tropical forests' biome and in the even greater context of the global biosphere. In fact, we could also call this dimension the 'ecological' or 'ecosystemic' one. The term 'biospheric' is used here as a reminder of the relevance of the Amazon Forest for the global biogeophysical processes of the planet as a whole. This ecological dimension of the Amazon is the result of a long process of natural evolution whose initial stages and many currently observable characteristics far precede human presence there or are independent of it. This natural space truly deserves to be classified as a biospheric 'treasure', in all senses of the word. The most widely cited element underlying this classification is the Amazon's enormous biodiversity. Numerous projections indicate that, although the tropical forests occupy only 6 per cent of the earth's surface, they host more then 50 per cent of the species living on it. Considering that the Brazilian Amazon represents about one-third of the surviving tropical forests, it seems fair to postulate that it might be host to as many as 20 to 40 per cent of the species existing on earth (since they are not distributed evenly throughout the biome). This number assumes an even more impressive virtual value if we recall that ignorance of Amazonian biodiversity is still great and that, in addition to the 1.4 million species already recorded, specialists admit that the real figure may be anywhere from five to 50 million.[6]

However, the presence of such mega-biodiversity has overshadowed the existence of other equally significant natural elements in the Amazon. Some 20 to 30 per cent of the earth's

available fresh water flows through the Amazon Basin. We know that only 3 per cent of the planet's water is fresh, and half of this total is frozen in glaciers and permafrost. The worldwide water crisis is getting worse, considering waste, pollution and inequality in use (for example, average per capita consumption in the USA is 500 litres a day, as compared with 5.4 litres in Madagascar). To give an idea of the geopolitical potential of Amazonian water, suffice it to recall that only three hours of the outflow from the Amazon River (an average of 175 000 cubic metres per second) would be sufficient to supply Israel for a year. Another extremely significant projection is that the Amazon region houses some 20 per cent of the earth's available biomass, which reproduces there at a rate of 90 tons per hectare per year. The energy capacity of this biological yield is enormous. Another frequently analysed element is climate. The Amazon Forest holds some 50 billion tons of carbon. Release of this element into the atmosphere would cause a greenhouse effect of unimaginable proportions. Inversely, we may imagine the constant beneficial effect that the forest now exerts on the climate, water systems, and so on, both in Brazil and worldwide. The present chapter does not permit adequate exploration of this issue, but the above data should be sufficient to demonstrate the region's ecological grandeur.[7]

We should recall that this biospheric treasure did not start as a finished product. It is the result of a dynamic, living process, a typical example of what used to be called 'natural history', beginning millions of years ago. Several dramatic changes occurred, such as the upward buckling of the Andes range (some 60 million years ago), reversing the direction of the Amazon River, which use to flow towards the Pacific. Major climatic changes also occurred, with periods of drought and the expansion of the savannahs, followed by other periods in which the rainforest recovered its ground, all of which occurred over a period of thousands of years. Although the forest is quite ecologically mature now, its environment is still constantly changing, producing a variable and dynamic environment.[8] In other words, the forest is living its own history, with its own rhythm and timeframe. The reality of the forest as a living 'being' of great value is usually absent from the conscience of the social actors interacting inside it. Often, observing the daily Amazonian drama, one gets the impression of watching a football match in a porcelain shop.

It is precisely at this point that we enter the second dimension of Amazonian reality, which we called the 'historical' one. By this concept is meant the patterns of relatively long human occupation which have consciously or unconsciously oriented the make-up of social structures located in the Amazon Forest as a whole. Obviously, none of the historical patterns established in the region thus far has been based on an all-encompassing scientific view of the forest's ecological wealth or its prominent place in the earth's biosphere. For one thing, this type of vision has only taken consistent shape in recent years, through advances in our knowledge of global ecology. What we can say, however, is that, in a more or less empirical fashion and based on intuition, observation and different cultural premises, patterns of occupation with highly diverse degrees of ecological damage have managed to exist in the Amazon. In a synthetic way, we can define four main patterns of historical occupation of the region: (1) the traditional indigenous occupation; (2) the 'weak' colonial pattern established by the Portuguese from 1500; (3) the 'rubber boom' that started at the end of the nineteenth century; and (4) the geopolitically driven predatory occupation promoted at the beginning of the 1970s.

In the first place, one must consider the patterns established by indigenous nations and their most ancient ancestors, who accumulated vast empirical and theoretical experience of

the forest's ecology and truly succeeded in building sustainable social structures, even over the long term. Of course, the indigenous populations left their mark on the forest. Today, specialists debate the degree of this modification in the biogeography of plants and animals, the extinction of a few species, and so on, stemming from over 10 000 years of human presence. Of course, the universe of Indian cultures in the Amazon is quite heterogeneous in terms of world views and social practices. Yet the basic sustainability of these indigenous societies is unquestionable and should serve as one of the bases for building new, consciously drafted projects for a sustainable relationship with the forest.[9]

Despite the centuries of destruction and displacement suffered by the Indian communities, a considerable number of them have survived until the present day. Moreover, the post-military regime Brazilian constitution of 1988 ordered a quite liberal process of land demarcation in the region. Even given the difficulties associated with enforcing this order, both in terms of actual demarcation of the areas and of protection of their borders, there has been a great advance in recent years. The demarcation of Indian lands gives hope for a renewed demographic increase and sociocultural revival of these communities. The total area that is being officially put under their control in Brazil is very relevant, amounting to 940 867 square kilometres. In the Amazon, where by far most of the Indian areas are concentrated, the reserves will occupy around 20 per cent of the forest. The important outcome, however, will be the kind of economic and social patterns that the Indian communities establish in their reserves. Will they follow the tradition of sustainable use in a renewed way or just join the currently dominant, predatory pattern in alliance with capitalist companies? At the moment we can see examples of both trends in the region, in spite of the barriers that the law clearly puts in the way of predatory economic practices inside the reserves.[10]

The second historical pattern, that of 'weak colonialism', was established after the arrival of the Portuguese in the sixteenth century. Despite the overall aggressiveness of the European colonial undertaking and the genocide and ecocide it produced in various areas of the planet, one can safely state that, in the case of the Amazon (for a series of reasons that we have already mentioned), the promotion of economic occupation and destruction of the forest was quite moderate and geographically limited. This in no way means that the European colonialists established rational, sustainable social structures in the region. Rather, the destructive frontier only encroached moderately on the forest. In short, one could say that the pattern of occupation prevailing from the time Europeans first arrived until the late nineteenth century guaranteed a relatively loose political and military command over the region (largely because it was not seriously threatened by other powers), ensured a minimum population density with the colonial presence and selectively extracted certain commercially feasible resources from the forest (such as certain herbs and spices). There was also strong missionary activity in order to adapt the Indians for servile relationships with the colonialists. Attempts at more ecologically destructive activities, such as livestock and sugar cane monoculture, were not made on a large scale. Portuguese occupation of the Amazon was thus limited to guaranteeing political control over the area by building a few towns and military fortresses. Penetration of the forest by the non-native population was scant and not very destructive, involving fishermen, gatherers of medicinal plants and herbs, small traders, a few military and public employees, and so on.

Most occupation was along the rivers. Although such occupation was quite sparse, it obviously led to serious confrontations with the indigenous nations. However, a major

portion of these groups moved away from the main channel of the Amazon River, settling in the southern part of the region, where the colonial presence was extremely limited and there was little potential for conflict. This process also led to the formation of a *caboclo* (mixed Indian–Portuguese) ethnicity and culture, expressed particularly in the riverine population of poor settlers, who moved further and further up the tributaries in the Amazon Basin. From the perspective of the juxtaposed levels of historical occupation we have been adopting, we can say that this second pattern prevails in many areas of the region even today. Small and traditional communities of *caboclos* living an autarchic existence have been disrupted in recent years, however, by the growth of the predatory frontier, especially as a result of logging activities.[11]

A new historical pattern was introduced during the nineteenth century, when the discovery of the vulcanization process increased enormously the industrial demand for rubber, especially as an essential product for the burgeoning motor industry. Thus rubber became the first tropical forest product that was exclusive to the Amazon Forest and had great potential for producing and amassing wealth in the capitalist world economy. It represented the first economic factor that could justify the costs of occupying the Amazon *vis-à-vis* other tropical forests. The 'rubber boom' induced the migration of hundreds of thousands of workers to the Amazon and the non-Indian population that was estimated at 137 000 inhabitants in 1820 increased to 476 370 by 1890 and to 1 217 024 by 1910.[12] Nevertheless, although this pattern increased the population density and the presence of Brazilian capitalist society in the region, it was not truly predatory. The boom in rubber was short-lived, concentrated during the period from 1880 to 1912. Soon after 1912, there came the growing world market hegemony of rubber plantations in South East Asia. During the Second World War, with the occupation of these plantations by the Japanese, there was a short renaissance for the rubber trade, though this had no major historical consequences.[13] Tapping continued in the region, producing small quantities of rubber destined for the internal market.

The results of the rubber boom were not only short-lived, but also relatively limited in scope. In the first place, rubber tapping is not very damaging to the forest, since it does not require felling the trees. It is true that the rubber rush promoted migration to the Amazon and the rapid growth of some of its old cities, such as Manaus and Belem. Still, this flow stopped abruptly after the bottom fell out of the rubber economy, so that the new settlers had no significant impact on population density or destruction of the forest. In fact, the population started to decline before starting slowly to increase: in 1960, it was still just 3 603 860 inhabitants: very low for such a huge region.

One major result of the rubber decades, however, was the increase in the *caboclo* population and culture, through the waves of poor settlers who stayed behind in the forest as rubber tappers, Brazil nut gatherers, fishermen or small farmers. They mixed with the populations living according to the patterns already discussed, in order to create their own survival strategies, based on practical knowledge of forest dynamics. According to conventional economic logic, the decades following the end of the rubber boom could be called a time of 'stagnation', that is, a period of limited population increase or economic dynamism. Viewed from a different angle, however, one could also say that this was a period of maturation for a regional culture proper and a traditional way of living: in short, a time for learning how to establish a form of social life in harmony with the tropical forest. Although it is hardly our intention to idealize the social life of the 'old Amazon', this period did usher in a way of living which tended not to destroy the forest and which was in many ways superior to the

present in terms of quality of life, despite the extremely serious social injustices in the decadent rubber and Brazil nut groves. This way of life, especially that built by the independent riverine and forest communities, deserves to be better researched by social scientists, in order to achieve a deeper knowledge of its characteristics. This recovery is particularly valid in light of the need for a better understanding of the brutality and chaos which later took hold of the region.

This last outcome has to do with the birth of a fourth historical pattern of occupation in the region, promoted during the military dictatorship in Brazil, especially from the 1970s. It is difficult to call this recent period of occupation a 'development' model or a 'policy' in the rational sense of the word. It would be more appropriate to talk about a 'non-policy policy', or a policy of promoting a 'free-for-all' or an 'everyone-for-himself' situation, obviously to the benefit of a powerful few, almost all of whom are alien to the region. In fact, as we intend to show, this model was based on the false premise that it was necessary to occupy the Amazon quickly, and at whatever cost, for purely geopolitical motives. It was a matter of establishing infrastructural conditions and incentives to attract any and all types of exogenous activities that could be called some form of 'Brazilian presence' in the Amazon. This model led to chaos and ecological disruption, marginalized the local population and opened the way for all kinds of opportunism, such as drug trafficking, child prostitution and many other predatory and illegal activities, including the unbridled extraction of timber and gold.[14]

As was said above, the reasons for the promotion of this model were primarily geopolitical rather than economic. The Brazilian economy was still concentrated along the coast and was expanding into the central west. The country was undergoing a burst of urban and rural industrialization, and great numbers of peasants were forced off the land, joining the rural exodus. Although the agricultural frontier was closed to such small farmers in most of the areas outside the Amazon owing to the persistent latifundia (large land holdings) and growth of large, export-oriented agribusinesses (which were destroying traditional economic relations in the countryside such as sharecropping), there was no real widespread rural conflict. For one thing, repression by the military regime made it difficult for peasants to mobilize in their struggle for land. On the other hand, the growth of the big urban centres was able to accommodate the population that was forced out of rural areas (even if this 'accommodation' meant the uncontrolled growth of the sadly famous shanty towns).

It is worthy of note that there was no spontaneous, mass migratory flow towards the Amazon at that time: living conditions in the forest are harsh and tend to discourage migrants, except when there are no other alternatives or when migration is induced artificially. The military regime thus opened the Amazon to occupation by large capital interests and migrant peasants, but not according to some urgent economic or social rationale. It is true that the opening of the Amazonian frontier to peasant families also served as an escape route for peasants thrown off the land, thus relieving potential pressure for agrarian reform. This was expressed in the famous phrase of President General Emilio Medici: 'to lead men without land to land without men'. Yet, as just indicated, the exodus to the cities was a more than sufficient release valve, and the objective dimensions of the problem were insufficient to explain the need for opening up the Amazonian frontier, much less all the artificial mechanisms that the military regime promoted to induce migration into the region.

Likewise, there was no natural attraction towards the Amazon for capital. Many economic interest groups did in fact benefit from the tremendous artificial incentives created by the military regime for investment in the region, especially for speculative capital. But capital

expansion into northern Brazil had to be fed by subsidies, fiscal exemptions and other facilities, often covering over 80 per cent of costs. Without such tremendous facilities, capitalists probably would not have run the risk of exploring the Amazon, because there were other less costly and easier alternatives. The big exception was mineral production, an activity that does have the capacity to generate a great amount of wealth in the Amazon. The great logistical difficulties involved in the implementation of large-scale mining in the region, however, usually make it an exclusive domain for public or transnational companies.

The regime's main motivation for rubbing the lamp and freeing the genie for predatory, chaotic occupation of the Amazon was thus geopolitical. The military regime was worried about the 'population void' in the region; what they wanted was a so-called 'living frontier' in the Amazon, with a Portuguese-speaking population, since the indigenous peoples were not really considered Brazilian citizens. This 'living frontier' drive stemmed from the traditional military paranoia over foreign invasion of such a rich territory. Ironically, this policy helped destroy much of the traditional Amazonian social fabric that had produced the most permanent settlements, fostering all kinds of violence, crime and unrest (just consider the impact of child prostitution – promoted mainly by the gold digging enterprises – on local families). Furthermore, it was the main incentive for internationalization of the Amazon, through the penetration of transnational capital and numerous foreign companies, particularly in the mining and iron and steel industries, which have the highest profit margin.

As we have already said, the model implemented in the Amazon was a sort of 'non-policy policy'. In other words, government shirked its duty to organize collective activity in favour of the common good and to discipline economic activities to meet long-term national objectives, including preservation of natural resources and public security. On the contrary, the regime promoted a 'free-for-all' policy, including 'no-strings-attached' facilities, capital incentives with no concern for the social and ecological quality of the activities to be implemented or even for a cost–benefit analysis on investment returns. Like virtually all other policies under the military regime, the model used to occupy the Amazon promoted the interests of large capital and concentration of income, to the detriment of overall social well-being, particularly for the Amazon's original communities. This policy was also characterized by gross ecological irresponsibility, a particularly serious issue in view of the ecosystem's unique characteristics. The regime thus invested in such heavy infrastructure as highways, hydroelectric dams and so on, but without correctly evaluating social needs and priorities. A clear example was the Tucurui Dam, with a great percentage of its energy output supplying just two aluminium factories, selling energy to them at heavily subsidized rates. Another example is the huge Carajas iron ore mine, which is technically quite sophisticated as a single, isolated undertaking, but which simply ignored the external consequences (or 'externalities', in economic jargon) of promoting chaotic occupation of the southern region of the state of Para. The same is true of settlement schemes such as the 'agricultural hamlets' along the Trans-Amazonian Highway or the 'Polonoroeste' (Northwest Pole) project, funded by the World Bank, which lured hundreds of thousands of settlers to the state of Rondonia, only to abandon them because of the total lack of preparation and infrastructure in the area. The result was that the level of deforestation in Rondonia increased from 5.4 per cent in 1978 to around 49 per cent in 1994.[15]

The military regime's policies functioned as if the important thing were to lead companies, exploratory activities and settlers to the Amazon, expecting that such social agents would somehow get by in a situation where the poor did not enjoy any of the same subsidies

that allowed capitalist speculators to amass huge fortunes. Still, in a certain sense, the geopolitical objective of exponentially increasing settlement in the region was achieved. The ecological and social burden of this adventure must now be borne by Brazilian society as a whole.

This is where the third dimension of Amazonian reality comes in, which we term 'conjunctural'. In fact, this dimension is ubiquitous in social life. It is the set of daily circumstances, of spontaneous initiatives, individual or collective, aimed at short-term promotion of particular private agents, with no concern for a greater historical rationality or a higher common goal. Over the course of history, such conjunctural activities or events have tended to conform to prevailing structural patterns, through processes that have been studied by historians and sociologists. When they diverge from the prevailing pattern, they are normally relegated to historical irrelevancy, or they may follow a cumulative expansion movement which ends up transforming the prevailing pattern itself. The dominant historical patterns tend to feed and be fed by a myriad of daily events and initiatives, but the relationship between the patterns and the events is complex and often contradictory. On the other hand, we can say that some historical patterns open up more space for uncontrolled growth in the conjunctural movements than others. It is not difficult to deduce that the pattern implemented in the Amazon by the military regime was particularly permissive of this kind of disordered growth of conjunctural activities.

The problem is that the heavy presence of such conjunctural activities in this kind of daily free-for-all is particularly serious in the Amazon. In the first place, this is a frontier region, where conflict and violence appear at the drop of a hat. Second, they relate to the very ecological grandeur of the ecosystem; we see chaotic, disordered movements motivated by short-term ambitions and conflicts, where the social actors are unaware of the surrounding ecological and geographical context. Third, the irresponsible model by which the Amazon was occupied has favoured unbridled growth of such conjunctural movements, to the point of sparking processes that have proved difficult to control or reverse, even when society perceives their pernicious character.

A typical example is what is happening with cattle ranching and the Amazon Forest. There is now somewhat of a consensus that cattle raising in the Amazon is an ecological disaster, directly responsible for some 80 per cent of the deforestation from the 1970s on. This was a prime activity among the first wave of swashbuckling 'entrepreneurs' who invaded the region, since it allowed for the easy appropriation of huge stretches of land, and since it was promoted with fat incentives and tax exemptions covering over 80 per cent of the costs. But the economic results have been pitiful, both in yields and in creation of jobs. Government administrations following the military regime thus decided to eliminate such incentives or even openly to discourage cattle ranching in the Amazon. Many analysts believed it would die out. In fact, it has proved capable of expanding on its own, even without subsidies. On the basis of research carried out by the Imazon Institute in the state of Para, we find that cattle raising provides a low profit margin, some $8–54 per hectare per year, but that this is sufficient to encourage a conjunctural trend towards slashing and burning areas to open up new pasture, for one thing because this is still a quick way to gain private control over the land.[16] In other words, the model gave root to a harmful activity that has since survived on its own, like a weed, through conjunctural trends. To put a stop to it now requires much more dramatic and difficult political measures.

Another example has to do with the uncontrolled opening of roads in southern Para by logging companies searching for the last reserves of mahogany. Because of mahogany's biological characteristics and the fact that it is widely dispersed throughout the forest, logging companies slash thousands of kilometres of roads right through the heart of the forest, expecting to compensate for costs with the timber's handsome international price. As a result of this indirect factor, the so-called 'mahogany frontier' has become a major factor for expanded destruction of the forest, a veritable bridgehead for opening the forest to direct exploitation and other subsequent uses, such as cattle ranching. It has also become a shock factor for the indigenous nations that have fled for centuries to the southern Amazon, leading to numerous episodes of violence, corruption and cultural breakdown of the indigenous peoples, including cooptation of their traditional leaders. In their conjunctural search for a particular timber species, the logging companies are producing structural trends in that region that will generate much wider perverse impacts and remain for a much longer time than the mahogany reserves themselves.[17] Similar processes include the spread of other equally pernicious and even more violent conjunctural trends, such as gold digging, the unauthorized extraction of fine hardwoods ('timber mining') and, of course, drug trafficking.

By the early 1990s, it was already obvious that several policies surviving from the military period were beginning to run their course, as with the obvious failure of subsidized cattle ranching. Their ecological and social costs were becoming much more obvious to the Brazilian public. There was also a major financial crisis in the Brazilian public sector and an overall economic recession that considerably alleviated pressure on the Amazon. This reduced pressure meant that the average annual deforestation slowed down from around 23 000 square kilometres in the 1980s to around 11 000 after 1990. This reduction, however, was typically conjunctural and, since the end of the economic depression in 1994, destructive processes in the Amazon have been on the increase once more. Deforestation in 1994 increased to 14 896 square kilometres. On the other hand, since the end of the military regime, Brazilian social and political forces have been unable to produce a new historical pattern to overcome and replace the former one. It is true that a certain perception of the negative impact of the military model, and also of the need to change it, became widespread. But in fact what we still see in the region is the dominance of the conjunctural movements released by the chaotic 'take-off' from the 1970s. Some alternative processes and proposals did emerge, such as the demarcation of many Indian reserves and the raising of the 'extractive reserves' idea launched by the rubber tappers movement led by Chico Mendes. These positive steps for the sake of sustainability, however, remained quite isolated from a new, global, historical movement of the kind we have been considering.

As was said before, it is hard to appreciate the prospects for the implementation of true solutions to the Amazon's problems until these types of historical initiatives emerge. On the other hand, the lack of this kind of major initiative is opening up ever more space for new, perverse, conjunctural movements that may ultimately produce a kind of irreversible chaotic and predatory order in the region. Among such movements we may include the huge growth in drug trafficking and the prospect of a new, extremely intense, subcycle of deforestation, led this time by the timber industry, rather than the cattle raising of the 1970s. With the growing depletion of forests in Asia, the result of unchecked, unsustainable use, timber companies from South East Asia have begun to approach the Amazon, hoping to occupy a timber frontier that is still relatively unexplored, production from which now supplies less

then 10 per cent of the international market, despite having some 60 billion cubic metres of timber. It is a well-known fact that these Asian logging companies are many times more powerful than their local Brazilian competitors. Malaysia and Indonesia alone control over half of the international market. Their entry into the Amazon may launch a new cycle of destruction, much more intense than before. This will mean that for the first time the Amazon Forest as such (and not only its underground mineral reserves) will be included in the globalization process, with all the damage this can involve. Chinese and Malaysian companies are already beginning to purchase land and companies in the state of Amazonas. They began to arrive a little earlier in Surinam and Guyana, where they have caused a great uproar. For many years, environmentalists and other analysts have called attention to this coming change in the international geography of tropical timber production. If preventive action is not taken, the potential for damage is unimaginable.

It is thus essential to reinvigorate the struggle to change the model for occupying the Amazon, in both quantitative and qualitative terms. We must work on the reality outlined above to conceive of a transition towards sustainability in the region. We are now at a crucial crossroads for this political assessment. Maybe there is still a historical opportunity for Brazilian society to reflect on past mistakes, prevent an even more destructive type of development and seek alternative solutions for the Amazon. If the situation remains as it is now, the marginal capacity to use this historical opportunity may continue to contract.

CONCLUSION

In concluding this chapter, and on the basis of the above, we can infer some conceptual keys for understanding the Amazonian reality as a whole and also the political steps (in a wide sense) that are needed for the building of an alternative sustainable future. As a first step, we need to incorporate the biospheric dimension as a crucial variable in any analytical or political discussion about the future of the Amazon. There are no longer any excuses for ignoring the forest's ecology and its own dynamic reality. Any sustainable historical project for the region must obey the premise of adapting to the forest's ecological rationale. Scientific knowledge of the latter continues to grow, despite the fact that many gaps still exist. Some essential aspects are already well known, especially when used as a basis for the application of the precautionary principle. Of course, as any political analyst can perceive, the existence of scientific knowledge is not enough. Much of this knowledge already existed in the 1970s, when the predatory model was unleashed. This adds further to its perpetrators' liability. The central point, therefore, is to enforce the political will to respect the Amazon as a biospheric treasure and understand its ecological landmarks.

Second, we should examine which historical pattern is behind a given social actor's behaviour: the old, traditional patterns like those of many indigenous nations and *caboclo* communities or the chaotic patterns of more recent decades. Of course, we cannot deny the existence of any historical processes. But it is within the power of political activity to take decisions in order to promote historical patterns compatible with sustainability and to overcome the ones that lead to destruction and unsustainability. In fact, it is essential to create a new political consensus in opposition to the military regime's model. It is also necessary to raise awareness in Brazilian society as to the political imperative of building a new model, a new standard for occupying the Amazon, in harmony with the ecosystem's

characteristics, promoting justice, democracy and social empowerment: in other words, exactly the opposite of what the former model promoted.

It is essential to argue that such a new historical model cannot be created as an intellectual exercise or as a result of the mental activity of enlightened technocrats. It should be designed – if it is to have any relevance at all – as an outcome of the democratic interaction between the social forces that can harmonize their practices and interests with the ecological imperative. The traditional ways of life, for example, can easily be incorporated in a new historical project for sustainability. This does not mean that they can be maintained in their present state in perpetuity. What is required is to provide secure space for their own developments according to a new, positive, general pattern. The communities of Indian and extractive workers, for example, have a lot of practical and theoretical experience that must be incorporated into the common search for effective ecoforestry methods in the economic use of the Amazon Forest. In order to improve their livelihoods and refine their practical knowledge, however, these communities need to have land security and enough space for their own development. This should be achieved through the demarcation of large tracts of forest land given over to their control. These extractive or communitarian reserves also fulfil the ecological imperative of conserving the forest.

Nevertheless, it is important to remember that the traditional forest peoples are not the only source of experience for a new, more sustainable, historical model. Relative newcomers to the region can also become essential players in this process. The peasants that were abandoned after the failure of the military colonization schemes, for example, have an interest in the growth of the agrarian reform process in the areas already deforested. They do not want, as many of their leaders have been saying again and again, to be settled inside the forest, where survival is much harder and deforestation work is necessary. Moreover, many rural workers' unions and associations in the Amazon, especially in the south of Para and Rondonia, have been researching and promoting ecological agriculture as a way to renew their economic livelihood and recover the region's soils. These movements have arisen as a result of the failure of conventional agricultural technology in the Amazon.

All this recent historical experience of the peasants can thus be included in the new project we have been discussing. There is also a growing group of business people in the Amazon that is ready to act to overcome the 'free-for-all' profit making that has prevailed in recent decades. They are beginning to see the limits of such a philosophy for true business activity in a globalized world. They see, for example, that unless clear ecological regulations are defined for logging activity they will not be able to compete with the coming Asian companies, which are much better prepared for an unregulated economic war.

To talk about a new historical project in this way is not an abstract dream. In fact, the debate about a sustainable future is already a reality in the region, including many different social actors and public authorities: many concrete proposals have already been released. (The discussion of their nature, limits and possibilities would require another chapter.) It is only after such social and political interaction that a relevant, new, historical project can effectively emerge.

Third, it is important to understand that a precondition for the implementation of a new historical model must be the identification and overcoming of the conjunctural trends that are particularly predatory or harmful. Without clear resistance to the illicit drug trade and the uncontrolled expansion of gold digging and timber mining, for example, it is impossible to think of any future besides violence and destruction. The same historical forces that can

build a new, more sustainable model must also be a platform for a new consensus and movement of resistance against the predatory conjunctural trends. This resistance must also imply, as we said earlier, political pressure for the enforcement of true public power and respect for existing laws in the region.

The conceptual frameworks and the implicit (and explicit) political suggestions expressed in this chapter are not intended, of course, to be a complete guide to, or exhaustive definition of, the necessary steps for the design and implementation of a new, sustainable historical project for the Amazon. Our only intention has been to present a broader picture of the problem in order to help the emergence of a wider understanding of the grave challenges already present, and also the production of more creative ideas and proposals on the possibilities for a political solution to the present situation.

NOTES AND REFERENCES

1. The research that made this article possible was carried out under the auspices of the international project 'North–South Perspectives on Sustainability', led by Friends of the Earth International. I want to thank FASE NACIONAL, the Brazilian link of the project, for the opportunity to take part in this global discussion.
2. According to calculations made by Philip Fearnside using data from INPE (National Institute for Space Research). The results were published in *The Challenge of Sustainable Development: the Brazilian Report for UNCED*, Brasilia: Presidency of the Republic, 1992.
3. For a magisterial history of the Atlantic Forest, see W. Dean, *With Broadax and Firebrand: The destruction of the Brazilian Atlantic Forest*, Berkeley: University of California Press, 1995. Some of the historical processes that produced the destruction of that forest are quite similar to the ones happening in the Amazon.
4. This figure covers the period until August 1994 and was released by INPE only in July 1996. There is a scientific controversy over the whole set of vegetation forms that should be included in the Amazon forest. Because of this fact, INPE works with a figure different from that of Fearnside as to its original size. According to INPE, this was 3 983 000 square kilometres. Thus the official percentage for Amazon deforestation in Brazil until August 1994, established by INPE, is 11.8 per cent.
5. In his excellent book on the Mediterranean world, Braudel created the idea of history as happening through three juxtaposed levels: structures, institutions and events, with the first level largely based on the relations between societies and their natural environment. See F. Braudel, *La Méditerranée et le Monde Méditerranéen à L'Epoque de Phillipe II*, Paris: Armand Colin, 1966.
6. For many reflections and data about the Amazon's biodiversity, see E.O. Wilson, *The Diversity of Life*, New York: Norton, 1992.
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8. On the forest history of the Amazon basin, see C. Harcourt and J. Sayer, *The Conservation Atlas of Tropical Forests: The Americas*, London: Simon & Schuster, 1996.
9. For good analyses of the ecological adaptive strategies of the Indian communities in the Amazon, see B. Meggers, *Amazonia: Man and Culture in a Counterfeit Paradise*, Chicago: Aldine, 1971; and E.A. Moran, *Ecologia Humana das Populacoes da Amazonia*, Petropolis: Vozes, 1990.
10. The most up-to-date information on the Brazilian Indians' problems, projects and initiatives can be found in Instituto Socioambiental, *Povos Indigenas do Brazil 1991–1995*, São Paulo: Isa, 1996.
11. For an overview of the transformations produced since the arrival of the Portuguese, see A. Engracia de Oliveira, 'Amazonia: Modificacoes sociais e culturais decorrentes do processo de ocupacao humana (sec. XVII ao XX)' in *Boletim do Museu Paraense Emilio Goeldi*, **4**, (1), 1988. For a traditional account of the life and culture of *caboclo* communities, see C. Wagley, *Uma Comunidade Amazonica* (original title: *Amazon Town*), São Paulo: Editora Nacional, 1977.
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13. For an environmental history of the 'rubber boom', see W. Dean, *Brazil and the Struggle for Rubber*, Cambridge: Cambridge University Press, 1987.
14. The best chronicler of the irrational and painful processes established since the 1970s, using a style full of knowledge, passion and irony, has been Lucio Flavio Pinto. See, for example, L.F. Pinto, *Amazonia, a Fronteira do Caos*, Belem: Falangola, 1992.

15. The different aspects of the model are covered in A. Hall and D. Goodman, *The Future of Amazonia*, London: Macmillan, 1990.
16. See M. Mattos, C. Uhl and D. Goncalves, *Perspectivas Economicas e Ecologicas da Pecuaria na Amazonia Oriental na Decada de 90*, Belem: Imazon, 1992.
17. See A. Verissimo, P. Barreto, R. Tarifa and C. Uhl, 'Extraction of a high-value natural resource in Amazonia: The case of mahogany', in *Forest Ecology and Management*, **72**, 39–60, 1995.

27. Environment and society in the Middle East: conflicts over water

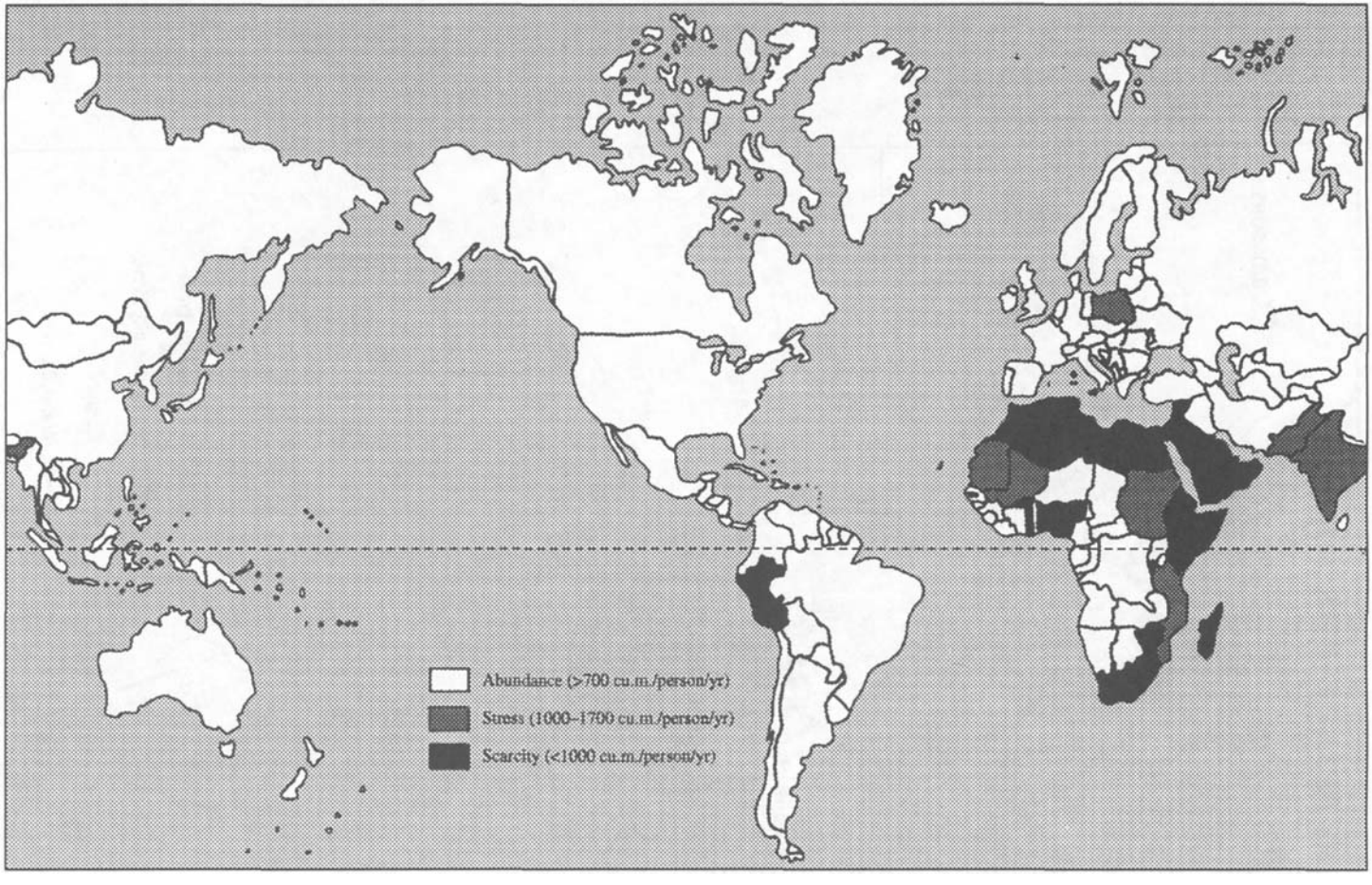
Steve Lonergan

INTRODUCTION

The scarcity of fresh water will be one of the key resource issues of the next century in many regions of the world. Already, water availability is severely limited in some of these regions and this condition will be exacerbated as population grows. It is anticipated that between 44 per cent and 65 per cent of the world's population will experience conditions of water scarcity or water stress by the middle of the next century, according to the United Nations (UN, 1994). Figure 27.1 provides an indication of countries which will be experiencing water stress or water scarcity by the year 2050, according to a medium population projection from the UN (ibid.). As indicated in the figure, nowhere is this problem more acute than in the Middle East. The region contains three international rivers which have been the source of conflict in the past and which are crucial to the economic development of many countries. Of particular concern are the Nile, with nine riparian states and the most downstream country (Egypt) which is almost entirely dependent on the flow of the river for its economic development; the Euphrates, which has been the subject of recent controversy as Turkey develops its Southeast Anatolia Project, which has already reduced the flow of the river to downstream riparians Syria and Iraq; and the Jordan, which has been a long-standing source of conflict between Israel and its Arab neighbours. The most publicized of these disputes over water in the region has been with the Jordan river and, hence, it serves as the focus of this chapter.

THE CASE OF THE JORDAN RIVER VALLEY

Control over water in the Middle East has long been of strategic importance to organizations and states in the region, and with most countries experiencing rapid population growth, this is even more true today. In the Jordan river valley, there have been numerous incidents of conflict over water resources over the past half-century. During the war with the Arabs which led to the establishment of the state of Israel, one of the first actions by Arabs when the British troops left Palestine was to cut the water supply to the Jewish section of Jerusalem. Many authors have claimed that water played a key role in the 1967 war between Israel and its Arab neighbours. And the importance of water to the region was further exhibited in the recent Middle East peace process, where water was one of five key topics which were selected for multilateral discussions (along with refugees, economic development, environment and arms control).



Source: UN (1994): medium population projection.

Figure 27.1 Available fresh water resources, 2050

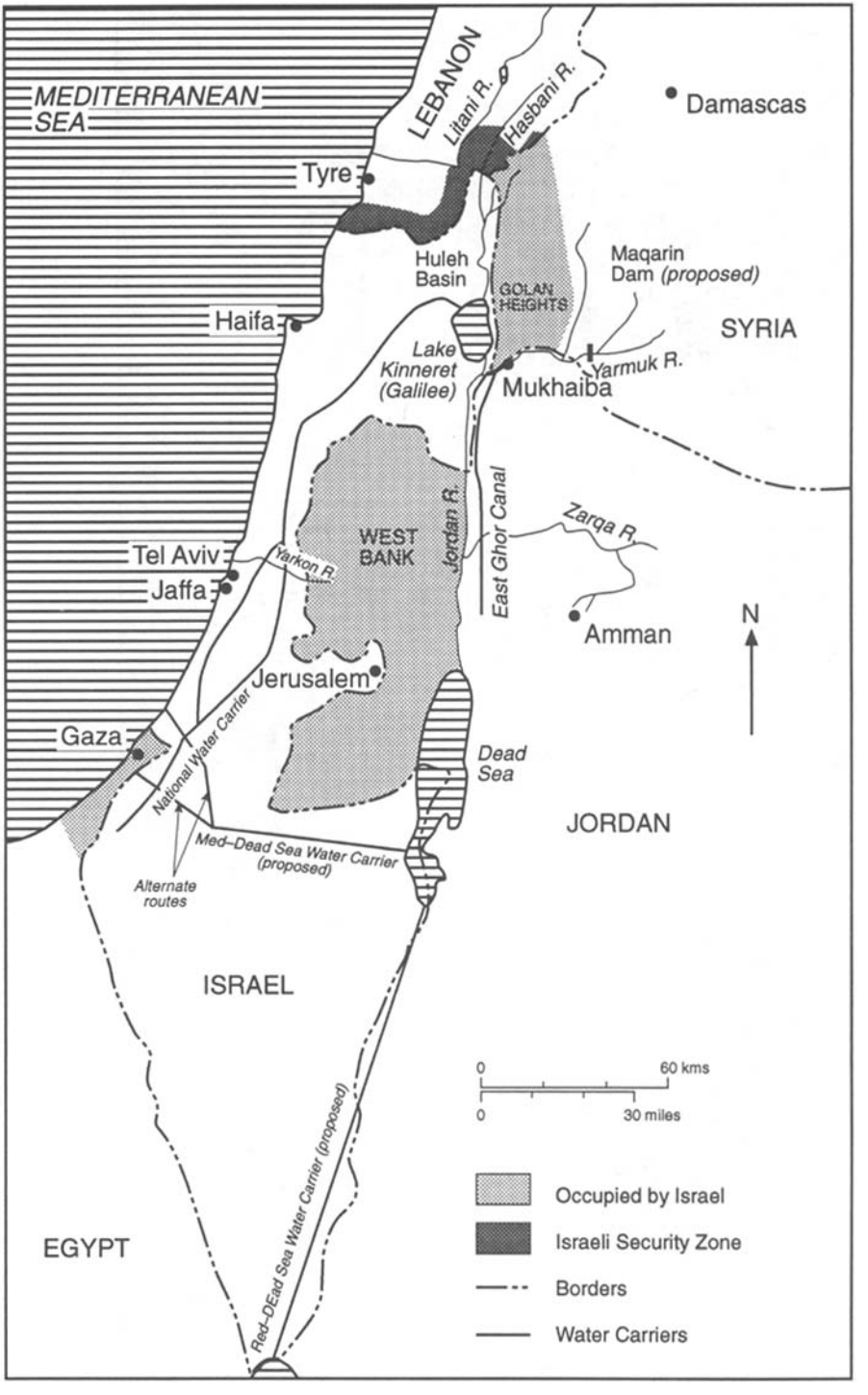


Figure 27.2 International borders, 1967–present, with water diversions

The Jordan River has also been referred to as the 'river basin in which competition for water is stronger than anywhere else in the world' (Falkenmark, 1986: 87). Four riparian states border the river: Israel, Jordan, Lebanon and Syria (Figure 27.2). In addition, increasing sections of the West Bank are coming under the jurisdiction of the Palestinian National Authority. A Palestinian state on the West Bank (still uncertain at this point), would add a fifth riparian. Most of the disputes over water have been between Israel and its Arab neighbours. Even before the Arab–Israeli war of 1967, there had been attempts to initiate water development projects based solely on individual states' needs and often thwarting each other's use of the river. Israel consistently resisted – often by force – Arab attempts to divert Jordan river water or to make any changes in land use that might have affected the downstream availability of water. The occupation of the Golan Heights and the West Bank by Israel after 1967 also significantly improved its hydrostrategic position (Naff and Matson, 1984). The occupation ensured that rainfall in the West Bank would sufficiently recharge the aquifer supplying half of Israel's water, rather than being diverted for other uses. Until the start of the recent peace process, there had not been any attempts to reach a settlement regarding use of water resources in the region, and political tensions in the area were too high to facilitate cooperation, no matter how beneficial it might be. However, recent agreements signed between Israel and Jordan, and Israel and the Palestinians have included joint water management and water development projects as key components. The election of Benjamin Netanyahu as Prime Minister of Israel, however, may limit these joint initiatives. Israel expects to retain control over water resources in the West Bank (along with control over security) and has stated categorically that any discussions on returning control of the Golan Heights to Syria are dependent on security of water resources. Unless there is a coordinated effort to jointly manage water in the Jordan river basin, however, there is a high probability that the riparian states will face acute and progressively worsening shortages. Severe droughts during the late 1980s and early 1990s in Israel resulted in a 'crisis situation', according to the state controller (*Jeruselum Post*, 3 January 1991). While the drought situation has eased over the past few years, there remains a constant threat of future droughts.

The water supply situation in Israel is complicated by the fact that the country currently draws about one-third of its total fresh water supplies, and 50 per cent of its drinking water, from sources that originate in the West Bank. Most of that water continues to be drawn, as it was in the pre-1967 period, by wells within Israel proper. That is, vertical wells are drilled within Israel to reach the mountain aquifer and bring water to the surface for irrigation and other uses. Israel draws between 300 and 350 Mm^3 per year from these wells, which is about half of what the aquifers can supply on a fully renewable basis. Such wells are consistent with international law, but some of the provisions applied in the Occupied Territories to ensure maximum flow into the aquifers are legally and morally questionable.

Israel would undoubtedly face immediate water shortages and significant curtailment of its economic development if it lost control of West Bank water resource supplies in a sudden or disruptive manner. The new prime minister of Israel has stated that the Palestinians would be allowed to run their own affairs in the West Bank, but without a separate state, and with Israel retaining control over foreign affairs and water resources. It is clear, then, that the West Bank is – and will likely remain – a critical source of water for Israel.

To ensure security of water supply from the West Bank aquifers, Israel put in place quite restrictive policies regarding Palestinian use of water after 1967. This situation increased

resentment and added to the potential for conflict in the area. Arabs in the West Bank have protested for years to Israeli authorities that their agriculture and economy are being negatively affected or even ruined by unfair water policies, and that the water network supplying the Jewish settlements has drastically depleted the villages' water resources. The Palestinians have been frustrated in their efforts to change their circumstances and, given no rights of control over water, they have little recourse with respect to water management. While some of the Palestinian charges are disputed, the issue is a highly emotional one, and a number of authors have used the metaphor that the water situation in the occupied Palestinian territories is a 'time bomb waiting to explode'.

Israel

Israel is an arid country with a limited resource base. Currently, its population is approximately 5.8 million (Table 27.1); with a growth rate of almost 2 per cent per year (Table 27.2) – a large influx of immigrants in the early 1990s increased the growth rate for the first half of this decade – population is expected to exceed six million by the end of the century. In addition to continued population growth, there has also been a general increase in the standard of living, which puts an added strain on the water supply network, and gross domestic product (GDP) has increased more than sixfold since 1960.

Table 27.1 Population (in millions) 1960–95, selected Middle East countries

	1960	1965	1970	1975	1980	1985	1990	1995
Egypt	25.5	29.4	33.1	37.0	42.3	46.8	52.43	58.52
Ethiopia	20.0	22.6	25.5	28.8	31.1	36.5	49.83	58.04
Sudan	11.2	12.5	13.8	16.5	18.7	21.6	25.2	28.96
Israel	2.1	2.6	3.0	3.5	3.9	4.3	4.66	5.88
Jordan	1.7	2.0	2.3	2.7	3.2	3.5	4.01	4.76
Lebanon	1.9	2.2	2.5	2.8	2.7	2.7	2.74	3.03
Syria	4.6	5.3	6.3	7.4	9.0	10.6	12.36	14.78

Source: World Resources Institute (1988), *World Resources, 1988–89*, New York: Oxford University Press; World Resources Institute (1994), *World Resources, 1994–95*, New York: Oxford University Press.

As a general rule throughout the Middle East, detailed water statistics are not available, as the continued strife in the region has largely precluded the preparation of assessments and made much of the information which does exist inaccessible. This situation is changing, however, and, as part of the recent peace agreements with Jordan and the Palestinians, Israel has agreed to share all available data on water resources. It is estimated that the renewable water resources available to Israel (that is, including the resources on the West Bank and in the Golan) equal approximately 1500 Mm^3 per year with an additional 300 Mm^3 added through reuse programmes (Beaumont, 1989). Israel's fresh water demand is approximately 1700–1900 Mm^3 per year (it varies according to water quotas to agriculture, which are limited during periods of drought), implying that Israel is using virtually all of the water available at present.

Table 27.2 Average annual population growth rates (per cent) 1965–95, selected Middle East countries

	1965–70	1970–75	1975–80	1980–85	1985–90	1990–95
Egypt	2.2	2.1	2.5	1.9	2.3	2.2
Ethiopia	2.3	2.3	1.5	3.0	2.8	3.05
Sudan	2.0	3.3	2.3	2.7	2.9	2.78
Israel	2.8	2.8	2.1	2.0	1.7	4.67
Jordan	2.9	3.0	3.3	1.5	4.0	3.42
Lebanon	2.6	2.2	–0.8	0.1	2.1	2.0
Syria	3.0	3.2	3.4	3.0	3.7	3.58

Source: As for Table 27.1.

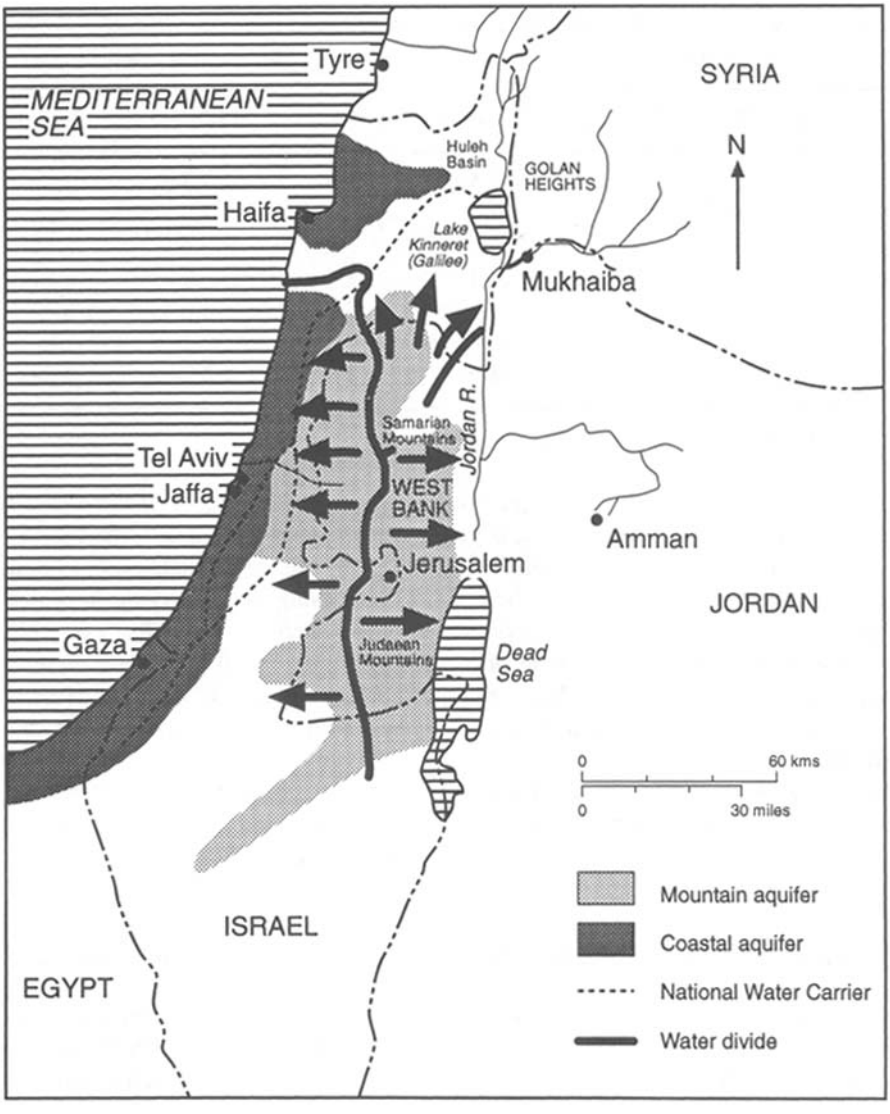
In addition to a growth in demand, Israel also faces a major problem of deteriorating water quality. Increasing levels of sewage discharge are causing nitrate build-ups, the Jordan river is being polluted by oil spills and recreational use, and there is eutrophication from drainage of agricultural fertilizers into the river. Irrigation is increasing the salinity of the water, and the high level of groundwater use relative to the natural rate of recharge has caused higher salt levels in these sources. Israel is aware of the pollution, but the issue of supply is so important that problems with quality are expected to continue (Beaumont, 1989). It is expected, then, that Israel's increasing water needs will result in a resource deficit by the end of the decade.

Realistically, the country has only three options related to obtaining more water: engaging in shared agreements with Arab countries, restructuring the economy to place less emphasis on agriculture, or importing water from other countries. Desalination projects are simply too expensive, and alternative sources of supply are not available.

The Occupied Territories (including Gaza, the West Bank and the Golan Heights[1])

The West Bank presents an indication of how global environmental problems are linked to problems of international peace and security. As a result of Israel's water shortage, the state is trapped in what Calleigh (1983) refers to as the 'hydraulic imperative'. Israel draws more than 40 per cent of its water requirements from the West Bank, and the country could not relinquish control of the region without facing immediate water shortages and curtailment of its agricultural and industrial development. The West Bank, then, has become a critical source of water for Israel, and this fact has resulted in continued Israeli control over water, despite relinquishing other aspects of control to the Palestinian National Authority. In the face of increased demand for water, from population growth, agricultural settlements and general economic expansion, and decreased supply, from water quality deterioration and present and future climatic variation, many in the country feel that for Israel to lose control of these resources would be economic suicide.

There are three major aquifers in the West Bank. Even before the 1967 war, Israel was already exploiting two of these, and since the war the third source has been used for an additional 66 Mm^3 annually (Figure 27.3). The water in the West Bank is now used in a ratio



Source: Lonergan and Brooks (1994).

Figure 27.3 Aquifers in Israel and the Occupied Territories

of 4.5 per cent by Palestinians and 95.5 per cent by Israelis (Lonergan and Brooks, 1994). This difference in use alone is quite controversial, but the debate over Israeli use of water is likely to increase, particularly if there is an expansion of Israeli settlements.

Jordan

Like both Israel and the West Bank/Gaza, Jordan also faces serious water shortages. Again, data for Jordan's water demand and supply are not readily accessible, but total consumption has been estimated to be approximately 870 Mm^3 annually (Frey and Naff, 1985). To meet this demand, Jordan is already using almost all of the water available to it, and this situation is expected to worsen by the end of the century, when demand is expected to reach 1000 Mm^3, exceeding supply by 20 per cent. With a growth rate of almost 5 per cent in the early half of the 1990s, Jordan's population will double, from six million to over 12 million by 2025. Food production remains low and increases in agricultural output will require more water. In addition, the country is also interested in developing its industrial sector, which will create an additional demand for water. Therefore Jordan is facing an ever-increasing deficit in water supply, and if no solutions to the water problem are found, the standard of living in the country will drop or development will be curtailed. Even with a major agreement on water sharing in the region, the Jordanian economy will be extremely stressed by limitations on water availability.

THE THREE CRISES

The economic importance of water belies the complex nature of water problems in countries throughout the region. Water problems are not based solely on considerations of scarcity, but are a result of three interrelated and interacting crises. The first crisis is one of water supply and demand. Since the mid-1970s, demand has outstripped supply in Israel, Jordan and the West Bank/Gaza. Population growth through natural increase and migration continues to put pressure on the water system, and many proposals for economic expansion would, if implemented, augment the pressure. Yet there is no evident way to increase supply without either excessive cost or relinquishing some measure of sovereignty over water.

The second crisis involves deteriorating water quality. Much of the region's water has been – and is still being – polluted by growing volumes of industrial and agricultural wastes, and in some cases by human sewage. The city of Jerusalem, for example, has no waste water treatment facilities at present. Finally, the region's water crisis also has a geopolitical dimension. As noted above, roughly one-third of the water consumed in Israel comes from groundwater that originates as rainfall over the West Bank – on land that in any final settlement is likely to belong to Palestinians. The dependence of both peoples on the same water has led to what many have called a zero-sum game.

The first two crises are common to many countries, and even the third crisis reflects conditions that are anything but rare in the region. Rogers (1994) reports that, in 1990, Bahrain, Kuwait, Libya, Qatar, Saudi Arabia and the United Arab Emirates were all consuming much more water than their annual renewable water supply, and that Egypt, Libya, Oman and the Sudan were fast approaching the same situation. More specifically, whatever the ultimate resolution of the Israeli–Palestinian conflict, both peoples will have to deal in the near term, the middle term and the long term with water quantity and water quality problems. How they resolve those problems will have a great deal to do with the standard of living and the quality of life that each people will create.

DATA: A FOURTH CRISIS

Concerns about data availability, validity and reliability are common to all studies of water supply and demand. However, in the Middle East these concerns rise almost to the point of becoming a fourth 'crisis'. Water is a strategic resource, vital for state security, for human well-being and for economic development. Consequently, many countries in the region keep most data on water availability and use confidential. In other cases, data may be released but be purposely misleading or too aggregate ('massaged') to permit independent analysis. In still others, data are not available simply because the country lacks any regular monitoring programme.

Problems still exist even when data are available. Inevitably, one faces problems of measurement and sampling error, and of aggregation. Moreover, just as with energy, water suppliers are few and consumers many, so data on 'consumption' are typically measured at the point of dispatch, not at the point of use. One can almost never distinguish among end users and end uses below the level of three broad sectors: domestic (including municipal), agricultural and industrial. Then, too, there is a problem with comparability, as each country typically has its own set of data and is unwilling to accept the often conflicting data from another country or from an international agency.

These problems, which make analysis of water data and development of policy options problematic at best, are all exaggerated in the Middle East. Until recently, almost all data on water in Israel were treated as state secrets, and it is still said that journalists must submit articles on water for review by military censors. Palestinians complain vehemently that they cannot get access even to those data that are unclassified, and that any data made available to them are so massaged as to make the numbers useless for verification or comparison (Elmusa, 1993). Palestinians have also been blocked from receiving some remote sensing data and satellite images because the international agencies that collect them can only release them to 'states' – and the West Bank and Gaza are not formally a state.

SECURITY IN THE REGION

Is a resolution of the water issue important to the future security of the region? The selection of water as one of the key issues to be dealt with in multilateral discussions as part of the Middle East peace process clearly indicates its importance. Similarly, the extent of water provisions in the Israeli–Jordanian agreement and the Taba (or 'Oslo Two') agreement between Israel and the Palestinians underscores the seriousness with which all parties address the water issues. With respect to water agreements, possibly the only reasonable solution to the water supply problem, the situation in the Jordan river basin remains quite dismal. Jordan has recently claimed that Syria was constructing dams on the Yarmouk River to deprive Jordan of much-needed water. Israel will not yield any control over water to the Palestinians. And Lebanon continues to claim that Israel desires Litani river water and that this partly accounts for the latter's occupation of the southern part of the country. The past gives little cause for optimism; even though the basin is well suited to integrated development, any agreements that have been tried so far have failed. Since 1947, attempts to reach some level of cooperation have been blocked by the water question. As Cooley (1984: 3) notes:

while the need for a rational, overall water-sharing scheme steadily grows more apparent, it seems less attainable, as water issues are aggravated by political tensions and by the fact that, while its neighbours' consumptions are rapidly rising, Israel still consumes roughly five times as much water per capita as each of its less industrialized and less intensively farmed neighbours.

In 1964, an Arab summit meeting resolved to divert the headwaters of the Jordan's tributaries outside Israel. When these attempts were made, there were open clashes between Israel and the Arabs, and since that time the water question has effectively been militarized. The basin has been the scene of international conflict before, and it remains a likely place for violence in the future.

For decades, all Jordan river riparian states, as well as the USA and the UN, have attempted to negotiate an acceptable regional plan for the distribution and development of the Jordan waters. The most comprehensive plan for cooperative use of the Jordan suggested to date was the Johnstone Plan in the early 1950s. This proposal, however, like all others before and after it, was derailed by political intransigence and distrust between the riparian states. Each nation has continued to follow its own policies, often to the detriment of other nations. The political difficulties in the region are immense: the Jordan river divides not only individual Arab states with vastly different plans and ideologies, but also the Arab world from Israel.

Perhaps the most important hope for the future of the region is technological improvement, along with more efficient management of the resource. This avenue is currently being given a great deal of attention, and Jordan and Syria could benefit from research regarding efficient water use and management ideas carried out in Israel. Such information is not readily transferred, however, and although technology may be able to address some of the water problems, political factors appear more important.

The recent agreements between Israel and Jordan, and Israel and the Palestinians provide some hope for a resolution of the water problems. Joint management, joint water supply projects, shared technology and data sharing are all components of these agreements. Despite such cooperation, the issues of water quantity and water quality are still strategic ones for the region, and it remains to be seen whether these can be resolved to the benefit of all concerned.

THE LINKS BETWEEN WATER SCARCITY AND SECURITY

One typology of resource-related conflicts is provided by Gleick (1990) and it is a useful framework within which to view this, and other, resource conflicts. He classifies resource and environmental threats to security in five categories.

Resources as Strategic Goals

An obvious example would be territorial conflicts over energy resources. With the advent of greatly expanded international trade and world spot markets for resources, this link between resources and international conflict may be weaker now than in the past. However, this is not the case with water in the Middle East. Gleick also notes a potentially more important source of conflict in the inequitable distribution of resources.

Resources as Strategic Targets

Modification of resources and the environment for military purposes is a long-standing issue. In 146 BC, the Romans ploughed salt into the farm fields around Carthage, destroying the city's economic base; much earlier, in about 2400 BC, Sumerians dug a canal to divert water from the Tigris to the Euphrates to gain independence from Umma (Roots, 1992). Energy production and transmission facilities and water supply projects are often primary targets of military activity. A present-day example is the destruction of Kuwaiti desalination plants by the Iraqis in the Gulf War.

Resources as Strategic Tools

The most obvious example in this category is the threat by Turkey to restrict the flow of the Euphrates to Syria and Iraq in order to pressure Syria into discontinuing its support of Kurdish separatists in Turkey. Despite assurances to the contrary by the Turkish President Ozal that the country would never hold downstream riparians hostage by restricting the flow of the Euphrates, it is obvious from the specific threat to Syria that Turkey would be more than willing to use water as a strategic tool.

Resource Inequities as Roots of Conflict

Growing disparities between resource-rich and resource-poor regions and groups in terms of access to resources have created a constant tension in some areas and open rebellion in others.

Environmental Services and Conditions as Roots of Conflict

An example of this type of threat is disruptions of the waste assimilative capacities of ecosystems or the deliberate manipulation of the *flow* of environmental services. This issue is at present being addressed by the United Nations General Assembly in its proposed revisions to the Convention on the Prohibition of Military or Other Hostile Use of Environmental Modification Techniques (popularly called the ENMOD Convention). The Convention was originally signed in May 1977, and focused more on weather modification and modification of earth processes such as earthquakes and hurricanes for strategic use. Proposed revisions will expand the Convention to include a broad array of environmental processes such as forest fires and the massive release of airborne pollutants (for a complete discussion of the ENMOD Convention, see Roots, 1992).

Gleick's categories, while not mutually exclusive, are useful in characterizing the different uses of resources and the environment for strategic purposes. While it is important to note that resources have historically been at the root of many violent conflicts, there must also be a recognition that the potential for extensive modification of the environment for strategic purposes is far greater now than it has been in the past. Additionally, the vulnerability of society to modifications in the environment may also be greater.

It should be clear from the comments above that Israel – and probably other countries in the region – at least *thinks* in terms of water as a strategic goal. It would actually be surprising if water was not considered a strategic goal. Water has one of the highest marginal values of any input to the Israeli economy; it is crucial to the establishment of new settlements; it is essential to an ideology centred on agricultural development; and it is 'life itself'. Thinking about water as a strategic goal and *acting* on those thoughts are, however, two very different things. Initial proposals to establish the boundaries of a Jewish state explicitly considered water as a strategic resource. In addition, evidence suggests that there has also been discussion among Israeli government officials for many decades on the possibility of acquiring the Litani River from Lebanon.

The acquisition of territory to augment water supply is not the only basis for viewing water as a strategic goal. Much of the conflict over water between the Palestinians and the Israelis relates to the blatant discrimination in water pricing, allocation and delivery systems. Water consumption by Israeli settlers in the Territories is roughly eight to 10 times that of the Palestinians. Water is sold to Israeli settlements for 0.5 New Israeli Sheckels (NIS) per cubic metre (settlers in Gaza pay only 0.3 NIS), while it is sold to Palestinian villages for 1.8 NIS (and to individual Palestinians for 2.1 NIS). Water is available to Palestinian villagers only one or two days a week (and is otherwise stored in water tanks on the roofs of houses) while it is made available daily to Israeli settlements. These discriminatory practices are enforced through the application of Israeli military orders to the West Bank and Gaza, and while this may be a more subtle use of water as a strategic goal, it certainly is an example of using available water for Israeli interests at the expense of the Palestinian population. These examples also illustrate the fourth water/security link, that of *resource inequities*.

Water has been a *strategic target* both for and against Israel over the past four decades. In 1953, when Israel began construction on its National Water Carrier, the intake site was in the demilitarized zone north of Lake Kinneret. Syrian troops were then moved into the area and they opened fire on the construction site (Cooley, 1984). This skirmish, in conjunction with an official protest lodged by the Syrians at the UN, resulted in Israel moving the intake point to the north-west shore of the lake.

Israel has also been the initiator of armed conflict following Arab construction on diversion projects in the Jordan river's headwaters. Financed by Egypt and Saudi Arabia, the plans for this project involved diverting the Hasbani River into the Litani and the Banias River into the Yarmouk, and it would have cut by 35 per cent the installed capacity of Israel's new National Water Carrier and would have increased the salinity in Lake Kinneret (Wolf, 1995). On three occasions in 1965 and 1966, the Israeli army attacked the site (Cooley, 1984) and it is these attacks which have led analysts to conclude that water was a primary factor in the 1967 war.

The evidence for the overt use of water by the Israelis as a *strategic tool* is quite speculative, but two situations are worthy of mention. Wolf (1995) notes that during an interview an Israeli officer told him that 'plans were investigated, but never used, to cut water to Beirut to enforce a siege' during the 1982 war with Lebanon. More recently, in 1989 the Israelis apparently cut the power supply to the Jalazun refugee camp near Ramallah to reinforce a curfew during the *intifada* (it has been rumoured by some authors that the water supply was also cut, but this was not the case). Pearce (1991) notes that villagers in Jiftlik complained in the summer of 1990 that their water supplies were cut off in retaliation

for stone-throwing incidents (but this is unverified). Admittedly, this is weak evidence to prove that Israel uses water as a strategic tool, but one must also recognize that the total control of water in the West Bank by the Israeli military authority (officially, the Water Department of the Civil Administration) is a very subtle – but powerful – example of using this vital resource as a strategic tool. Although the Palestinians are not denied access to water for drinking, they are denied access to water for almost all other uses. In addition, there are over 175 villages (with over 150 inhabitants) which do not have running water. Although Mekorot has offered to supply water to many of these villages (at the cost of 1.8 NIS per cubic metre), very few of the villages have accepted, defying the attempt by the civil administration to control their services.

There have also been disruptions in the *flow of environmental services* to the Palestinian population (and to Jordan, as well). Two examples should suffice. The first situation involves the Israeli diversion of the saline springs at the lower end of Lake Kinneret away from the lake and into the Jordan river. Along with domestic and industrial waste, and agricultural run-off, this saline water has caused significant deterioration of the Jordan river below the lake – enough to render it useless even for agricultural purposes. Second, the deep Israeli wells in the Territories (often descending 500–600 metres), built to obtain higher flow rates and better quality water, have also drained water from shallower Palestinian wells, often drying them up. In both of these cases, the issue was less a deliberate alteration of the environment (or environmental services) than an insensitivity to the broader social and environmental costs of resource extraction and use.

CONCLUSION

It is clear that water scarcity is – and will be – a major strategic issue for many regions over the next few decades. The problem is particularly acute in the Middle East, where water scarcity, water pollution, geopolitics and problems with data combine to make water a key element of security to nation-states. These few pages were intended to illustrate how certain resources are linked to security, both directly and indirectly, and to present different ways of looking at resources in the context of security. The Middle East is only one region which is experiencing water-related stress; by 2050, much of Africa, the Middle East, South Asia, China and even parts of South America are expected to be experiencing severe water shortages. The potential for conflict within, and between, nation-states over water resources is significant, and possibly the best example of the way resources are linked to security issues globally.

NOTE

1. At the time of this writing, control of Gaza and portions of the West Bank have been transferred to the Palestinian National Authority. West Bank water resources, however, remain in Israel's control.

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28. Irrigation in India: equity and sustainability

Satyajit Singh

INTRODUCTION

Water is a crucial resource for agricultural production. It will be demonstrated in this chapter that an understanding of the politics of water use and its distribution is thus crucial to any understanding of state and society based on agricultural production. Though water is a common property resource, rights over the use of water are related to the changes in, and control over, agricultural production. People's relationship to water is a dynamic one. Various social groups constantly manipulate the use of this resource in their own interest. Irrigation therefore has to be understood in relation to the wider changes in agricultural production and to social change. This study of the role of the state in colonial and independent India, and the nature of its mediation between the different classes in relation to water, will help us understand the rights over water, its use and ecological change. It will also help us understand the politics of irrigation development on which, since independence, nearly 10 per cent of the total planned expenditure of the state has been spent.

The approach adopted here is not just a method of analysing the social context of irrigation but, by emphasizing the need to view water as a common property resource, it also has a policy implication for equitable and sustainable use of water. In India, today, property rights in water are linked to ownership of land. The skewed distribution of land necessarily debars the majority from having a use of the 'common' resource, water. This raises the question of whether all irrigation is a 'public' good or not. In the pages that follow, a case for greater emphasis on egalitarian hydraulic property rights will be made (for details, see Singh, 1997).

THE PRE-BRITISH AND BRITISH PERIOD

Historically, the settlement of agriculture and irrigation development seem to have taken place hand in hand before 5000 BC in India. Irrigation was commonly in the form of wells, canals and tanks. These small and minor irrigation works could be operated by small households to irrigate small patches of land. These irrigation technologies still exist in India with little technological change, and they continue to be used by independent households for small landholdings.

While the construction of small schemes was well within the capability of village communities, large irrigation works were to emerge only with the growth of states, empires and the intervention of the rulers. There was to emerge a close link between irrigation and the state, helping in the expansion and consolidation of empires. The ruler had at his disposal

the power to mobilize a large supply of labour which could be used for irrigation works. The invention of the sluice was an important breakthrough for the manipulation of hydraulic property rights. While the sluice made possible the construction of large-scale irrigation reservoirs, control over the distribution of water helped in the accumulation of agricultural surplus in the hands of the rulers (Gunawardana, 1978: 272). In India, this breakthrough seems to have taken place at least as early as the Mauryan rule in 322 BC, with the introduction of large-scale irrigation following the excavation of Lake Sudarsana.

State support for irrigation development continued during the medieval period when significant technological developments took place in both canal and lift irrigation. The Central Asian experience of canal construction was brought to India. Advances also took place in the construction of inundation canals. Water was blocked by constructing *bunds* (a temporary mud/stone block) on streams. This raised the water level and canals were constructed to take water to the fields. These *bunds* were built by both the state and private sources. In the field of lift irrigation, the traditional *araghatta* was modified to form the modern Persian wheel. These innovations had a major impact on agricultural productivity and social change and were supplemented by progress made by the state in loans related to agriculture and irrigation (Habib, 1964). This period witnessed a consolidation of minor peasant production (Mukhia, 1986: 118), perhaps due to the limitations of the scope of large irrigation and because of the continuation of small irrigation works, suitable for smallholdings. The production process was primarily based on family labour, however; there were few large farms. The nobility were in essence rent receivers (Habib, 1978).

It was during the British period that structural changes in irrigation systems took place. The British interest in irrigation rested on the enormous revenue earned through its development. By 1945–6, on the eve of Indian independence, about 74 656 miles of canals and distributaries served about 32.8 million acres, one-quarter of India's cropped area. Rs1544 million had been expended on the system, at an average rate of Rs47 per acre, bringing in an average annual net revenue, in gross receipts less working expenses, of Rs138.3 million, about Rs4.2 per acre (Whitcombe, 1982: 677). The British mainly focused on surface irrigation and brought about major technological and institutional changes here. However, attention was also paid to the mechanization of lift irrigation, especially around the 1930s, when tube well technology was introduced.

In contrast to the rich irrigation expertise that had developed in India, the British had virtually no experience in this area prior to coming to India. Irrigation is unnecessary in the British Isles, nor was it used in the colonies by Great Britain before 1849. The East India Company officials were struck by the sophisticated irrigation works in the kingdoms of Delhi and Tanjore. Initially, they did little about maintaining these works, as a result of which, by the early nineteenth century, these systems fell into disrepair. The resultant fall in revenue awoke the British to the importance of maintaining the irrigation system and their army took over its repairs and management (Sengupta, 1985: 1924).

Lt-Gen. Sir Arthur Cotton, who was the architect of canal construction in British India, realized the enormous revenue potential of irrigation. He categorically stated that, 'Water in India is more valuable than Gold of Australia.' His statement was backed by hard data and the astute logic of providing irrigation and navigation at the same time (Cotton, 1885: 130). Cotton dreamt of 'connecting the whole system of Indian navigation with the Yangtse and the internal navigation of China, thus giving us a private entrance into China of the utmost political importance, and uniting the immense population of India and China' (Cotton, 1874:

60). Apart from the revenue earned through irrigation, canal irrigation provided more agricultural production with less labour, which brought high returns in the market. As India was a country 'without communication' (Cotton, 1885: 135), navigation was to provide the link between production and markets. According to Cotton, canal-irrigated agriculture was less labour-intensive, setting free labour which could be employed 'in raising whatever their country is best suited to produce for foreign countries'. Cotton thus reiterated the imperial agenda when he said, 'All that is wanted is water; and this want supplied, everything else will almost follow' (ibid.: 159).

Irrigation science was soon taken from the people and used for the imperial agenda by the civil engineers of the British army. The military influence in irrigation was considerable, so that often construction of irrigation works was abandoned during times of war and embarked upon in peace. During this time, the *main* system of agricultural production, which comprised the peasants, crops and water use, gave way to an emphasis on engineering aspects or the *subsystem*, comprising the technologically sophisticated headworks, concrete structures and canals (Tamaki, 1977). In a more recent publication, Gilmartin points out how modern science in irrigation was used by the colonial powers to do away with the dependence on the landed classes in the command area to regularly desilt and maintain the vast canal networks. Through elaborate calculations it was sought to establish how the flow of water at a particular speed and gradient would automatically carry the silt away, thus making the irrigation canals a carefully regulated machinery (Gilmartin, 1994).

The colonial state also made far reaching changes in land tenure which denied a large number of peasants access to water. The Permanent Settlement and Ryotwari Acts for the first time created property rights in land. Under the existing regime, all land belonged to the state and the ruler had rights to a proportion of the produce as rent. Upon implementation of the new act, land became alienable and could be bought or sold. As hydraulic rights were determined on the basis of property rights in land, the colonial enactment in one stroke denied most agricultural families direct access to water. While the Permanent Settlement created intermediaries in the form of *zamindars* (landlords) who were given property rights to vast areas of land, the Ryotwari plan was implemented to transform the existing social structure by bringing the *ryots* (peasants) directly under the influence of the colonial state through the exclusion of intermediaries. However, the Ryotwari system did not greatly change the social fabric as both land and labour were now mobile (Mukherjee and Frykenberg, 1979). These powerful interests in the villages, which derived their influence from control over both land and water, acted as the pillars supporting the British state.

The large-scale canal irrigation projects of the colonial government led to severe ecological degradation. The canal-irrigated tracts of the North Western Province were notorious for both waterlogging and a general state of unhealthiness of its people (Whitcombe, 1972). Waterlogging had been a chronic problem associated with irrigation in Punjab; consequently, the state Irrigation Department was more concerned with decreasing waterlogging than with increasing the supplies of water for irrigation (Aloys, 1967). In the years to follow, an Irrigation Laboratory was set up in 1922 and an Irrigation Research Institute at Lahore in 1930. Obstructions to drainage led to swamping, the worst consequence of which was an increase in the spread of malaria. In 1928, a conference was called on irrigation and malaria by the National Institute of Sciences in India, reflecting the seriousness of the situation. The increase in mortality, debilitation from fever and long-term productivity of affected land was not taken into account by the British while assessing the cost of irrigation projects. The

British treasury was soon to realize that, in any case, the returns from the irrigation works constructed by them were on the decline and the traditional works repaired by the British continued to be profitable. This led to a shift in British expenditure, away from irrigation and into railways.

However, after the First World War (1914–18), the British were to show a renewed interest in irrigation when many men of the Irrigation Branch returned to service after the Mesopotamian campaign and the Third Afghan War. In spite of the poor financial returns from the new works, the interest in them grew out of new technological developments that had taken place. By the turn of the century, Portland cement had been improved and could be used for constructing large dams. Further, the availability of earthmoving equipment wrought a revolution in dam building. Not only did it become possible to build an earth-fill or rock-fill dam almost anywhere, but the costs of such dams were substantially reduced. For instance, the Boulder Dam and the Great Pyramid have identical volumes. To build the latter, 100 000 men laboured 20 years, while 1200 men built the former in under two years (Page, 1937: 381). In India, the new technologies were first used in the 214 foot Mettur Dam built on the Cauvery in the early 1930s.

The availability of this technology was a boon to the British colonizers. It was a logical continuation of their emphasis on the subsystem. It was now possible to construct a permanent dam structure and not bother about the troublesome maintenance and repairs of the weirs and barrages. It promised to bring more fallow land into the ambit of cultivation, while the establishment of cultivation opportunities created a situation which further strengthened British patronage among the new settlers.

Developments in the field of hydroelectricity had also taken place earlier. The British interest in hydro power was confined to investments for flour mills on the Western Jumna Canal at Karnal, Delhi and Hissar and municipalities in hill stations sited near mountain torrents. In time the model of the Tennessee Valley Authority (TVA) project became popular, and the multi-purpose features project, of which TVA is cited as a prototype, was applied at the Krishnaraja Sagar hydroelectric station, completed in 1931.

There was also a need for developing electric power during the Second World War to facilitate arrangements for supply of power to various ordnance factories and industries engaged in the war effort. However, these were not without their own problems. Protests against displacement by these multi-purpose irrigation works started during the colonial period itself. The Tata Hydro-Electric Power Supply Company in the 1920s planned a series of dams on the Sahyadri hills, near Poona, affecting 54 villages with a population of about 15 000. The object was to supply electricity to Bombay. At Mulsi, the site for the second dam, the peasants protested, but finally had to agree to accept the meagre compensation offered by the company. Significantly, the company gave up their intention of going ahead with other hydroelectric projects they had previously planned (O'Hanlon, 1988; Gadgil and Guha, 1994).

The massive size of the reservoirs and of the main canals and distributaries, which earthmoving equipment rendered possible, brought in their wake new problems, such as those of submergence and resettlement, unprecedented waterlogging and salinity, siltation, threat of floods, seismicity and the problem of irreversibility and uncertainty of investment. The scale of the problem was too great. At independence, the British left behind them a professional group of civil engineers, through their network of engineering institutions. The interests of this group and other middle-class professionals, in conjunction with the politicians and the landed classes, were to see the continuation of this technology.

INDEPENDENT INDIA

In independent India large dams became the modern temples of an industrializing, developing nation. Just a year after independence, about 160 large-scale dams were being considered, investigated or executed (Hansen, 1966). The First Plan itself emphasized the need to develop major and medium irrigation projects, allocating about 22.2 per cent of the plan outlay in the public sector for the purpose. The British legacy of emphasizing the *subsystem*, dominated by civil engineering, was to continue. In this move to 'modernize', no effort whatsoever was made to learn from traditional irrigation science, which was ecologically sensitive.

The Second Five Year Plan went a step further to institutionalize and codify the colonial experience in irrigation. The planners clearly indicated the need to train more engineers if India's irrigation needs were to be met. Likewise, the Third Plan document highlights the requirements of technical personnel for irrigation development and it is seen that engineers – civil, electrical and mechanical – are the only professionals required for irrigation development. The total number of degree and diploma holders required in the Second and Third Plan only amounts to 53 200 (GOI, 1961: 394). There is absolutely no mention of expertise from other disciplines which could render invaluable service in this area. The resultant emphasis on steel, cement, and massive designs and huge headworks were to dominate the irrigation map of India. The irrigation establishment has quite naturally not been very receptive to criticisms based on social, ecological and economic aspects of large dams.

In independent India, the financial productivity test of 'rates of return', designed by the British, continued to be rigidly applied until 1964 in the selection of public irrigation projects. This narrow financial approach to project evaluation in the form of internal rate of return was replaced, during the Third Plan, by a wider criterion of social benefit–cost analysis. This takes into account the monetary economics of agriculture in unirrigated land and compares it with the monetary economics of irrigated agriculture. After deducting charges for land levelling, interest on capital, depreciation and administrative expenses, it recommends a benefit–cost (BC) ratio of 1.5 for considering a project viable. This shift was facilitated with the entry of the World Bank and other international financial agencies into the irrigation and hydropower sector. Theoretically, the more sophisticated concept of benefit–cost analysis not only takes into account the financial costs and benefits, but can account for wider social, institutional, organizational and political factors as well. However, the indirect costs of irrigation and the benefits from it were not reflected in the new approach that was adopted. Nor were ecological considerations taken into account. In addition, the use of weights and handicaps in calculating the BC ratio as it affects different social groups (as stated in principle by the Planning Commission) was not followed.

The adoption of the new method had to do with the fact that it was less stringent about the financial benefits in comparison with the older method under which new irrigation projects were failing to meet the requirements of the productivity criterion. In 1966, the New Agricultural Strategy (NAS), popularly known as the 'green revolution' was also adopted in India. Under this scheme, in many parts of the country, attempts were made to increase artificially the productivity of the agroecosystem, through highly subsidized inputs such as fertilizers, diesel for pumps, tractors, irrigation, pesticides, biotechnological inputs and other agricultural machinery. Large scale canal irrigation, particularly through large dams, could change the ecology of the region and provide the required water for water-intensive 'green revolution' crops that could not have been grown in the region earlier.

These two significant developments in the 1960s, a dilution of the economic criterion of project evaluation with the introduction of the benefit–cost ratio, and the subsequent adoption of the NAS, signified a watershed in irrigation planning and development in India. It is striking that, since 1966, irrigation outlay for major and medium projects rose by about 91.27 per cent annually until the end of the Eighth Plan (projection for the latter period, 1992–7), compared to an increase of a mere 9.43 per cent annually during 1951–66. These figures suggest that the new method did open the 'floodgates' for sanctioning new irrigation projects. This significant change, aimed at increasing productivity, led to a gross neglect of ecological and social issues, and in that sense encouraged the adoption of unsustainable and inequitable irrigation methods.

The 'green revolution' has had its critics, for a number of reasons. It has an inbuilt bias towards the rich farmers, for they are able to take advantage of the technology with the application of the whole gamut of inputs which require considerable investment. Almost the entire agricultural strategy for enhanced production revolved around a few highly endowed regions such as Punjab and Haryana and, to a lesser extent, Andhra Pradesh and Tamil Nadu, at the expense of poorer states such as Bihar, Orissa and Madhya Pradesh, leading to uneven development in the country.

Of the 1554 large dams built and under construction by 1979, as many as 1121 were built in just 14 years after 1965. The construction of large dams had little to do with the adverse climatic and geographical characteristics that made agriculture difficult, however, but was determined more by political equations. For instance, the presence of the powerful sugar cane lobby, requiring water, and the industrial bourgeoisie, requiring power, in Maharashtra culminated in that state constructing and planning 631 large dams during 1952–79. Rather more than two-fifths of the large dams of the country are found in that state. While water continues to be diverted to the sugar fields of Maharashtra, which produce about 13.6 per cent of the total sugar cane output of the country, nearly 40 per cent of the state is a drought-prone region.

Huge public investments are being made in large-scale irrigation works, even though it has been demonstrated that smaller irrigation works tend to be cheaper. The only substantial investment made in small-scale irrigation works is in tube wells, which play a crucial role in the cultivation of high-yielding crop varieties. In fact, the subsidies given to the ecologically problematic tube well technology in the form of cheap credit, fuel and machinery have rendered other traditional and sustainable forms of well and tank irrigation uncompetitive.

The overwhelming and, by and large, uncritical support of large dams by the Indian state can be considered to be due in large part to the irrigation bureaucracy, which as a whole finds it easy and profitable to manage large projects in comparison to smaller ones. It has been pointed out that there are many opportunities for rent seeking, through a selective distribution of contracts, quality of construction and manipulation of the distribution of water. There has developed an excellent working arrangement between the engineers, contractors and the politicians who regularly skim off a proportion of the significant financial allocation made to large dams (Wade, 1982).

The performance of large dams has come under criticism from various quarters. The exercise of arriving at the BC ratio is often determined, not by objective methods, but by political compulsions. The absence of ex post verifications of the BC ratio has made the irrigation planners unaccountable for the misuse of public funds. Criticism on this count has come from none other than the chairman of the Central Water Commission himself, who

pointed out that the standards of preparation of project reports are 'getting diluted', and 'benefit–cost ratio is not worked out on a realistic basis'. As a result, the 'cost-overuns' of large irrigation projects are phenomenally high. According to one survey of 32 major dams conducted by the Public Accounts Committee of the Government of India, these averaged as high as 500 per cent (GOI, 1983: 38). This chronic manipulation of data has made a mockery of the exercise of the BC calculation itself. What is even more alarming is the fact that irrigation is not reaching the areas stipulated in the project documents. According to a survey of a few large dams done by the Comptroller and Auditor General, on average only about 64.4 per cent of the stipulated area was actually irrigated (GOI, 1976b: 23–4).

Large dams are also prone to serious ecological problems. Poor land and water management in the catchment area results in higher than expected siltation rates in the reservoirs. The government surveyed some reservoirs, to conclude that in many instances the annual inflow of sediment is at least four times as high as was initially calculated. The actual siltation rate in the Nizam Sagar reservoir is about 1646 per cent higher, and about 371 and 400 per cent higher in the case of Massanjore and Parambikulam dams, respectively (GOI, 1972: 326). It is estimated that the life of the Bhakra dam, often described as the success story of large dams, has almost halved, from an expected 88 years to the current projection of 47 years, owing to siltation, while that of Hirakud has been reduced from as many as 110 years to a paltry 35 years (GOI, 1976a).

Poor studies on the suitability of the soil for irrigation have led to an actual decline in agricultural production after introduction of irrigation in the black cotton soil region of Madhya Pradesh by the Tawa dam (GOI, 1983). Waterlogging also resulted in productive land becoming uncultivable in the Chambal project area (Vohra, 1972). Fears of similar problems have also been expressed by experts regarding the proposed Narmada Valley projects in that state (Paranjpye, 1990). In southern India, as much as 33 000 hectares of agricultural land has also been lost as the result of waterlogging caused by the Tungabhadra project. Agricultural scientists estimate that anywhere between 3.387 and 10 million hectares of agricultural land are waterlogged in the country. Salinity has been another major problem. A survey of 10 large dams put the figure at 346 838 hectares. The performance of large dams is also affected by seepage of water from unlined canals. The 1972 Report of the Irrigation Commission estimated conveyance losses in the alluvial plains of North India at 62 per cent; that is, only about 38 per cent of water released at the head of the canal reaches the crop root zone (GOI, 1972). In most regions, large dams have greatly increased the incidence of malaria, and in some areas they have triggered the onset of *genu valgum* or knock-knees syndrome. There is a further reason for alarm, as dam safety is being questioned. The recent controversy of the Tehri dam being situated in an earthquake-prone zone is but the tip of the iceberg. Recently, the World Bank surveyed the safety standards of 131 dams funded by it, only to conclude that in many of these cases safety specifications had been flouted (Murthy, 1989: 2).

While there has been a considerable increase in irrigated area, its impact needs to be evaluated considering the changes in cropping patterns and the relations to the market in the irrigated regions. While the area under cultivation for rice and sugar cane has doubled (both requiring large amounts of water), that of maize has gone up three times, and land under cultivation of wheat has increased more than five times, between 1950–51 and 1983–4. On the other hand, the production of cereals and pulses has remained stagnant in irrigated areas. However, sorghum and millets, categorized as 'poor men's crops', have experienced a

dramatic decline in irrigated hectarage as a percentage of the total irrigated area. Crops like sugar cane require 300 ha cm of water to irrigate one hectare of crop, in comparison to only 10 ha cm required for millets. The other water-guzzling crops are grapes, other fruits, vegetables, cotton, onions and rice, while the water-thrifty crops are millets, gram, sorghum and groundnut. The production of certain crops is directly proportional to the amount of water available and to profitability. If a farmer has access to an unlimited amount of water, then the total value of the crop per hectare can be as high as Rs60 000 for grapes, Rs30 000 for other fruits or Rs25 000 for sugar cane.

On the other hand, let us consider the alternative hydraulic economics being put forward by a people's group, the Gram Gourav Pratisthan in Karnataka (Shiva, 1991). The cultivable land, crop produced and employment generated will depend on the water availability. If, let us say, only 300 ha cm of water is given to a farmer with as many as 30 hectares of land, the farmer will choose not to grow sugar cane or rice, which earn him only Rs25 000 and Rs29 400, respectively. In comparison, millets will earn him Rs75 000, irrigate 30 hectares of land and create 2700 man-days of work. The assurance of supply of water in proportion to the ownership of land, it has been seen, plays an important role in the choice of crops, production and market relations. The 'scarcity' of water, on the basis of which more irrigation is justified, is thus linked to issues of land tenure and the market. If water was to be genuinely regarded as common property, and its distribution not linked to land rights, then it would provide a more rational consideration of water scarcity and demand. At the same time, the acceptance of hydraulic property rights irrespective of property rights in land, as espoused by people's movements like the Mukti Sangharsh Chalwal in Maharashtra, through the people's Baliraja dam, could act as a catalyst for social change in rural India. It would justify the rubric 'public irrigation', which so far is directed to benefit the landed minority.

Apart from unequal benefits from irrigation on the basis of access and size of landholdings as well as choice of crops in the command area, the people in the submergence zone, who are displaced, are the worst affected. It needs to be highlighted that the Indian government does not have a comprehensive rehabilitation policy to date. The colonial Land Acquisition Act of 1894 has until recently been used to provide only cash compensation for those whose land is claimed for a public project. Though this act was amended in 1984 to allow the state to provide alternative land as compensation, this is not legally binding. It merely facilitates the provision of alternative land, should the government desire this. Neither the colonial government's act nor its recent amendment acknowledges the rights of the landless (for example, those who do not have formal land titles or *pattas* but have been customarily cultivating the land; or are actually landless; or women without formal land titles but with user rights to land) and the wage-labourers, artisans and communities and castes who either are not dependent on agriculture or provide services to the agricultural communities. Under the above scheme of things, property, and not the various determinants of an economy that constitute a livelihood, is compensated. Given the unequal distribution of land, until recently, only a minority among those ousted were compensated. The focus of governmental policies, unfortunately, has been the 'resettlement' of individuals and not of the entire village or community. Though the central government stated in 1985 that a comprehensive rehabilitation policy should be adopted, little effort has been made in that direction.

While there are some large dams which submerge just a handful of villages, with only a few hundred people being displaced, it is not uncommon to find dams such as Kangsabati Kumari, Bansagar, Polavaram and Sardar Sarovar that displace more than a hundred

thousand people. It is difficult to provide a definite number of people displaced by large and medium-sized dams, but there have been some private attempts to quantify such displacement, in a restricted timeframe, through calculated projections. For example, Fernandes *et al.* (1988) put the figure at around 10 million for the period 1947–82 for the whole country. Quoting various displacement-related data from reliable studies, they take an average displacement of 50 000 people by large dams to arrive at their figure. There seems to be some mistake in this calculation, for there were about 1348 large dams constructed or under construction between 1952 and 1979 in India. If one were to calculate for that number of large dams at a modest rate of 36 134 persons per project (as per a notional average derived from a survey of 56 dams by the author), one would get a figure of over 48.7 million displaced by large dams during these 27 years. Even if the notional average was to be diluted further, the tally would still be shocking. What is surprising is that this has come to pass without any serious debate on a proper resettlement policy. Akin to the agricultural revolution in England during the seventeenth century, which created a pool of cheap labour for later industrialization, the process of displacement in India is alienating a large enough number to constitute an uprooted class that provides a cheap labour force for capitalistic industrial development.

CONCLUSIONS

In this chapter the wide implications of statist intervention in irrigation development and ecological change in colonial and independent India have been examined. It has been seen that there has been a continuity in the logic determining the choice of irrigation technology. Considerations of revenue, market and disbursement of patronage for the stability of the British empire were the main reasons for the colonial investments in irrigation. The Indian state has, however, argued for investing in irrigation projects in order to meet the growing food requirements of its vast population. Nevertheless, it has been demonstrated that public plans and investments made by the state have considerable problems which impede an economical and sustainable supply of irrigation. It is seen that, in reality, public investments in irrigation have been made to consolidate and strengthen the propertied and influential classes, like the landed, the educated elite (for example engineers) and the politicians and contractors. While the waste of public money and ecological degradation goes on in the name of the public good and development, environmental groups across the country through their criticism of large dams are coming up with cheaper, sustainable and egalitarian irrigation methods, laying down the principles for an alternative development model.

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29. Surging environmentalism in Japan: a sociological perspective

Hisayoshi Mitsuda

IS JAPANESE ENVIRONMENTALISM SUCCESSFUL?

Japanese environmentalism today is not only alive but also able to mobilize much broader public support for its goals, which are increasing in number. Few social movements have received such widespread support among the general public in Japan. Why has Japanese environmentalism been so successful in mobilizing so much support and generating numerous and diverse organizations? There are two major reasons. First, the seriousness of environmental destruction in modern Japan greatly stimulated public support for environmental protection. In particular, local grassroots anti-pollution movements ('Jyumin-Undo') have emerged in reaction to a wide-ranging environmental deterioration due to pollution and waste problems in and near their communities, in effect caused by the industrialization and urbanization during the rapid economic growth of the 1960s and 1970s. Most such community-based movements are run by powerless residents victimized by pollution.

The second reason is the emergence of an alternative, post-materialistic lifestyle among the Japanese people. After the Second World War, Japanese economic growth created widespread affluence among the general population. In particular, the emergent urban middle class began to be concerned with a non-materialistic lifestyle and search for unpolluted natural settings in periphery areas. Unexpectedly, the very success of economic growth, the so-called 'economic miracle', has encouraged the establishment and strengthening of environmentalism in the process of Japanese modernization.

Japan, like the USA and Europe, has conservative and radical environmental elements – that is, major cleavages in their environmental movements. In Japan, unlike the USA, environmental radicalism is a multi-class phenomenon (fishermen, forest-dependent communities, blue-collar workers as well as urban middle-class ecologists). There exist environmental bridges where in other societies there are gulfs, suggesting that the flourishing of environmentalism is more likely in Japan than in the USA.

In many countries, ecological destruction has been discussed as unavoidable in the process of modernization and, further, it has been said that environmental disruption is an inevitable cost of economic growth. The causes of economic growth and environmental deterioration in advanced industrial societies have received considerable attention from sociologists. Some have explored theoretical models for analysing the relationship between economic expansion, deterioration of environmental problems and emergence of environmentalism (Catton and Dunlap, 1978; Schnaiberg, 1980; Humphrey and Buttel, 1982; Dickens, 1992). The models explored by American and European scholars might be adopted to

explain the structure of environmental problems and the rise of environmentalism in Japan. Indeed, there is a debate concerning the possibilities and problems of introducing these models into Japanese environmental sociology (for example, Dunlap, 1995; Iijima, 1993, 1994, 1995; Mitsuda, 1994, 1995). This debate suggests the need to test the appropriateness of such models by examining the historical development of Japanese environmentalism and its characteristics, as compared with other countries.

EVOLUTION OF JAPANESE ENVIRONMENTALISM

Japan displays several conditions that have encouraged its environmentalism over and above the changes in its socioeconomic situations, political activities, cultural contexts and ecological condition. Japanese environmentalism can be seen as a complex phenomenon because of the interrelationship between the above-mentioned objective and subjective factors. Here we review the historical development of Japanese environmentalism, focusing on its socioecological structure.

The First Generation Stage: Early Environmentalism

The postwar rehabilitation phase (1945–60)

The economic rehabilitation after the Second World War had already brought about a lot of serious environmental disruption, especially in terms of human health, resulting from the hazards of industrial pollution. The most serious cases involved mining industries such as Toho Zinc Mine in Gunma Prefecture and Ashio Copper Mine in Tochigi Prefecture, polluting neighbouring farmlands and causing damage to farmers and their families. Prior to 1960, industrial pollution was mainly limited to certain fishing villages, mining towns and pulp industry cities outside the central core area in Japan. During this period many local politicians in economically depressed regions aimed their development strategies at luring chemical and heavy industrial companies into their regions. Higher priority was given to industrial development and, accordingly, its malfunctions, such as the damage to peasants' health, farming and fishing, were totally ignored by all levels of the government hierarchy.

The victims of pollution gathered petitions and marched to Tokyo to demand improvements in their environmental situation and to claim adequate compensation for the victims (Hase, 1981: 15). Although there were many victims of environmental destruction, it was very difficult to organize an effective victims' movement during this period. The reasons were not only the difficulty of verifying the causal relationship between environment destruction and victims' diseases in the polluted areas, but also an inability to mobilize public support for the victims' cause. Among the public, little attention was paid to the victims' movements and the tragic consequences of industrial pollution which were becoming evident. The rise in pollution levels led to a sharp increase in the occurrence of pollution-related diseases. Examples of this phenomenon include Itai-Itai disease (1955), Kumamoto-Minamata disease (1956), Yokkaichi asthma (1961) and Niigata-Minamata disease (1965). These diseases were caused by increased concentrations of various hazardous chemicals and heavy metals in the human body. These pollutants were and are a major hazard to humans because of the high levels of accumulation in human bodies (Ui, 1992).

Prefecture and local governments such as Tokyo and Osaka introduced and enacted the environmental regulation laws, but their efforts had little success in improving environmental conditions, owing to the lack of firm implementation.

The rapid growth phase (1960–73)

In 1960, the Ikeda Cabinet announced its National Income-Doubling Plan. This plan's objective was to create rapid economic growth to double the national income of Japan. The plan successfully created a 'growth at all costs' attitude among the Japanese. The First Comprehensive National Land Development Plan of 1962 was established in this pro-growth mood. This comprehensive land plan was in every way a development plan formulated by bureaucrats of the Japanese Economic Planning Agency, without any consultations with environmentalists, which consequently resulted in speeding up the disharmony between nature and people in Japan.

Air and water pollution throughout the country were undergoing a dramatic change for the worse because of a massive transfer of staple energy sources, from water power and coal to oil. Urban pollution problems such as traffic noise, exhaust emissions and effluent wastes resulted in a general decline in health and quality of life for the Japanese. By the 1960s, the scope of industrial and urban pollution expanded greatly as real GNP catapulted to new levels. While the problems related to continually increasing pollution levels worsened, Japanese environmental policies to correct those problems were almost non-existent. The National Income Doubling Plan and the First Comprehensive National Land Development Plan exacerbated environmental deterioration throughout Japan.

In this serious environmental situation, however, mass media attention to environmental problems was insignificant. The general populace remained ignorant of the need for policies designed to limit levels of pollutants discharged into the environment and of the tragic consequences of not introducing them. Early environmentalism in Japan was spearheaded by the sufferers of pollution-related diseases, such as peasants, fishermen and their families living in polluted areas. By the end of the 1970s, the diverse, citizen-based, environmental movement, known as the 'anti-pollution movement' (Kougai Tousou) emerged, not only as a fight for compensation, but also as a means of preventing future pollution. At that time, it was anything but an elitist movement.

In 1969, the Japanese government passed the Second Comprehensive National Land Development Plan. This plan had two contradictory and countermanding objectives; promotion of large-scale industrial development, on the one hand, and control of environmental pollution, on the other. Following analyses of this problem of the plan, the government re-examined and amended the Second Comprehensive Plan in 1972 so as to cope with Japan's worsening environmental conditions.

During the 'rapid growth' period, Japanese environmental policies centred on the prevention of industrial pollution. These policies were created in response to a growing social movement organized to protest about environmental pollution. In August 1967, the Basic Law for Environmental Pollution Control was enacted. This law significantly improved the administrative structure for environmental pollution control. Policies at this time focused on direct controls of pollution: for example, enactment and enforcement of laws regulating the seven types of pollution: air, water, noise, noxious odours, soil, ground and excessive industrial vibration pollution.

In 1970, a total of 14 laws related to environmental protection were enacted and the Basic Law for Environmental Pollution Control was amended to encompass the Japanese Diet. When the Basic Law was first enacted, it espoused the protection of human health and contained a so-called 'harmonization clause', that is, a clause which stressed that Japanese environmental policies should be carried out in harmony with the sound development of the economy. This clause could be misinterpreted as giving priority to economic interest.

In 1973, the Pollution-Related Health Damage Compensation Law was enacted. This act required the government to pay compensation to the sufferers from pollution-related disease such as Minamata disease. The new law resulted from the victims' movement of the 1960s and four court victories of pollution disease suits: the Itai-Itai disease suit (August 1972), Niigata-Minamata disease suit (September 1971), Yokkaichi asthma suit (July 1972) and Kumamoto-Minamata disease suit (March 1973). However, the law did not really provide a solution until 1996. Many victims had not been entitled to receive fair compensation. It should be noted that these policies were 'top-down', meaning that citizen leaders of the anti-pollution movement were excluded from the policy-making process.

In 1971, the Environmental Agency was established in order to coordinate and implement environmental policies which had previously been carried out separately by individual ministries or industries. Its creation was a landmark in the development of Japanese environmental policies and for social movements organized to combat environmental pollution. In addition, a regulatory system known as 'PPP' (the Polluter Pays Principle) was established so that companies selected for governmental pollution control projects or that caused injuries to people by pollution were required to pay compensation for damages (Miyamoto, 1989: 208–42). Because strong correlations were deemed to exist between pollution and industry, industrialists were denounced as great villains. During this phase, environmentalism was rapidly transformed into a strong popular movement.

Second Generation Stage: Current Environmentalism

The growth consolidation phase (1974–85)

By the mid-1970s, the Japanese economy faced decelerated growth after a series of international economic crises, including the Yen revaluation of 1971, and the oil crises of 1973 and 1979. In 1974, the Japanese economy showed negative growth for the first time during the post-Second World War period. Despite the oil crises and negative growth, the benefits of economic growth did 'trickle down' to a broad spectrum of the population. The pro-growth attitudes among the general public began to decline and the Japanese people began to recognize that *our economic miracles had been purchased at enormous environmental and social cost*. Economic growth was not the only consensus-based goal of the people in the 1980s. Japan had become an affluent, middle-class society requiring the maintenance of amenities throughout the country. In particular, the emergent urban middle class sought unpolluted natural settings (Goto and Alanen, 1987). With the major portion of the population concentrated in core areas, there had been a resultant loss of 'green spaces'. Areas surrounding Tokyo, Nagoya and Osaka suffered from more than a 10 per cent loss of green areas between 1970 and 1980. People placed great importance on the preservation of natural settings (Japan Environment Agency, 1983: 27) .

By 1980, 41 per cent of the public felt that a 'high-quality stable environment can coexist with economic growth' (Japanese prime minister, 1981). The great majority recognized that

'we should protect the natural environment because nature gives us environmental amenities and "peace and quiet" in life' (Japanese prime minister, 1982, 1986). Another high percentage (approximately 45 per cent) supported nature conservation because of its implications for the better upbringing of future generations of Japanese. An opinion survey carried out by the Prime Minister's Central Office in 1986 showed that 49.1 per cent of those surveyed preferred 'spiritual affluence' to 'material affluence'. According to another survey conducted by the National Land Agency, the proportion of urbanites who desired to live in outlying rural areas of Japan increased rapidly from 9 per cent in 1975 to 28 per cent in 1982. As more and more people began to evaluate their lifestyles from the perspective of intangible environmental amenities rather than material ones, the protection of green open space and wilderness emerged as a national priority.

In 1974, the National Land Use Planning Act was passed in order to promote the development of amenity-related resources in Japan . This policy was not administered by economic planners, but rather by officials from the newly created National Land Agency. In 1972, the Nature Conservation Law was enacted primarily to promote the safeguarding of Japan's natural environment. The Basic Policy on Conservation of the Natural Environment, adopted by the Diet in 1973, indicated that the enhancement of quality of life in terms of amenity conditions was pursued as the central goal of environmental policies. Although there was a partial, if not full, success in pollution control, however, ordinary quality of life was not improving significantly enough because of general indifference to very positive environmental policy making.

In 1977, the National Land Development Plan was adopted to improve the residential environment by increasing the amenities available to urban residents. This plan additionally called for the improvement of the social infrastructure in both metropolitan and rural areas throughout Japan. The Third Comprehensive Plan was the first to focus attention, from ecological perspectives, on the 'citizen participatory approach' for the creation of quality of life. The second stage of environmentalism was set in motion with the oil crisis of 1973, which sobered the pro-growth enthusiasts, and people in general became aware that an urban standard of living was unsatisfactory. The large cities were unable to provide the environmental amenities available to residents of rural areas in Japan. As more and more people began to evaluate their lifestyles from an ecological rather than a material perspective, the environmental movement was also bound to shift.

The anti-development groups constituted the core of the Japanese environmental movement, not only because controversial development projects such as nuclear power stations, airports and bullet express railways construction were so widespread in the whole country (Funabashi *et al.*, 1985), but also because the lifestyle of the general public shifted from a pro-growth attitude to an ecologically sound attitude (Hase, 1981). Most of the anti-development movements were pursued by wide-ranging active groups, having started as organizations of non-professional citizens from different social contexts. (There were several exceptions among the national organizations, such as the Japanese Society for the Protection of Nature, which led protest activities against the construction of highways in the Japanese Alps, and the Japanese National Trust Movement, which protected wilderness in remote areas.)

The motivation behind the anti-development movement was partially the activists' life experiences of pollution with respect to their urban lifestyle. The characteristics of the movement were rather different from those of the anti-pollution movement of the first stage

of Japanese environmentalism. The later environmentalists criticized, not only 'the growth myth' of the mass-production, mass-consumption and mass-waste lifestyle, but also the ideology of the anti-pollution movement which was seen as too anthropocentric.

'Bubble economy' phase (1986–91)

In the 1980s, Japanese international trade went fully into surplus and the Japanese government continued to be pressured internationally in order to solve the huge trade surplus problems with all other countries, in particular, the USA. Under this international pressure, the Japanese government devised the policy of domestic demand expansion and invested in socioeconomic infrastructure developments such as highways, bullet express railways, airport constructions, development of information system networks and housing development all over the country. As a result, the economic high growth revived and expanded to rural Japan during the late 1980s. The 'bubble economy' grew from 1986 and climaxed by 1991.

The Fourth Comprehensive National Land Development Plan and the Resort Development Law of 1987 vitalized the local economy even in periphery regions. The latter stimulated the construction of golf courses, ski centres and marinas in fringe areas of Japan. These resort developments ravaged natural landscapes in the countryside (Sato, 1990). To make matters worse, very little concern was given, even by environmentalists, to the preservation of high-value environments from either scientific, aesthetic or genetic viewpoints, or to harmonization between conservative and local perspectives on land use (Mitsuda and Geisler, 1992).

The Japanese environmental movement changed from the late 1980s. The profound socioeconomic transformations permitted the environmental movement to become more conservative and more ecological. A more radical, urban-based environmental movement gradually came to search for an alternative way of life and yielded to a more rural conservative perspective which, while retaining certain populist aspects, had adopted elitist characteristics. The supporters of this ecological movement have much respect, not for modern technology, but for the global ecosystem. They believe that humans live in and are dependent on the ecosystem as a whole and must seek ways of living that do little damage to either human or natural environments. This kind of new environmental movement is more normative and philosophical, inspired in part by an ecologically sound lifestyle. Most of the supporters come from well-educated, rather high income and professional-level backgrounds, seeing themselves as upper middle-class in lifestyle. For example, the members of Shiretoko National Trust Movement (ibid.) which was protecting old-growth trees and endangered owls on Hokkaido Island were twice as likely to be university graduates as were members of the general public. Approximately a quarter of them have professional occupations. Interestingly, factory workers and salaried workers are very rare in this movement, in which 51.7 per cent are female and 20.8 per cent are housewives (Mitsuda and Geisler, 1988: 115–16).

Many female and young people today, who remain in a marginal position in the modern business society, participate in ecological movements such as the recycling movement, green consumerism, organic farming occupations and the anti-nuclear movement as they search for an alternative lifestyle. Though the demand for an alternative lifestyle is not predominant among the Japanese public today, a large number of people show their interest and agree with an ecologically sound lifestyle.

Global environmental issues emerged in the 1980s. Surprisingly, a high level of public concern with and support for global environmental protection became a nationwide

phenomenon. A poll survey conducted by the Prime Minister's Office in 1988 showed that 59.7 per cent of respondents identified global environmental problems as the most serious problem to be solved. The new wave of Japanese environmental groups, such as Greenpeace-Japan and Friends of the Earth-Japan, is concerned with global environmental problems, including the greenhouse effect, the depletion of the ozone layer, acid rain, the diminishing rainforest, endangered species, and so on. The mass media continue to focus on the crisis of the environment from the local to the global level. The 'Earth Summit' in Rio de Janeiro in 1992 was the highlight for both the government and the environmental NGO groups.

The collapse of the 'bubble economy' phase (1992–present)

Economic growth began to decline at the end of 1989. In January 1991, the Japanese economy was seriously damaged by the heavy fall on the stock market and the 'bubble economy', which started around 1986, collapsed in 1992. The government announced the comprehensive emergent economic counter plan to meet this economic depression.

After the collapse of the bubble economy, environmental groups and environmental policy makers were afraid of the negative influence of this economic depression on public support for environmentalism. Nevertheless, the people remained highly concerned by environmental problems and strongly supported environmental movements. A public opinion survey indicated that more than 90 per cent of people were concerned about environmental problems and supportive of the movements (Japanese prime minister, 1993). Present-day environmentalism has continued to develop as an ecological movement and is becoming more diverse and stronger than it was as a purely anti-development movement.

However, the diverse nature of contemporary environmentalism results in conflicts within and among the groups, arguing justification of their goals, strategies, ideologies and, in particular, causes of environmental destruction. The bigger and more diverse the environmental movement becomes, the more difficult and complex the challenges the movement faces. After the 'Earth Summit' of 1992, most of the leaders of environmental NGOs abandoned their activities because of fading enthusiasm among supporters and the shortage of funds (*Mainichi Shinbun*, 1993).

In recent times, the leading groups of the environment movement have recognized their failure in effectively mustering the public enthusiasm and support of the 1980s in their current environmental movements. Many leading environmentalists are reconsidering how to remedy their environmental elitism and to recreate the movements as real, people-based movements, in search of a sustainable movement for generating an ecologically sustainable society.

CHARACTERISTICS OF JAPANESE ENVIRONMENTALISM: A TYPOLOGY

The Japanese environmental movement emerged in the 1970s bearing at least a superficial resemblance to that of the USA and EC (see Pierce *et al.*, 1989). However, the validity of this resemblance bears scrutiny and makes the Japanese case particularly interesting. Environmentalism as a mass movement in the USA became a significant political force in the wake of affluence and the broad diffusion of high living standards (Hays, 1987; Nash, 1989; Dunlap and Mertig, 1992). In Japan, the environmental movement mounted its offensive

when the costs rather than the benefits of industrial expansion became notorious and the rewards of industrialization uncertain. The organizational aspect of environmental movements is unique in the history of social movements in Japan. Most environmental groups have been administered in neither bureaucratic nor hierarchical, but in grassroots democratic ways (Hase, 1980).

Early environmentalism, represented by the victims' movement and the anti-pollution movement in the 1960s and 1970s, was born from the struggle against industrial and urban pollution in order to conserve a sound and natural environment for human beings. Thus the predominant issues of the environmental movements of the first generation stage were the maintenance and enhancement of people's health and daily life in polluted communities, rather than environmental aesthetics, wilderness protection or global environmental change. At that time, the movement was only participated in by the pollution-related victims, with some support from professionals such as lawyers and university professors.

Later on, as pollution problems got worse through rapid industrialization and urbanization in the process of Japanese modernization, the movement was able gradually to gather support among the general population as a result of their activities: for example, the pursuit of four pollution disease suits. However, it was still very difficult to mobilize strong public support for their litigation as an environmental tactic because the public had faith in the myth of economic growth.

It should be emphasized that the impact of the early environmental movement, such as the four court victories, contributed, not only to the enactment of numerous pollution-related laws that transformed the environmental policy of the Japanese government in 1970s, but also to the emergence of human rights consciousness with respect to the victims of pollution and to the growth among the public of a sceptical attitude towards the benefits of uncontrolled economic growth. The sociological question was finally being asked of the people: 'Why did the Minamata people have to pay the social and environmental costs of economic benefits which had accrued to Japanese society as a whole?'

The first stage of Japanese environmentalism in the 1960s and 1970s had shared some characteristics, perspectives and activities with the grassroots environmental movements growing dramatically during the 1980s in the USA. With their goal of environmental justice, local environmental activism in both countries, as in the well-known cases of Minamata and Love Canal, aimed at assisting individuals in coping with physical and social ill-health in the local communities. Most of the participants did not have an elitist background (Harada, 1978; Mitchell, 1989; Freudenberg and Zaltberg, 1984).

The second stage of environmentalism, represented by the anti-development movement and the ecological movement in 1980s and 1990s, focused on ecologically sound lifestyles and global environmental issues. Interestingly, this later environmentalism in Japan had numerous similarities with the American conservation movement at the first generation stage, such as membership backgrounds, environmental issues and types of action (Dunlap and Mertig, 1992). High income accruing from the continuously successful economic growth until the mid-1970s emancipated most Japanese from worries of material living and, simultaneously, caused people to begin to evaluate their lifestyle from spiritual and ecological perspectives. The emergent urban middle class sought environmental amenities in uncontaminated natural settings and wanted to preserve wilderness areas for the next generation. Against this socioeconomic background, the supporters of these movements, in the second stage, were people from the urban middle class with high levels of education and a preponderance of women.

As a concluding remark, it may be said that Japanese modernization since the Second World War has stimulated the birth and rise both of economic development and environmentalism in its different stages. Paradoxically, the more rapidly Japanese economic growth accelerated, the more deeply environmentalism affected the modernization process, resulting in its control. That is, environmentalism, the favourite child of modern society, started to curtail the process of modernization itself.

CHALLENGES FOR FUTURE ENVIRONMENTALISM IN JAPAN

Recent poll surveys confirm that environmentalism continues to enjoy increasing support from the general populace in Japan. According to a poll survey on environmental preservation, 44 per cent of the public recognized that global environmental problems threaten their daily lives very seriously and 64 per cent remained highly concerned about environmental problems at the community level, such as waste and sewage problems (Japanese prime minister, 1993). 'Green consumerism', avoiding buying products which harm the environment, and reducing household waste are widely practised by the public: 61 per cent of people reported that they make efforts to solve environmental problems in their daily lives.

However, fewer than 5 per cent of respondents participate in environmental organizations that aim to protect the environment. Most of the public hesitate to take part in environmental organizations because they dislike environmental elitism in these organizations and they see the ecocentric idea of environmentalists as too radical. The public also criticize environmentalists because the movement is apt to ignore the poverty and the social inequity in the periphery of Japan, as well as in developing countries, preferring to devote themselves to soul-searching with respect to nature and debate concerning the health of the planet. Environmental elitism from domestic and international perspectives will remain one of the most difficult problems to be faced by the Japanese environmental groups in the future.

A recent poll survey compared international attitudes towards the environment and economic growth among the citizens of 22 nations (Dunlap *et al.*, 1992). It indicated that the Japanese environmental attitude is very different from that of citizens of other advanced, industrial societies (Mitsuda and Dunlap, 1993). Regarding concern for global environmental problems, the Japanese showed the lowest level among the industrial societies and only a small percentage of the Japanese wanted to participate in environmental movements. There is no doubt that the Japanese public is learning a lot concerning crucial environmental problems at national and international levels. However, the people do not always take responsibility for resolving these environmental problems: 'Vast knowledge with low responsibility' is the typical environmental attitude among the Japanese public. The lack of responsibility for solving global environmental problems will also become crucial for Japanese environmentalism in the future.

Instrumental environmentalism has become prevalent among the current Japanese environmental groups. Early environmentalism in Japan was a more 'intrinsic environmentalism', supported by grassroots people in order to protect the physical environment at the community and local level. However, present-day environmentalism is shifting towards the instrumental environmentalism employed by the movement's leaders in order to gain political power and leverage in environmental controversies. 'Is environmentalism an ultimate end or an instrumental goal?' will be a crucial question for all environmentalists.

Environmentalism in Japan will have to challenge these problems to enhance its capacity to solve both environmental problems and the social inequity that scars Japan as well as the world as a whole.

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30. Agricultural development policy and the environment in Ghana

Mahamudu B. Seidu

INTRODUCTION

This chapter traces the development of official agricultural development strategies in the West African country of Ghana from the colonial era through to the present day, placing greatest emphasis on the policies of successive post-colonial governments. The central characteristics of these policies are related to the general political objectives of respective government regimes, while their impact is analysed in terms of the achievement of their stated objectives (their intended outcome) and their unintended consequences with respect to local livelihoods and the environments upon which these depend for their continued reproduction.

Like many of the country's political institutions, current issues in Ghana have been shaped by past policies. To gain an insight into current agricultural and environmental issues in Ghana thus requires an examination of the sociopolitical and socioeconomic strategies of successive governments. Emphasis is placed on the period since independence in 1960, largely because the drive for development in Ghana became strongest after independence.[1] However, events of the colonial era deserve some brief narration.

FROM FIRST ENCOUNTERS TO INDEPENDENCE

The main objective of the first European sailors who set foot on the Gold Coast during the last two decades of the fifteenth century was to conduct trade with the local inhabitants. These intrepid Portuguese sailors had heard from the Moors about abundant supplies of gold dust and nuggets available in the area. The initial interest of the Portuguese in trade of commodities soon expanded to include slaves, trade in which quickly eclipsed all other commercial activities. In exchange, the indigenous African traders got salt, iron implements, pewter and beads. The abolition of the slave trade in the early nineteenth century coincided with establishment of British colonial rule and the appointment of a British governor.

Anin (1987) indicates that, under colonial rule, the agricultural systems of the Gold Coast were under the control and ownership of indigenous people. However, it was the colonial rulers that were responsible for the the production and trade of goods for export. Initially, it was gold that topped the list of exports, but agriculture and other primary industries soon blossomed and trade came to include items such as palm oil, ivory, grains, pepper, coffee, timber, gum copal, hides and skins, ginger and, later, cocoa. Trade within the country and

abroad was conducted with the collaboration of indigenous merchants who had attended local missionary schools and acquired basic levels of numeracy and literacy. These indigenous merchants were mainly inhabitants of the southern territory of the Gold Coast, which partly explains the economic backwardness of northern Ghana today.

Since colonial times, the agricultural export sector in Ghana has come to be dominated by cocoa. From the outset, however, both food production and the cocoa industry were developed and continue to be dominated by small-scale, indigenous farmers. Cocoa and other export crops such as palm oil and coffee and even timber are cultivated in the southern sector of Ghana. Thus, in order to intensify the production and export of these crops, the colonial administration concentrated all infrastructural development of roads, railways and construction in the southern half of the country, to the neglect of the north. However, more recently it has been acknowledged that the northern region is an important supplier of grains such as rice, beans, maize, sorghum and millet, and tubers such as yam, for national consumption and that some of these commodities have even found their way into the export market.

The colonial government made no effort to develop either the natural or human resources of the Northern territories. Among other reasons for this neglect were the facts that the region was large and poorly provided with administrative offices or the funds to develop them. According to Kasanga and Avis (1988), the colonial administration claimed that the administration of the north was a heavy drain on the resources of the colony proper and that the cost of administering the territory was more than the revenue obtained. This led to the reduction of the imperial grant to the region and its subsequent cancellation.

Having sketched briefly the character of the emergent colonial state and noted some of the distinctions between the isolated and largely ignored Northern Region and the Southern Region with its ports and trade centres, it is now time to move on to the central theme of this chapter, which concerns the agricultural development strategies of successive post-colonial governments and their impact on livelihoods and the environments upon which they depend.

POST-COLONIAL DEVELOPMENTS

Gyimah-Boadi (1989) outlines the problems that faced the Ghanaian agricultural sector on the eve of independence as follows: monocrop dependency (cocoa); low productivity in agriculture in general and food production in particular; and farmer dissatisfaction with state-run marketing boards, such as the Cocoa Marketing Board and the Cotton Board. In addition, there were problems due to land tenure issues and a lack of credit for production. Despite promises by successive post-colonial governments to 'modernize' the agricultural sector and improve the physical environment, farm productivity to date continues to decline and land degradation is rife.

Agricultural Policy under the Convention People's Party (CPP), 1956–66

Under the leadership of Kwame Nkrumah, the agricultural policy of the CPP went through two distinct phases; the first sought to revitalize the traditional smallholder and peasant-based sectors, and the second to develop large-scale, mechanized, public-sector farming and centralized control over agricultural production and marketing. A major feature of the CPP

government, however, was the excessive attention it gave to the industrialization of the economy, to the detriment of agriculture. Such was Nkrumah's contempt for the production of primary commodities that he declared, 'industry rather than agriculture is the means by which rapid improvements in Africa's living standards are possible ... The world's economic history shows that it is only with advanced industrialisation that it is possible to raise the nutritional level of the people' (Nkrumah, 1966: 6).

In November 1952, Nkrumah invited Arthur Lewis, Professor of Economics at Manchester University, to prepare and submit a report on industrialization and economic policy for implementation in Ghana. This report, submitted in June 1953, emphasized agriculture as the bedrock on which active industrialization should be built. In Chapter 3, paragraph 99, of the report, Lewis declared: 'The secret of industrialisation is a rapidly progressing agriculture and, more particularly, since food production is the major part of agriculture, the number one priority in a programme of economic development is measures which increase food production per head' (cited in Anin, 1987: 56). Unfortunately, Nkrumah's dislike of primary commodity production resulted in the report being left on the shelf to gather dust and, thus, an opportunity to set Ghana on the right path for economic progress and eventual industrial development had been missed.

The CPP's ideological and economic thinking was entrenched in the principles of state socialism. According to O'Connor (in Merchant, 1992) such regimes have fostered ecologically destructive policies to no lesser extent than their capitalist counterparts. The CPP goal of abolishing poverty and creating a more equitable distribution of wealth seemed achievable only if nature were treated as a 'warehouse' of raw materials – a passive backdrop to industrialization, rather than a dynamic yet fragile living system.

The Ghanaian agricultural economy is dominated by small-scale farmers and Gyimah-Boadi has indicated that this was acknowledged by the CPP government, which took steps to revitalize the peasant-based sector. In support of this position, he cites the establishment of the 1961 Development Plan in which the government demonstrated its determination to salvage the cocoa industry within seven years. The manner in which this objective was pursued in policy clearly demonstrates the utilitarian view of nature espoused by the CPP regime. Revitalization was sought through initiatives to eradicate swollen-shoot disease of cocoa by cutting down all infected trees and paying generous compensation to all affected farmers, while capsid seed infestation was to be dealt with by providing sprayers and insecticides on a subsidized basis to any farmers who were prepared to treat their own fields. Thus the so-called 'assistance' to the smallholder and peasant-based sector was geared towards the production of export-oriented crops, and cocoa in particular. In contrast, the attainment of food security and the sustainable management of agricultural resources depended on the initiatives of local people with little recourse to government aid.

The returns to export crops were hit by falling world market prices, however, which placed constraints on the government's ability to pay for the development of agricultural infrastructure, the inputs it required and the necessary imports for industrial development (Gyimah-Boadi, 1989). Under these circumstances, declining productivity was inevitable.

It is generally acknowledged that farmers' first and major priority is to feed themselves and their families before they can engage in expanded social reproduction and the task of economic development (Hansen and Ninsin, 1989). Also, where farmers do not have sufficient resources to secure their own reproduction, they are often unwilling to risk an investment of labour and scarce funds in soil and water conservation (SWC) activities (Seidu,

1990). Thus declining terms of trade for agricultural exports ultimately fed into increasing levels of environmental degradation as well as social deprivation. In addition, to avoid demands for increased industrial wages and hence unrest in the cities, the Convention People's Party held food prices artificially low. Their ability to do this was largely a result of maintaining unfavourable producer prices, which also contributed to failure of agricultural projects (Gosh, 1984), with disastrous environmental effects.[2]

Support to smallholder agricultural production changed under the second phase of CPP agricultural policy, with emphasis shifting to state-sponsored, large-scale mechanized agriculture. This change was based on the view that there was no problem with actual food production in the country: the problem was rather with distribution and marketing. It was also a result of Nkrumah's belief that small-scale production was a hindrance to progress and had to give way to large-scale mechanized agriculture (Hansen, in Hansen and Ninsin, 1989).

The establishment of the State Farms Corporation (SFC) in 1963 epitomized attempts to shift Ghanaian agriculture from a smallholder to a state and cooperative base. Other parastatal agricultural institutions created at the same time as the SFC included the paramilitary Workers Brigade (WB) and the United Ghanaian Farmers' Co-operative Council (UGFCC). The UGFCC organized cooperative farmers and the Young Farmers League (YFL), which operated settlement farms for Ghanaian youth. Gyimah-Boadi underlines the fact that these statist agricultural institutions were often large-scale, mechanized and involved extensive infrastructure and high overhead costs; in short, they were largely economically unviable. Yet, at the same time, these policies marginalized the smallholder because such organized cooperatives were often dominated by party officials, resulting in further misuse and mismanagement of the natural resources. Table 30.1 provides a comparison of production indices for smallholders and large-scale, state farms in the early post-independence years. The better comparative performance of the former compared to the latter is quite evident in the figures: labour productivity for the smallholder was nearly six times that achieved by those employed on state farms, despite the relative neglect of the smallholder sector.

Table 30.1 Comparative performance of large-scale state farms and smallholder systems

Parameter	Smallholdings	State farms
Approximate number of farms (thousands)	1 800	18
Area under cultivation (thousands of hectares)	2 575	20
Labour productivity (tons per worker per annum)	3.33	0.59

Source: Adapted from a survey report by Killick (1980: 193).

Several reasons have been put forward to explain why the government of Ghana sought to control agricultural production and marketing. Two interrelated political and economic factors have been emphasized: the imperative of political consolidation and the imperative of capital accumulation. State activity in the rural sector provided the means (1) to secure hegemony over agriculture – in particular the cocoa industry – and (2) to pre-empt political opposition from the rural areas in general (Gyimah-Boadi, 1989). The government's apprehensions concerning rural-based political opposition were rooted in the political develop-

ments of 1954–6, when the challenge to the pre-independence government and its political dominance centred around the price of cocoa and increasing state appropriation of cocoa incomes, with the Ashanti region as the centre of opposition and the National Liberation Movement (NLM) as its main instrument (Austin, 1970).

The use of party machinery such as the UGFCC in the distribution of vital agricultural inputs was a key plank in the process of political consolidation and CPP's victory over its regionalist opposition in the 1965 elections appears to have been possible only with the crucial assistance from the UGFCC (Gyimah-Boadi, 1989). Unlike the opposition United Party (UP), the CPP leaders did not have close ties with the ruling elements in the rural class structure, so expanding the public sector into agriculture was an attempt to build political bridges (Hansen and Ninsin, 1989). However, the results of the CPP's agricultural policies were abysmal, with profound implications for smallholder production and, as a consequence, environmental sustainability. By 1966, the Ghanaian agricultural environment was in a 'crisis' as a result of the adoption of inappropriate strategies and an underfunded agricultural sector.

Agricultural Policies of the National Liberation Council (NLC) and Progress Party (PP), 1966–72

The CPP was overthrown in a *coup d'état* led by a group of army officers on 24 February 1966. This was followed successively by governments of the National Liberation Council (NLC, 1966–9) and the Progress Party (PP, 1969–72). The NLC mentioned, *inter alia*, food shortages as the reason for the uprising. With a different political outlook, they set out to reverse everything that had been created by the CPP government. In Gyimah-Boadi's view, their agricultural policies followed two broad trends: the disengagement of the state from production and marketing, and the encouragement of large-scale mechanized private farming by both national and foreign investors.

The ideological perspectives of the NLC and PP on the nature of Ghana's problems and their possible solutions were in line with political views held by powerful western nations such as the USA and Britain, which saw the political demise of Nkrumah as an opportunity to bring Ghana back firmly under western political and economic influence (Hansen and Ninsin, 1989). However, as Merchant has put it, 'capitalism creates its own barriers to growth by destroying its own environmental conditions of production' (Merchant, 1992: 147). In pursuit of profits, capitalism employs ecologically destructive methods of production which eventually raise the costs of raw materials that lead to the underproduction of goods and capital, with devastating effects on the most vulnerable in society. This inevitably results in land degradation, as the poor are incapable of responding to the social and economic implications of the process of degradation. In another sense, 'Rather than leaving Nature free and autonomous, capitalism recreates it as capitalized nature – a second nature treated as commodity and subjected to ecological abuse' (ibid.: 149). Thus, as Merchant's work suggests, it was only a matter of time before the parties' policies were seen as ecologically destructive and agriculturally bankrupt.

The de-emphasis on state control of agricultural production and marketing did not mean that adequate provision was made for smallholder production. Even though the NLC promised to cater for the neglect suffered by peasant farmers under the CPP, it was the so-called 'modern farmers' to whom it directed its attention. The Agricultural Development Bank's

(ADB) credit policies were very liberal, yet clearly designed to serve wealthier producers. For instance, for a farmer to qualify for credit from the ADB, he or she was expected to have cleared at least six acres of cultivable land and to have acceptable collateral security. Given that the average holdings of food growers in Ghana is less than 3.5 acres (Hansen and Ninsin, 1989), the bulk of the peasantry could not qualify for institutional credit. In addition, packages of incentives, such as tax concessions and easy credits, were made available by the Ghana Commercial Bank (GCB) but all were to the benefit of the commercial farmer. Nevertheless, the fact remained that it was smallholders that were responsible for the bulk of production of both food and export crops. It was particularly in the northern and upper regions, where upland rice farming provided the opportunity for large-scale commercial agriculture, that attempts were made to put this policy into practice in a more determined way.

Another feature of the NLC government was the attempt to get multinational companies (MNCs) to become involved in the production of industrial raw materials and food. The results of this policy were at least twofold. The structure of Ghanaian capital shifted from indigenous to foreign investors, while some 3000 peasant producers in the western region were displaced by large-scale, commercial operations (Jonah, 1989). Once again, marginalization of the peasantry meant that adequate resources could not be committed to the maintenance of the physical environment. In addition, mechanized farming called for high inputs of chemical fertilizers and pesticides, accompanied by an increasing incidence of chemical resistance among both pests and diseases, further aggravating environmental deterioration. In short, the results of NLC agricultural policies were inadvertently negative and ineffective, in terms of both agricultural production and of the maintenance of environmental quality.

Ghanaian agriculture was in steep decline when the NLC handed over the reins of government to the Progress Party. On assuming office, the PP government promised to diversify the export sector and produce for local industries as well as increase food production. They announced that their agricultural policy was to focus on both the peasant and modern agriculture. They selected rural development as the chief means by which peasant production could be enhanced. Gyimah-Boadi (1989) indicates how a comprehensive package of assistance to rural areas was formulated, which included the construction and rehabilitation of feeder roads, health posts and centres and the supply of good drinking water and improvement of rural housing through loans for building materials. In addition to infrastructural development, the government also promised easy access to subsidized production inputs such as fertilizers and insecticides.

It was soon realized, however, that the PP only paid lip-service to these rural development programmes. It therefore occasioned little surprise when the rural development plan ran aground in 1971. Once again, the traditional smallholder and rural dweller had lost out to the 'modern' farmer and to non-agricultural interests in the struggle for attention and resource allocation. Once again, the consequences for the environment were dire.

In a bid to 'modernize' and diversify agriculture, the PP promised special incentives and retirement benefits for public servants who were planning to go into farming. Tax holidays and import quotas were granted to Ghanaians and foreign companies investing in agriculture. However, profits accrued from agricultural exports between 1969 and 1970 were hardly invested in agriculture; instead they were used to meet middle-class consumption demands. The austerity measures of 1971, including taxes and other levies, which were instituted to raise development funds from non-traditional sources (for example, the army, bureaucracy

and the trade unions) proved suicidal for the regime, creating the political atmosphere which induced a second *coup d'état* on 13 January 1972.[3]

Agricultural Policies of the National Redemption Council (NRC)/Supreme Military Council (SMC), 1972–9

The NRC/SMC came to office after the 1972 coup and took steps to 'salvage' Ghanaian agriculture. Their initial efforts focused on reforming the internal marketing system of the cocoa industry. This was considered necessary following the fraudulent activities of some licensed buying agencies (LBAs), which had considerably damaged the morale and confidence of peasant cocoa farmers. But yet again the peasant sector was soon to suffer another setback.

The extent of neglect in this instance is captured in a 1976 statement attributed to the Commissioner for Works at the time, who suggested that 'the small-farmer must give way to plantation type of farms. Seasonal crops designed to depend on the rainy season must give way to all-year cropping assured by irrigation' (cited in Hansen, 1989: 89). Consequently, the regime's agricultural input subsidies on sprayers, chemical fertilizers and insecticides were directed towards mechanized farming. Educated Ghanaians (civil servants, army officers and professionals) as well as businessmen and women were encouraged to go into commercial farming with tax and other concessions. For example, customs duties on agricultural machines and spare parts were waived, rent on farmland was reduced, the repatriation of profits from agricultural investments by foreigners was guaranteed, profits earned in the first five years of operation were exempted from taxation, minimum prices for some farm products would be subsidized and, above all, government-guaranteed bank loans were assured (Gyimah-Boadi, 1989).

Perhaps the most ambitious programmes ever launched in response to the country's productive shortfall in agriculture were Operation Feed Yourself (OFY) and, later, Operation Feed Your Industries (OPFI). Projected as a populist measure to meet the food problem, OFY initially enjoyed a great deal of popular support as students from the country's universities and youth organizations responded to the call from the new military leaders to contribute free labour in harvesting sugar cane, vegetables and rice on state farmers (Hansen, 1989). In the northern region the response was less well organized and included random land grabbing for upland rice and maize cultivation by powerful military officers, well-to-do civil servants and the top stratum of rural people.

Despite these intensive policy measures, NRC/SMC intervention in the agricultural sector did not yield any appreciable results. Yet again, well-intended policies had been aimed at the wrong people. In addition, funds generated through cocoa exports and other agricultural activities were diverted into other sectors of the economy. For instance, Gyimah-Boadi has indicated how embezzlement and misallocation of Cocoa Marketing Board funds became rampant. Finally, rural development programmes that had been initiated by previous governments were either terminated or denied the resources necessary for their completion.

Agricultural Policies of the Peoples National Party (PNP) 1979–81

The PNP came to office, like so many of the post-independence regimes, with the promise of revamping the agricultural sector. It came to power as the result of a democratic election

after a three-month, bloodstained intermission by the army. The army came to power after overthrowing the SMC rule. In its three months in office, events were in such turmoil that no clear agricultural policies could be pinned down. In effect, the army had engaged in what it called 'a house-cleaning exercise' in readiness for the next democratic government. When the PNP came to power, it tried to promote the legacy of the CPP government, by attempting to revive the state farms and the cocoa rehabilitation schemes; but wage disputes between the government and agricultural workers crippled the programme even before it could get started (*West Africa*, 11 August 1980: 1256; 16 November 1980: 2744).

The PNP also tried to re-establish rural development programmes by giving rural farmers modest assistance and undertaking the construction of feeder roads in particular. But in its 15-month rule the PNP, like its predecessors, was unable to deliver anything meaningful and innovative to the agricultural sector and thus left farmers disillusioned and Ghanaian agriculture in a worse state than ever.

The Provisional National Defence Council (PNDC)/National Democratic Congress (NDC) and Agriculture

On 31 December 1981, the PNDC replaced the PNP in another military *coup d'état*. The PNDC took tentative steps, mainly interventionist policies, to deal with the agricultural crisis at the time. This, in part, involved the mobilization of university students and army officers to transport cocoa and other agricultural produce from the hinterland where they had been locked up because of the dire state of the roads and railways and the lack of haulage trucks (Gyimah-Boadi, 1989). They also made attempts to limit the role of middlemen and women in the food trade by enforcing existing price control legislation.

The initial long term agricultural policy of the PNDC entailed a steady increase in the producer price of cocoa and cash crops. For example, the producer price of cocoa increased threefold from 4000 *cedis* (unit of currency in Ghana) per ton in 1981 to 12 000 *cedis* per ton in 1983, and then fivefold to 56 000 *cedis* in 1985/6 and finally to 85 000 in 1987.[4] To boost the morale of cocoa and sheanut farmers, and to prevent unscrupulous purchasing clerks from cheating farmers, the government introduced the Akuafo Cheque System, under which rural banks were expected to improve the credit situation of farmers and encourage them to adopt the habits of saving any moneys that might accrue to them.

In 1983, the government of Ghana started implementing an Economic Recovery Programme (ERP), part of which involved the adoption of a Structural Adjustment Programme (SAP) recommended by the World Bank and the International Monetary Fund (IMF). The initial measures taken in this programme involved the devaluation of the *cedi* from 1.75 to 1 $US in 1983 to roughly 182 *cedis* to the dollar in 1987; the 5–35 per cent retention of foreign exchange earnings by exporters of non-traditional items such as sheanuts, kolanuts, pineapples and processed timber; vigorous road and railway rehabilitation efforts; and wholesale retrenchment of the government-employed workforce, all of which were considered to be highly favourable to the development of export agriculture. Overvaluation of the currency, it was argued, discouraged exports, particularly from cocoa and the mining sectors. It made it difficult for the Cocoa Marketing Board, now the Cocoa Board, to pay a realistic price to producers in order to encourage production, with the result that peasants either shifted to the production of other crops or smuggled cocoa out of the country along illicit trade routes (Hansen and Ninsin, 1989).

There is some disagreement on the effect of exchange rate policy on the environment, but the general consensus seems to be that overvaluation of exchange rate discourages agricultural export because exporters receive less in local currency than would be the case with a lower exchange rate. This implicitly produces a tax on domestic products which discourages farmers from adopting ecological conservation practices. Moreover, overvaluation makes imported commodities artificially cheap, so that domestic farmers find themselves effectively competing with subsidized imported food stuffs.

The thinking behind the ERP in terms of agricultural policy was the belief that private capital, both foreign and local, is the best agent through which the country could raise food production. The 1985 Investment Code gave ample credence to this commitment: it made agriculture one of the priority sectors of the economy requiring foreign participation. Accordingly, it stipulated certain types of facilities that the state should provide for foreign investors willing to go into food production. It also guaranteed state intervention in securing farmland for the establishment of such agricultural projects (Hansen, 1989).

In the course of implementing the policies of the ERP and SAP, the government of Ghana admitted the bitter consequences of the programmes. In order to cushion the economic and social side-effects of the ERP and SAP, in November 1989 the government launched a Programme of Action to Mitigate the Social Costs of Adjustment (PAMSCAD). According to the government's own publication, PAMSCAD seeks to address the needs of vulnerable groups who are in a precarious condition as a result of the Adjustment Programme or of the earlier period of economic decline. The vulnerable groups include small farmers, mainly in the northern and upper regions. Their productivity is low, and they face unemployment and hunger during the lean season. The vulnerable groups also include low-income and underemployed urban households and retired workers from the public and private sector (Anin, 1987).

At the local level, a Home Extension Unit (HEU) was created to deal almost exclusively with women farmers, by supplying them with information on improved farming practices as well as seeds in order to improve food production, processing and preservation (Hansen, 1989). However, funding constraints, institutional bottlenecks and deep-rooted bureaucratic dispositions have prevented the project from being a complete success. Inefficient project identification and low levels of funding under PAMSCAD have rendered the programme less than effective. PAMSCAD has failed significantly to alleviate the suffering of the poor and vulnerable in Ghana. Field work (Seidu, 1997) suggests that there is still widespread poverty amongst small farmers in Ghana, especially in the more isolated rural areas and, as already indicated, poverty amongst farmers has a profound impact on their ability to manage the natural environment sustainably.

After 11 years of unconstitutional rule, the PNDC handed over power to the National Democratic Congress following democratic elections in December 1992. However, the NDC was the official party of the PNDC and was led by Ghana's military leader, Jerry Rawlings, during the election of Ghana's Fourth Republic. Thus, in effect, the same policies have been kept in place under a new name.

DISCUSSION

It would seem clear from this analysis of the agricultural and sociopolitical strategies of post-independence regimes that there have been some notable continuities. In some cases, present policies seem to be directly linked to policies that have already been seen to be inappropriate both in terms of engendering agricultural development and, perhaps more critically, with respect to their impact on livelihoods and the natural environment upon which they depend. Generally speaking, the clearest trends in policy demonstrate a tendency to fluctuate between half-hearted support of peasant production and the promotion of large-scale, mechanized agricultural development programmes. While lip-service was paid to the former, the latter failed owing to serious underfunding.

There are clearly dangers associated with large-scale crop production and export dependency. Large-scale export crop production exposes developing economies to the external stresses and shocks imposed by the vagaries of international markets. There is also the danger of attention being focused on export crops at the expense of food production. For example, in the Southern Volta region of Ghana, cash cropping for export has taken most of the fertile land, pushing food production and subsistence onto marginal lands (Conway and Barbier, 1990). Nevertheless, it would be banal to suggest that export-oriented agricultural crop development is less environmentally sustainable than food production for consumption.

At the heart of the problems currently faced are two important and interrelated issues that must be addressed if Ghana is to transcend its food insecurity problems and at the same time maintain a sound environment. The most critical requirement for a successful food policy is that measures should be directed to the most relevant group engaged in food production. In the Ghanaian case it is the small-scale producer. The second is almost as critical and a point expressed vividly by Conway and Barbier (1990): if national agricultural strategies and targets fail to take account of the conditions required for sustainability and equitability – especially the need for proper resource management – the long-term prospects for agricultural development may be seriously undermined.

One of the major objectives of the Economic Recovery Programme was to adopt measures to increase food production. But the withdrawal of subsidies in consonance with the SAP's requirements has had profound implications for agricultural production and resource management by the peasantry. The removal of subsidies on insecticides, chemical fertilizers, pesticides and mechanized agricultural inputs arguably prevents farmers from using such inputs excessively. The environmental effects of chemical fertilizers, pesticides and insecticides have, however, been well documented.[5] Briefly, we can say that excessive use of chemical fertilizers may result in a general decline of soil structure, nitrate pollution of underground waters and the eutrophication of surface waters, while pesticides and insecticides expose farmers to toxic substances and can lead to more resistant strains of insect pests.

Chemical pesticides and fertilizers are not, however, the only agricultural inputs for which subsidies could be offered. The numerous benefits of organic manure include a marked capacity to maintain soil fertility and structure over time, in contrast to chemical fertilizers. For example, most sandy upland soils in northern Ghana could undergo tremendous beneficial change with the incorporation of organic manure, through the eventual improvement in their water retention capacity and the slowing down of leaching. In valley areas with clayey soils, organic manures render the earth more porous, allowing more water to infiltrate the

soil, thereby reducing surface run-off and erosion, and also reducing the likelihood of development of induration pans. Also most cultivable, tropical soils are highly acidic, and organic manure could buffer these soils against increasing acidity and toxicity.

On the question of pest control by the application of pesticides, most experts suggest the use of integrated pest management (IPM), which relies on a balance of biological and chemical control, along with changes in husbandry practices such as cropping patterns and the timing of irrigation (Dover and Talbot, 1987). Essentially, biological methods of pest control involve the introduction of a natural enemy into a pest-plagued ecosystem, and the subsequent maintenance of a population balance between the pest and the introduced enemy.

The above synopsis of the merits of environmentally friendly methods of fertilization and pest control suggests a strong case for agricultural subsidies to be redirected towards the development of locally relevant agricultural alternatives, which aim to realize the specific potential of each region in terms of both its ecological and cultural resources. Development, as Redclift argues, is tied up with the idea of progress and is a powerful concept to groups of different persuasions (Redclift and Sage, 1994). However, in a developing country like Ghana, development need not be equated with the introduction of new technologies and the provision of social services or increasing national incomes alone. More than anything, development must entail changes in the awareness, motivation and behaviour of individuals and in the relations between individuals and their agroecosystems (Verhelst, 1990). In this connection, Redclift convincingly argues that, notwithstanding the progress of science and technology, and the material improvements to which they helped give rise, development in its present context will encounter a more deep-rooted difficulty. For, if 'human progress can only be at the expense of destroying the environment, and ultimately the resources on which development depends, then development lacks credibility' (Redclift and Sage, 1994: 20).

In effect, this means development planners must realize that, in addition to the technical and physical solutions they often prescribe, attention must also be paid to the sociopolitical and sociocultural structures that help us to understand the conditions and dynamics of the livelihood systems which underlie agricultural production. Agricultural development is governed by the 'law of minima', where the most limiting factor conditions the entire development process (Mellor, 1961). Consequently, intervention to promote the development process must consist of progressively lifting the constraints that limit sustainable production and the improvement of the welfare within the household. In this regard, 'we need to develop a much deeper understanding of the relationships between human populations, their technologies, cultures and values and the natural capital (renewable and non-renewable natural resources) they depend on for life support, if we are to achieve sustainability' (Arizpe *et al.*, 1992: 61).

It is therefore essential for national governments to take steps to promote the full participation of their citizens in decisions that condition their very existence. This, to some extent, also involves the idea of self-reliance. In the Arusha Declaration, Nyerere (1967) indicated that the ideology of self-reliance within a nation and the ideology of the satisfaction of the basic needs of the people of a nation are closely related. It is by doing things for oneself, maintaining one's own self-confidence and making independent decisions either as an individual or within the context of a collective group that the significance of development can be brought to bear on society.

The government of Ghana has made attempts in recent years to decentralize political power by creating District Assemblies, the functions of which include the following:

- the overall development of the district;
- formulation and execution of plans, programmes and strategies for the effective mobilization of the resources necessary for the overall development of the district;
- the promotion and support of productive activities and social development in the district and the removal of obstacles to initiative and development;
- ensuring easy access to courts in the district for the promotion of justice;
- cooperating with the appropriate national and local security agencies, for the maintenance of security and public safety in the district;
- monitoring the execution of projects under approved development plans and assessing their impact on people's development in the local, district and national economy.

On matters affecting the environment, the Environmental Protection Agency (EPA) in Ghana has established 51 District Environmental Management Committees in eight of the 10 regions in the country to advise District Assemblies on environmental issues. The Committees are provided with technical assistance from officers of the EPA and encouraged to assess people's perception of the environment, prioritize action and ensure active public participation in environmental programmes. As a result of recent field work (Seidu, 1997), however, it has become clear that it is one thing to spell out such guidelines in policy documents and another to ensure that they are effectively implemented. The majority of the people in the northern region are illiterate, which hinders their ability to participate actively in deliberations regarding the issues outlined above. They are unable to articulate their views within the existing policy framework and, ultimately, have no option but to allow their interests to be debated for them by the educated elite of their communities.

CONCLUSIONS

Land degradation is not a new phenomenon in Ghana, nor is concern for it a recent development. Prior to independence, the colonial government became concerned about the extent of declining agricultural productivity, drought and general environmental deterioration, especially in the northern and upper regions of the country. Consequently, in 1949, the government established the Land Planning Scheme, essentially a local-level, integrated rural development and land use initiative that aimed to improve the environment and living conditions of people in these regions. Efforts have been made, since the beginning of this century, mainly by legislation, both to improve production and to protect the natural resource base upon which such production depends. Such legislation has been less than effective, however, because of ineffective target selection and implementation. In addition, environmental conservation initiated in the 1950s was suspended after independence and official policy shifted from the peasant farmer to large-scale mechanized farming.

A critical examination of the policies of colonial and post-independence governments reveals some gaps in the management of the country's resources which are perhaps the root cause of Ghana's environmental 'crises' today. First is the lack of institutional and political commitment to manage resources sustainably; second is the inability of governments to conduct their action programmes effectively; and third is the lack of commitment to pursue the interest of the social groups that dominate the rural farm economy.

The preceding discussion of the political ecology of Ghana has revealed that successive colonial and post-independent governments have lacked the institutional and political commitment to support small farmers in the pursuance of their everyday productive ventures. Governments' intentions and policies have always been geared towards introducing so-called 'modernization' practices into agriculture without actually creating the necessary conditions required to incorporate small farmers into the overall modernization process. This, as we have seen, has undermined the ability of small farmers to manage their environments sustainably and has resulted in degradation of the land.

NOTES

1. Ghana became an independent state in 1957 and a republic in 1960. Before becoming a republic, the country was known as the Gold Coast, a name given by the Portuguese because of the great quantity of gold that they found upon their arrival.
2. For more details on the effects of producer prices on agricultural projects and the environment, see Ewusi (1985), Lipton (1987), Repetto (1988) and Barrett (1989).
3. For a full account of the events that led to the *coup d'etat* of 13 January 1972, see Goldsworthy (1973) and Bennet (1972).
4. In 1987, there were 182 *cedis* per US dollar, since when it has continued to devalue. As of September 1996, the *cedi* stood at around 1400 per US dollar.
5. See Conway and Pretty (1989).

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31. Rural sustainability in Britain: the social bases of sustainability

Terry Marsden, Jonathan Murdoch and Simone Abram

INTRODUCTION

The 1990s have been marked in the British context by a growing environmentalization of the social sciences and of the policy-making community. Initially, concern focused on attempts to define the parameters of sustainability and to identify some coherence in its logic. This represented a particularly daunting prospect for rural sociologists, geographers and political scientists, given their long-standing problems and preoccupations in defining 'rurality'. The prospect of conflating woolly notions of sustainability with the rural created its own dangers of perpetuating the intractability of rural social science – just at a time when research funding opportunities were recognized as needing to deliver clear 'answers' to the contradictions in neoconservative rural Britain. This issue began to perplex the rural studies community, illustrating old tensions between positivistic and humanistic thinking and approaches. For instance, in a wide-ranging stocktaking of rural research which pertained to sustainability questions in 1992, Hodge and Dunn admit:

> A considerable volume of research has been undertaken in the past few years in the areas of social science relating to rural issues. This has informed our understanding, for instance, of socio-economic change in rural areas, of the changing characteristics of farm households, of environmental impacts and control. All of these areas potentially touch on concerns for rural sustainability although very little has addressed them directly. And yet there is a great deal of work which is required so as to establish the ways in which sustainability can be incorporated into rural affairs. The immediate requirement is to establish the criteria and methodologies by means of which the general principles of sustainability may be translated into the practice of sustainability. (1992: 108)

Since this time, despite some attempts to explore a research agenda (Murdoch, 1992) and to pursue sustainability questions through the integration of existing social theory (Drummond and Marsden, 1995) and knowledge systems (Murdoch and Clark, 1994), rural researchers have been somewhat subsumed under the growing wave of environmental research which has avoided the peculiarities of British rural change for what are seen as the richer pastures of global or urban concern. In particular, there has been, until recently, a marked reluctance to assimilate sustainability questions within a critical rural social science. This has meant that, where sustainability has been addressed, it has suffered from continuing to be rendered a largely economistic or physical/environmental problematic. As a result, academic discourse on rural sustainability has tended to marginalize its socially active significance, as social scientists have attempted continually to objectify it as a 'natural capital' phenomenon.

For instance, after striving for a conceptual framework within which to integrate sustainability and land use, Owens (1994) is forced to admit:

> It seems that principles of sustainability, applied to land-use change, return us to the familiar discourse of limits. Limits are inherent in the concept of sustainable levels of pollution and resource depletion; and they rapidly manifest themselves in the definition of environmental capacities in both the material and the post-material realms ... . There is a clear expectation that limits should establish the 'solution space' within which development proposals will be generated and contained. (1994: 451)

The inevitable social, political and cultural *construction* of where these limits are placed, who places and defines them, and how it becomes recognized that they are being exceeded in rural society, has been given scant attention. Sustainability as a discourse for creatively integrating resource conservation, the built environment, environmental quality and access, social equity, and social and political participation (see Blowers, 1993), seeing it as embedded in social organization (see Norgaard, 1994), is in its infancy in British rural debates. The critical rural studies literature, an area of significant vibrancy throughout the 1980s and 1990s, has been somewhat reluctant to engage and integrate sustainability notions or to appreciate the opportunities a creative integration of socially embedded 'nature' can suggest (Whatmore and Bouchier, 1994).

Nevertheless, the conditions are now emerging in the late 1990s whereby a more serious engagement can take place. It is important, initially, to outline what some of these conditions are, and then, through the examination of some key examples, begin to analyse what this means for the development of critical rural social science in Britain. In particular, we need to consider the role of uneven rural development and rural planning in debates about sustainability. Such an examination can begin to take scientific and policy debates about sustainability beyond its contested and contradictory definitional status. It begins to show how its themes highlight the contradictions in capitalist development and state regulation, and how these may no longer be seen as inevitable. What this suggests is that sustainability needs to be constantly linked to the (socially active) policy-making and policy-implementing process in socially embedded formations.

UNEVEN DEVELOPMENT IN RURAL BRITAIN

Economic restructuring and social change are leading to more distinct and differentiated countrysides in Britain and north-west Europe. Growing external pressures in terms of amenity and environment mean that the welfare and development trajectories of rural areas are affected by different combinations of external and internally generated pressures. These processes have been set in train for over a decade now as the postwar compromises of urban containment and agricultural productionism have declined in importance (see Marsden *et al.*, 1993). Charting this process of differentiating countrysides has also become more difficult within single or standard parameters, such as agricultural enterprise type or population growth or decline, giving way to more subtle changes associated with the constellation of public and private interests and institutions in particular places. Local and regional forms of regulation, through planning and economic development strategies, have begun to fill the gaps left by the deregulating national state, leading to greater variation in regional and rural trajectories.

This unevenness has most recently been expressed in the publication of three separate White Papers for England (Department of the Environment and Ministry of Agriculture, 1995), Wales (The Welsh Office, 1996) and Scotland (The Scottish Office, 1995) respectively, and their realization that local and regional actions will need to be relied upon in enhancing rural life in the face of the severe limits now imposed on deregulated national governments in developing universal public policies. The 'hollowing out' of the national state is being partially replenished by differentiated local and regional strategies, which are often, in themselves, responsive actions to the diminution of national public policy. As a result, and despite a considerable amount of national policy rhetoric concerning the development of sustainability principles (see Department of the Environment, 1994), the origins and progress of sustainability in rural areas is less likely to be implemented through nationally coordinated policies. The differentiation of rural Britain, together with the ideology of self-help, means that any changes in policy direction are likely to be more variable and subject to local and regional forms of institutionalization and implementation. In this sense sustainability policy or, more broadly, progress in integrating nature into rural development, is likely at best, to use Norgaard's (1994) phrase, to coevolve unevenly, alongside the economic development trajectories and social reorganization of different rural spaces. Marsden *et al.* (1993) and Murdoch and Marsden (1994) have begun to develop new typologies of this new differentiated British countryside. While these have not incorporated sustainability issues directly, they have focused on the significance of local institutional structures and power networks in evolving rural development. Consequently, it is worth outlining some of their characteristics in relation to the potential for the coevolution of uneven sustainability.

There are four generalized ideal types in the British countryside, the first of which is *the preserved countryside*. This is perhaps most evident in the English lowlands, as well as in the attractive and increasingly accessible uplands. These areas are characterized by established preservationist and anti-development interests and local decision making. While agriculture has recently been intensively practised, farmers are now seeing the benefits of diversification and of tapping into local demand from ex-urban groups. Concerns are most clearly expressed through middle-class fractions (Cloke and Thrift, 1990) who may impose their views through the planning system on would-be developers (Abrams *et al.*, 1996). In addition, demand from these fractions provides the basis for new development activities (often of a very exclusive kind), associated with leisure, industry and residential property. Rural change is thus a highly contested process articulated by different middle-class consumption interests who use the local political system to protect their environmental positional goods (Hirsch, 1978). The ways in which this occurs will be detailed below as an example of the growing use of sustainability discourses to promote the preserved countryside.

Second, *the contested countryside* is represented by those rural spaces which lie outside the core commuter catchments and, as yet, may be of no special environmental quality. Here farmers (as landowners) and development interests may still be politically dominant and thus able to push through development proposals associated with agricultural diversification and small industrial schemes. These are increasingly opposed by the recent waves of incomers who adopt the positions that are effective in the preserved countryside. Thus the development process is marked by increasing conflict between old and new groups.

Third, *the paternalistic countryside* refers to areas where large private estates and farms still dominate and the development process is decisively shaped by established landowners and farmers. Many of the large estates and farms may be faced with falling farm incomes

and are thus searching for new sources of income. In this sense, many are trying to translate agriculturally productive capital back into new forms of landed capital, by selling off redundant buildings or leasing land out to private farm management companies (see Whatmore *et al.*, 1990). Landowners and farmers are unlikely to be constrained in these strategies and they still take a long and custodial view of their land, property and village contexts, adopting a modified paternalistic and stewardship role in the rural community. These areas are less likely to be under great development pressure than either of the earlier two types.

Fourth is *the clientelistic countryside*. This is likely to be found in the remote upland rural areas where agriculture and its associated political institutions still hold sway, but where farming can be sustained only by state (UK, but increasingly EU) subsidy, such as per capita payments and welfare transfers for less favoured areas. Processes of rural development are dominated by farming, landowning, local capital and state agencies, usually working in close corporatist relationships. Farmers will be dependent on systems of direct agricultural and agrienvironmental support (for example, Environmentally Sensitive Areas (ESA) payments) and any external investment is likely to be dominated by employment concerns and the welfare of the rural community.

The above typology is an attempt to characterize the processes of uneven rural change as being driven by different sets of internal and external powerful interests. These in turn tend to 'create their own spaces', shaping rurality in different directions. In the *paternalistic* countryside we should expect landowners and farmers to still hold sway, not only, as Newby *et al.* (1978) suggested, in demarcating and upholding cheap agricultural labour markets, but also in shaping the degree of agricultural diversification and the shift of assets between agricultural operations and other land development opportunities. Moreover, the MacSharry reforms of 1992, creating greater incentives for set-aside and environmental conservation, coincided with the devaluation of the UK national currency (and the 'green pound') and the relative uplift in European regulated price support levels. Early evidence tends to suggest that this provided a fillip for the agile intensive producer, further creating the conditions for land concentration and intensive production in many parts of arable eastern England. In addition, the development, however patchy, of agrienvironmental measures (such as farm stewardship and ESA schemes) in the intensively farmed areas has further recognized and reinforced the custodial property rights of farmers and landowners, with their traditional representative bodies, the National Farmers' Union (NFU) and the Country Landowners Association (CLA) now more eager to assimilate the post-productivist countryside as long as it is shaped around the commodification of their members' property assets. In this sense, then, the hegemony of the landed classes in the paternalistic countryside has been far from a static phenomenon in the post-productivist era. Indeed, partly because of the incremental and partial nature of many of the policy reforms (that is, failing to really address sustainability issues and upholding agricultural property rights), they have been able to maintain their local and regional grip in many of the most intensively farmed (and thus potentially unsustainable) parts of rural Britain. Agrarian paternalism has adapted to both local and external demands by accommodating the environmental stewardship of agricultural land. And, with the current absence of a rump of preservationist middle class, the degree to which the landed classes can truly deliver the alleged benefits of this broadened stewardship role remains largely unassessed at the local level.

In the *clientelistic* areas of upland marginal Britain, where rural economic development concerns sit side-by-side with growing formal environmental protection and continued

agricultural state support as a multifaceted system of public welfare from Whitehall and Brussels, it is the growing dominance of the representatives of the 'provider' agencies which begins to shape developments. In addition, given that many of these areas have traditionally been the sources of extractive industries (for example, coal, water and energy) and, because of their physical remoteness and weak labour markets, prone to the relocation of waste, and toxic and defence industries, the privatization of most of these utilities in Britain over the past decade has also tended to increase their reliance upon the private providers of jobs in these areas. As a result, for instance in Wales and in parts of Cumbria, one now sees the emergence of some interesting juxtapositions of private and public clientelism, where National Park authorities, mining firms and public and semi-privatized development agencies (such as English Partnerships) play influential roles in the shaping of these rural spaces. In these areas, the relationships and dependencies between the provision of jobs and the provision of consumption spaces for amenity come into stark relief (Munton, 1995). And as a result of the weak labour markets and the dependencies these bring in terms of the powers of inward investors to bargain with public authorities, it means that the outcomes for environmental care and plan making are of an increasingly different order and shape than in the other types of countryside developed here.

Such tendencies begin to provide a clearer understanding of the relative constraints local planning experiences in its attempts to develop more alignment with sustainability objectives (see Rydin, 1996; Roberts, 1995; Selman, 1995). There is considerable hope on the part of many planning scholars that the planning system can readily grasp the opportunity it seems to have been given by the national government to play an explicitly central role in delivering sustainability policy (see Department of the Environment, 1994) and, armed with the statutory duty since 1991, to produce district-wide local plans (HMSO, 1991) which incorporate integrated land use concerns. However, the realization of these objectives will depend upon an appreciation of the local and regional contextual constraints which the differentiating countrysides outlined here actively create. Local plan making may have increasingly to reflect the variability of rural space and the local and regional interests which shape it. However, there is no guarantee that the level of compliance and consistency will not be subject to different development pressures, empowered as they are by their existing social formations in particular places and regions.

In addition, and this requires much more research, it is not clear *whether* or *how* notions of sustainability will be translated and embedded into the social and physical shape of the differentiating countrysides. We can begin to examine this with reference to empirical research conducted around plan making in parts of the *preserved* countryside (Buckinghamshire), where sustainability discourses during the mid-1990s began to insinuate themselves into both the pro- and anti-development networks associated with the plan-making review process.[1]

SUSTAINABILITY DISCOURSES IN THE PRESERVED COUNTRYSIDE: THE RECONSTITUTION OF 'MIDDLE ENGLAND'

Notions of sustainability began to infiltrate the plan-making process in Buckinghamshire and other counties in the south east in the early 1990s. The Buckinghamshire structure plan review process 1991–6 began notionally to pay at least passing reference to the Rio

conference, the European Fifth Action programme and the specific implications these have for sustainable settlement planning (see Breheny, 1992). This mainly concerned a recognition of the need to encourage the lowering of energy consumption through considering reductions in commuting, the size and spacing of settlements, and the further need to develop and maintain (rural) environmental protected areas beyond existing Green Belt and AONB (area of outstanding natural beauty) designations. In other words, notions of sustainability were pragmatically fitted into the established land use discourse of formal planning, as an additional adjunct to the 'Abercrombie' style of settlement planning long dominant in the pressured areas of south-east England. With diverse demands from preservationists, this immediately raised the question for the planners of the degree to which non-statutory environmental protection could be justified in the face of a strong development lobby. In addition, in consultations with 'the public', it becomes clear that the formal planning operationalization of sustainability becomes restricted. Middle England expects more from the sustainability discourse.

Debates about rural development and protection focus on the relationships between development interests (particularly house and road builders), very active village preservationist groups, and the county and district planners (Abram *et al.*, 1996; Murdoch *et al.*, 1996). Planning becomes the central arena for the struggles over the reshaping of rural property rights. In the forward strategic plan-making process we observed the ways in which established middle-class preservationist groups, particularly in the Green Belt, and AONB areas in the south of the county, began to articulate discourses of sustainability to further their already entrenched and powerful positions in restricting developments in 'their patch'. For these groups, sustainability meant further protectionism in *their* local areas, but the result, in the context of overall county forecasts for growth, was inevitable further development in the less protected areas of the north of the county. They were supportive of the planners' aims of using sustainability arguments to further justify the concentration of settlements as a major plank of settlement policy. In this sense, the focus upon the maintenance of settlement concentration added renewed weight to the established arguments of the protectionist interests. The adoption by the planners of rationalist and technocratic planning definitions of sustainability (see Hajer, 1996) tended to fit the needs of political members and preservationist interest groups. In turn, this tended to exacerbate the rural/urban distinction, with much more credence being placed on the preservation of the rural, and the untrammelled internal growth of the urban. Indeed, urban representative groups were underrepresented in the consultation activities, including the Enquiry in Public (EiP).

The developers' interests and position were, not surprisingly, somewhat different, even though they accepted some of the tenets for improving sustainability. The House Builders Federation pointed to the imbalance of regulation between jobs and housing in the new proposals, and the degree to which this could lead to an increase in commuting, particularly in and out of the existing Green Belt and AONB areas. This inbuilt 'distortion' would increase energy consumption, with more flexibility needed in the size and spacing of settlements. An alliance of developer interests between the roadbuilders and the housebuilders began to realize the benefits of linking the promotion of small town and village bypasses as a 'sustainable' policy for improving the quality of life in their centres, with the possibilities for redefining 'boundaries' and village envelopes to justify extensive village housing 'infill'. Using the sustainability discourse to shoehorn new housing, retailing and road building into selected small towns and villages demonstrates how the incorporation of sustainability in

the areas of the preserved countryside is adopted by some of the more powerful development and anti-development groups. It is becoming another dimension upon which the battles to protect Middle England are fought. Fuelling these contestations is an approach to planning which firmly sits within a revitalized technicist and rationalistic frame, enabling the incorporation of some of the tenets of general sustainability into the tried and tested settlement planning formulae. This approach undoubtedly accords with the extant preservationist interests, in that it reinforces the 'cleanliness' of *their* rural spaces, now as harbingers of the sustainable tomorrow.

The playing out of these sustainability discourses in the preserved countrysides of Middle England does not come without their underlying contradictions, however. In this sense it is important to ask whether or by what means the ostensibly 'public interest' function of planning should be representing the specific needs of a sizeable section of the rural middle class. Moreover, however coherent the sustainability aims of the local planners may be, they do have to wrestle with the unequal sociospatial and environmental consequences their continual adherence to a traditional settlement planning position creates. In this sense, as some of the development interests suggested, how can the policy of a restricted Green Belt be 'sustainable' when it distorts the journey to work and creates greater gulfs between work and residence? The failure to seriously address the 'lack of fit' between traditional planning tools like the Green Belt and AONBs, and the social and spatial dynamics implicit in a serious concern for sustainability allows, for the time being at least, the continued *preserved* countryside to be maintained. It is, as Bauman (1991) suggests,

> What is left outside of the confines of rational discourse which is the very issue that stands a chance of making the discourse rational and perhaps even practically effective: the political issue of democratic control over technology and expertise, their purposes and their desirable limits – the issue of politics as self-management and the collectively made choices. (1991: 276)

In the long term, there is considerable doubt as to whether the social and political practices outlined here for the *preserved* countryside can withstand the regional pressures for development or, more specifically, whether, with the aid of a compliant planning system, the rural middle classes can maintain their spatial and positional grip on key parts of preserved (and prosperous) rural space. Ironically, it is most likely that the renewed call for strong and strategic regional planning (see Roberts, 1995; Morphet and Hams, 1994), fashioned to the needs of the powerful in the preserved countrysides, will be the most effective guarantor of its basic features. The current calls and growth of activity for more specific regional guidance are an area worthy of close scrutiny, as the realization dawns that the scale and differentiation of rural restructuring continues to create social and political pressures which demand specific treatment for those powerful groups caught up in particular spaces.

'TRICKLE-DOWN' PRESERVATIONISM OR AUTONOMOUS DIFFERENTIATION?

The conditions briefly defined above concerning the reconstitution of the *preserved* countryside, and the particular use that is made of the sustainability discourse by its most powerful actors and agencies, create important questions about the temporal and spatial diffusion of the preserved countryside model in the UK, if not in rural north-west Europe more generally

(see Hoggart *et al.*, 1995; Marsden, 1995). We wish to emphasize an interpretation which promotes the notion of the *differentiating* countrysides, with many social and political features of the 'clientelistic' and 'paternalistic' rural spaces following their own, perhaps increasingly autonomous, trajectories, supported by their derived institutionalized frameworks and patterns of governance. Nevertheless, many commentators agree that even within these spaces outliers and pockets of regionally adjusted preservationism are taking hold, even though these may be far less dominant politically or economically.

In the *contested* countryside of Devon, for example, where the economy, society and culture are dominated by farmer, landowner and other small and medium-sized businesses, a high degree of self-employment and high levels of owner-occupation amongst farmers and residents (Flynn and Lowe, 1994), the contestations often occur along development/preservationist lines, even though these may involve significantly different constituencies of interest. For instance, the incidence of retirement groups and small industrialists creates much local conflict for planners (see Grant, 1977). The development of the *contested* countryside, nevertheless, evolves its own social momentum around sustainability concerns. For instance, the coincidence in Devon of intensive livestock production and the newly arrived ex-urban residential groups is causing a heightening of local public consciousness of farm-level pollution, and informal policing by residents of neighbouring farms (Ward and Lowe, 1994; Ward *et al.*, 1995). The continued surges of non-metropolitan population growth in the 1980s tended to focus on these remoter and traditionally agrarian areas. It was the rural areas, and resort, port and retirement areas, which grew the most (Champion, 1993), with the biggest increases in Northamptonshire, the Isle of Wight, Lincolnshire, Dyfed, Gloucestershire and Devon. Together with an enhanced social concern for clean environments and a growing scepticism about intensive farm practices, local farmers in these contested areas are being subjected to the close moral scrutiny of the new rural middle classes. This has meant that many of them 'have become the eyes and ears of the regulators, both in Devon and in many other areas, pressure has been brought to bear on government, the National Rivers Authority and the magistrates' (Ward *et al.*, 1995).

The potential criminalization of members of the local farm population may not be the most socially sustainable form of impact to have developed in these areas, but it is indicative of the degree to which issues of environmental care are variably expressed in the differentiating parts of the modern British countryside. Also it indicates the need for policy analysts as well as rural scholars to take heed of the different local and regional definition of sustainability concerns in the context of social, economic and regulatory change.

While it may seem in an aggregate sense, then, that the logical diffusion of the *preserved* countryside is occurring in line with the diffusion of the middle-class population and the associated service sectors it requires, this is a gross oversimplification. The differentiating countrysides, situated in their local and regional contexts, have the power socially and politically to mould incoming groups and external relationships in such a way that they interact and express themselves in different ways. Moreover, the incomers are likely to react differently to the particular environmental conditions facing them, and the local networks and arenas of power that are already established. It is in the *content of these networks*, how they remain established and how they accommodate new pressures, that the potential to advance, or otherwise, differentiated sustainability lies.

Each of the differentiating countrysides outlined here have 'arenas of representation' which fuse certain powerful actors to their changing contexts for action (see Lowe *et al.*,

1993). We thus need to focus upon these complex processes which give rise to both unsustainable and sustainable development in the countryside. Within these (economic, social and political) processes various actors and networks of actors are attempting to achieve outcomes commensurate with their aims. They represent themselves using whatever means (social, material, economic, political or knowledge-based) are at their disposal in various arenas. Recently, sustainability discourses have emerged as one means of representation.

It follows from this that, for significant changes to occur in the adaptation towards rural sustainability, the very idea will have to capture the consciousness of these networks as a progressive social endeavour. Thus the technological or organizational fixes which notions of ecological modernization and more general models of sustainability espouse (Hajer, 1996), or the more specific planning scholars' concerns with defining a new aggregate role for environmental planning (see Selman, 1995), will not do for the differentiated countrysides of Britain.

The considerable depth of empirical evidence on contemporary change in rural Britain since the demise of the agricultural productivist model and the coherence of a national strategy for the countryside suggests that any normative progress towards sustainable development will have to be socially designed and be incorporated by the differing networks of power (at the very least) as socially progressive. From the above analysis, it would seem that this may be even harder to achieve in the prosperous parts of preserved Middle England, where the positionality of rural living is so firmly embedded. In addition, there can be little confidence in the existing institutional frameworks (such as preservationist planning with a revitalized rationalist base) in attempting to foster such progressive, rather than positional, social consciousness. In these areas the social progressiveness of sustainability is so far restricted to those preservationist groups who have most to lose from the abandonment of traditional land use planning tools and logics. It may be that, somewhat ironically, and in completely overturning our earlier modernist notions of economic centrality and peripherality (see Goodwin *et al.*, 1995), it is in the clientelistic and paternalistic rural regions where such progressive notions could more easily be fostered and grafted onto their more developmental institutional forms and public concerns.

In conclusion, we wish to posit some of the new parameters for a more regionally sensitive sustainability agenda, which we see as more appropriately beginning to fit the differentiating countrysides of rural Britain and which start to provide a renewed agenda for comparative rural research.

TOWARDS SUSTAINABLE MODERNIZATION?

It follows from the above account that we should expect regionally different sustainability strategies to develop given the differentiating countrysides outlined in modern Britain. Despite national policy rhetoric, the progressive removal of universalist and state welfare national policy goals, at the same time as the particular demise of national agricultural and rural strategies, means that any progress towards sustainability goals will have to rely upon their social progression in a regional and local context. This means that the social organization of progressive notions of sustainability will have to be socially rebuilt in the context of existing institutional structures and networks which typify the different rural spaces of Britain. This requires extending the current way of thinking concerning ecological moderni-

zation (as essentially technological 'fixes' to meet environmental risks) in two directions: first, by incorporating regional and rural diversity into debates and models, and second, by emphasizing the need to consider the social dynamic in creating progress in sustainability goals.

In parts of the *clientelistic countryside*, for instance (such as rural Wales), the degree of regional institutional development built around economic as well as environmental concerns *could* facilitate the emergence of more sustainable forms of modernization. In addition, in many of these areas, the level of community involvement and identity is high, even though its motivations and direction may not yet assimilate sustainability issues to any large degree. While it is in these regions that the pressure to accept any development as good development remains a strong argument on employment grounds, there are opportunities for planners, politicians and the networks of interest to rethink development strategies, integrating safe environmental and consumption strategies with economic development.

In this regard, there is a lot of important work for the rural social scientist to undertake in advancing notions of sustainable modernization in the rural context. We need a much more sophisticated and comparative analysis of the differentiating countrysides outlined briefly here so as, at the very least, to understand how combinations of externalized and internal networks of social action influence rural development; and then how they may advance sustainable goals *in that specific developmental context*. In this sense, we have to engage conceptually and empirically at the local and regional levels, looking at the organization and participation in networks, the possibilities for the definition of production and consumption links, and the use of locally 'mined' resources, including those associated with local cultural identity. This involves incorporating some quite imaginative actor-oriented notions in planning as social design and organization, of suggesting alternatives on the basis of critical analysis and in developing cases studies of unsustainable and partially sustainable alternatives. Such approaches need only make a passing reference to the scientistic definition of limits, placing emphasis rather on the relative and highly differentiated construction of value, as conceived and advanced by the sets of local and non-local actors involved. As O'Riordan and Cobb (1996) have argued concerning sustainable agriculture debates, for instance, there is no point in arriving at an agreed version of sustainable agriculture, given the limitations of scientific knowledge and the growing differences of opinion in society (and in different regions) about what farms are really for. Rather, we need to begin to treat sustainability as conceptually and empirically integrated into our social analysis of rural change and diversity. Observing rural Britain today suggests that sustainability is neither an absolute nor an objective phenomenon. It should begin to provide the stimulus for a more imaginative and critical debate about the comparative position of rurality in modern society.

NOTE

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