A HISTORY OF NATURAL RESOURCES IN ASIA

The Wealth of Nature

Edited by

GREG BANKOFF AND PETER BOOMGAARD

A History of Natural Resources in Asia

This page intentionally left blank

A History of Natural Resources in Asia

The Wealth of Nature

Edited by

Greg Bankoff
and
Peter Boomgaard

palgrave
macmillan

A HISTORY OF NATURAL RESOURCES IN ASIA

Softcover reprint of the hardcover 1st edition 2007 978-1-4039-7736-6

First published in 2007 by
PALGRAVE MACMILLAN™
175 Fifth Avenue, New York, N.Y. 10010 and
Houndmills, Basingstoke, Hampshire, England RG21 6XS
Companies and representatives throughout the world.

PALGRAVE MACMILLAN is the global academic imprint of the Palgrave Macmillan division of St. Martin's Press, LLC and of Palgrave Macmillan Ltd. Macmillan® is a registered trademark in the United States, United Kingdom and other countries. Palgrave is a registered trademark in the European Union and other countries.

ISBN 978-1-349-53744-0 ISBN 978-0-230-60753-8 (eBook)
DOI 10.1057/9780230607538

Library of Congress Cataloging-in-Publication Data is available from the Library of Congress.

A catalogue record for this book is available from the British Library.

Design by Newgen Imaging Systems (P) Ltd., Chennai, India.

First edition: September 2007

10 9 8 7 6 5 4 3 2 1

Printed in the United States of America.

Contents

List of Figures

This page intentionally left blank

List of Tables

This page intentionally left blank

Contributors

S. Robert Aiken was educated in the UK, Canada, and the United States. He is a cultural and historical geographer with a long-standing interest in tropical deforestation and environmental change in Southeast Asia, focusing mainly on Malaysia and Indonesia. He is presently working on indigenous land rights issues in Malaysia. Dr Aiken is coauthor (with C. H. Leigh) of *Vanishing Rain Forests: The Ecological Transition in Malaysia* (Oxford: Oxford University Press, 1992/1995) and author of *Imperial Belvederes: The Hill Stations of Malaya* (Kuala Lumpur: Oxford University Press, 1994). He is a professor of geography in the Department of Geography, Planning and Environment at Concordia University in Montreal.

Greg Bankoff is a social and environmental historian of Southeast Asia and the Pacific. In particular, he writes on environmental–society interactions with respect to natural hazards, resources, human-animal relations, and issues of social equity and labor. He is professor of modern history in the Department of History, University of Hull. Among his publications are *Crime, Society and the State in the Nineteenth Century Philippines* (Manila: Ateneo de Manila University Press, 1996) and *Cultures of Disaster: Society and Natural Hazard in the Philippines* (London: RoutledgeCurzon, 2003). He is also coeditor of *Mapping Vulnerability: Disasters, Development and People* (with Georg Frerks and Dorothea Hilhorst, London: Earthscan, 2004).

Peter Boomgaard is senior researcher at the Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV), Leiden, and professor of economic and environmental history of Southeast Asia at the University of Amsterdam. He was the editor of the series of historical-statistical publications entitled *Changing Economy in Indonesia*. Peter Boomgaard was also director of KITLV. His main publications are *Children of the Colonial State: Population Growth and Economic Development in Java, 1795–1880* (Amsterdam: CASA, 1989), *Frontiers of Fear: Tigers and People in the Malay World 1600–1950* (New Haven/London: Yale University Press, 2001), and *Southeast Asia: An Environmental History* (Santa Barbara: ABC-CLIO, 2007).

Francesca Bray's research focuses on the history and anthropology of science and technology. Her first book was the volume on *Agriculture* in

Joseph Needham's series *Science and Civilisation in China* (Cambridge: Cambridge University Press, 1984). Subsequent publications include *The Rice Economies: Technology and Development in Asian Societies* (Oxford: Basil Blackwell, 1986), *Technology and Gender: Fabrics of Power in Late Imperial China* (Berkeley: University of California Press, 1997) and *Technology and Society in Ming China (1368–1644)* (Washington DC: American Historical Association-Society for the History of Technology, 2000); a coedited volume, *The Warp and the Weft: Graphics and Text in the Production of Technical Knowledge in China*, will appear in 2007 (Leiden: Brill). After nearly twenty years at the University of California, Bray is now professor of social anthropology at the University of Edinburgh.

Raymond Bryant is a Reader of Human Geography at King's College London where he has taught since 1993. He has produced five books and numerous articles on theory and practice in political ecology, multiactor networks in environmental management, as well as the historical and contemporary politics of Southeast Asian environmental change. His books include *The Political Ecology of Forestry in Burma 1824–1994* (Honolulu: University of Hawaii Press, 1997), *Environmental Management: New Directions for the 21st Century* (with Geoff Wilson, London: Taylor and Francis, 1997), *Third World Political Ecology* (with Sinead Bailey, London: Routledge, 1997), and *Nongovernmental Organisations in Environmental Struggles: Politics and the Making of Moral Capital in the Philippines* (New Haven: Yale University Press, 2005). He is currently conducting research on the "alternative" organic and fair trade sectors, the history of teak consumption, and the political ecology of the rich and famous.

Michael Charney received his Ph.D. in History from the University of Michigan in 1999 with a thesis examining the emergence of Theravada Buddhism in early modern Burma. He is senior lecturer of Southeast Asian history at the School of Oriental and African Studies, University of London. He has written extensively on early modern Burmese history, Buddhist monasticism, Western technology in Burma, Southeast Asian warfare, and migrant communities. His most recent publications are *Powerful Learning: Buddhist Literati and the Throne in Burma's Last Dynasty, 1752–1885* (Ann Arbor: UM CSEAS, 2006) and *Southeast Asian Warfare, 1300–1900* (Leiden: Brill, 2004).

Gregory Clancey is an associate professor of history at the National University of Singapore, where he teaches modern Japan and the history of science and technology. He received his Ph.D. from the Doctoral Program in the History and Social Study of Science and Technology at MIT in 1999. Much of his research has focused on natural disasters and the concept of emergency, though he is also interested in cities, planning, and architecture, particularly in Asia. His book *Earthquake Nation: The Cultural Politics of Japanese Seismicity* was published in 2006 by the University of California Press. He has coedited *Major Problems in the History of American Technology*

(Boston: Houghton-Mifflin, 1998) and *Historical Perspectives on East Asian Science, Technology, and Medicine* (Singapore: Singapore University Press, 2002), and his articles have appeared in journals such as *Urban Studies*, *Asian Studies Review*, *Modern Asian Studies*, and *Cultural Politics*.

Mary Somers Heidhues has taught at universities in Germany and the United States, most recently as visiting professor of Southeast Asian studies at the University of Passau. Her research has concerned the history and politics of Southeast Asia and the role of ethnic Chinese minorities, especially in Indonesia. She is the author, among others, of *Southeast Asia: A Concise History* (London: Thames and Hudson, 2000) and *Golddiggers, Farmers, and Traders: The Chinese in West Kalimantan, Indonesia* (Cornell University Southeast Asia Program, Ithaca, 2003). A recent focus is on travelers and their perceptions of the region.

David Henley is a geographer whose interests include the agricultural and demographic history of Indonesia. He obtained his Ph.D. from the Australian National University in 1992, and currently works as a researcher at the Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV) in Leiden. Among his publications are *Fertility, Food and Fever: Population, Economy and Environment in North and Central Sulawesi, 1600–1930* (Leiden: KITLV Press, 2005) and (as coeditor and contributor) *Smallholders and Stockbreeders: Histories of Foodcrop and Livestock Farming in Southeast Asia* (Leiden: KITLV Press, 2004).

John Kleinen is a senior lecturer at the University of Amsterdam (UvA), the Amsterdam School for Social Science Research (ASSR) and the Centre for Maritime Research (MARE). His field research in Vietnam has focused on the revival of religious practices, on coastal zone development and fisheries. Major publications are *Facing the Future Reviving the Past: A Study of Social Change in a Northern Vietnamese Village* (Singapore: ISEAS 1999); *Cambodia* (Amsterdam: Royal Tropical Institute, 1989; 2004); *Vietnam* (Amsterdam: Royal Tropical Institute, 1993); *Vietnamese Society in Transition* (Amsterdam: Spinhuis/IIAS, 2001) and contributions to books and articles about colonial ethnography, religious practice, and visual anthropology. His current research interests are the meaning of civil society for transitional societies, religion, and society in Southeast Asia, maritime piracy and the environmental effects of changes in climate, water levels, and the use of land and natural resources.

Kathleen Morrison is professor of anthropology and director of the Center for International Study at the University of Chicago. She received her M.A. from the University of New Mexico and her Ph.D. from the University of California, Berkeley. Her publications include *Fields of Victory: Vijayanagara and the Course of Intensification* (New Delhi: Munshiram Manoharlal, 1995, reprinted 2000), *Empires: Perspectives from Archaeology and History* (Cambridge: Cambridge University Press, 2001), *Forager-Traders in South and Southeast Asia: Long-Term Histories* (Cambridge: Cambridge University

Press, 2002), and numerous articles in academic journals and edited volumes. She has been conducting fieldwork in India since 1985; formerly codirector of the Vijayanagara Metropolitan Survey, she is now codirector of the Early Historic Landscapes of the Tungabhadra Corridor project.

Baas Terwiel has been professor for languages and cultures of Thailand and Laos at Hamburg University since 1992. Previous positions include an extraordinary chair for Mainland Southeast Asia at the Universiteit Leiden (1999–2004) and various teaching posts in Louvain, Canberra, and Munich. Among his publications are *Monks and Magic* (Lund: Studentlitteratur, 1975), *Through Travellers' Eyes, an Approach to Early Nineteenth-Century Thai History* (Bangkok: Editions Duang Kamol, 1989), *Shan Manuscripts* (Stuttgart: F. Steiner, 2003), and *Engelbert Kaempfer in Siam* (Munich: Iudicium, 2004).

Preface

This volume has its origins in a workshop entitled "The Wealth of Nature: How Natural Resources Shaped Asian History, 1500–2000" held in May 2004 at the Netherlands Institute for Advanced Study in the Humanities and Social Sciences (NIAS) at Wassenaar, the Netherlands. The workshop was the culmination of a very productive and memorable year spent at NIAS by a research nucleus consisting of Robert Aiken, Greg Bankoff, Peter Boomgaard, John Kleinen, and Baas Terwiel between September 2003 and June 2004. The nucleus studied various aspects of the environmental history of Southeast Asia between 1500 and 2000 with a focus on the mutual interaction of humans and nature. The research encompassed natural and human-induced changes as well as the ways in which the environment influenced human behavior and how environmental change led, in turn, to behavioral change. Within this rather broad theme, however, the group particularly focused on the exploitation of natural resources. This theme was picked up and expanded during the workshop. All chapters but one in this book are based on papers presented there and a contribution was written specifically for this volume.

While the emphasis of the workshop was firmly on Southeast Asia, it was felt that the scope and breadth of the discussion would be immeasurably enriched by comparison with East and South Asia, and experts in those regions were duly included among the participants. The fact that Southeast Asian environmental history is less well developed than that of other Asian regions warranted such an emphasis on the former in our view. This is the first environmental history volume ever in which so many Southeast Asian countries are represented covering such a long period.

In the realization of this study, we would like to extend our appreciation to the various institutions that have funded the workshop and the book. Foremost in this respect is NIAS that housed (and fed) the research nucleus and the workshop. Not only are the buildings set in a magnificent "natural' environment"—the forested dunes of Wassenaar—but its staff did everything in its power to create an atmosphere conducive to research and to make residing there both pleasant and productive. A special debt of gratitude is owed to the English language editors and the library staff of NIAS.

We are also grateful to the Netherlands Organisation for Scientific Research (NWO), The Hague, and the International Institute for Asian

Studies (IIAS), Leiden, for additional funding. Without their support, the task of assembling such a diverse and far-flung group of scholars would have been much more difficult if not impossible to effect. Finally, we would also like to express our gratitude to the publisher, Palgrave Macmillan, for bringing this informative volume to press. It has been a pleasure working with them.

Introduction: Natural Resources and the Shape of Asian History, 1500–2000

Greg Bankoff and Peter Boomgaard

Historians of Southeast Asia have often ignored the question of natural resources, mainly accepting them as a given and passing on to what they identify as the central issue, trade. Anthony Reid's important two-volume revisionist history of the region even goes so far as to classify the early modern period as "an age of commerce," emphasizing exchange as the economic activity of significance (Reid 1988–93). Yet exchange is only one aspect of a process that includes both the market destination and the production source as part of a global commodity chain. And while it is certainly not our intention to ignore any of these components, the focus of this volume is on the way the extraction and export of natural resources affects the development potential of the societies and locations wherein they lie (Bunker 1984). Southeast Asia has never been just an entrepôt, simply a "gate to China" through which goods produced elsewhere passed. It has also been an important supplier of raw and semiprocessed materials. It has historically been part of a worldwide, if bounded, network of exchange that predates 1500 and that tied the region closely to India, China, and Japan (Abu-Lughod 1989). That this network evolved over the past five centuries into a global commodity system in no way lessens the significance of the preexisting ties and their effects on the peoples and environments of the region.

The central concern in this volume is the paradoxical question that has intrigued scholars of all persuasions and disciplines for generations: does the presence of natural resources within the territorial confines of a state predispose its inhabitants to material prosperity and well-being or does it lead ineluctably to exploitation and immiseration? Are they a blessing bestowed by Nature or a curse made by Man? Even attempting to answer this riddle requires first trying to determine what exactly a natural resource is and coming to the conclusion that it does not so much exist as it is made to become (Zimmermann 1933). That is, what constitutes a natural resource is determined more by utility than by any innate properties. As such, of course,

it is a culturally defined artifice, dependent on the relation of a people to their environment at any given time. It has even been argued that the very concept of a natural resource with "the feeling tones that it carries" is very much the product of Western industrial capitalism's "insatiable appetite" to seek out new sources and novel ways of consuming Nature's prodigious bounty and that it is doubtful whether any other societies ever regarded the natural world in quite the same way (Spoehr 1956, 93).[1] While so categorical a distinction between "industrious" and "industrial" societies seems to create an unjustifiable dichotomy between non-Western and Western ones, clearly the technological innovations and mass consumer demands of the nineteenth and twentieth centuries were of an unprecedented order and have much bearing on our current understanding of the term (de Vries 1994).

What Are Natural Resources?

The "wealth of nations" that Adam Smith had in mind in his treatise on economic development (and after which the subtitle of this book is a pastiche) was still primarily agricultural—the productivity of the land. And agricultural products certainly comprise an important aspect of natural resources. While recognizing agriculture's relative profitability and continuing ability to absorb capital, Smith realized that the availability of abundant mineral deposits and an expanding population would likely herald more intense industrial development and high profit in this sector (Kula 1998, 14–21). Minerals, therefore, also constitute an important aspect of natural resources. Thus agriculture and mining, to which can be added forest products and marine resources, constitute the basis of any discussion of natural resources. A further distinction, however, needs to be drawn between those that are perceived as renewable and those that are not. Renewable resources are those that regenerate themselves such as trees, plants, and animals, while nonrenewable resources are ones that are exhausted through extraction such as oil, coal, or tin. In fact, all resources are renewable in a sense but the issue is over what period of time; geophysical processes will recreate deposits of oil, coal and tin but only in the course of millennia. The whole concept of renewability is intimately linked to a human dimension of time as measured in terms of seasons or decades. Correspondingly, all natural resources can be utilized in a nonrenewable manner; that is, utilized over too short a period of time to allow regeneration naturally and so become exhausted in this manner (Davenport and Scapple 2005, 277–79).[2] This notion of temporality is not only central to how natural resources are categorized but also lies at the heart of what constitutes a resource. Without demand, a plant or mineral is just that and nothing more. Only when people find a use for a material does it become a resource. Demand and culture, however, vary over time: today's resource can be yesterday's waste product and vice versa. The Dutch East India Company (*Vereenigde Oostindische Compagnie* or VOC) officials' hunger for ship-timbers in the seventeenth and eighteenth centuries led them to differentiate only teak or *jati* from other tropical hardwoods on Java and

to dismissingly label as mere "wild wood" trees that are today so sought after by loggers for export (Boomgaard 1988).[3]

Early political economists did not recognize natural resources as a form of capital and failed to incorporate them into their analysis of economic activity. While Adam Smith and David Ricardo acknowledged that nations differed in their natural and material endowments, indeed both saw the huge inflow of silver and gold from the Americas as having had important consequences on the trade, money supply and rate of investment in Europe, such materials were accorded value only in the form of rent, where the latter is defined as the sum paid to the "landlord" for use of that portion of the earth's produce. For Karl Marx, "nature" was the location and source of raw materials that were transformed through the productive power of labor and industry but was not inherently valuable in itself (Ciccantell and Smith 2005, 2–8). More recently, though, scholars have begun to think of resource endowments as constituting "natural capital." The concept includes not only the material and energy inputs into production but also the environment's role as a sink for waste emissions and in the provision of ecological services required to sustain production such as nutrient recycling, catchment functions, habitat support, and even climate regulation (Barbier 2005, 11). Of central interest, therefore, is the relationship between physical and human capital and this natural capital, or what Edward Barbier calls the total capital stock, and whether it leads to sustainable development.[4] Much concern now arises out of the realization that the current economic development may have led to the rapid accumulation of physical and human capital at the expense of the degradation and absolute depletion of natural capital. In contrast to the other two, the services provided by natural capital are unique both in the nature of their resource endowments and in the life support services that they provide. Some economists see this as largely a matter of aggregates; that as long as natural capital is replaced by even more valuable stocks of physical and human capital there is no need to reconsider present development paths. Others, however, maintain that the "essential" qualities of natural capital are irreplaceable and their exhaustion an irreparable loss to future generations and their quality of life (Barbier 2005, 15–17).

The notion of a natural resource, however, depends not just on its physical properties and material endowments but also on factors such as its potential markets and transport. While the need to consider the demand for a product is more obvious, the means of conveying it there is perhaps less so. Transport is crucial to what constitutes a natural resource, as the site of cultivation or extraction frequently lies far from the principal place of consumption. Until the nineteenth century, transportation was generally costly, complex, and frequently hazardous, constraining the transfer of bulky goods over even quite short distances. Distance itself is also a constructed notion depending on social, economic, and scientific factors that are historically contingent; that is, they change over time. Political-economists often refer to these factors as constituting global commodity chains of labor and production whose end results are finished commodities (Hopkins and Wallerstein

1986, 159). Location astride these chains is all important, not least as higher levels of profit and surplus are generally realized at each stage and especially during the latter ones. The comparative advantage of any location is not just naturally and socially created but is also specific to a respective moment in world economic history (Bunker and Ciccantell 2005, 103). Such moments often prove to be fickle and a change in circumstances brought on by technological innovation or market preference can just as easily reverse a comparative advantage and a favorable situation. Over time, moreover, the organization of these chains has tended to become more demanding: the pace of transactions more rapid, the areas encompassed larger, and the quantity of goods exchanged greater (Bunker and Ciccantell 2005, 224).

As many of the contributors to this volume point out, the way in which the environment is perceived is also very much culturally constructed and specific to a particular society at a given time. The human mind perceives the world through a variegated "network of conventions, schemata and stereotypes," or what David Pepper called a *cultural filter* (Pepper 1984, 6; Burke 1991, 6). Speaking of Southeast Asia, Robert Dentan observed that "people do not respond directly to their environment but rather to the environment as they conceive of it . . . as conceptualized in their minds and labelled by their language" (Dentan 1970). Western scholars have frequently tended to credit Asian societies with a closer, more sustainable relationship to the environment than their Western counterparts. Unfavorable comparisons are often made between Christian philosophy and East Asian religions; for example, the quiescent and adaptive approach toward nature of the latter to the aggressive masculinity of the former and look to the "traditional" cultures of regions like Southeast Asia for answers to the problems that beset their own societies (Tuan 1970, 247; McNeely and Wachtel 1991, 11). It is also assumed that this "greater harmony" changed radically after 1800 as the full force of North Atlantic capitalism and European colonialism came to bear upon Asian societies. In reality, matters appear not to be as simple as that and, while the nineteenth century did herald major changes in scale and scope, they were more ones of degree than ones of substance (Bankoff 1995). That is there is no evidence to suggest that Southeast, South, or East Asian states thought about trees, plants, animals, or minerals as anything else but commodities, natural resources to be harvested and exchanged in the realization of profit.

A more realistic indication of Asian attitudes toward nature can be inferred from a number of sources. In the case of Southeast Asia, an extant pre–nineteenth century legal code from a Malay sultanate, the *Laws of Johore*, that deal fairly extensively with agriculture, distinguish between only two basic classifications of land: appropriated and unappropriated. Appropriated lands are ones marked by wells, fruit trees or "signs of cultivation, and if any one interfere[s] with such land he shall be subject to prosecution." Unappropriated lands bear no mark of ownership and "therefore cannot be the subject of litigation" (Logan 1970, 86). W. Maxwell makes this distinction even clearer: appropriated land, land that was cleared, cultivated, or had

a house constructed upon it, was said to be "*tanah hidop*" [sic *hidup*] or "live land"; while non-appropriated land, land bearing no trace of cultivation but in its natural forest state, was referred to as "*tanah mati*" or "dead land" (Maxwell 1970, 356). Even the word for "environment" has no exact Eastern equivalent in many Southeast Asian languages, which tend to differentiate between a nature tamed and manipulated for human interests (Thai: *thammachaat*, Malaysian/Indonesian: *taman*, and Burmese: *thaba-wà*) and one that connotes a wild, rustic and untamed space that is often associated with evil spirits and that should be entered only with care (Thai: *pa thuan*, Malaysian/Indonesia: *hutan* and Burmese: *tàw*) (Rigg 1997, 46–48). Moreover, Southeast Asia, as previously noted, was an important hub of trade in early modern times; a center of commerce and a supplier of natural commodities of some consequence (Brown 1994, 1–20; Brown 1997, 1–11). The importance of China, India, and to a lesser extent Japan to trade, on the other hand, was very significant and has been the subject of much of the revisionist histories of the world written over the past 15 years or so.[5]

While there is still considerable debate over the levels of economic convergence and divergence between pre–nineteenth century Asia and Europe, with some historians finding explanation for the latter's clear economic advantage by 1800 in the continent's *exceptionalism*, it is difficult to completely ignore the scale and extent of intra-Asian trade and especially the economic significance of China as a market (Wong 2002).[6] As a consequence, the question that has occupied the interest of scholars increasingly is how societies that were relatively rich in the past have now become relatively poor. Why were the relative incomes of people in Ming China, Mughal India, and, to a lesser extent, possibly precolonial Southeast Asia, comparatively high during the early modern period but dropped significantly in comparison to Europe over the ensuing centuries? This is what Daron Acemoglu and his coauthors aptly term "the reversal of fortune," and they go on to conclusively demonstrate that there is an inverse relationship between urbanization and population density and economic prosperity: that those societies with large cities and teeming populations in the past were wealthy but are relatively poor today, while those lands that were historically sparsely inhabited are now included among the Organization of Economic Cooperation and Development (Acemoglu, Johnson, and Robinson 2002). What were the factors that influenced such an outcome?[7] More to the point was this apparent reversal in any way related to the presence or otherwise of natural resources or do the explanations lie elsewhere?

Asia's Natural Resources and Asia's Nature

One of the most striking features of post-1500 trade flows and agriculture in Asia is that "exotic" or "alien" commodities and crops appear to play such a large role. This applies not only to Asia as a whole—at least to that part dealt with in this book—but also to smaller regions within this area. For instance,

coffee was an entirely new crop to this part of Asia around 1700, and tea spread gradually from China to South and Southeast Asia after the eighteenth century. In both cases, these new products became important export commodities in the countries where they had been introduced.

Besides tea and coffee, most new crops came from the Americas. This flow of plant species from America to Asia after 1500 was part of the so-called Columbian exchange (Crosby 1972). Tobacco and rubber are good examples of crops that came from the Americas and became important Asian export commodities. Tobacco was already a very successful crop in China and Southeast Asia at an early stage, while rubber became an important export in Malaysia and Indonesia after 1900. However, there were also introduced crops that remained almost invisible to Western observers for a long time as they were originally produced mainly for local consumption. This applies, for instance, to maize (corn), sweet potatoes, and cassava. Maize and sweet potatoes had already become widespread over large parts of Asia by the sixteenth and seventeenth centuries but cassava was hardly mentioned prior to 1800 and did not become significant until much later in the nineteenth century. At a later stage, some of these subsistence crops also came to constitute important export commodities.

Many crops such as tobacco, coffee, cacao, cinchona, rubber, maize, cassava, chili peppers, and oil palm, which had been introduced to this region after 1500, became well-known Asian export commodities. One might well wonder why a region famous for its spices, fragrant woods, cotton, silk, and ceramics started to export introduced crops, thus converting "nature" from other regions into commodities, turning what was for Asia rather "unnatural" into "natural resources." The most plausible explanation of this phenomenon is that alien crops, lacking the specialized natural enemies of their area of origin, often do remarkably well on foreign soil if they are able to survive the attacks of local, generalist (nonspecialized) pests, and plagues. This remarkable fecundity is called "ecological release", and the history of rubber is a good illustration of its progress. Rubber is an indigenous crop (*Hevea brasiliensis*) in Brazil, but because of the presence of many natural enemies, establishing rubber plantations was impossible there. In Malaysia and Indonesia, however, where rubber was introduced as a plantation crop around 1900, the plantations did very well as specialized enemies were absent (Hecht and Cockburn 1990, 95–99). This state of affairs strongly suggests that the notion of "natural resources" invites misunderstanding and misrepresentation, as the term evokes the suggestion that a region's resources are necessarily the equivalent of its natural endowments.

But how natural are Asia's natural resources? And how does their exploitation influence Asia's natural environment? Does a rich natural environment imply that an area is rich in natural resources? Such questions come to mind when the student of environmental history contemplates the relationship between nature and resources in Asia over time.

Having discussed the "unnaturalness" of "exotics," we should also look at the effects of their introduction in the region (e.g., Boomgaard 2003).

Introductions did not start around 1500, but their number increased substantially after that date, and a complete list of them would be quite long. It is clearly impossible to generalize when discussing the local effects of so many different plants. However, it can be argued that two (environmental) effects are attributable to some of the most successful introductions. In the first place, many new crops could be only grown profitably in the cooler, upland areas; or at least people thought they grew well only at higher elevations. In a number of cases, crops prospered equally in lower areas but there they had to compete with existing crops, particularly rice. Growing them at higher altitudes, where rice could not be cultivated, was often the best thing to do. One or more of these considerations apply to crops such as coffee, tea, tobacco, maize, sweet potatoes, and "Irish" potatoes.

Although this is not a process well-documented in the historical records, it can be assumed that the increasing availability of these crops led to the gradual peopling of the uplands; areas where, due to the fact that rice could not be grown there, it was generally sparsely populated. As the uplands were also areas often better suited to the rearing of cattle and horses, and as some of these crops—particularly maize—produced excellent fodder, the introduction of exotics must have stimulated upland pastoralism.

The second, related, effect of the introduction of a number of foreign species was that it might have led to higher population growth rates. This was partly the result of the expansion of arable lands at higher elevations. An important determinant may have been that some crops gave higher returns for a lower labor input (for instance, sweet potatoes and cassava) than comparable crops that had been grown in the region before the introduction of the new ones (for instance, yam and taro). Finally, some crops, such as tobacco and coffee, were commercially interesting commodities, and may be assumed to have had positive effects on population growth rates.

If all of this—expansion of the arable into the uplands and higher population growth rates—sounds like a positive development in economic terms, it is quite likely to have been detrimental in environmental terms. Generally speaking, the Asian uplands are and were environmentally vulnerable areas where agricultural expansion and population growth easily led to deforestation, loss of wild life, erosion, flooding of lower lying areas, and, finally, a drier climate. The link between the introduction of American crops—particularly sweet potatoes—and these negative environmental effects has, for instance, been posited for China (Marks 1998, 277–332).

Finally, the introduction of new crops in general had a number of effects that are often forgotten. It not only gradually changed the landscape, frequently beyond recognition, but also sometimes led to drastic ecological change. The new crops, if grown in sufficient quantities, changed and increased the region's biodiversity ("agrodiversity"; cf. Brookfield 2001). Their presence and spread created new plant communities and this, in turn, led to changes in the fauna as well.

Here we touch upon a difficult point. On the one hand, biodiversity is usually regarded as good but the introduction of foreign species, which so

often have unintended negative effects ("bioinvasions"; cf. Bright 1998), is not. As there is not enough space to discuss this problem at length here, it suffices to say that the net effects of these introductions have to be judged on a case-by-case basis.

The introduction of new crops, their expansion as subsistence and export crops, and their environmental effects have been emphasized here because these introductions were such a conspicuous phenomenon. If we now turn to resources that were, indeed, natural in the sense that they were part of the region's natural endowment, it will become clear that the environmental effects of their exploitation were not all that different from those of the introduced ones. The effects regarding the resources already present were only less spectacular and more gradual.

By distinguishing wild faunal and floral resources from domesticated ones, in addition to marine and mineral resources, it will be clear that the spread of domesticated plants and animals after the Neolithic Revolution has been the most influential form of natural resource "creation." However, the spread of crops such as rice did not do much for biodiversity. In contrast, the expansion of rice cultivation was, until at least 1900 or even as recently as 1950, the main force behind deforestation and the concomitant loss of species in the lowlands and the mid altitudes. Here, too, population growth, although relatively low prior to the nineteenth century, was the driving force behind these developments.

It is difficult to generalize regarding wild fauna and flora. Good wood for building purposes, for instance, was turned into a resource at an early stage. Palace building and the like, using high quality timber, led to local depletions even prior to 1500. Reports on this phenomenon can be found for Japan as early as the seventh century (Totman 1989, 24–26). Many other types of wood, however, would not be so readily "commodified" or turned into anything more than a negligible resource until far into the twentieth century.

In this respect, the presence of natural endowments to a certain extent determined the shape of a region's development. However, there are other examples to the contrary. Java, poor in copper and iron ore, had to import most of its iron and copper, as was to be expected. The Philippines, however, which were rich in iron and copper ore, imported most of their iron and copper too, instead of exploiting their own resources (Bronson 1992, 90). The same point is, of course, illustrated by the strong presence of exotic crops in Asian countries.

The Nature of the State

Many explanations have been put forward to explain the apparent anomaly between resource potential and social deprivation. One school of thought claims that resources may actually be a curse, that their development inhibits the necessary innovation required for sustained economic growth. Others blame trade liberalization—that open access resource exploitation and poorly defined property rights in developing economies function to reduce the

overall level of welfare in society. Yet another view regards the relative profusion of natural resources with respect to the supply of labor as negatively affecting economic growth either directly through prolonging specialization in primary-production for export or indirectly through generating legal and economic institutions inimical to growth and development.[8] Leaving aside till later explanations of a more economic vein, it is the role of the state and its management of natural resources that requires further amplification.

Since some societies with resources have become rich while others have remained poor, scholars have looked for explanations that go beyond the question of natural endowment to the ways in which the resources have been exploited. In particular, they have related the differences in economic performance to the organization of societies: those that provide incentive and opportunities for growth are richer than those that have somehow failed to do so. This is what Daron Acemoglu and his coauthors call the "institutions hypothesis" and they evoke it to account for the apparent different outcomes among the various states colonized by Europeans (Acemoglu, Johnson, and Robinson 2002, 1234). The evident prosperity of North American and Australasian societies stand in marked contrast to the relative deprivation found in other former colonies that are mainly ranked among today's developing nations. European colonialism led to what they call an "institutional" reversal; that is, the development of institutions of private property in previously relatively deprived regions and the introduction (or maintenance) of extractive institutions in previously prosperous ones. The main reason for this reversal was a pressing need to develop institutions that might encourage European settlement and investment in what were formerly sparsely inhabited areas. In contrast, large populations and relative prosperity at time of contact only made extractive institutions all the more immediately profitable for Europeans who erected institutions to force indigenous peoples to work on plantations or down the mines. In many cases, this simply involved bending existing corvée and tribute systems to their own ends (Acemoglu 2002, 1279).

The choice of colonization strategy was determined at least to some extent by the feasibility of European settlement. In places where Europeans faced high mortality, they did not settle and were more likely to establish extractive institutions to facilitate the rapid transfer of natural resources to the metropole. The legacy of these early institutions persists right down to the present, being inherited by indigenous elites at independence and subsequently used to entrench existing economic and political inequalities in such societies (Acemoglu, Johnson, and Robinson 2001). With specific reference to the Americas, Kenneth Sokoloff and Stanley Engerman have similarly argued that the stark differences between the north and south are largely a legacy of how institutions evolved to exploit natural resources and how broadly the resultant opportunities for economic development were shared among the population. The nature of some resources meant their extraction was generally characterized by extreme inequalities virtually from the outset, as in

the Caribbean. Moreover, slave societies like Haiti, Cuba, and Barbados (that is, regardless of European colonizers) enjoyed higher average per capita incomes than the United States or Canada until 1800 and it was only during the nineteenth century that their situations reversed so markedly (Sokoloff and Engerman 2000, 218–19).

All of this has more than peripheral importance to the state's role in the development of natural resources in the regions covered by this book. In Southeast Asia, the full impact of the colonial state saw a remarkable increase in agricultural and mineral production after 1830 and the elaboration of the legal and financial infrastructure necessary to facilitate commodity production according to Western business practice (Brown 1994, 43–65). This expansion, however, was not uniform or uninterrupted and many introduced crops failed or enjoyed only modest success. Moreover, commodity production was disproportionately concentrated in certain geographical areas of the region such as in the lower deltas on the mainland, along the west coast of the Malayan peninsula and the east coast of Sumatra, in the western half of Negros and in the Bikol provinces of southern Luzon. Other regions were left largely unaffected by major economic developments till well into the twentieth century (Brown 1997, 29). But Southeast Asia had also been a dynamic hub of commerce prior to the nineteenth century in which the state, mainly in the form of the ruler, had been a major factor. Ruling elites, however, fearing challenges to their hold on power, failed to create the conditions necessary for the emergence of a widespread indigenous merchant class and either attempted to retain monopoly trading rights themselves or increasingly came to rely on Chinese and Indian merchant intermediaries for these services (Brown 1997, 3–5). Government administrations were generally not in a strong enough position to intervene directly in the economy to facilitate natural resource developments on their own account until well into the late nineteenth or even twentieth centuries. Significant import-substitution industrialization drives, with their corresponding effect on local resources, did occur in both Siam and the Philippines but not until the 1930s (Brown 1997, 57).

The situation in China was somewhat different since it constituted the main market not only for Southeast Asia but for much of global commerce prior to 1800 (and even beyond). In particular, the collapse of the Ming dynasty's paper currency in the mid–fifteenth century created an almost insatiable demand for silver as an alternative means of exchange among a hundred million of the world's most prosperous people. While demand for the metal was initially driven by the private sector as merchants sought greater commercial security, the state played an increasingly important role by converting local taxes previously paid in grain to ones paid in specie, culminating with the consolidation of all taxes into a single amount payable in silver in the 1570s. The creation of this enormous "silver zone" and the high bimetallic value of the exchange rate with gold there encouraged a substantial arbitrage trade. China sucked in perhaps as much as 200 tons of silver annually from both the mines of the New World as well as from those in the

old (principally Japan), a trade that effectively came to constitute the basis of much of intercontinental commerce in the early modern world (Flynn and Giraldez 1995).[9] Not that foreign trade ever loomed large for China in purely quantitative terms given the size of its domestic market. The Chinese state was primarily an agrarian empire more concerned with promoting the domestic production and commerce of natural resources and in maintaining internal stability than in promoting foreign trade. It was not that the state was too weak to foster alliances between government and merchants to advance overseas trade, but rather that it was too strong and successful "to have reason to consider practices that would bring it revenue it did not anxiously desire and potential problems it did not really want" (Wong 2002, 458). It was the enduring resilience of this state-supported domestic market system that ultimately left Great Britain and the other European powers with little other recourse but to attempt to break it open by force in the nineteenth century.[10] The situation in Japan was somewhat analogous with the state playing an active role both under the Tokugawa (1603–1867) to restrict foreign trade, promote agriculture and initiate conservation measures, and then under the Meiji to support rapid industrialization during the late nineteenth century (Smith 1988, Totman 1989). It is important to appreciate the continuing importance of state dynamics and its ability to influence the economy within Asia even after the clear ascendancy of European power in the region. Indeed, Heita Kawakatsu maintains that nineteenth-century Japanese industrialization is better understood in terms of that country's continuing competition with China than as purely a response to threats of European intervention (Latham and Kawakatsu 1994).

The state's role in managing trade and promoting natural resource development inevitably brought it into competition and conflict with others engaged in similar pursuits. At the most generalized level, the period covered by this volume involves two modes of resource use organized on very different social and ecological principles coming into contact with one another. However, the conflict is not so much a clash between European and Asian cultures as one between agrarian economies and industrial capitalism and shares many similarities with related struggles that took place around the enclosure of the commons and forests in England or Germany. Comparable disputes over land and resources occurred in India and Southeast Asia between colonial states and dispossessed peasantries (Scott 1976; Gadgil and Guha 1993). Even a growing awareness among colonial bureaucracies of environmental degradation that prompted state attempts to regulate natural resource extraction and to adopt conservation measures to reduce forest loss, soil erosion, and flooding provoked bitter resistance from local inhabitants who saw all such attempts as infringements upon their customary rights and as denying them access to communal resources (Guha 1989, Peluso 1992). These struggles are by no means over but are now often elevated from purely local affairs to ones of national and even international significance (Ekins 1992). Roger Hayter and his fellow authors contend there are four

dimensions through which present conflicts generally occur on what they term "resource peripheries": economic (in what form industrialization takes), environmental (with the emergence of environmental nongovernment organizations), cultural (as resources are increasingly linked to issues of aboriginal peoples' rights), and geopolitical (due to the volatility of international relations in the aftermath of the cold war). In particular, they argue that these resource peripheries have become "deeply contested spaces" whose internal dynamics are misunderstood by those looking in from the core.[11] Certainly the modern history of much of Southeast Asia can be categorized in such terms; perhaps that of India, too, though with some important reservations. While both China and Japan have their own "internal" contested spaces they represent different trajectories. Nor is it always clear, when we look back to the past or even forward to the future, in which direction of the compass the core always lay.

ECONOMY

Forest products, minerals, and fish were in principle "free gifts of nature" in the sense that, until powerful individuals or states claimed residual rights regarding their exploitation, they were there for the taking. However, people first had to find a use for them—resources are, as previously noted, a social construct after all. Finding a use for some minerals, for instance, took people a long time. Oil was not really exploited on any scale prior to 1870. The importance of the industry started to expand rapidly only when gasoline, originally a worthless by-product, turned out to be the most appropriate fuel for the internal combustion engine. In this case, therefore, the natural resource was already being exploited before its main use as gasoline had been discovered. Without the enormous and continuous increase of the car as a means of transportation, oil might have remained a minor product for a long time to come. In this case, complicated chemical processes, not available at an earlier stage, were needed to turn a "product of nature" into a "natural resource."

At a much earlier date, people discovered what they could do with bronze and iron, thus ushering in the Metal Ages. However, as in the case of the Philippines, people might import iron and copper instead of exploiting the ores to be found in the region (Bronson 1992, 90). In this case, therefore, the relevant "products of nature" were present, they had been recognized (as resources), but they were nevertheless not exploited, and their presence was therefore useless in terms of the economy.

When some use had been found for a product of nature and the exploitation of what now had become a resource had started, can it be said that society somehow benefited from this exploitation? In other words, is an abundance of natural resources a good thing in the economic sense of the word? In the eighteenth and nineteenth century people often thought not. According to many European observers the abundance of coconut trees,

sago palms, or breadfruit trees, as found in Southeast Asia and the Pacific, made for lazy people and the absence of "civilization." Food was just too easily available (Alatas 1977).

Following this line of thought, we could conclude that the abundance of natural resources made it unlikely that people would go hungry, a supposition supported by historical research (Knapen 2001). However, so the argument would go, such abundance should not be conceived of as a stimulus for statehood and high rates of economic growth. At the same time, we might expect that the abundance of resources was conducive to sustainable exploitation of the natural environment, which would have kept the environmental impact at low levels.

Is the opposite also true, that an environment poor in (potential) faunal, floral, and mineral resources was conducive to economic and state development? This is, indeed, suggested by historian Arnold Joseph Toynbee (1889–1975). In his famous 10-volume *A Study of History*, he argues that great civilizations originated in environments where the "challenges" to humankind were neither too formidable nor too small; only "the golden mean" was the right environmental basis.[12] However, this is a view rejected by many today, as it appears to be akin to environmental determinism.

Part of Toynbee's view—particularly the notion that resource-rich areas are not necessarily the ones with the highest rate of development—appears to be supported by the so-called resource curse thesis (Auty 1993). This thesis suggests that among the postwar developing nations those with good resource endowments often do less well economically speaking than poorer endowed countries, mainly because an abundance of natural resources leads to corruption, misplaced government spending and subsidies, price distortions, and inflation.

In an even more recent study, biologist Jared Diamond (1998) does see a positive link between the presence of wild cereals and types of animals that could be domesticated (therefore potential natural resources) on the one hand and great civilizations on the other. Although, therefore, equally environmentally deterministic, his conclusions are quite different.

So far we have discussed whether societies benefited from rich natural endowments, but this question could also be asked with reference to groups and individuals. Were those living in a resource-rich environment better off than people who did not? It has been argued, and is argued here by various contributors, that this was not necessarily the case. People living in the teak forests of Burma or in the fertile wet rice growing valleys and mid altitudes of Southeast Asia were often, for various reasons, not as wealthy as might have been supposed. On the contrary, they often had to work hard for low returns, and were more often confronted with famine than many people who lived in less well-endowed regions. The same may also be true of China, India, and Japan.

The presence of natural resources, therefore, appears to have been a mixed blessing for individuals as well as countries.

NOTES

1. "Insatiable appetite" is a purposeful invocation of Richard Tucker's recent work of that title (Tucker 2000).
2. A further categorization is also often made between boundary and transboundary resources; those that are clearly found in a single defined location and those that are mobile such as rivers or fish.
3. Tropical hardwoods, especially the Southeast Asian teak (*Tectona grandis*), provided a suitable alternative to the shortage of oak required for shipbuilding during the heyday of sail between the seventeenth and mid-nineteenth centuries. Teak is not only an easily worked and extraordinarily durable wood, but also contains a resinous oil that protects it from fungal and animal attack and even prevents iron from rusting (Baker 1978, 40).
4. Physical capital constitutes machinery, equipment, buildings, tools, and other investment goods used in production and human capital the labor skills necessary for production and the research and development activities leading to technological innovation. The World Commission on Environment and Development (otherwise known as the Bruntland Commission) defines sustainable development as one that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987).
5. Blaut (1993), Frank (1998), Pomeranz and Topik (1999), Pomeranz (2000).
6. On the celebration of European distinctiveness, see Jones (1981) and more recently Landes (1998).
7. Japan constitutes an important exception to other Asian nations in this respect with significant industrialization and rising income levels from at least the nineteenth century.
8. For a comprehensive list of authors who have advocated these approaches, see Barbier (2005, 109).
9. India, too, acted as a sink, drawing silver into its markets but it always played a secondary role in comparison to China.
10. Most noticeably during the Opium Wars of 1839–42 and 1856–60.
11. Hayter, Barnes, and Bradshaw (2003).
12. An abridged version was published as Toynbee 1946–57, 2 vols.

BIBLIOGRAPHY

Abu-Lughod, Janet. *Before European Hegemony: The World System A. D. 1250–1350.* New York and Oxford: Oxford University Press, 1989.

Acemoglu, Daron, Simon Johnson, and James Robinson. "The Colonial Origins of Comparative Development: An Empirical Investigation." *The American Economic Review* 91, 5 (2001): 1369–1401.

———. "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distributions." *The Quarterly Journal of Economics* 117, 2 (2002): 1231–94.

Alatas, Syed Hussein. *The Myth of the Lazy Native: A Study of the Image of the Malays, Filipinos and Javanese from the 16th to the 20th Century and Its Function in the Ideology of Capitalism.* London: Frank Cass, 1977.

Auty, Richard M. *Sustaining Development in Mineral Economies: The Resource Curse Thesis.* London and New York: Routledge, 1993.

Baker, Herbert. *Plants and Civilization*. Belmont, CA: Wadsworth Publishing Co., 1978.

Bankoff, Greg. "Coming to Terms with Nature: State and Environment in Maritime Southeast Asia." *Environmental History Review* 19, 3 (1995): 17–37.

Barbier, Edward. *Natural Resources and Economic Development*. Cambridge: Cambridge University Press, 2005.

Blaut, James. *The Colonizer's Model of the World: Geographical Diffusionism and Eurocentric History*. New York and London: Guildford Press, 1993.

Boomgaard, Peter. "Forests and Forestry in Colonial Java, 1677–1942." In *Changing Tropical Forests: Historical Perspectives on Today's Challenges in Asia, Australasia and Oceania*, edited by John Dargavel, Kay Dixon, and Noel Semple, 58–87. Canberra: Centre for Resource and Environmental Studies, Australian National University, 1988.

———. "In the Shadow of Rice: Roots and Tubers in Indonesian History, 1500–1950." *Agricultural History* 77, 4 (2003): 582–610.

Bright, Chris. *Life out of Bounds: Bioinvasions in a Borderless World*. New York: W. W. Norton, 1998.

Bronson, Bennett. "Patterns in the Early Southeast Asian Metals Trade." In *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*, edited by Ian Glover, Pornchaii Suchitta, and John Villiers, 63–114. Bangkok: White Lotus, 1992.

Brookfield, Harold. *Exploring Agrodiversity*. New York: Columbia University Press, 2001.

Brown, Ian. *Economic Change in South-East Asia, c. 1830–1980*. Kuala Lumpur: Oxford University Press, 1997.

Brown, Rajeswary. *Capital and Entrepreneurship in South-East Asia*. Basingstoke: Macmillan, 1994.

Bunker, Stephen. "Modes of Extraction, Uneven Exchange, and the Progressive Underdevelopment of an Extreme Periphery: The Brazilian Amazon, 1600–1980." *American Journal of Sociology* 89, 5 (1984): 1017–64.

Bunker, Stephen and Paul Ciccantell. *Globalization and the Race for Resources*. Baltimore: The Johns Hopkins University Press, 2005.

Burke, Peter. *New Perspectives on Historical Writing*. Cambridge, MA: Polity Press, 1991.

Ciccantell, Paul and David Smith. "Nature, Raw Materials, and Political Economy: An Introduction." In *Nature, Raw Materials, and Political Economy*, edited by Paul Ciccantell, David Smith, and Gay Seidman, 1–20. Amsterdam: Elsevier, 2005.

Crosby, Jr., Alfred W. *The Columbian Exchange: Biological and Cultural Consequences of 1492*. Westport, CT: Greenwood, 1972.

Davenport, Deborah and Karrin Scapple. "Conflict and Cooperation over Natural Resources." In *Introducing Global Issues*, edited by Michael Snarr and D. Neil Snarr, 277–98. Boulder and London: Lynne Reinner Publishers, 2005.

de Vries, Jan. "The Industrial Revolution and the Industrious Revolution." *Journal of Economic History* 54, 2 (1994): 249–70.

Dentan, Robert. "An Appeal to Members of the Society from an Anthropologist." *Malayan Nature* 23 (1970): 121–22.

Diamond, Jared. *Guns, Germs and Steel: A Short History of Everybody for the Last 13,000 Years*. London: Vintage, 1998.

Ekins, Paul. *A New World Order: Grassroots Movements for Global Change*. London: Routledge, 1992.

Flynn, Dennis and Arturo Giraldez. "Arbitrage, China, and World Trade in the Early Modern Period." *Journal of the Economic and Social History of the Orient* 38, 4 (1995): 429–48.

Frank, Andre. *Reorient: Global Economy in the Asian World*. Berkeley, Los Angeles and London: California University Press, 1998.

Gadgil, Madhav and Ramachandra Guha. *This Fissured Land: An Ecological History of India*. Delhi: Oxford University Press, 1993.

Guha, Ramachandra. *The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya*. Delhi: Oxford University Press, 1989.

Hayter, Roger, Trevor Barnes, and Michael Bradshaw. "Relocating Resource Peripheries to the Core of Economic Geography's Theorizing: Rationale and Agenda." *Area* 35, 1 (2003): 15–23.

Hecht, Susanna and Alexander Cockburn. *The Fate of the Forest: Developers, Destroyers and Defenders of the Amazon*. London: Penguin, 1990.

Hopkins, T. and Immanuel Wallerstein. "Commodity Chains in the World Economy Prior to 1800." *Review* 10, 1 (1986): 157–70.

Jones, Eric. *The European Miracle: Environments, Economies and Geopolitics in the History of Europe and Asia*. New York: Cambridge University Press, 1981.

Knapen, Han. "Forests of Fortune?" *The Environmental History of Southeast Borneo, 1600–1880*. Leiden: KITLV Press, 2001.

Kula, E. *History of Environmental Economic Thought*. London and New York: Routledge, 1998.

Landes, David. *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor*. New York: W. W. Norton, 1998.

Latham, A. J. H. and Heita Kawakatsu, eds. *Japanese Industrialization and the Asian Economy*. London and New York: Routledge, 1994.

Logan, James. "A Translation of the Malayan Laws of the Principality of Johore." In *Readings in Malay Adat Laws*, edited by M. Barry Hooker. Singapore: University of Singapore Press, 1970.

Marks, Robert B. *Tigers, Rice, Silk, and Silt: Environment and Economy in Late Imperial South China*. Cambridge: Cambridge University Press, 1998.

Maxwell, W. "Malay Land Tenures." *Journal of the Royal Asiatic Society Straits Branch* 13 (1884): 75–220.

McNeely, Jeffrey and Paul Wachtel. *Soul of the Tiger: Searching for Nature's Answers in Southeast Asia*. Singapore: Oxford University Press, 1991.

Peluso, Nancy. *Rich Forest, Poor People: Resource Control and Resistance in Java*. Berkeley and Los Angles: University of California Press, 1992.

Pepper, David. *The Roots of Modern Environmentalism*. London: Croom Helm, 1984.

Pomeranz, Kenneth. *The Great Divergence: China, Europe and the Making of the Modern World Economy*. Princeton, NJ: Princeton University Press, 2000.

Pomeranz, Kenneth and Steven Topik. *The World That Trade Created: Society, Culture, and the World Economy 1400 to the Present*. Armonk, NY: M. E. Sharpe, 1999.

Reid, Anthony. *Southeast Asia in the Age of Commerce, 1450–1680*. 2 vols. New Haven, CT: Yale University Press, 1988–93.

Rigg, Jonathan. *Southeast Asia: The Human Landscape of Modernization and Development*. London and New York: Routledge, 1997.

Scott, James. *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia*. New Haven, CT: Yale University Press, 1976.

Smith, Thomas. *Native Sources of Japanese Industrialization, 1750–1920*. Berkeley, CA: University of California Press, 1988.

Sokoloff, Kenneth and Stanley Engerman. "Institutions, Factor Endowments, and Paths of Development in the New World." *Journal of Economic Perspectives* 14, 3 (2000): 217–32.

Spoehr, Alexander. "Cultural Differences in the Interpretation of Natural Resources." In *Man's Role in Changing the Face of the Earth*, edited by William Thomas, 93–102. Chicago, IL: University of Chicago Press, 1956.

Totman, Conrad. *Green Archipelago: Forestry in Pre-industrial Japan*. Berkeley, CA: University of California Press, 1989.

Toynbee, Arnold J. *A Study of History*, abridged by D. C. Somervell. 2 vols. Oxford: Oxford University Press, 1946–57.

Tuan, Yi Fu. "Our Treatment of the Environment in Ideal and Actuality." *American Scientist* 58, 3 (1970): 244–49.

Tucker, Richard. *Insatiable Appetite: The United States and the Ecological Degradation of the Tropical World*. Berkeley, CA: University of California Press, 2000.

WCED. World Commission on Environmental Development. *Our Common Future*. Oxford and New York: Oxford University Press, 1987.

Wong, R. Bin. "The Search for European Differences and Domination in the Early Modern World: A View from Asia." *American Historical Review* 107, 2 (2002): 447–69.

Zimmermann, Erich. *World Resources and Industries: A Functional Appraisal of the Availability of Agricultural and Industrial Resources*. New York and London: Harper and Brothers, 1933.

1

Natural Resource Management and Mismanagement

Observations from Southeast Asian Agricultural History

David Henley

Using evidence from the history of agriculture in Southeast Asia, this chapter attempts to say something about the conditions required for effective management of natural resources. Effective management, as understood here, means management for sustainability. In recent literature sustainability is often defined in eclectic ways and according to abstract criteria, such as preserving the "quality" of the environment and the "integrity" of ecosystems (Smith and Jalal 2000, 16). In this chapter, however, sustainability simply means that the availability of whatever resource is under discussion—be it food, soil, or biodiversity—does not decrease over time.

Some point out that fluctuations in production occur in nature as well as in agriculture, and argue that "resilience"—the ability to absorb and utilize change—is more useful than sustainability as a criterion of excellence in man-made ecosystems (Brookfield 2001, 271). But the ability to respond productively to changes, whether in economic, demographic, or environmental conditions, usually depends on not having exhausted existing resources. And while it is true that in the past the generally lower pressure of population meant that unsustainable patterns of resource use could often continue for longer without precipitating a human crisis, in Southeast Asia most farmers have always been intimately concerned with the limits to sustainability because of the particular vulnerability of tropical soils to erosion and nutrient loss. Their successes and failures in staying within those limits may still have something to teach us today even though agriculture is no longer the mainstay of the Southeast Asian economies. The question of sustainability in agriculture also overlaps directly with the very topical issue of forest protection and conservation.

Regarding the conditions for sustainable resource use, the three parameters that are ultimately of greatest interest are demographic, economic, and political: how do population pressure, commerce, and the structure of institutions affect the effectiveness with which resources are exploited or conserved? To begin with, however, it is useful to compile a rough inventory of the proximate reasons why resources may be exploited in unsustainable ways. Unlike certain other resources, such as minerals and fossil fuels, the forms of natural wealth under discussion here—plants and soils—are in principle renewable over historical time. Why might they fail to be renewed?

One possibility, heavily emphasized in the relevant literature, is that access to the resources is not (sufficiently) restricted, leading to a "tragedy of the commons" in which individuals overexploit them on the assumption that if they do not do so themselves, others will. The classic example is the overstocking of public pasture land by livestock owners who know that the benefits they derive from adding more grazing animals will be temporary, but also know that by not participating in the rush they will deny themselves those benefits without having sufficient effect on the behavior of others to avert the crisis (Hardin 1968). Insecure or conflicting regimes of private land ownership rights may produce similar outcomes.

A second kind of situation in which renewable resources are not renewed is what might be called the "tragedy of time" or "tragedy of the future," which arises either when individuals' time horizons are short, or when a resource requires such a long period of time to reach economic maturity that the costs and risks of allowing it to do so are prohibitive even for the most forward-thinking. In its severest form, when the period of time necessary for even an optimally managed resource to be renewed exceeds the span of a human lifetime, the tragedy of time becomes the tragedy of mortality itself: in the long run, as the economist Keynes famously observed in a different context, we are all dead. A good illustration is the impracticality of harvesting Southeast Asian rainforest timber species sustainably. Tropical forests "just aren't sustainable economically," as one timber company executive frankly told a journalist in 1986: "I don't care what anybody says, no one can wait 100 years for trees to grow" (Ooi Jin Bee 1993, 139).

A third potential cause of unsustainable resource use, prominent in the popular imagination, is population pressure, leading to what Blaikie and Brookfield (1987, 240) call the "desperate ecocide" of the poor. Two further categories of resource mismanagement are "tragedies of ignorance," in which resource users fail to fathom the preconditions for sustainability; and "tragedies of indifference," in which they do understand what is sustainable and what is not, but for one reason or another do not care. The massive erosion of agricultural soils in North America in the 1920s and 1930s resulted partly from ignorance of the technical necessity for soil conservation, and partly from indifference in view of the abundance and cheapness of land, which disguised the need to conserve it and discouraged investment in conservation measures (Blaikie and Brookfield 1987, 33).

In what follows it will be argued that insofar as unsustainable agricultural practices can be identified in the Southeast Asian historical record, they have tended to reflect two of the five classes of tragedy listed above: those of the commons and indifference. These two types of resource tragedy were associated with conditions of commercial isolation and low population pressure, in which farmland was under collective rather than private ownership and had little economic value. Tragedies of desperation may also have occurred on occasion, but more likely as a result of diminishing food imports than because of mounting population pressure. At high population densities and under commercialized economic conditions, smallholder farming practices were generally sustainable. This was partly because the scarcity and value of land under such conditions favored the emergence of exclusive private ownership rights and encouraged investment in tree crops, terracing, and irrigation.

Southeast Asian Farming Systems as Solutions to Sustainability Problems

For agricultural purposes Southeast Asia, like the rest of the tropical world, is in important respects environmentally disadvantaged. Half a century ago Southeast Asianists were very much aware of this (Dobby 1956; Gourou 1947), and in the past decade the environmental constraints on tropical agriculture have once again attracted scholarly attention after a long period of neglect (Sachs 2000; Weischet and Caviedes 1993). Two of the three basic environmental requirements for productive farming, sunlight and (at least on a seasonal basis) water, are typically available in great abundance. But the third, fertile soil, is problematic due to the high rates of nutrient leaching and erosion to which natural soils in the wet tropics are subject, partly because of the abundance and intensity of rainfall, when the forest under which they have developed is removed. An additional drawback for (arable) farmers is that weeds and pests proliferate much more rapidly on cleared land than they do in the temperate latitudes. Soil erosion, nutrient loss, and weed proliferation pose immediate and pressing threats to the sustainability of agriculture. If they are not dealt with, yields will not be sustained even in the short term. Historically speaking, Southeast Asian farmers have had three main answers to these sustainability problems: wet rice cultivation, arboriculture, and swidden farming.

The ecological stability of the irrigated rice field, the first and most characteristically Southeast Asian of these three systems, is almost proverbial. In his seminal book *Agricultural Involution*, Geertz (1963, 29) made much of its "extraordinary stability and durability, the degree to which it can continue to produce, year after year, and often twice in one year, a virtually undiminished yield." The traditional pond-field rice terraces of Bali and Luzon were also used by Netting (1993, 44–46, 179–80) in *Smallholders, Householders* to illustrate his general thesis that intensive smallholder agriculture, of which Asian wet rice farming can be regarded as the epitome, is environmentally sustainable as well as economically efficient and socially

integrative. Writers emphasizing the diminishing returns associated with continuous cultivation of deforested land in the tropics have always been careful to make an exception for irrigated rice cultivation (Gourou 1947, 174; Weischet and Caviedes 1993, 149–58). Wet rice farming incorporates neat solutions to all three of the problems that threaten the sustainability of yields from agriculture on tropical soils. The problem of weeds is solved by the circumstance that few terrestrial plants can compete with rice in a flooded environment; the problem of erosion by the fact that the pond-fields are surrounded by bunds and covered with water; and the problem of nutrient loss by a combination of the silt deposited from the irrigation water; the development of an impermeable pan at the base of the ploughed layer; and the presence of nitrogen-fixing organisms in the flooded fields (Greenland 1998, 188–95).

A second historically important response to the challenge of maintaining soil fertility, protecting against erosion, and controlling weeds under equatorial conditions is arboriculture, which circumvents all three problems by keeping the ground permanently under tree cover. "The closer a farming system in the humid tropics is to a natural rainforest ecosystem," runs a common argument, "the more sustainable it is" (Schulte 2002, 46). Hence, in large part, the academic enthusiasm of the past decade for "agroforestry," a term that strictly speaking refers to the integrated cultivation of field (food) and tree crops in combination (Huxley 1998), but which in the Southeast Asian context has come to be used as a synonym for mixed smallholder arboriculture.

> Agro-forests are extremely close to natural forest formations. . . . Some of them have the structural as well as functional characteristics of a primary forest ecosystem, with high specific richness, great ecological complexity and closed mineral circulation systems. As with natural forests, agro-forests can be considered sustainable in the long term. (Michon and de Foresta 1995, 94)

Not all arboriculture, of course, is biodiverse, and there is a sharp contrast in this respect between smallholder agroforestry and the oil palm plantation monocultures that have come to dominate much of the rural landscape in Indonesia and Malaysia. But the cultivation by smallholders of commercial tree crops like coconuts, coffee, rubber, and cocoa, and more locally also of palm species yielding sago for subsistence consumption, has a long history in Southeast Asia and represents an effective response to the environmental constraints on agriculture in the region.

The last of the three classic responses to the challenge of agricultural sustainability in tropical environments is swidden farming. In this system, annual crops are planted on a given piece of land for only one or two years at a time, whereafter the farmer moves on to a new plot and tree cover is allowed to regenerate on the (temporarily) abandoned land. The resulting fallow vegetation shades out the weeds that have appeared during the cultivation phase, protects the remaining topsoil from erosion, and is

ultimately felled and burned to provide fertilizing ash at the beginning of a new cultivation cycle (Nye and Greenland 1960; Seavoy 1973).

The fallow interval in Southeast Asian swidden farming, it is worth noting in view of prevailing opinions to the contrary (Cribb 2000, 23; Reid 1995, 93), was seldom long enough to allow the natural vegetation to regenerate in anything like its mature form. The reported predilection among swidden farmers in parts of Borneo for clearing mature forest (Freeman 1955, 115; Padoch 1985, 281) is unusual. In most parts of Southeast Asia the preference has been for secondary forest, which is easier to fell, dry, and burn (Conklin 1957, 41, 137; Zinke, Sabhasri, and Kunstadter 1978, 134), and very often for bush-fallow vegetation less than 10 years old (Ellen 1978, 117; van Steenis 1937, 638), which can still be cleared with a machete rather than an axe. Hill (1977, 183), in his historical geography of rice cultivation in Malaya, went so far as to regard all swidden systems involving fallow periods of more than eight years as recent innovations. The essentially man-made landscapes created by short-fallow swidden cultivation often supported higher densities of large mammals than any natural ecosystem in the region (Boomgaard 1997; Kathirithamby-Wells 1997). But in terms of total biomass or biodiversity, they were not comparable to the forest that they had replaced. Wet rice cultivation, in fact, was less damaging to the natural environment in that, although it banished the trees entirely, it also involved much less land per head of the human population.

A more important point for our purposes is that swidden farming systems were not always sustainable through time either, and did not always result in woodland fallow of any description. Although by African standards it may be true to say that Southeast Asia has "no substantial grasslands" (Reid 1988–93, I, 5), until recently there were always some areas where swidden farmers, in accordance with colonial stereotypes, were shifting rather than rotational cultivators, periodically moving their villages on to new forest lands and leaving open expanses of sword grass or savanna parkland in their wake (Adriani and Kruyt 1950–51, I, 167; Isikowitz 1951, 207). It was these itinerant or nomadic swidden farmers whom the French in Indochina referred to as *mangeurs de bois.* In most cases their destructive impact was connected with the fact that, alongside agriculture, they also practiced area-extensive forms of animal husbandry and hunting, in which the more or less uncontrolled use of fire to stimulate the growth of young pasture for water buffalo, cattle, or deer prevented the reversion of abandoned swiddens to woodland (Gourou 1940, 348, 368–70; Terra 1958, 170–71). Because these practices were exceptional in a region where adverse environmental conditions generally compelled farmers to give constant attention to safeguarding sustainability, unsustainable combinations of swidden farming and livestock rearing will play an important role in the analysis that follows. My discussion is divided into three sections, exploring the implications for agricultural sustainability of demographic, economic, and institutional factors respectively.

Sustainability and Demography

In some parts of the world, notably the Mediterranean uplands (McNeill 1992), demographic growth over the past two centuries has led to near-permanent environmental degradation as a consequence of unsustainable land use under mounting population pressure. In Southeast Asia, paradoxically, the particular vulnerability of tropical soils to leaching and erosion meant that if unsustainable forms of intensification such as excessively short swidden-fallow intervals were applied, the effect on agricultural yields was so immediate and dramatic that any long-term demographic "overshoot" was unlikely: either sustainable alternatives were found, or more food was imported, or the population quickly ceased to grow. The very fragility of the environment, in other words, made land degradation as a result of "tragedies of desperation" unlikely. Loss of soil fertility in this region typically occurred not as a slow, sinister, and irrevocable development over decades or centuries, but as a rapid, controlled, and reversible process within the sustainable cycle of swidden farming.

Not all Southeast Asian swidden farming systems, as noted above, were in fact sustainable. Some involved the permanent conversion of forest into grassland rather than the continuous recycling of woodland fallow. But this kind of progressive deforestation by swidden farmers, although it was often found in regions with naturally infertile soils, seldom seems to have reflected population pressure or the transgression of limited environmental "carrying capacities." On the contrary, it typically occurred at low population densities under conditions in which land was perceived as having almost no value, so that the disincentives to slashing and burning, at least in the short term, were minimal. In nineteenth-century Sulawesi, for example, some of the greatest expanses of grassland and savanna vegetation were found not on the populous southwestern and northern peninsulas, but in the eastern central part of the island where population densities were below 15 persons per square kilometer (figure 1.1). Here, abandoned swiddens were routinely set on fire to promote the growth of young grass shoots for grazing by herds of semidomesticated water buffalo and wild deer (Henley 2002, 191). Because of the limited amount of fertile ash the grass yielded after burning, and the heavy labor involved in extracting grass root mats from the soil or weeding their fast-growing grass shoots, grasslands created in this way were difficult to reincorporate into the swidden farming cycle (Adriani and Kruyt 1912–14, II, 239).

It might be argued that there was actually no "tragedy" of any kind here: the abundance of land in this part of Sulawesi simply made extensive livestock grazing a rational ancillary activity for swidden farmers who were obliged to fell forest anyway in order to plant their food crops. But in fact the permanent conversion of former swiddens to fire-climax grassland had significant disadvantages for the farmers in question despite the low population density. First, it meant that whole villages, not just their outlying swidden huts, periodically had to be shifted to new locations as the woodland in their vicinity, and with it the potential swidden sites, disappeared (Adriani 1919, 9–10;

Figure 1.1 *A Colonial Survey Expedition Crossing the Pada Grassland in Eastern Central Sulawesi, 1910.* Abendanon 1915–18, Vol. II, Plate CXVIII (original drawn from a photograph).

Adriani and Kruyt 1950–51, I, 167). As villages were rather well built and their sites carefully chosen for defensive purposes, this was a serious inconvenience that rotational swidden farmers elsewhere were pleased to avoid. Second, as grassy and savanna vegetation began to dominate the landscape, grassland fires became difficult to control and posed threats to houses, tree crops, and productive swidden fields (Adriani and Kruyt 1900: 206–7; Horsting 1924, 217). If this was the result of a "tragedy of indifference," in short, the indifference was not entirely justified. Further on it will be argued that elements of a tragedy of the commons, itself conditioned by the low population density and low land value, were also involved here.

Where the population was denser, by contrast, the greater scarcity and value of land tended to discourage unrestricted burning and encourage investment in permanent "landesque capital" (Blaikie and Brookfield 1987, 9) such as tree crops and terracing (Metzner 1982; Nibbering 1991). Population growth is one factor behind the current transition from pioneer shifting cultivation to sustainable permanent-field farming techniques on many of Southeast Asia's forest frontiers (Henkemans, Wiersum, and Persoon 2000). The mechanisms at work here include economies of scale in the provision of market and transport infrastructure and a greater per hectare availability of labor for investment in land improvement. For similar reasons, unexpectedly positive relationships between population growth and sustainable

agriculture have also been well documented in some African contexts (Leach and Mearns 1996; Tiffen, Mortimore, and Gichuki 1994).

Wet rice cultivation, perhaps the most robustly sustainable of the three classic Southeast Asian agricultural systems mentioned above, is particularly associated with high population densities. Boserup (1965) famously argued that irrigation and other area- and labor-intensive farming methods have typically been adopted only where population pressure gives rise to a shortage of land. Although she may have exaggerated the inefficiency of wet rice cultivation in terms of routine returns to labor (Hunt 2000), there is direct evidence from the Philippines that population pressure can trigger (and facilitate) the heavy initial investments of labor in field bunding and other infrastructure that are necessary to make irrigation possible (Conelly 1992). Investments in the quality of pond-field soils, moreover, may have a cumulatively beneficial effect. Analysis of a large collection of historical and recent soil core samples held by the Indonesian Centre for Soil and Agroclimate Research in Bogor suggests that on average the agricultural quality of soils on Java may actually have improved between 1940 and 1990, whereas in the outer islands, where less irrigation is practiced, it declined slightly over the same period. The same set of evidence also shows that, even allowing for the intrinsic differences in fertility between the volcanic islands of Java and Bali, where the population has always been densest, and the naturally less well-endowed outer islands, "soil quality is noticeably higher where a dense population has worked the land intensively for decades or centuries" (Lindert 2000, 26 and 236).

SUSTAINABILITY AND COMMERCE

Of the three classic Southeast Asian agricultural systems discussed above, one, arboriculture, is almost entirely predicated on market exchange. With the exception of sago palms in certain restricted areas, trees in Southeast Asia have never been sources of staple foodstuffs. The high light requirements of field crops like rice and maize, moreover, mean that these cannot be grown under a forest canopy (Donner 1987, 167). It follows that most subsistence farmers in the region, although they tended small numbers of fruit, coconut, and other useful trees to supply their household needs, always had a stronger interest in felling trees than in planting them. Arboriculture as a central, as opposed to an ancillary, agricultural activity, as the geographer Gourou pointed out in Indochina at the end of the colonial period, is generally a commercial phenomenon:

> The cultivation of shrub and tree crops makes it possible to exploit mountain soils on a permanent basis without having recourse to the flooded ricefield. But these are not subsistence crops, and their development is possible only in a developed economy which enables the cultivators to exchange their industrial products against foodstuffs. (Gourou 1940, 348)

By allowing farmers to profit from the biomass-generating heat and humidity of the equatorial environment without making unsustainable demands on its fragile soils, the modern demand for industrial tree crops like rubber and copra has enabled Southeast Asian agriculture to overcome ecological constraints that once restricted it either to intensive wet rice cultivation in favorable locations or to the production of annual food crops in temporary swiddens (Scholz 1984, 366; 1991, 49–51).

Half a century ago it was not to commercial arboriculture but to "integral" swidden cultivation, based on subsistence production in isolation from commerce, that scholars looked for examples of agricultural systems simulating natural forest ecosystems (Conklin 1957). Geertz (1963, 16, 24–25), noting that some large forest trees were often left standing on cleared swiddens and that fallow vegetation included deliberately planted fruit and coconut trees, thought the swidden a "canny imitation" of the rainforest. In the past decade there has been renewed interest in the role of swidden farmers as "managers of the forest" (Colfer and Dudley 1993). Many of today's smallholder agroforestry systems, it is true, have developed out of, or in close association with, swidden farming, and include trees yielding products for domestic markets—fruit, nuts, firewood—as well as rubber, copra, resins, spices, and other export commodities. But they are still dependent on access to markets, without which tree crops could not be sold, imported foodstuffs could not be purchased, and much more land would have to be cleared of trees for local food production.

> Until the introduction of rubber in the 1920s . . . the landscape managed by Salako Dayaks consisted of largely swidden field crops and their multi-aged fallows . . . . Rice self-sufficiency was crucial to local people when markets were few and food supply local; numerous large swiddens provided the family's food and dominated the landscape. In 1991, only a third of the villagers planted any swiddens at all; the average size of these was a meager one-third hectare. Economic trees now dominate the landscape. (Peluso 1996, 517)

In contemporary Mindanao it is said that tree farms located more than 100 kilometers from the nearest market are no longer economically viable (Pasicolan 2003, 99). The replanting of coastal mangroves in the Philippines is likewise predicated on local markets for mangrove wood (Walters 2004). "The main incentive for establishing an agro-forest," acknowledge Michon and de Foresta (1995, 94) in their celebration of Indonesian agroforestry as a model for forest management and biodiversity conservation, "is economic, and is closely linked to the market economy."

To a lesser extent, wet rice cultivation is also associated with economic situations in which trade is important. Historically speaking, rice, which is more laborious to produce than subsistence staples like tubers or sago, has often been in the first place a cash crop (Knapen 2001, 225). On the island of Nias in the early nineteenth century, for example, most rice "was raised for

exportation, the inhabitants raising but little for themselves, and preferring sweet potatoes . . . for their own consumption" (Raffles 1991, 488–89). The fact that rice is more susceptible to pests and dry weather than most other crops meant that it could become the staple food only where trade and exchange were intensive enough to compensate for the risks involved in growing it (Missen 1972, 75). This applied particularly to irrigated rice farming since wet rice fields, in contrast to swidden fields on which a wide range of secondary crops was also grown, typically produced only rice.

The greatest risk of permanent land degradation probably came not in times of economic and demographic growth but in periods of disengagement from commerce, when populations that had previously imported some of their food were suddenly obliged to depend on purely local resources. There are reasons to think that the pattern of expansionary shifting cultivation and grassland formation found in Central Sulawesi in the late nineteenth century was related in this way to the decline of the local iron export industry. Eastern Central Sulawesi was once an important source of valuable iron ore; weapons forged from it were exported to many other parts of Indonesia. From the seventeenth century onward, however, this industry gradually declined because of competition from iron imported to Indonesia from Europe and China (Reid 1988–93, I, 112). In the process, it is likely that a population that had formerly imported much agricultural (and other) produce from elsewhere was increasingly thrown back on inadequate local resources, and that this contributed to the spread of unsustainable farming practices. Of course, the process of repeated migration by swidden farmers as a result of deforestation could not continue indefinitely, and the fact that the total population of this part of Sulawesi was said to be declining rather than growing in the late nineteenth century (Kruyt 1903, 203–4) suggests a continuing demographic adjustment to its limited economic potential in the absence of the iron trade.

SUSTAINABILITY AND INSTITUTIONS

It is interesting to note that Southeast Asia's most impressive historical achievements in sustainable resource management, which are to be found in the field of intensive smallholder agriculture, have had little or nothing to do with governments or states. Except on lowland plains, where large engineered dams are required to control the problem of flooding, this is true even of wet rice farming (Reid 1997, 78). In the mountains of Luzon, the stateless and warlike Ifugao built and maintained 20,000 kilometers of spectacular and productive irrigated rice terraces over a period of at least four centuries:

> Incredible skill and ingenuity—often taken for granted by the local community—are employed throughout Ifugao in the productive treatment of water, soil, rock, and stone, as well as in the use of domesticated biota, hand implements, and human labor. . . . Only by constant repair, extension, restructuring,

> and the dynamic recycling of resources has the present landscape been achieved and maintained. There is no evidence that this Ifugao pattern ever required, or resulted in, a complex bureaucratic organization, a widely based form of political integration, or recognition of a centralized authority. (Conklin 1980, 37–38)

As Garrett Hardin (1968) would have predicted, this achievement was based squarely on private rather than common ownership of resources. Ifugao rice fields were held in private tenure, transferable either by inheritance, usually with primogeniture, or by sale (Barton 1969, 33). In places where forest cover was particularly scarce the same was true of arboreal "woodlots" on the watersheds, which were "valued for timber, other products and protection of lower farmland from runoff and erosion" (Conklin 1980, 8). These individual rights to fields and woods, however, were maintained by custom rather than state law and enforced, if necessary, by the spears of the individual owners and their kin rather than by a central authority (Barton 1969, 87–88).

Private land ownership is often assumed to depend on the presence of a legislating and adjudicating state (De Soto 2000). Evidence from many parts of the world, however, suggests that land tenure arrangements depend more on popular custom than on state law, and that both individual land rights and working land markets emerge spontaneously when population growth and/or economic development raise the scarcity and value of land (Netting 1993, 157–88; Platteau 2000, 75–92). Access and ownership rules, in other words, vary in accordance with the so-called supply-and-demand or evolutionary model of land rights, in which institutions of exclusive ownership appear when the economic benefits they confer on land users outweigh the costs involved in defining and policing property boundaries. Where the population has long been very dense, as among the Ifugao, private land ownership is typically part of local customary law. That this relation has not always held in the particular case of Java (Booth 1988, 72) has to do with the unusual way in which Dutch rule promoted communal village tenure on that island (Boomgaard 1989, 42). When land becomes commercially valuable as a result of new opportunities for cash crop cultivation, as in Sumatra and Borneo during the twentieth century, traditional systems of communal tenure may evolve rapidly in the direction of private ownership even at low population densities (Cramb and Wills 1998; Suyanto, Tomich, and Otsuka 2001). Whether the trigger is demographic or economic, the security of tenure provided by individual land rights tends to promote sustainable farming methods, and also works alongside land scarcity itself to encourage investment in landesque capital.

Cases of expansionary shifting cultivation, conversely, have usually been associated with communal land tenure as well as with low population densities and low levels of commercial exchange. In eastern Central Sulawesi at the end of the nineteenth century, private land rights for individuals or households were recognized only on a temporary basis with respect to recently cleared primary forest (Adriani and Kruyt 1950–51, III, 10). Fallow land was

reallocated each year by an unpredictable process of consultation and consensus (Schrauwers 1998, 116). Conflicting claims were referred to the arbitration of the village elders, whose task was facilitated by the fact that as any decision applied only to a single planting season, a disadvantaged party could be "contented with the hope that next year, more allowance [would] be made for his preference for a particular piece of land" (Adriani and Kruyt 1950–51, III, 27). The idea of buying and selling land was reportedly regarded as "an absurdity" (Adriani and Kruyt 1912–14, II, 232). Exactly how much the practice of converting abandoned swiddens to fire-climax grassland had to do with this pattern of collective land ownership is hard to judge, since as we have seen there were also other reasons for profligate use of land resources in this part of Indonesia. To some extent, however, insecurity of individual tenure over specific plots must have made farmers less inclined than their counterparts elsewhere to protect growing swidden-fallow vegetation from spreading fires.

Where communally owned resources were better managed than this in the Southeast Asian past, it was often because in practice they were managed by individuals or families belonging to the social and political élite of the community in question. Among Kenyah swidden cultivators in Kalimantan, for example, forest reserves called *tana ulen* containing valuable timber, rattan, and game were controlled by aristocratic families who permitted access to them only for limited periods on specific occasions, and excluded them altogether from clearance for agriculture.

> The aristocrats claimed a percentage of all products collected in the *tana ulen* and maintained the privilege to grant permission to enter the area. However, they were also responsible for monitoring its management and punishing those who violated the existing regulations approved by the council of the elders. It appears that rather than be granted full ownership, the heads of the aristocratic lineages were entrusted with the management of the reserve on behalf of the community in recognition of their multiple responsibilities. (Eghenter 2003, 204)

Similar arrangements were characteristic of chiefdoms in the Lesser Sundas (Fisher 1999, 114; McWilliam 2001, 99). In parts of precolonial Sulawesi, local chiefs or "kings" (*raja*) acted as stewards and protectors of (deliberately planted as well as naturally growing) sago palm groves. These afforded them commercial income (sago was a significant item of local trade), and provided their subordinates with emergency food in times of famine, when chiefs were expected to display largesse (Henley 2005). In Buol on the northern peninsula the royal sago stands, of which the *raja* was said to be the "nominal owner" but which were also described as "the property of the whole community," were ceremonially shown to each new ruler on the occasion of his inauguration. At the same time he was explicitly warned to manage them in the public interest if he wished to avoid incurring the hostility and "curses" of subaltern nobles and community elders

(Van Wouden 1941, 378). The management of this important resource on behalf of the collectivity, in other words, formed an integral part of the social contract binding ruler and subject.

Such centralized, hierarchical forms of resource management, in historical settings, mainly seem to have been applied to resources located in remote places where rights of direct private ownership by individual members of the community would have been difficult to monitor and enforce. Agricultural land, at least if the population density was high, was relatively easy to divide up into private plots, the rights to which could then be defended by their owners on a decentralized, more or less egalitarian basis. But where valuable resources were located far from the centers of settlement, as in the case of *Metroxylon sagu* trees growing in swampy environments unsuitable for other forms of agriculture, it was often more practical to leave them undivided and delegate their management to specialized organs of state—we might say, of the community—with the power to protect them, and the resources to maintain a permanent physical presence at the sago site, in order to avert the "tragedy of the commons" that might otherwise have resulted from their undivided condition.

Chiefs who performed this and other "public" duties effectively, it is interesting to note, were often rewarded with lifetime tenure. In many cases they were also given at least the hope that they would be succeeded in office by one of their children, since descent was usually a potential (though seldom in itself decisive) criterion of leadership. In this way the risk that leaders might squander public resources in a destructive "end game" toward the end of their incumbencies or lives—*après moi le déluge*—was minimized. Aristocratic hierarchy, in other words, served to help avert a potential "tragedy of the future" as well as a "tragedy of the commons." Hereditary privilege has been prevalent in history partly because the underprivileged understand that it gives the powerful a useful incentive to take the long view.

Conclusion

Institutional factors, then, were important to sustainability in agriculture, but by and large they were reflections of demographic and economic conditions rather than independent variables. And in institutional terms, as in other respects, it was dense populations and commercialized economies that generated the conditions most conducive to sustainable farming. My conclusion that population pressure and commercial development had more positive than negative implications for sustainability is somewhat counterintuitive given the romantic popular belief in the ecological wisdom of traditional, isolated, tribal peoples (McNeely and Wachtel 1988), and the persistent academic interest in learning from traditional resource management practices (Berkes and Folke 1998; Persoon, Van Est, and Sajise 2003).

The optimistic argument presented in this chapter is in itself, of course, an oversimplification. Commercial land use can manifestly take unsustainable forms—most obviously the mechanized logging, driven by the world's

"insatiable appetite" (Tucker 2000) for timber products, which has been responsible for most of the fateful destruction of rainforests over the past four decades. Unprecedented in scale and relentlessness, for many observers this continuing pillage in pursuit of profit makes a mockery of all optimism with regard to the environment in Southeast Asia. In the past, nevertheless, it does appear that the risk of unsustainable exploitation was great precisely when the commercial value of a resource was slight, as in the case of the forests that shifting cultivators in some remote, infertile, and sparsely populated areas transformed into permanent, low-quality pastures after just a single cycle of agricultural use.

Most Southeast Asian farmers, fortunately, always valued their land more highly than this. Their interest in protecting its fragile soils from erosion and leaching, which under repeated cultivation would otherwise have been rapid, gave rise to three robust, sustainable agricultural systems well adapted to the exacting demands of the tropical environment: short-fallow rotational swidden farming, arboriculture, and wet rice cultivation. Of these, tree farming and wet rice farming were more efficient than swiddening in their use of land and also, contrary to popular belief, more sparing of the natural vegetation. Unlike swidden farming, moreover, smallholder arboriculture and irrigated farming were associated with commercialized economic conditions and high population densities. Wet rice cultivation in particular is also highly amenable to further area-intensification via additional inputs of labor, capital and technology; inputs that are most likely to occur in already populous, prosperous areas (Booth 1988, 100–101, 142–46; Geertz 1963, 32–37).

It follows that neither population growth nor the commercialization of agriculture (as opposed to the commercialization of forest exploitation itself) has been quite such bad news for the natural forests of Southeast Asia as is sometimes assumed. At least, the rate of agricultural expansion has seldom been fully proportional to the growth of either the agricultural population or the agricultural economy. Toward the end of the twentieth century the association between economic growth, population growth, and agricultural deforestation was further weakened by a spectacular increase in urban and nonagricultural employment opportunities, which reduced the attraction of farming in remote forest fringe areas by raising the opportunity costs of labor (Angelsen 1995, 1718; Vincent and Rozali 2005:124, 173, 369). As a generalization the idea of an "Environmental Kuznets Curve," in which economic growth leads first to a deterioration but ultimately to an improvement in environmental quality, has attracted a good deal of criticism recently (Smith and Jalal 2000, 29; Pasqual and Souto 2003, 47–48). Nevertheless if—and of course this is a very big "if"—commercial logging can be curtailed, the "de-agrarianization" (Bryceson, Kay, and Mooij 2000) of Southeast Asia may ultimately bring the region into line with the historical experience of the developed world where economic growth, beyond a certain threshold, has tended to favor the conservation of forest resources.

Bibliography

Abendanon, E. C. *Geologische en Geographische Doorkruisingen van Midden-Celebes (1909–1910)*. 4 vols. Leiden: E. J. Brill, 1915–18.

Adriani, N. *Posso (Midden-Celebes)*. Den Haag: Zendingsstudie-Raad, 1919.

Adriani, N. and Albert C. Kruyt. "Van Posso naar Mori." *Mededeelingen van wege het Nederlandsch Zendelinggenootschap* 44 (1900): 135–214.

———. *De Bare'e-Sprekende Toradjas van Midden-Celebes*. 3 vols. Batavia: Landsdrukkerij, 1912–14.

———. *De Bare'e Sprekende Toradjas van Midden-Celebes (de Oost-Toradjas)*. 3 vols. Amsterdam: Noord-Hollandsche, 1950–51.

Angelsen, Arild. "Shifting Cultivation and 'Deforestation': A Study from Indonesia." *World Development* 23, 10 (1995): 1713–29.

Barton, R. F. *Ifugao Law*. Berkeley, CA: University of California Press, 1969 (first published 1919).

Berkes, Fikret and Carl Folke, eds. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge: Cambridge University Press, 1998.

Blaikie, Piers and Harold Brookfield, eds. *Land Degradation and Society*. London: Methuen, 1987.

Boomgaard, Peter. *Between Sovereign Domain and Servile Tenure: The Development of Rights to Land in Java, 1780–1870*. Amsterdam: Free University Press, 1989.

———. "Hunting and Trapping in the Indonesian Archipelago, 1500–1950." In *Paper Landscapes: Explorations in the Environmental History of Indonesia*, edited by Peter Boomgaard, Freek Colombijn, and David Henley, 185–213. Leiden: KITLV Press, 1997.

Booth, Anne. *Agricultural Development in Indonesia*. Sydney: Allen and Unwin, 1988.

Boserup, Ester. *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure*. London: George Allen and Unwin, 1965.

Brookfield, Harold. *Exploring Agrodiversity*. New York: Columbia University Press, 2001.

Bryceson, Deborah, Cristóbal Kay, and Jos Mooij, eds. *Disappearing Peasantries? Rural Labour in Africa, Asia and Latin America*. London: Intermediate Technology Publications, 2000.

Colfer, Carol J. Pierce and Richard Dudley. *Shifting Cultivators of Indonesia: Marauders or Managers of the Forest? Rice Production and Forest Use among the Uma' Jalan of East Kalimantan*. Rome: Food and Agriculture Organization of the United Nations, 1993.

Conelly, W. Thomas. "Agricultural Intensification in a Philippine Frontier Community: Impact on Labor Efficiency and Farm Diversity." *Human Ecology* 20, 2 (1992): 203–23.

Conklin, Harold C. *Hanunóo Agriculture: A Report on an Integral System of Shifting Cultivation in the Philippines*. Rome: Food and Agriculture Organization of the United Nations, 1957.

———. *Ethnographic Atlas of Ifugao: A Study of Environment, Culture, and Society in Northern Luzon*. New Haven, CT: Yale University Press, 1980.

Cramb, R. A. and I. R. Wills. "Private Property and Collective Choice: The Evolution of Iban Land Tenure Institutions." *Borneo Research Bulletin* 29 (1998): 57–70.

Cribb, Robert. *Historical Atlas of Indonesia*. Richmond, Surrey: Curzon Press, 2000.

Dobby, E. H. G. *Southeast Asia*. London: University of London Press, 1956.
Donner, Wolf. *Land Use and Environment in Indonesia*. Honolulu: University of Hawaii Press, 1987.
Eghenter, Cristina. "Imagined Models versus Historical Practices: Tana Ulen and Community-Based Management of Natural Resources in the Interior of Indonesian Borneo." In *Co-Management of Natural Resources in Asia*, edited by Gerard A. Persoon, Diny M. E. van Est, and Percy E. Sajise, 198–214. Copenhagen: Nordic Institute of Asian Studies, 2003.
Ellen, Roy F. *Nuaulu Settlement and Ecology: An Approach to the Environmental Relations of an Eastern Indonesian Community*. The Hague: Martinus Nijhoff, 1978.
Fisher, Lawrence Alan. *Beyond the Berugaq: Conflict, Policy and Decision-making in Forest and Conservation Management in Nusa Tenggara, Indonesia*. Ph.D. thesis, Cornell University, 1999.
Freeman, J. D. *Iban Agriculture: A Report on the Shifting Cultivation of Hill Rice by the Iban of Sarawak*. London: Her Majesty's Stationery Office, 1955.
Geertz, Clifford. *Agricultural Involution: The Process of Ecological Change in Indonesia*. Berkeley, CA: University of California Press, 1963.
Gourou, Pierre. *L'utilisation du sol en Indochine française*. Paris: Centre d'Études de Politique Étrangère, 1940.
———. *Les pays tropicaux: Principes d'une géographie humaine et économique*. Paris: Presses Universitaires de France, 1947.
Greenland, D. J. "Rice and Rice-based Farming Systems." In *Agriculture in the Tropics*, 3rd ed., edited by C. C. Wepster and P. N. Wilson, 178–99. Oxford: Blackwell Science, 1998.
Hardin, Garrett. "The Tragedy of the Commons." *Science* 162 (1968): 1243–48.
Henkemans, Ariënne B., Gerard A. Persoon, and K. Freerk Wiersum. "Landscape Transformations of Pioneer Shifting Cultivators at the Forest Fringe." In *Tropical Forest Resource Dynamics and Conservation: From Local to Global Issues*, edited by K. F. Wiersum, 53–69. Wageningen: Department of Environmental Sciences, Wageningen University, 2000.
Henley, David. "Population, Economy and Environment in Island Southeast Asia: An Historical View with Special Reference to Northern Sulawesi." *Singapore Journal of Tropical Geography* 23, 2 (2002): 167–206.
———. "Of Sago and Kings: Sustainability, Hierarchy and Collective Action in Precolonial Sulawesi". In *Muddied Waters: Historical and Contemporary Perspectives on Management of Forests and Fisheries in Island Southeast Asia*, edited by Peter Boomgaard, David Henley, and Manon Osseweijer, 235–57. Leiden: KITLV Press, 2005.
Hill, R. D. *Rice in Malaya: A Study in Historical Geography*. Kuala Lumpur: Oxford University Press, 1977.
Horsting, L. H. G. *Pawiro: Zwerftochten door Indië*. Batavia: G. Kolff, 1924.
Hunt, Robert C. "Labor Productivity and Agricultural Development: Boserup Revisited." *Human Ecology* 28 (2000): 251–77.
Huxley, P. A. "Agroforestry." In *Agriculture in the Tropics*, 3rd edition., edited by C. C. Webster and P. N. Wilson, 222–56. Oxford: Blackwell Science, 1998.
Isikowitz, Karl Gustav. *Lamet: Hill Peasants in French Indochina*. Göteborg: Etnografiska Museet, 1951.
Kathirithamby-Wells, Jeya. "Human Impact on Large Mammal Populations in Peninsular Malaysia from the Nineteenth to the Mid-Twentieth Century." In

Paper Landscapes: Explorations in the Environmental History of Indonesia, edited by Peter Boomgaard, Freek Colombijn, and David Henley, 217–41. Leiden: KITLV Press, 1997.

Knapen, Han. *Forests of Fortune? The Environmental History of Southeast Borneo, 1600–1880*. Leiden: KITLV Press, 2001.

Kruyt, Albert C. "Gegevens voor het Bevolkingsvraagstuk van een Gedeelte van Midden-Celebes." *Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap*, 2nd series, 20 (1903): 190–205.

Leach, Melissa, and Robin Mearns, eds. *The Lie of the Land: Challenging Received Wisdom on the African Environment*. London: The International African Institute, 1996.

Lindert, Peter H. *Shifting Ground: The Changing Agricultural Soils of China and Indonesia*. Cambridge, MA: The MIT Press, 2000.

McNeely, Jeffrey A. and Paul Spencer Wachtel. *Soul of the Tiger: Searching for Nature's Answers in Exotic Southeast Asia*. New York: Doubleday, 1988.

McNeill, J. R. *The Mountains of the Mediterranean World: An Environmental History*. Cambridge: Cambridge University Press, 1992.

McWilliam, Andrew. "Prospects for the Sacred Grove: Valuing *Lulic* Forests on Timor." *The Asia Pacific Journal of Anthropology* 2, 2 (2001): 89–113.

Metzner, Joachim K. *Agriculture and Population Pressure in Sikka, Isle of Flores: A Contribution to the Study of Agricultural Systems in the Wet and Dry Tropics*. Canberra: The Australian National University, 1982.

Michon, Geneviève and Hubert de Foresta. "The Indonesian Agro-Forest Model: Forest Resource Management and Biodiversity Conservation." In *Conserving Biodiversity Outside Protected Areas: The Role of Traditional Agro-Ecosystems*, edited by Patricia Halladay and D. A. Gilmour, 90–106. Gland, Switzerland: International Union for the Conservation of Nature and Natural Resources, 1995.

Missen, G. J. *Viewpoint on Indonesia: A Geographical Study*. Melbourne: Thomas Nelson, 1972.

Netting, Robert McC. *Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture*. Stanford, CA: Stanford University Press, 1993.

Nibbering, Jan Willem. *Hoeing in the Hills: Stress and Resilience in an Upland Farming System in Java*. Ph.D. thesis, Australian National University, 1991.

Nye, P. H. and D. J. Greenland. *The Soil under Shifting Cultivation*. Farnham, Buckinghamshire: Commonwealth Agricultural Bureaux, 1960.

Ooi Jin Bee. *Tropical Deforestation: The Tyranny of Time*. Singapore: Singapore University Press, 1993.

Padoch, Christine. "Labour Efficiency and Intensity of Land Use in Rice Production: An Example from Kalimantan." *Human Ecology* 13, 3 (1985): 271–89.

Pasicolan, Paulo N. "Exploring the Right Blend between Government's Facilitative Role and Farmers' Initiative in Forest Regeneration." In *Co-Management of Natural Resources in Asia: A Comparative Perspective*, edited by Gerard A. Persoon, Diny M. E. van Est, and Percy E. Sajise, 87–112. Copenhagen: NIAS Press, 2003.

Pasqual, Joan and Guadalupe Souto. "Sustainability in Natural Resource Management." *Ecological Economics* 46 (2003): 47–59.

Peluso, Nancy Lee. "Fruit Trees and Family Trees in an Anthropogenic Forest: Ethics of Access, Property Zones, and Environmental Change in Indonesia." *Comparative Studies in Society and History* 38, 3 (1996): 510–48.

Persoon, Gerard A., Diny M. E. van Est, and Percy E. Sajise, eds. *Co-Management of Natural Resources in Asia: A Comparative Perspective*. Copenhagen: NIAS Press, 2003.

Platteau, Jean Philippe. *Institutions, Social Norms, and Economic Development*. Amsterdam: Harwood Academic, 2000.

Raffles, Sophia, ed. *Memoir of the Life and Public Services of Sir Thomas Stamford Raffles*. Singapore: Oxford University Press, 1991 (original edition: 1830).

Reid, Anthony. *Southeast Asia in the Age of Commerce, 1450–1680*. 2 vols. New Haven, CT: Yale University Press, 1988–93.

———. "Humans and Forests in Pre-colonial Southeast Asia." *Environment and History* 1, 1 (1995): 93–110.

———. "Inside Out: The Colonial Displacement of Sumatra's Population." In *Paper Landscapes: Explorations in the Environmental History of Indonesia*, edited by Peter Boomgaard, Freek Colombijn, and David Henley, 61–89. Leiden: KITLV Press, 1997.

Sachs, Jeffrey D. *Tropical Underdevelopment*. CID Working Paper 57. Cambridge, MA: Center for International Development at Harvard University, 2000.

Scholz, Ulrich. "Ist die Agrarproduktion der Tropen ökologisch benachteiligt? Überlegungen am Beispiel der dauerfeuchten Tropen Asiens." *Geographische Rundschau* 36, 7 (1984): 360–66.

"Überlegungen zum Agrarpotential und zur Tragfähigkeit tropischer Regenwaldgebiete." In *Tropischer Regenwald als Ökosystem*, edited by U. Scholz, 41–53. Giessen: Wissenschaftliches Zentrum Tropeninstitut Giessen, 1991.

Schrauwers, Albert. "'Let's Party': State Intervention, Discursive Traditionalism and the Labour Process of Highland Rice Cultivators in Central Sulawesi, Indonesia." *The Journal of Peasant Studies* 25, 3 (1998): 112–30.

Schulte, Andreas. *Rainforestation Farming: Option for Rural Development in the Humid Tropics of Southeast Asia: A Review of Major Issues on Community-Based Rehabilitation Silviculture and Guide to Recommended Native Tree Species for the Visayas/Philippines*. Aachen: Shaker Verlag, 2002.

Seavoy, Ronald E. "The Shading Cycle in Shifting Cultivation." *Annals of the Association of American Geographers* 63, 4 (1973): 522–28.

Smith, Douglas V. and Kazi F. Jalal. *Sustainable Development in Asia*. Manila: Asian Development Bank, 2000.

Soto, Hernando de. *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else*. London: Black Swan, 2000.

Steenis, C. G. G. J. van. "De invloed van den mensch op het bosch." *Tectona* 30 (1937): 634–53.

Suyanto, S., Thomas P. Tomich, and Keijiro Otsuka. "Agroforestry Management in Sumatra." In *Land Tenure and Natural Resource Management: A Comparative Study of Agrarian Communities in Asia and Africa*, edited by Keijiro Otsuka and Frank Place, 97–143. Baltimore: The Johns Hopkins University Press, 2001.

Terra, G. J. A. "Farm Systems in South-East Asia." *Netherlands Journal of Agricultural Science* 6, 3 (1958): 157–82.

Tiffen, Mary, Michael Mortimore, and Francis Gichuki. *More People, Less Erosion: Environmental Recovery in Kenya*. Chichester: John Wiley, 1994.

Tucker, Richard P. *Insatiable Appetite: The United States and the Ecological Degradation of the Tropical World*. Berkeley, CA: University of California Press, 2000.

Vincent, Jeffrey R. and Rozali Mohamed Ali. *Managing Natural Wealth: Environment and Development in Malaysia*. Washington, DC: Resources for the Future / Singapore: Institute of Southeast Asian Studies, 2005.

Walters, Bradley B. "Local Management of Mangrove Forests in the Philippines: Successful Conservation or Efficient Resource Exploitation?" *Human Ecology* 32, 2 (2004): 177–95.

Weischet, Wolfgang and Cesar N. Caviedes. *The Persisting Ecological Constraints of Tropical Agriculture*. Harlow, Essex: Longman, 1993.

Wouden, F. A. E. van. "Mythen en Maatschappij in Boeol." *Tijdschrift voor Indische Taal-, Land- en Volkenkunde* 81 (1941): 333–410.

Zinke, Paul J., Sanga Sabhasri, and Peter Kunstadter. "Soil Fertility Aspects of the Lua' Forest Fallow System of Shifting Cultivation." In *Farmers in the Forest: Economic Development and Marginal Agriculture in Northern Thailand*, edited by Peter Kunstadter, E. C. Chapman, and Sanga Sabhasri, 134–59. Honolulu: University Press of Hawaii, 1978.

Part 1

Resources and State

2

The Physical Transformation of the Central Thai Region in Premodern Times

Baas Terwiel

Changes that have occurred in the Thai landscape in recent times have been the subject of many studies, usually drawing attention to a dramatic environmental deterioration as a result of a growing population, agricultural diversification, urbanization, and industrialization.[1] Less known is the fact that in early modern times, roughly between 1600 and 1850, the Thai economy was more diversified than usually is assumed. As a result of such early economic developments, it is argued here, there occurred some hitherto not anticipated drastic changes to important parts of the landscape. In this chapter, a differentiation is made between various types of human activity and their impact upon the environment.

In the following, two commonly accepted assumptions are challenged. The first is the assumption that there were no economic continuities following the traumatic events around the fall of Ayutthaya in 1767. The second deals with the nature of the traditional village economy.

Questioning the Assumption that the Fall of Ayutthaya Should Always Be Seen as a Major Watershed in Thai History

In Thai history books the prolonged siege of the capital city and its fall in 1767 are invariably depicted as the end of an era, followed by a resurrection under the leadership of the half-Chinese new ruler King Taksin (who in 1782 was supplanted by the first ruler of the Chakri dynasty). Although undoubtedly large parts of the Chaophraya basin suffered under the invading armies, and while the capital city was looted and an important part of its population was taken to be resettled in Burma, these events and the succeeding years of unrest tend to blind historians to some continuities. In the first place large

parts of Siam, in particular the densely populated northeastern, eastern, and southern regions, were not devastated; its traditional hierarchy and administrative structures remained in place, thus making a rapid return to stable conditions possible.

Second, historians' concentration on the fall of the capital city has prevented them from perceiving a continuing trend that deeply influenced the region, namely the fact that between from 1700 and 1850 the influence of Chinese entrepreneurs grew dramatically.

THE MYTH OF THE SELF-SUFFICIENT VILLAGE ECONOMY

In Thailand it is widely believed that in early modern times a typical farming community was a self-sufficient unit. Farmers not only grew rice, but also cotton; they also cultivated tobacco; they fished; they made their own boats and carts.[2]

This belief gained popularity in 1984 when the economics historian Chatthip Nartsupha wrote *Sethakit Muban Thai nai Adit* [*The Thai Village Economy in the Past*], a book that rapidly became a classic (recently even an English translation has appeared). In it he suggested that he had discovered (mainly through a series of interviews with farmers) that in the past the traditional village was a self-sufficient economic unit. Chatthip maintained that the principles of a Thai self-sufficient village economy were applicable to the whole period from the mid-fifteenth to the mid-nineteenth century. In this type of village, rice and vegetables were grown primarily for the villagers' own consumption, men fished for protein, clothing was made by adult women working their looms, tools were locally made, and building wood was taken from nearby forests. Villagers assisted one another in communal tasks and when they were sick they relied upon their own herbal remedies. A barter system was followed: the money economy did not affect the village until after the second half of the nineteenth century. There was little development of classes of workers, no specialized craftsmen, and no class of shopkeepers.

A peculiarity of this self-reliant village was that it was exploited by the state authorities. The state thus skimmed off the resources, but did not interfere with the village in other ways. Chatthip implies that the state's imposition was chiefly limited to occasional corvée duties and payments in kind. Whenever Chatthip came across information that pointed to economic diversification or evidence of a penetration of the money economy to the village level, he assumed that to have been relatively insignificant, not affecting the basic subsistence of the village culture.

Chatthip's model of early Thai rural life has occasionally been criticized I belong to the critics; in the first place because I have serious doubt whether interviews with Thai farmers can provide us with knowledge about early modern times, in particular knowledge about the state and the degree of economic diversification. Moreover, I have come to the conclusion that the surviving

early modern historical documents are in conflict with Chatthip's model of the traditional village economy. I hope this chapter will contribute to putting the myth of the self-subsistent farming community to rest.

Dealing with Early Sources

Only from the 1830s onward do we find a broad database (albeit much of it hidden in archives) from which we can extrapolate the size and complexity of the Thai state organization, the degree to which the money economy had permeated to the periphery and the effects human enterprise had on the environment.[3] There are grounds, however, to assume that the situation at the beginning of the nineteenth century was the tail end of an integral, functioning, stable system that had been in place for centuries. The main indicators that prove this are seventeenth-century snippets of information; some of these (when read in isolation) seem trivial; these may be taken as indications that the central Siamese state system was in place and effective. Thai annals suggest this system may have been set into place as early as the middle of the fifteenth century.

The effectiveness of the state diminished at larger distances from the main roads and waterways. There people could escape state control and only there some degree of autarky could be sustained.

Defining the Region and Its Topographical Characteristics

In this chapter central Thailand is taken to be the lower reach of the Chao Phraya basin, the lowland region stretching from Ratburi in the southwest, to Chonburi in the southeast, stretching northward to Chainat and its most easterly reach being Kabinburi (Takaya 1987, Hubbbard 1977).[4] In the middle of this region the city of Ayutthaya is situated that until its destruction in 1767 was the capital of Siam. During most of the early modern period Ayutthayan direct control stretched far beyond this central region in all directions, northward along the chief river systems, toward the northeastern densely populated Mun and Chi River basins, toward the important southeastern coastal zone leading to Cambodia and to the far southern provinces—in the days of sailing ships—the key to international trade.

Determining the chief characteristics of the natural environment of the central basin is complex. Probably the most sophisticated studies of the region are presented by Japanese scholars, especially by Yoshikazu Takaya.[5] Takaya recognizes in the middle and lower reaches of the Chaophraya six distinct parts: mountains, foothills (which he specified as fan-terrace complexes), floodplains (stretches of river within natural levees together with adjacent lower-laying swamps), the old delta (four or five meters above the floodplain), the young delta (one or two meters below the old delta), and finally the coastal zone.

Even within this relatively small delta region the human situation differed considerably depending on location. At the beginning of the period under consideration humans in the coastal zone, for example, made a living fishing, as well as exploiting mangrove forests and nipa palm trees. The young delta, however, being a wilderness, was in early modern times almost completely unsuited to human occupation. As a consequence of the many swamps, humans living there or passing through were plagued by swarms of mosquitoes, and they were exposed to the danger of crocodiles and tigers. Only along the chief waterways that connected Auytthaya to the sea had a number of human settlements developed, where a remarkable division of labor could be observed.

The old delta, as well as the Suphanburi and Noi-Lopburi floodplains, the Bang Pakong Delta, and the Mae Khlong Fan were the sites of many towns and villages, all ranged along the banks of the chief waterways, with rice growing in the immediate vicinity, the most valuable fields being those that were situated low enough to be flooded during part of the year (ten Brummelhuis 1995, 126–27). The fan-terrace complexes were partly used for rice-growing but, from the beginning of the eighteenth century, they also saw the development of plantations. It was in the mountain areas that forest products were stored and animals hunted.

SIZE OF THE POPULATION

Contemporary visitors are divided in their opinion as to whether Siam was thinly inhabited. Those who had seen only parts of the lower Delta, which was generally uncultivated, considered the country to be very thinly populated. So few woods had been cleared, according to La Loubère (1986 [1693], 11), that the Siamese could not have inhabited the land very long. Neijenrode (1622) and Van Vliet (Van Ravenswaay 1910, 9, 11), who had the opportunity to see much more of Siam, tells us on the contrary that the country was thickly populated.

We may safely assume that some parts, along both banks of the Chaophraya River, the Pasak, Banpakong, Suphanburi, and Mekong Rivers, and in particular the Mun and Chi River, were fairly densely populated. At the other end of the spectrum was wilderness that was either avoided by humans or only visited by them for forest products or game.

The exact population of the early modern times is very difficult to assess. Foreign observers had only a vague idea about the extent of the influence of the Siamese state and, up to the middle of the nineteenth century, their estimates were often not more than a wild guess. However, there is a figure, recorded at the end of the seventeenth century, apparently based on Thai government records. La Loubère writes (1986 [1693], 11) that because of their taxation system the Siamese kept an exact account of the men, women, and children and that, according to their own count, 1.9 million people lived in the vast Kingdom of Siam. This figure obviously includes all regions that were directly taxed, which were at that time, apart from the lower

Chaophraya basin, also its more populated middle and upper reaches, the Mun and Chi River banks, Chanthaburi, many southern provinces, and possibly also Tenasserim.

There are historians who doubt whether the central government actually did keep such a register, but the annals mention that a full count of human resources in the whole kingdom was for the first time undertaken during the reign of Ramathibodi II (1491–1529).[6] It must be seen as having been an important instrument of the state to control and exploit the realm's varied resources. There can be no doubt that this registration system, and related administrative measures, were successful in linking the hinterland with the capital city. It was the basis upon which the state acquired large amounts of export products, such as sappan and eaglewood, lac, deerskins, and tin.[7]

Transportation

From the perspective of Ayutthaya, the bulk of local transport, and long-distance travel to the north, the south, and the southeastern coastal region was by boat. In the delta the chief waterways were connected by a system of canals, which may be regarded as its infrastructure, making it possible to move goods and people, along which settlements could develop, which made effective state control possible.

How important the digging of canals was for the Thais is reflected in frequent and sometimes detailed accounts in the annals of Ayutthaya. The earliest record dates from the end of the fifteenth century, when it is reported that a section of the Samrong canal had silted up, obstructing the passage of boats and the king ordered that section to be deepened.[8] After this early mention there are regular entries related to human-made waterways. Some of these waterways were intended to shorten the route between Ayutthaya and the sea through bypassing meanders; others were technically more ambitious, digging new tracts through the landscape. There is, for example, the case of the improvements to and extension of the Mahachai Canal to connect with the Thachin River near Sakhònburi (Samut Sakorn in Hubbard's map).

The work began in 1645 when the minister in charge of civil affairs (*chaophraya* Chakri) ordered conscripts from Nonburi, Nakhòn Chaisi, Sakhònburi, Samut Songkhram, Phetburi, Ratburi and Samut Prakan, a total number of over thirty thousand men (one version says sixty thousand),[9] to be placed under the supervision of *phra* Rachasongkhram. The latter had the total length of the future canal measured and it was found to be 340 *sen* (13.6 kilometers). Stakes were driven into the ground to indicate the course of the projected canal.[10] The new waterway had to be 16 meters broad at the top, its depth was set at 3 meters and at the bottom it was 10 meters broad, so it can be deduced that the sides were planned to slope to an angle of 45 degrees. The length of the canal was divided, with each conscript given the task of digging a narrow segment about 30 centimeters wide. After three months of digging the work was completed, and *phra* Rachasongkhram was promoted to *phraya*.[11]

In early modern times there were also various overland connections between Ayutthaya and regions further away. These were simple paths and trails that fanned out toward the west and in an easterly direction. Over such paths heavy goods could be transported on elephants or in carts drawn by oxen or bullocks. It was possible for traders to carry goods overland, for example, from Ayutthaya to Tenasserim, the route going westward to Suphanburi, then leading south via Ratburi and Phetburi toward Kuiburi before crossing the peninsula; a journey that in the late seventeenth century could take some 25 days.[12] Toward the northeast there was a network of overland routes, the main one following the Pasak River Valley to Saraburi then overland toward Nakhon Ratchasima and the Mun River System. In a southeasterly direction there was a road via Nakhon Nayok to Prachinburi and Kabinburi, eventually leading to Cambodia. The people living in the Prachin Valley were also directly connected to the coast, via the Bang Pakong River, passing through Chachoengsao. Important for Ayutthaya was the coastal region beginning at Chonburi stretching east via Rayong, Chanthaburi, and Trat toward Cambodia. Until the nineteenth century this coastal region was connected to the capital by boats traveling in the coastal waters of the Gulf.

THE EXPLOITATION SYSTEM

The central part, roughly corresponding to the lower delta, was under direct administration by Ayutthayan (after 1767, Thonburi and from 1782, Bangkok) officials. We know that in this central region a register of rice fields (distinguishing between land in bunds[13] and fields that would be naturally flooded[14]) was kept, as well as a register of orchards, together with an administrative apparatus to collect duties. The registration of fields and produce-bearing trees was extremely complex. A full count was made occasionally, often at the beginning of a new reign. In the tree register each type of plantation was recorded with the number of mature trees. For every type of tree there was a particular tax.

There was a distinction between older plantations in the lowlands (containing areca palms, coconut palms, betel vines, mango trees, maprang trees,[15] durian trees, mangosteen, and langsat trees[16]), which were registered only in a general registration, and plantations in higher-laying regions, which were assessed every year. The latter comprised orchards, with fruit trees such as citrus, breadfruit, guava, rambutan, and pineapples. Also falling under an annual registration were tamarind and banana trees as well as pepper and cinnamon plants. The reason for the distinction probably relates to the fact that control over the lowlands was easier to maintain than in the uplands. Moreover, higher plantations may, after a few years of exploitation, often have been abandoned for new grounds.

The maintenance and upkeep of such registers was possible only in a state where the use of paper was widespread, where methods of recording were standardized, and the state employed a vast number of literate persons who

were willing to do the work. All evidence points in the direction that these conditions were met. The state paid its agents by prescribing a specific collecting fee that was added to the tax, thus providing the incentive to do the work. In the central region there were various other taxations—on markets, ships, and commercial cargos, with toll stations manned at strategic points. In the seventeenth century it was also common for the state to sell liquor, opium, and gambling licenses for a specific town to the highest bidder.

However, the system of exploitation controlled by the Siamese capital went much further. In a wide ring far beyond the Chaophraya Delta, 18 outer centers were supervised by the Mahatthai ministry, each under one or more "Chiefs of an outside centre" (*nai kòng nòk*). The Peninsula was placed under the responsibility of the Kalahom ministry, divided over 10 further outer centers. The number of *nai kòng nòk* in a single location varied, and each of these chiefs, assisted by a group of lower officials, was responsible for the payment of a particular tax to the state called *suai*. The amount and nature of *suai* payment depended on the assessment of the number of adults of the *kòng* and the type of natural resources in each location.[17] We may safely assume that hundreds of government officials resided in local centers and were responsible for the collection and sending of *suai* payments. The earliest surviving documents relating to the administration of this taxation system date from the beginning of the nineteenth century (earlier pieces of paper not having withstood the tropical climate) and they show both the extent and variety of taxation.[18] Low remarks that the Thai system of government was "minutely and extensively efficient."[19]

The southwest produced palm sugar and salt. The western mountain ridges were the source of many forest products, the most important ones being sappan wood and various species of deer. In the north there were iron mines, and further inland lac was produced from forests near Phitsanulok Sukhotai and Chiangmai. In addition, the north was the source of a seemingly inexhaustible supply of teak. The northeast, where the Mun and Chi River flowed, contained a vast reservoir of humans that could be called upon in case of warfare. Most communities had been registered and in peacetime they were to send tributes, such as ramie,[20] cardamom, beeswax, and silk. Between the Prachin Valley and the southeastern coastline much of the terrain was a wilderness where, among other animals, the rhinoceros was hunted and forest products such as cardamom was collected.[21] The southeastern coast was the kingdom's chief pepper-growing region.

The state apparatus extracting land and plantation tax, supervising corvée services and collecting *suai* payments drew a steady stream of valuable resources to the capital city. One of the first surviving travel accounts, dated 1806, mentions Klaeng, a small town at the foothills in the southeastern region, several days' distance from the capital city, recording that the whole community was engaged in weaving mats in order to fulfill their *suai* quorum.[22] Many of the goods thus collected would be channeled through the king's trade minister to be exported. In years when the rice crop was sufficient the surplus was sold to foreign traders.[23]

ECONOMIC DIVERSIFICATION IN SIAM IN THE EARLY MODERN PERIOD

A stereotypical image of the landscape of Central Thailand is of an endless patchwork of rice-fields, with an occasional palm tree growing on the bunds. It ought to be kept in mind, however, that this open landscape was largely created during the modern period after the Bowring Treaty (1855) forced the Thais to dramatically lower import duties. Although somewhat simplified, it may be stated that after the middle of the nineteenth century many local industries could not compete with cheap manufacture from abroad. Instead, as the price of rice remained profitable and stable for long periods, Siam gradually became a major rice exporter. By about 1900, it was estimated that about 50 percent of the central plain was still to be developed for human use. Drainage schemes opened up large sections of the new delta for farming.

In the seventeenth century much of the central region was still hostile to humans, with tigers inhabiting the grasslands, crocodiles lurking in the rivers, and large swamps breeding innumerable mosquitoes. Even then, rice-growing was and always had been an important aspect of the functioning of the state. Rice was the staple food; it was perceived as an intrinsically valuable commodity that measures of rice could be used in lieu of money. The best rice-growing lands were the floodplains of the old delta where there was no salinity, where the soil was suitable and its fertility was replenished through occasional inundation.

However important rice was, it was by no means the only product coming from rural Siam. One of the early seventeenth-century descriptions of the kingdom by the leader of the Dutch trade office, Jeremias van Vliet, mentions various professions. In Siam there was brick- making, the production of iron goods, and the baking of tiles; many people worked in plantations of indigo, fruit trees, coconuts, betel vine, and areca palms. The regular export of sappan wood, lead, deer hides, and agar wood was possible only because sections of the population specialized in producing, manufacturing, and transporting these goods. In contrast to Chatthip's presumed lack of tradesmen, Van Vliet mentions that the population of towns earned their living by trade, court services, navigating with junks, barges, and small boats, by fishery, and various industries. Van Vliet also mentions the widespread use of money in the form of small clumps of silver coins and cowry shells (600 or 700 shells for one silver *fueang*).[24]

The VOC (Vereenigde Oostindische Compagnie) surgeon Gijsbert Heeck wrote in 1655 a fairly detailed account of the 100-odd kilometer stretch between the mouth of the Chaophraya River and the capital Ayutthaya. He confirms Van Vliet's description of an economy with a strong degree of specialization. Around Bangkok, Heeck noticed many fruit gardens: coconuts, oranges, lemons, banana trees, and areca nuts: produce that was transported and sold at the biggest market on the Chaophraya River by professional transporters.[25]

On passing villages Heeck noted that many people specialized in raising livestock. Some villages were inhabited only by pot-makers, some specialized in cutting firewood, at some villages people made a living pressing oil from coconuts while one village specialized in making coffins, which were prominently displayed along the waterside. In the capital city there were many gold and silversmiths. Gold and silver were sold in the seventeenth century (as now) by weight and a fixed sum for the labor (L'Honoré Naber, 1910–11, 448).

The region around Bangkok was already in the seventeenth century the scene of fruit gardens. Early in the nineteenth century the region had developed into what was described as a "forest of fruit trees," with mangos, mangosteens, oranges, durians, lichis (then newly introduced from China), pineapples, guavas, and papayas.[26] Some 15 kilometers south of Ayutthaya, Heeck noted plantations of sugarcane, watermelons, pumpkins, cucumber, and sugar palms. Engelbert Kaempfer, another seventeenth-century observer, recorded a brick-making industry south of Ayutthaya.

An industry that has hitherto received little attention is boat-building—not only the production of small vessels, but also large sea-going ships. One of the earliest accounts of the existence of a boat-building industry in Siam dates from 1638, when Van Vliet tells us that 120 sea-going vessels were built in order to make an assault on Pattani.[27] Not long after, Gijsbert Heeck notes: ". . . teak and other timber is easily obtained here, and this is why often old ships are sent here to be repaired and completely overhauled, because it can be done cheaper here than even in Batavia. Last year the yacht *Worcum* was built here (completely from Siamese wood), a very fine warship . . . ."[28]

The wood used for shipbuilding was mainly teak, which reached the wharves by being floated down the Chaophraya River from the northern reaches.[29] Teak was also used in Siam for temple construction. It did not itself become a major export product until the early nineteenth century. The Dutch were not the only people who exploited Siamese wood for ship-building—Chinese junks were also built and repaired there. Roberts described the boat-building scene in 1833 in some detail, noticing:

> . . . a great many large junks, building in dry docks, which consist of a simple excavation made on the banks, the water being drained out by an ordinary barrier of plank, well banked with clay. Many of these junks were upward of a thousand tons. From two to three hundred were lying in the river.[30]

We may conclude that, at least along the main thoroughfare between Ayutthaya and the sea, there was division of labor at the village level and that the life of ordinary villagers was unthinkable without money. There is no evidence of an economic autarky of villages as assumed by Chatthip. When expanding our view beyond the much-traveled lower Chaophraya River, the situation becomes much more complex.

In the western part of the coastal zone, particularly near the mouth of the Thachin River, as mentioned above, there was a thriving salt industry. There

must have been thousands involved in producing not only sufficient for the country's own needs but plenty for export.[31] Other coastal villages derived their livelihood chiefly from fishing in the Gulf and harvesting shellfish in shallow water. In the seventeenth century there were already large coconut plantations, the oil of the coconut being a major export article till the middle of the nineteenth century. Apparently vast numbers of rural people found a livelihood in occupations other than rice-growing. All low-lying regions near the coastline were too salty for rice—villagers living within the coastal belt fished, cut mangrove wood,[32] and some made charcoal. In places with open grassland some specialized in raising cattle. Where a suitable supply of river clay was found, villagers made ceramics or baked bricks. There were villages that specialized in basket-weaving or in paper-making and others supplied the market with fruit.

Around Phetchaburi lay the center of an age-old palm-sugar industry, and consequently the central state's involvement with that region centered around that industry. D. B. Bradley gives the first detailed account, noting multitudes of women carrying between 12 and 15 pots of palm sugar on shoulder sticks from the boiling centers to the merchants. They sold about 14 or 15 pots for one *baht*. Boats carrying between two and five thousand pots would take two days to reach Bangkok, and about a week to sell out. What with heavy taxes on the boiling centers and on the palmyra trees themselves, Bradley is surprised by the amount of labor for so little profit to the manufacturer.[33]

Thus, in contrast to what Chatthip suggests, we note already in early modern times an impressive variety of lifestyles in Siam with many small traders and well-defined specializations, indicative of an intricate web of relationships that are only possible in a large-scale money economy. The self-sufficient farming village may have existed, but we find no trace of it in the regions that have been observed. Of course, it may be argued that the Chaophraya River, being the country's chief thoroughfare, is not typical of other parts. It will be shown, however, that when the first observed data came from further inland, it attested to an even more diversified economy. In this chapter it is argued that the seventeenth-century diversified economy formed an ideal setting for the later developments, which are described below.

THE USE OF MONEY

One of Chatthip's hypotheses is that the basic traditional village economy functioned without money. He assumes that people bartered for goods, and for labor-intensive occasions they maintained reciprocal work schedules. However, in early modern sources not a single case of barter can been found. As for reciprocal networks, there can be little doubt that until recent times these did exist, but they existed in conjunction with, and supplementary to, a fully developed and well-functioning money economy.

Various seventeenth-century Dutch observers confirm the widespread use of money (for example, the daily wages for a rower in 1655 were one-eighth

of a *baht*). Much of the taxation on goods and produce was set in terms of money and, although part of the rice harvest was likely to have been handed over by way of tax, other taxes were paid in money. Toll stations in strategic spots stopped all traffic and collected money when no evidence for an exemption could be produced. The earliest Thai account of a voyage of a Siamese tax collector from Bangkok to a provincial town shows that he returns to the capital with a box full of money. An additional interesting fact is that, even though he reports a high degree of hardship due to several successive years of crop failure, the tax collector does not seem worried about his safety, or that of the accumulated silver.

The small currency of the people was the cowry shell, which was appreciated because, unlike metal money, shells could not be tampered with or faked.[34] The earliest account of a provincial market town of 1806, notes women walking around with bulging bags of cowries.

Thai women had money, and they used it, for example, to buy cloth. This explains why already in the early seventeenth century there was a thriving import of cotton cloth produced in the eastern part of the Indian subcontinent. Van Vliet (1910 [1638], 89) specifies that this cloth came from the Coromandel Coast and Surat. The fact that such cloth was especially designed for the Thai market and that it was imported in great quantities implies that this product was sold to the general populace.

One-and-a-Half Centuries of Chinese Expansion, 1690–1840

The earliest Portuguese accounts accord a special role to the Chinese as traders with a privileged role at the Siamese court. What has hitherto been overlooked is the unusually wide distribution of the Chinese presence. Heeck noted Chinese families settled in ordinary villages along the Chaophraya River. Many Chinese also lived in the capital Ayutthaya; not outside the walls like other foreigners, but in the city.

A striking account of the extent of the early Chinese trade network comes from Laos. In 1641, Dutch traders traveled for the first time up the Mekong River, deep into Lao territory. When they were some 450 kilometers upriver, Gerrit Wuysthoff came upon Chinese traders. He estimated that the Chinese assembled annually some 20,000 regular deerskins, 3,000 large deerskins, and about 80 piculs[35] of wax, which were collected with carts and boats and from time to time transported downriver to sell for a profit. These Chinese made journeys overland using carts to the Phnong people that took them two to three months.[36] They exchanged salt, cowry shells, iron, small copper gongs, and other mainly cheap trinkets for gold, rhinoceros horn, and elephants' teeth. For salt they could get its weight in gold. But, so warns Wuysthoff, these nine to tenfold profits had their price because the region was unhealthy and there was malaria.

Although the Chinese presence during the seventeenth century therefore should not be underestimated, it became much more invasive during the

eighteenth and the beginning of the nineteenth centuries. Dhiravat has drawn attention to the remarkable fact that between 1699 and 1733 the position of trade minister at the Ayutthayan court was filled by a Chinese person.[37] Sarasin has documented how in the 1680s the Sino-Siamese trade began to flourish and the Chinese population in Siam began to rise.[38] In addition, because of civil disturbances at the end of the seventeenth century in China, refugees from coastal southern China fled southward, where they were generally received in a friendly manner by local rulers, but where they also discovered hitherto unexploited regions and sometimes even set up autonomous units.

An example of the latter was the city-state of Ha Tien, that through most of the eighteenth century was a Chinese enclave of the Cambodian coast.[39] In 1671, Mac Cuu, a Cantonese, fleeing disturbances in South China, settled in Cambodia, where he served in a high position at the court. In 1700, Mac Cuu and his followers settled in Bantheay Meas (in European sources known as Ponthiamas) on the Gulf of Siam, where they built a Chinese style town called Ha-tien tran. They maintained an autonomous government for nearly 80 years, adhering to Chinese traditions, house-building, and dress code.

The early eighteenth century also saw a rapid increase in Chinese activity in many other places in the region. On the Malay Peninsula many were attracted to places where tin mines were in operation. Chinese immigrant workers were welcomed by the Thai authorities. Chinese paid an annual tax, payment of which was visible through a sealed badge on a rope around the wrist, in return for which they were free to move without restriction or registration for corvée. Many of them began exploiting the foothills both east and west of the old and new deltas. One of the most popular venues for migrating Chinese was the southeastern port of Bangplasoi, from where they could travel further inland to Bangpakong or Chachoengsao. Work was relatively easily found in sugarcane, pepper, and tobacco plantations.

Throughout the eighteenth century the population of China increased massively, resulting in a chronic shortage of food in that country. This had a twofold effect on Sino-Chinese relations. First, China's need to import rice created a major incentive to liberalize trade. Second, hunger drove many a Chinese immigrant to try his luck in Siam, where land and food was readily available.[40]

Until the early nineteenth century there are no historical sources giving us a view of the exact distribution and activity of Chinese immigrants in Siam. When, however, these sources do finally appear, they will show that a revolution of the foothills had already taken place.

One of the earliest snippets of information is by the poet Sunthorn Pu, who walked along the southeastern coastal region in 1806 and lost his way near Patthaya, but when he asked a Chinese worker (*Cek lukcang*) a question he found that he could not communicate with him in Thai.

In 1822, suddenly a wealth of details becomes available through the assiduous collecting of information by Crawfurd, who observed the role of the Chinese:

> The Chinese colonists are the only class of the population exempted from the conscription, in lieu of which every male of twenty years of age and upwards pays a poll-tax, with the exception of a few individuals bearing Siamese titles. Every individual who has discharged his contribution for the year is directed to wear upon his wrist a badge, bearing the seal of the officer to whom he has made payment; in failure of which, he is liable to be seized, and compelled to make a second payment. The amount of the tax, for each individual, is two ticals to the Government, and a fuang and a half to the collector. I was informed that the number of persons paying the contribution within the city of Bangkok and its jurisdiction was 31,500, but I had no opportunity of ascertaining its amount throughout the rest of the kingdom. The following analogy, however, will perhaps be considered to afford grounds for a reasonable conjecture on the subject. The Chinese are the principal consumers, and therefore the principal contributors to the spirit tax, which in Bangkok and its jurisdiction amounts to 144,000 ticals, and in the whole kingdom to 460,000. If the Chinese liable to the poll-tax be in a similar proportion, their contribution to the State will amount to 201,250 ticals—25,156£. 5*s.*[41]

The 31,500 Chinese mentioned by Crawfurd may be taken to be the number of head-tax-paying migrant Chinese in the central region for that year. Many of these would, after having saved money, return to their mother country, but all available sources indicate a large surplus in arrivals. In the mid-1820s, the surplus may have been two to three thousand, but later this increased dramatically. The highest estimate came from Malloch, who lived in Siam in the mid-1820s but wrote the following more than 20 years later:

> Considering the extent of Siam, it is thinly peopled, and capable of supporting twice the number of its present inhabitants; but now that the Chinese have seen the beauty of the country and of late years are arriving annually from Canton, Fokien and different parts of China to the number of 15,000, Siam cannot fail of eventually becoming a country of considerable magnitude and importance as a place of trade. As it is now, it is next to China in a commercial point of view, of any native state in the east. When I was in Siam [p. 10 "the three years I remained in Siam"—he left, according to the Burney Papers, 20 March 1827] I had a memorandum from the public records, shewing that 12,000 emigrants arrived annually from China, of whom the far greater number were from Canton. The Chinamen are well pleased with the country, and their prospects; and the China Junks which bring so many passengers carry very few away.[42]

All early nineteenth-century visitors traveling through Siam's foothills note the presence of plantations, ranging from coconuts, tobacco, indigo, cardamom, bananas, sugarcane, pepper and sweet potato. Crawfurd notes, apart from coconut plantations, the cultivation in Siam of much cotton in the

foothills, as well as the growing of sweet potatoes and other foodstuffs not only for domestic consumption but also for export. Mung beans were exported to China and the Malay Islands in considerable quantities, also much cultivated were soybeans and peanuts. Sugarcane was known of old, but large-scale cultivation, according to Crawfurd's informants, dated not more than 12 years before his visit (which took place in 1822), and this new sugar cultivation depended on the industry and enterprise of the Chinese settlers. In 1822 Siam exported more than 8 million pounds of sugar to China, Hindostan, Persia, Arabia, and Europe. The chief sugarcane districts were: Bangplasoi, Nakhonchaisi, Bangpakong, and Petriu (Chachoengsao), all lying in the southeastern part of Siam.[43] In all early-nineteenth- century accounts from the western foothills sugar manufacture is also reported; invariably it is Chinese enterprise that created the plantations and boiling factories.

The old black pepper industry around Chanthaburi and Thungyai was expanded by Chinese labor, so that Crawfurd could report that in 1822 not less than 8 million pounds of black pepper was destined for the Chinese market. Again it was the southeast where most tobacco was grown and cured. The fact that in 1822 tobacco was exported to Cochin China and Malay countries, although not many years before it was imported from Java, is another sign of the impact of the flood of industrious immigrating Chinese. Coffee was another new crop introduced at the beginning of the nineteenth century.[44]

This enumeration of Chinese enterprise in Siam is not complete without mentioning the iron industry near Phitsanulok. Here, iron was mixed with antimony, obtained from mines near Ratchaburi, and cast-iron pans were made in such quantities that much could be exported.[45] In addition, there was the exploitation of Mai-fang or sappan-wood forests;[46] many of these were near Chachoengsao but also in the western forests—a dark-red hardwood particularly wanted by Chinese cabinet-makers. This wood also yielded a red dye, sold to India and China.

The extraordinary economic developments in Siam in early modern times were made possible by the use of a massive pool of Chinese labor being granted access to Siam's rich resources. The presence of a steadily increasing alien male workforce, with its concomitant development of opium and gambling dens and prostitution did cause tension between Thais and Chinese. How high the tension had risen becomes clear when we read in the Thai annals for 1848 that large-scale rioting had broken out, during which thousands of Chinese were randomly killed by Thais. It need not surprise us that this killing took place near the town of Chachoengsao, the town in the southeastern region where Chinese impact had been the strongest.

HUMAN ACTIVITY AND THE ENVIRONMENT: THE DEGREE OF CONTROL

Pornchai Suchita, in line with the somewhat romantic view of rural life in early modern Thailand propagated by Chatthip, mentions the farmers' traditional

use of what he calls an "appropriate technology," by which he means technology in harmony with the social and physical environment. The very idea of human intervention being seen in connection with a harmonious relationship seems to me rather anachronistic. We may assume as that in order to create a complex society humans have to take control of their natural environment. Considerations of sustainability come to the fore only when depletion becomes apparent and, humans are usually not capable of taking appropriate action when scarcity occurs.

The Thais also forcefully changed their natural surroundings: they dug canals, ploughed rice fields, and built safe refuges without consideration of whether nature would suffer. In early- modern times, with a human population in the region now called Thailand of most likely far under 5 million, and with the limited technological means of that time, their impact must have been relatively small. This may have led to the hypothesis that in premodern times the Thais, possibly inspired by their Buddhist ideology, handled their environment gently. However attractive such an approach to early modern times may be to present-day environmentalists, it does not fit with an objective look at the available data. On the contrary, the Thai state appears to act most pragmatically and this-worldly. Two examples should serve to illustrate the government's willingness to change the world to fit their wishes and ideas.

In the first place, there is the case of the Reclining Buddha of Wat Pa Mok. In the early eighteenth century this masonry monument, more than 20 meters long, was undermined because the river bank on which it stood had been eroded. The Thai annals, some inscriptions, and a contemporary poem all tell us the fascinating story of the deliberations that led a courtier to vouch that he could transport the monument without taking it apart. The construction of a huge sledge and the machinery to pull the monument to safety, together with its flawless technical execution, shows with what vigor and zest the courtier was willing to take control over the forces of nature and how this feat was celebrated.[47]

The second example, indicating a rapacious exploitative attitude by the state, is a letter by a state minister to four towns in the southeast in January 1844. He states that the export quota for sappan and red wood had not been met in the previous year. In order to meet export goals, he orders various provincial governors to reassign people on lists for other types of *suai*, such as delivering pepper and gamboge so as to increase the number of woodcutters.[48] Apparently, the idea that the forest could not grow sufficient new trees did not play a role.

In general, the relationship between Thais and their environment may be described as problematic. Heeck notes that all the fields where rice is ripening have small huts where farmers stay throughout the ripening process in order to chase away birds with clappers, rattles, and traps. In other villages domestic animals had to be protected from attack by wild animals.

In early modern times nature posed dangers that were overcome only gradually. Kaempfer wrote: "Last night a wild buffalo swam [across the river]

into the town and he killed five to six people before it itself was killed."[49] Also in 1690, the king forbade all public bathing because several people had been killed by an animal that probably was a kind of eel.[50] Crocodiles lurked in many parts of the river, so that in the late seventeenth century people had to protect their bathing places with a cane fence so as to prevent crocodile attack. The naturalist J. G. Koenig was told in 1778 that King Taksin paid a sum of money for every crocodile in order to extirpate these animals.[51]

The case of Thailand demonstrates that the premise that nature is mild, in equilibrium, and inherently good (until modern times, when mankind lost its true place in nature) is a false one. Nature was dangerous, uneasy, and threatening; mankind cannot live in larger groups unless it imposes techniques and changes his surroundings.

We have sketched how the Thais had at an early stage developed an impressive state organization with which it exploited its human and natural resources. We have also argued that in the eighteenth and early nineteenth century, with the assistance of a large Chinese workforce, the Thais extended and intensified human control of their surroundings. Contrary to what is often assumed, this took place long before the West mesmerized the Thai elite.

NOTES

1. Feeny (2002, 194–206) demonstrated, for example, how in the 80 years between 1913 and 1992 the percentage of forest in Thailand declined from 75 to 18.
2. Johnston (1976, 27) citing a newspaper article, dated 1909, that ended ". . . and we were happy."
3. The pioneer in this type of analysis is undoubtedly Constance Wilson, whose oeuvre has guided me in many respects.
4. The Chaophraya Delta is taken to begin in Chainat Province and end at the Gulf of Thailand where it joins the deltas of the Maeklong and the Bangpakong River, a surface of approximately 514,000 square kilometers, or 7.3 percent of Thailand's surface (Hubbard 1977, 4).
5. Yoshikazu Takaya (1987) followed by others, culminating in Tanabe et al., 2003.
6. Cushman (2000, 19).
7. The idea that there were large numbers of people who escaped the Siamese administrative system, first posed as a hypothetical question by La Loubère in 1690, later expanded upon by Johnson and others, needs to be viewed with skepticism. It may well be inspired by romantic antiauthoritarian views imposed upon the historical data. Apart from a few years of turmoil around 1767, there is much evidence of a well-functioning legal system that stretched deep into the countryside.
8. Ibid. The Samrong, the Mahachai, and Sunak Hòn Canals are, strictly speaking, not canals, but natural waterways that have been partially adjusted and deepened in order to make them navigable.
9. The Phan Chanthanumat version as translated in Cushman (2000, 405).
10. Cushman (2000, 394).
11. Hubbard is of the opinion that the work was left unfinished, taken up again in 1705 and finally completed in 1722, 77 years after its commencement. This

appears to be a misinterpretation of the available data. Since many canals in the Chaophraya Delta rapidly clogged up with silt, the works in 1705 and 1722 probably represent a conscription drive to restore navigability (Hubbard 1977, 23–25).

12. O'Kane (1972, 48–49).
13. Thai: *Na khu kho.*
14. Thai: *Na fang loi.*
15. *Bouea burmanica* (Anacardiaceae), a tree with edible fruit.
16. *Lansium domesticum* (Mediaceae), a small tree with highly esteemed fruit.
17. For details, see Wilson (1980).
18. Wilson (1987, 3).
19. Low (1836, 247).
20. Fiber obtained from the *Boehmeria nivea*.
21. Crawfurd 1987 [1828], 430, reports that in 1822, 1,000 Rhino-horns were annually exported to China.
22. Hundius (1976, 67).
23. L'Honoré Naber (1910–11, 429).
24. Almost two hundred years earlier, 800 shells equalled one *fueang* (Cushman 2000, 16).
25. L'Honoré Naber (1910–11, 432).
26. Crawfurd (1987, 421–22).
27. Van Ravenswaay (1910, 10).
28. L'Honoré Naber (1910–11, 429).
29. Crawfurd (1987, 437).
30. Roberts (1837, 233).
31. See also Crawfurd (1987, 435).
32. In 1903 the Dutch engineer Homan van der Heide, inspecting the southwest of the central region, was the first to call attention to the problem of increasing salinization. Natural rivulets that connected up to the sea had been widened by the villagers so as to make it possible for them to use boats for collecting firewood in the mangroves and leaves from the nipa palm groves. The enlarging of such rivulets led to increased tidal movement, which further broadened and deepened these channels, causing salt water to penetrate deep inland (Ten Brummelhuis 1995, 128).
33. Bradley, unpublished diary, 9 February 1859.
34. For a good account of cowry trade in Eastern Asia see Vogel (1991).
35. One *picul* is the load a human can carry, at that time around 60 kilograms.
36. Muller (1917, 157).
37. Dhiravat Na Pombejra (1998).
38. Sarasin (1977, 45–48).
39. Chingho A. Chen (1979).
40. Details in Sarasin (1977, Chapter 5).
41. Crawfurd (1987 [1828], 386–87). The *tical* is another word for *baht*, the *fuang* represents one-eighth of a *baht.*
42. Malloch (1852, 8).
43. Crawfurd (1987, 423).
44. Crawfurd (1987, 89–90).
45. Crawfurd (1987, 418).
46. *Caesalpina sappan* (Leguminosae).
47. Details in A. B. Griswold and Praset na Nagara, 1970.

48. Terwiel (1989, 191–92).
49. Terwiel (2003, 130).
50. "Also there are in this river a very dangerous small fish that has something of a toad, if by accident or out of curiosity you hit it on the belly, it blows itself up with rage and becomes hard as a rock. It forcefully defends itself when attacked and cuts with its fins like a razor all it can catch." Gervaise (1688, 10); see also Terwiel (2003, 129–30).
51. Koenig (1894, 135).

BIBLIOGRAPHY

Bradley, Dan Beach, Journal of Rev. Dan B. Bradley M. D., Missionary to Siam, 1835–73, under the ABCFM and AMA, Oberlin College Library, Microfilmed.

Brummelhuis, Han ten. *De Waterkoning: J. Homan van der Heide, Staatsvorming en de Oorsprong van Moderne Irrigatie in Siam, 1902–1909*. Amsterdam: [n. p.] 1995.

Burney Papers 1910–1914. 5 vols. Printed by order of the Vajirañana National Library, Bangkok.

Chatthip Nartsupha. *The Thai Village Economy in the Past*. Translated from *Sethakit Muban Thai nai Adit*, by Chris Baker and Pasuk Phongpaichit. (1984; reprint Chiangmai: Silkworm Books, 1999).

Chen, Chingho A. "*Mac Thien Tu and Phrayataksin*: A Survey of Their Political Stands, Conflicts and Background." Proceedings, Seventh IAHA Conference, 22–26 August 1977, Bangkok, vol, 2, 1534–75. Bangkok: Chulalongkorn University Press, 1979.

Crawfurd, John. *Journal of an Embassy to the Courts of Siam and Cochin China* (1828; reprint Singapore, Oxford, New York: Oxford University Press, 1987).

Cushman, Richard D., trans. *The Royal Chronicles of Ayutthaya, Bangkok*. The Siam Society, 2000.

Dhiravat na Pombejra. "Princes, Pretenders and the Chinese Phrakhlang: An Analysis of the Dutch Evidence concerning Siamese Court Politics 1699–1734." In *On the Eighteenth Century as a Category of Asian History*, edited by Leonard Blussé and Femme Gaastra, 107–30. Aldershot: Ashgate, 1998.

Feeny, David. "The Coevolution of Property Rights Regimes for Land, Man, and Forests in Thailand 1790–1990." In *Land, Property, and the Environment*, edited by John F. Richards, 179–221. Oakland, CA: ICS Press, 2002.

Finlayson, George. *The Mission to Siam and Hué 1821*–1822 (1826; reprint Singapore, Oxford, New York: Oxford University Press, 1988).

Gervaise, Nicolas. *Histoire naturelle et politique du royaume de Siam*. Paris: Claude Barbin, 1688.

Griswold, A. B. and Prasert na Nagara "Devices and Expedients: Vat Pa Mok, 1727 A. D." In *In Memoriam Phya Anuman Rajadhon*, edited by Tej Bunnag and Michael Smithies. Bangkok: The Siam Society. 1970.

Heeck, Gijsbert. *Journael ofte Dagelijcxsz Aenteijkeninge wegen de notabelste Geschiedeniszen voorgevallen en gepaszeert op de derde Voagie van Gijsbert Heeck near Oost Indijen . . .*, Nationaal Archief, Den Haag, Collectie Aanwinsten van de (voormalige) *Eerste Afdeling*, Nr. 1.11.01.01, inv. Nr. 959, 1655.

Hubbard, Robert V. and James A. Hafner. "The History of Inland Waterway Development in Thailand." Transportation Series No. 1. Ann Arbor, MI: The Department of Geography and the Center for South and Southeast Asian Studies, University of Michigan, 1977.

Hundius, Harald. *Das Nirāt Müang Kläng von Sunthon Phū*, Wiesbaden: Harrassowitz, 1976.

Johnston, David B. "Opening a Frontier; The Expansion of Rice Cultivation in Central Thailand in the 1890s." *Contributions to Asian Studies* 9 (1976): 27–44.

Koenig, Jean Gerard. "Journal of a Voyage from India to Siam and Malacca in 1779." *Journal of the Straits Branch of the Royal Asiatic Society* (January 1894), 58–133.

La Loubère, Simon de. *The Kingdom of Siam*. (1693; reprint of *A New Historical relation of the Kingdom of Siam*. Singapore, Oxford, New York: Oxford University Press, 1986).

Lejosne, Jean-Claude. *Le journal de voyage de G. van Wuysthoff et de ses assistants au Laos (1641–1642)* Paris: Cercle de Culture et de Recherches Laotiennes, 1986.

L'Honoré Naber, S. P. "De Derde Voyagie van Gijsbert Heecq naar Oost Indijen." *Marineblad* 25 (1910–11): 193–231, 289–317, 422–52, 533–63.

Low, James, "On the Government of Siam," Asiatic Researches, 20, 2 (1836), 245–84.

Malloch, D. E. *Siam: Some General Remarks on Its Productions and Particularly on Its Imports and Exports, and the Mode of Transacting Business with the People*. Calcutta: Baptist Mission Press, 1852.

Muller, Hendrik P. N. 1917. "Gerrit Wuysthoff, Journael van de reyse naer der Lauwen-Landt." In *De Oost-Indische Compagnie in Cambodja en Laos, Verzameling van Bescheiden van 1636 tot 1670*, edited by Hendrik P. N. Muller, 149–229. 's-Gravenhage: Martinus Nijhoff.

Neijenrode, Cornelis van. *Remonstrantie ende Verthoninge der Gelegentheijt des Coninckrijx van Siam* . . ., Manuscript kept in the Archives of Utrecht, Hilten Archives, received 14 October 1622.

O'Kane, John (trans.) *The Ship of Sulaiman*. Persian Heritage Series, No. 11. London: Routledge and Kegan Paul, 1972.

Pornchai, Suchita 1989. "Traditional Technology as a Culture-Environment Relationship in Thailand." In *Culture and Environment in Thailand, A Symposium of the Siam Society*, 273–90. Bangkok: The Siam Society.

Porphant, Ouyyanont and Tsubouchi Yoshihiro. "Aspects of the Place and Role of the Chinese in Late Nineteenth Century Bangkok." *Journal of Southeast Asian Studies* 39, 3, (December 2001): 384–97.

Ravenswaay, L. F. van. Translation of Jeremias van Vliet's Description of the Kingdom of Siam [1692]. *Journal of the Siam Society* 7, Part1, (1910): 1–108.

Roberts, Edmund. *Embassy to the Eastern Courts of Cochin-China, Siam, and Muscat in the U.S. Sloop-of-War Peacock, David Geisinger, Commander, During the Years 1832–2–4*, New York: Harper and Brothers, 1837.

Sarasin, Viraphol. *Tribute and Profit: Sino-Siamese Trade, 1652–1853*, Cambridge, MA: Harvard University Press, 1977.

Stranski, Jiri. *Die Wiedervereinigung Thailands unter Taksin, 1767–1782*. Hamburg: Gesellschaft für Natur- und Völkerkunde Ostasiens, 1977.

Takaya, Yoshikazu. *Agricultural Development of a Tropical Delta: A Study of the Chao Phraya Delta*, translated by Peter Hawkes, Honolulu: University of Hawaii Press, 1977.

Tanabe, Shigerahu. *Historical Geography of the Canal System in the Chao Phraya Delta from the Ayutthaya Period to the Fourth Reign of the Ratanakosin Dynasty*. Discussion Paper No. 95. Kyoto: The Center for Southeast Asian Studies, Kyoto University, 1977.

Tanabe, Shigerahu. *Ecology and Practical Technology, Peasant Farming Systems in Thailand*. Bangkok: White Lotus. 1994.

Tanabe, Susumu et al. "Stratigraphy and Holocene Evolution in the Mud-dominated Chao Phraya Delta, Thailand." *Quaternary Science Reviews* 22 (2003): 789–807.

Terwiel, Barend Jan. *Through Travellers' Eyes: An Approach to Early Nineteenth-Century Thai History*. Bangkok: Duang Kamol, 1989.

Terwiel, Barend Jan, ed. *Engelbert Kaempfer in Siam, Engelbert Kaempfer Werke, Kritische Ausgabe in Einzelbänden* 4, Munich: Iudicium Verlag, 2003.

Van Vliet, 1910, see L. F. van Ravenswaay.

Vogel, Hans Ulrich. "Cowry Trade and Its Role in the Economy of Yünnan, the Ninth to the Middle of the Seventeenth Century." In *Emporia, Commodities and Entrepreneurs in Asian Maritime Trade, C. 1400–1750, edited by* Roderich Ptak and Dietmar Rothermund, 231–62. Stuttgart: Franz Steiner Verlag, 1991.

Wilson, Constance M. "The Nai Köng in Thai Administration, 1824–68." In *Smith Royalty and Commoners: Essays in Thai Administration*, edited by C. M. Wilson, Chrystal Stillings Smith, and George Vinal Smith, Contributions to Asian Studies, 1977, 15, 41–57.

———. *The Northeast and the Middle Mekong Valley in the Thai Economy: 1830–1870.* Paper presented at the International Conference on Thai Studies, Australian National University, Canberra, 3–6 July 1987, 1–26.

3

Poor Little Rich Islands

Metals in Bangka-Belitung and West Kalimantan

Mary Somers Heidhues

Minerals just lie there. They are not usually in the way of agriculture, as trees may be, nor do competing demands threaten them, as is the case with land or water. Local uses for them can be small or nonexistent. They can be exhausted, but new technologies for working deposits can revive them or extend their lifespan, and new demands and higher prices can lead to reopening once-abandoned activities. Sometimes, minerals can be very important.

In the eighteenth century, Southeast Asia's tin and gold began to be mined in sizable quantities for long-distance trade. Local rulers claimed sovereignty over these resources, but mining soon fell into the hands of outsiders, long before colonial governments intervened; later, European investors took control. Local residents played little role in the exploitation of metals, much less in collecting benefits from them. Often enough, they bore the disadvantages.

Bangka-Belitung—Little Hills of Tin Sand

A belt of tin deposits extends from Yunnan and Burma through southern Thailand and Malaysia, ending in the Indonesian islands of Bangka and Belitung. These two small islands off the coast of Sumatra, now an Indonesian province ("Babel") in their own right, are today eloquent reminders of a long history of mining exploitation. Rich tin deposits made Bangka one of the Netherlands Indies' most valuable possessions in the nineteenth century, but the mining of that metal goes back to earlier times. Over the years, the methods of exploitation and the ethnicity of the exploiters changed, often in tandem. Whoever was at the helm, however, profits moved up the ladder of control, not down.

Except for their tin, Bangka and Belitung would seem to be resource-poor areas. Soils are infertile and traditionally supported only slash-and-burn farming; later attempts to introduce wet-rice cultivation have been unsatisfactory. Belitung has a little iron ore, and once produced small iron tools; both islands have fish in the seas and nice beaches. But without tin, they would hardly have attracted outside interest before the era of map-driven consolidation of colonial territories at the beginning of the twentieth century. Instead, the Dutch became involved as purchasers of tin in the early eighteenth century and took control of Bangka in 1816, after the British interregnum.

Beginnings of Tin Exploitation

Perhaps Bangka's tin ore was already being dug in the time of Srivijaya, the maritime kingdom with its center in Palembang in southern Sumatra. The island was important enough to be the site of one of the inscriptions defining that realm's limits, the seventh-century Kota Kapur stone (Kern 1912, 393–400; Coedès 1930, 48–49). However, given the strategic importance of the Bangka Straits to Srivijaya's sea power—the island dominates the entrance to Palembang's Musi River—that alone may explain the presence of the marker.

Local accounts place the "discovery" of tin on Bangka at the opening of the eighteenth century, when the island was subject to the Islamic Sultanate of Palembang. Bangka's tin deposits are alluvial, washed out from primary deposits in the rock. The blackish tin sand lies relatively close to the surface, the ore is quite rich (about 60 percent tin), and it is easy to mine. Local people knew simple methods of exploitation—digging a hole and following a layer of ore underground by connecting the holes or pits with a primitive tunnel. They were familiar with smelting and found a customer for their tin in the sultan, who as their overlord took tin as part of the tribute he extracted from them.

By the eighteenth century, China had developed a considerable appetite for imported tin and, in fact, China was the major market for most of Southeast Asia's exports in that century, even those traded by the Dutch East India Company (VOC). In Batavia, the VOC soon got wind of the product, which they were already buying on the Malayan Peninsula. Although they were primarily interested in Palembang's pepper trade, in 1722 the company signed a contract with the sultan for delivery of tin to Batavia for export to China (Hullu 1917, 48–49). A key figure in bringing Palembang's (and in reality Bangka's) tin to the attention of the Dutch was an ambitious royal prince who had been exiled to the island, where he maintained a corps of Bugis retainers. The Bugis and Makassarese, who had fanned out from their homeland in southern Sulawesi to the entire Malay world about this time, were probably familiar with tin's importance on the Malayan Peninsula and helped him recognize Bangka's worth.[1] In the end, however, the Dutch sided with his rival, who with their help retained the throne and proved more amenable to Dutch interests.

Chinese Mining

The Bugis had some experience with the tin trade; nonetheless, supplies reaching Batavia remained fairly low. Until 1743, Batavia was receiving less than 6000 piculs (a *picul* is about 62 kilograms) of tin annually. After 1745, tin shipments increased and continued to climb.[2] A new group of outsiders was now at work; Chinese immigrants had begun exploiting the ore. By 1770, the sultan actually stopped asking for tin tribute from indigenous Bangkanese subjects because the Chinese were delivering ample supplies (Schuurman 1919, 88).

Chinese brought several advantages to tin mining. First, a group of Chinese merchants maintained strategic links with the sultanate. They were usually Muslim converts and they, or their ancestors, had taken local wives. These Chinese Muslims also married their daughters to influential noblemen—or to the sultan himself. This group could act as Palembang's agents in Bangka, administering the mining territories, brokering between the court and the miners. Through them, the ruler provided rice and other commodities in advance to support the miners. He then paid for the tin, subtracting the debt for advances, at a price well below what he received from the Dutch (who sold the tin for an even better price). An additional advantage of using Chinese was that they were able to work the mines with imported laborers, in larger groups, and more continually because of their special cooperative form of organization, called *kongsi*. Through the kongsis the miners divided the expenses, labor, and proceeds among themselves. A major expense, the cost of importing labor from China, was charged as a debt to the individual laborers. Indebtedness and the possibility of financial rewards acted as a powerful form of labor discipline.[3]

Finally, the Chinese applied simple technology, partly borrowed from Chinese agriculture, to mine more efficiently and on a larger scale. Crucial to keeping the mines working was the control of water, and for this the miners in Bangka adapted the wooden chain-pallet pump used in irrigated rice fields in China (see Francesca Bray's contribution to this book, figure 10.1, for an illustration of this device) to remove seepage and rainwater from the open pits from which ore was dug. Unlike the rice paddy pumps, which were often manned by farmers pedaling the wheels, the pumps in Bangka were usually driven by an overshot waterwheel, freeing scarce labor to do other work. Application of the chain pump to mining may have started in Bangka. The first description of its operation seems to be from 1803, but since outsiders seldom visited the island or saw the mines before then, it may have been introduced earlier (Jackson 1969, 45–46; ANRI Bangka 21, 34).

Once dug and removed from the pits, the ore was separated from excess soil in sluices, where it was agitated in the runoff water from the pump. The heavier ore remained in the sluice, while the water carried off excess dirt. Finally, in addition to their control of water, the Chinese also had simple bores for prospecting and more efficient methods of smelting the tin than native techniques. These innovations are ascribed to a certain "Oen [or Boen]

Asing," who introduced them around mid-century, coinciding with a jump in tin production at that time (Heidhues 1992a, 8–15).

By the mid-eighteenth century, tin mining on Bangka was a Chinese operation. What had happened to the indigenous population of the island? Bangka's indigenous people were not numerous and lived mostly as slash-and-burn farmers. Immigrants from Sumatra and other islands populated a few coastal settlements. In the eighteenth century, Chinese mining activity was still concentrated in just a few parts of the island.[4] Bangka's Chinese miners were probably mostly Hakkas, who in China opened hill tracts for farming by using the help of hill-dwelling, non-Han peoples.[5] Something similar may have happened in Bangka, where they used local labor and slash-and-burn techniques to help clear mine sites.

As mentioned, by 1770, the natives of Bangka no longer had to pay tribute to Palembang in tin. Batavia was receiving more tin than it wished to purchase and asked Palembang to limit deliveries. A prosperous time for both Palembang and its island ended soon. By the 1790s, little tin reached Batavia.

Several factors explain the decline in receipts. One was the transfer of authority over the tin mines from trusted Chinese agents (called *tiko*, boss or big brother, from the Chinese) to Palembang notables, often non-Chinese and nonresidents of the island. Another factor, however, was the increase in piracy after 1785, either from nearby Riau (home to *orang laut*, sea people) or from Mindanao and the Sulu Archipelago in the southern Philippines (often called "Lanun," from Ilanun). Annually these raiders fell upon coastal and mining settlements, carrying off slaves and booty. Many Chinese mines closed down. In addition, smallpox outbreaks regularly devastated entire settlements (Horsfield 1848, 319–25; Warren 1981). Finally, smuggling had become rampant, as British traders prowled the seas looking for goods and the authority of the VOC waned. Although the Dutch tried to prevent leakage, at the end of the eighteenth century a visiting ship could easily purchase tin at certain sites on the island by paying in silver dollars, and could sell some opium too (Milburn 1813, 348–49).

The miserable condition of the natives was obvious to a visitor of 1803; they were "the pack animals of Bangka [*de eigentlijke ezel van Banca*]." Especially, the coastal-dwelling Malays exploited them to chop down trees, cut lumber, make charcoal for smelting, transport tin, and to serve as unpaid coolies carrying notables from place to place by sedan chair. They lived in miserable huts in clusters in the mountains or valleys and survived on root crops and a little rice. In times of shortage they were forced to sell their meager rice to the miners or the coastal settlements. They received only a low price for the little tin they dug and smelted, while supplies they had to purchase cost them dearly (ANRI Bangka 21, 24–25). Ten years later, another visitor confirmed that the population, decimated by the calamities of the turn of the nineteenth century, seldom lived in settlements that could be called villages (Horsfield 1848, 333).

Europeanization of Mining

During their rule of Java (1811–16), the British established direct control over Bangka, thanks to another dispute among candidates for the sultanate in Palembang. Lieutenant Governor Thomas Stamford Raffles sent Thomas Horsfield, a physician and naturalist, to the island for several months to investigate its possibilities. The British then began to purchase tin directly from the mines, advancing rice and other supplies, cutting out the sultan's profit and that of his middlemen-agents. As a result, they could pay a higher price to the mines, benefiting the miners—and themselves. In December 1816, the island was turned over to the Dutch, who decided not to return it to Palembang. They placed European colonial administrators at strategic locations to govern the mine districts, to collect and pay for the tin, and to provide the usual advances in supplies to the mining kongsis. Advances were debited to the kongsis and, when the tin was delivered, subtracted from the payment to the kongsi. Sometimes kongsis defaulted on deliveries because of recalcitrant or sick workers, depletion of mine sites, or bad weather. Although the administrators kept careful count of such indebtedness and Batavia often complained about losses, these were trivial compared to the profits made on the sale of tin in Amsterdam, which had replaced China as the major destination of the exports. In 1822 and 1823, for example, net profit was well over 450,000 Dutch guilders (NA Collectie Elout, 1823).

In spite of friction between the administration and the mines, production climbed from about 20,000 piculs under British administration to over 50,000 piculs in the mid-1830s, with a peak of over 100,000 in 1856. By this time, Bangka's tin was the third major export of the Indies, coming after Java's sugar and coffee. In 1847, over 83 percent of the tin was sold in Amsterdam and tin profits added significantly to other annual transfers from the colony to the metropolitan treasury.[6]

A Century of Europeanization

The Europeanization of mining in Bangka was a step-by-step process that lasted a hundred years. After securing territorial control, the Dutch at first left the organization and technology of mining completely in Chinese hands, and the first mine regulation, dated 1832, confirmed this. Mine bosses or wealthy Chinese on the island recruited laborers, usually in China. Mine coolies were considered to be working for the colonial government and, from 1845, they faced criminal penalties if they left the mines with individual or collective debts unpaid (NA MR 1918:2583, I, 5–6, 12).

For the first decades of Dutch rule, the miners continued to organize themselves in kongsis and continued to employ the pumps, sluices, and smelting methods they had used before. The kongsis were responsible for all aspects of mining, and the new administrators had no better methods to suggest, because Chinese technology appeared to be the most efficient and practical available.

Around 1850, however, authorities began to assert the need to exploit the mines in a "scientific" manner, especially because it was becoming apparent that resources were dwindling. Production stagnated between 1850 and 1890 (Heidhues 1992a, 80) and forest reserves, important for smelting, which used charcoal, were near exhaustion. A German medical doctor who served on Bangka from 1836 to 1839 deplored the wanton destruction of the great trees by the Chinese miners, because only scrub (*belukar*) and Imperata grass (*alang-alang*) grew in their place (Epp 1841, 135–36). In 1853, mine engineers became responsible for all technical aspects of tin production, separate from the colonial administration. The resident, as highest official on the island, was still officially head of the mines, but he had to consult the chief engineer on all questions of mining (Mededeelingen 1902, 350; NA MR 1918:2583 I, 13–14).

One of the first fruits of scientific rationalization was the development of a new drill for prospecting in 1858, which helped in the systematic exploration and mapping of deposits. Larger than the Chinese stick bore, and able to take better samples from the deep, the Akkeringa Drill (named for the engineer who developed it, but also called the "Banka drill") enabled the opening of new sites and soon enjoyed wide acceptance. By the 1870s, a new type of furnace (Vlaanderen Oven) was replacing Chinese smelting methods. Thanks to water-driven bellows, it not only used less charcoal and less manpower but smelted the ore more efficiently.

The steam engine soon made its mark. In 1891, a few mines received a loan of steam-driven pumps to remove water from the diggings, enabling the more continual operation of the mines and deeper diggings. They would gradually replace the chain-pallet pump. In 1896, a steam-driven railway was built in the neighborhood of Belinyu to transport the ore, ending the dominance of the Chinese wheelbarrow. By 1900, steam-powered trolleys raised the soil from the diggings, making the brutal task of carrying it on shoulder poles obsolete (Heidhues 1992a, 66–68).

By the second half of the nineteenth century, labor supply had become a constant concern. For one reason, other demands for Chinese labor competed with Bangka's recruitment: the expansion of tin mining on the Malayan Peninsula, the gold rushes in California and Australia, and the opening of tobacco plantations in Sumatra. The first effects of mechanization had been to increase the demand for labor in new sites or for deeper mines before trolleys were introduced to remove the dirt. In addition, Bangka had a terrible reputation for exploiting labor. The colonial government of Hong Kong forbade recruitment for Bangka's tin mines in the 1880s (NA MR 1881:1047). The kongsis had ceased to be cooperative endeavors and most of the workers were simply indebted coolies. The mine heads did their best to keep them in debt. From the 1860s, beri-beri, a nutritional deficiency caused by eating mostly machine-polished rice (which the colonial government was selling to the mines) decimated the work force, and it would be decades before the cause was understood (Heidhues 1992a, 55–57, 110–16; on beri-beri, 61–65).

Europeanization of coolie recruitment was successful only in the twentieth century; again, steam power made the difference. An attempt by the tin administration to recruit in Amoy in the 1880s failed. Also, China regarded coolie recruitment as illegal; sometimes local mandarins intervened against it. Usually, coolies traveled first to Singapore, but there was no guarantee they would finally reach Bangka. In 1901, the first steamship brought coolies directly to Bangka. A few years later, in 1905, two European firms with operations in China signed contracts to deliver coolies to Bangka but failed because of interference from Chinese officials (NA MR 1929:3274, 2).

At this point, Bangka's mine administration resorted to a public relations stunt. They transported over 600 discharged coolies back to China's coastal ports, Haikou, Beihai, and Hong Kong, and paid them their outstanding wages on landing. Apparently the sight of the men, who brought home an average of about 50 silver dollars each, made a positive impression. In addition, coolies now had the right to free passage home, something they had not had before (Meyier 1907, 224–27). From 1907, Hong Kong reopened recruiting for Bangka and gradually it replaced Singapore as place of recruitment. The responsibility for recruiting passed to the Holland-China Handels Compagnie (HCHC), with the ships of the Java-China-Japan Line. Between 1910 and 1928, they and smaller individual recruiters annually brought an average of nearly 4,000 coolies to Bangka. In reality, Chinese "crimps" signed on prospective workers in China (where this activity was both illegal and unpopular) and transferred them, for a fee, to the HCHC (NA MR 1929:3274, 3). Although labor demand subsequently dropped, until World War II Chinese workers continued to nearly monopolize mine labor. Local people were only used in auxiliary tasks, and attempts to use mineworkers from other parts of the Indies failed.

Banka Tinwinning

The introduction of Western machines forced a reorganization of the administration of the mines. At first the mine engineers simply leased new machines such as pumps and ovens to the mine bosses. Soon, however, capital requirements had changed and it was necessary, among other things, to accumulate profits for investment in ever newer and more expensive devices. As a result, authorities decided to separate the organization of mining and its income from the colonial treasury. In 1913, Banka Tinwinning was established as a fully-owned enterprise of the colonial government; later it became subject to the Bureau of Mines (Braake 1944, 46).

Because it could now build its own reserves, Banka Tinwinning was in a position, in subsequent years, to take advantage of large-scale machines developed for tin mining. These included monitors—giant hoses that washed away the soil, laying bare the pay dirt—and, finally, floating tin dredges that first worked larger mines but later processed offshore deposits. These ships hauled the soil from underwater, cleaning and separating the ore on board.[7]

Also in the twentieth century, smelting moved to Singapore, Arnhem, and Texas (Braake 1944, 43–45).

These machines helped replace coolie labor, but the real decline in Chinese labor on Bangka set in after 1930, when the Depression saw tin prices plummet. In the end, the mechanization of tin mining opened the way for employing native Indonesians in the mines, but this transition took place after 1949. With the recognition of Indonesian independence in that year, Banka Tinwinning became an Indonesian government-owned company.

Colonial mining law regarded all mineral resources as owned by the state, something that applied also to coal and later petroleum. This set the stage for Article 33 of the Indonesian Constitution of 1945, dealing with "Social Welfare," which stipulates:

1. The economy shall be organized as a cooperative endeavor based on the principle of family life.
2. The State shall control those means of production which are important for the state and which dominate the economic life of the people.
3. The land, the water, and the natural resources contained therein shall be controlled by the state and exploited for the greatest prosperity of the people.[8]

The inspiration for this passage was not merely a socialist ideal but a continuation of the colonial tradition. The effect was to centralize the profits from such exploitation, which increased greatly after 1965, while the negative effects, environmental damage, strains through the presence of immigrant labor, or changing levels of employment, remained local.

BELITUNG

Belitung, known as "Billiton" in colonial times, followed a slightly different path. Although rumors of the existence of tin deposits there reached Batavia from time to time, the local ruler stubbornly insisted there were none. A mine engineer who went to the island in 1850 also agreed that there was no tin to be had, although in fact Chinese miners were already working sites on the island (as the ruler well knew). In the following year, a team of potential investors visited the island; they intimidated the ruler by promising to stay until they found tin—and they found it.

The first concession for tin mining was awarded in 1852 for 40 years. In 1860, the Billiton Maatschappij, a public shareholding company (with a small participation of the colonial state), took over the concession and the debts of the original exploiters. Thus, Belitung's tin was open to private Western investors, unlike that of Bangka.[9] The mines themselves, however, were organized and manned, as in Bangka, by Chinese immigrant laborers. The company gave them somewhat more freedom in labor organization than did

Bangka and allowed individual miners to do the coolie recruiting,[10] but essentially Chinese labor and technology remained decisive.

When, however, the first mining lease expired in 1892, the company was again in crisis, and the state increased its share in the enterprise from one-tenth to five-eighths. A further reorganization took place in 1924, when a joint public-private enterprise (NV Gemeenschappelijke Mijnbouwmaatschappij Billiton) received a new 25-year concession. Five-eighths of the shares were retained by the state and three-eighths by the privately owned Billiton Mij. After the first, very productive decades in the late nineteenth century, when production from the much smaller territory nearly equaled that of Bangka, the company faced depleted resources and production costs that remained consistently higher than Bangka's. From 1921, tin prices were falling, and tin-producing countries launched a number of schemes to support prices by limiting production, but the Depression overtook even these efforts to maintain profitability (Heidhues 1991, 11). After World War II, some exploitation continued, but the mines of the Billiton Mij were finally taken over by the Indonesian government when it nationalized Dutch enterprises in 1958.

End of Chinese Dominance in Labor

Recruitment of laborers from China for Bangka stopped altogether in 1933 and 1934. A few hundred entered in the following years, rising to nearly 2,000 in 1940. At the same time, the economic crisis led to mass discharges of laborers, and repatriations to China or to Singapore probably exceeded the numbers of new arrivals. From an average of over 20,000 miners on Bangka in the 1910s and 1920s, the number of laborers employed dropped to less than 4,000 in 1933 and recovered to 8,800 at the end of the decade. In 1940, Chinese were still 98 percent of the mineworkers and some three-quarters of the Chinese workers were immigrants from China (Heidhues 1992a, 112, 129–32). Belitung underwent a similar process; there, some indigenization began before World War II.

Mechanization was beginning to eliminate the tedious chores of digging and lifting for which the Chinese seemed so well qualified. One estimate had claimed that Chinese could lift and carry twice the daily load that native laborers could (NA AA 246 1928, 67–68), but this advantage was less and less significant with machines to do the job. Whereas in 1938, Javanese workers had long since replaced most Chinese labor in the plantations of East Sumatra, the tin enterprises found that the Javanese cost more to hire than Chinese. Only at the end of that decade were they actually cheaper than Chinese labor, which had become expensive to recruit. After World War II and Indonesian independence, as well as repatriation of substantial numbers of ex-coolies, the ethnic specialization of labor was largely ended. The mines hired some labor locally; in addition, workers were entering Bangka from other islands (Jaarverslag 1940, 28; Heidhues 1992a, 130–31).

CHANGES IN LOCAL LANDSCAPE THROUGH TIN MINING

No account of mining in Bangka-Belitung can be complete without a look at the impact on the island's landscape and its people who, in the end, faced great changes. First of all, settlement patterns changed. By 1851, in answer to a local rebellion, the authorities began to force the rural people to settle in distinct villages, with houses grouped along both sides of a central road or path—a pattern that prevails there today. Since road-building increased, the villages continued to be relatively dispersed, but they were now more easily accessible.

This gain for order and regularity was a source of joy to colonial officials, but it disrupted the work in the *ladang*, and in fact many working villagers spent most of their time in temporary housing near their fields (Waal, 1876, 195–96). The administration also tried to separate these new villages (which resemble in some ways the New Villages created in Malaya during the Emergency of 1948–60) from the Chinese mines, keeping the two ethnic groups apart as much as possible (Heidhues 1992b, 63–74). An unintended consequence of resettlement was the spread and deepening of Islam on the island. The number of prayer-houses and religious officials grew as the inland people were brought, thanks to better communications and more concentrated settlement, increasingly into the sphere of the Malays and others, who lived mostly along the coast, and their beliefs and practices (Lange 1859, 56; Teijsmann 1859, 45).

The most important change, of course, was in the demographic composition of the islands. Although the majority of immigrants either returned to China or died on Bangka before they completed their contracts, enough remained to alter the ethnic balance. By 1900, Chinese were 38 percent or 43,700 of a total population of 115,000 and their share climbed to 44.6 percent in 1920. The 1930 census, before the decimation of the Chinese labor force as a result of the Depression, counted 96,425 Chinese or 47 percent of a population of 205,432. Similarly, on Belitung, Chinese were 38 percent of the population in 1905, 42 percent in 1920, but fell to 39 percent in 1930, when cutbacks in the mine labor force had already made themselves felt there (Heidhues 1992a, 175–79).

How much the growth and persistence of a high proportion of Chinese in the island's population depended on the system of recruiting and employing coolies from China is clear from postwar statistics, when recruitment was a thing of the past. In the 1970s, an official local estimate reported that about 27 percent of the inhabitants of Bangka were ethnic Chinese, and the proportion continued to fall (Etnografi 1982, 9). The census of 2000, which for the first time since 1930 actually counted ethnic identification, but which, for a number of reasons, probably underreported the numbers of ethnic Chinese, recorded 103,736 Chinese in Bangka-Belitung combined, or 11.5 percent of the total population of 898,889 (Suryadinata, Arifin, and Ananta 2003, 81). Despite the declining percentage, the Chinese legacy is

evident today to any visitor to the islands in the form of shops and markets, houses, temples, and cemeteries.

Mining had serious ecological consequences. Not only did deforestation set in early (although the authorities did try to reserve some forests for making charcoal as long as smelting was done using that method), the miners moved on quickly when results from a digging were poor. As James Jackson describes the situation after 1780,

> The retreating miners left behind a sterile, sandy, stony surface, denuded of vegetation and honeycombed with water-filled diggings and small man-made swamps; natural drainage patterns and erosion processes had been seriously disturbed and the slowly regenerating vegetation developed into an almost impenetrable tangle very different from the original high forest. (Jackson 1969, 38–39)

Bangka today is dotted with "lakes," all of them man-made remains of mine diggings. The subsequent use of machines and hydraulic devices only increased the scope of the disruption.

Not surprisingly, in view of environmental changes, malaria was for years a serious problem. In addition, offshore dredging, the major source of the tin in recent decades, potentially damaged fishing grounds and reefs.

Finally, the island's infrastructure improved. There were new, paved roads, some health services, and a degree of electrification. Later, the mine companies tried to provide jobs and training for local people in mining-related jobs, but in reality they recruited much of their clerical and other personnel in Java and Sumatra.

Over decades, a settled Chinese population developed. Most of them did not work in the mines, or at least not as coolies. Some found jobs as mine bosses or in the administration of the Tinwinning. The Chinese-run mines themselves had always practiced a certain amount of agriculture, or at least gardening and pig-raising, and it was an easy transition for ex-miners to work a plot of land. This development took off when some enterprising Chinese introduced pepper production from Riau in about 1869.

Initially, Chinese grew pepper as a kind of plantation crop, using hired labor. Later it became a popular smallholder product, well suited to cultivation in the native ladangs, as well as in Chinese gardens. On the world market, Bangka led in production of white pepper in the early twentieth century (*Koloniaal Verslag* 1898, 175; Huitema 1933). Pepper, especially white pepper, provides Bangka's farmers, both natives and settled Chinese, with a cash income—albeit a speculative one, subject to price fluctuations. Some pepper is grown on Belitung, but it is not as important there as on Bangka. The introduction and marketing of pepper, and subsequently other cash crops, was probably more significant for the popular welfare of both natives and Chinese than what the mines contributed, with their tendency to move ore out and to distribute profits upward to mine owners and central authorities.

GOLD IN WEST KALIMANTAN

A brief look at the gold mines of West Kalimantan[11] will show both similarities and differences in exploitation and ethnic change. For centuries, alluvial gold deposits were mined, or panned, in small quantities by the local people, especially the non-Muslim indigenous people usually called Dayak. As in Bangka, where they were subjects of local sultans or *panembahan* (as lesser rulers were titled), the Dayaks were expected to deliver some of the metal in tribute, along with other products. From the mid-eighteenth century, Chinese laborers, organized in kongsis,[12] began to work the gold sites at the invitation of the rulers, using similar technology to that on Bangka, although the diggings were usually on a smaller scale.

The gold-mining kongsis of West Kalimantan, or West Borneo as it was then known, were able to develop into powerful state-like organizations, with a territorial base, their own industry and capital, and many activities pertinent to a state, such as maintaining infrastructure, supporting an army, and punishing criminal infractions (Heidhues 2003, 59–61). By the end of the eighteenth century they were practically independent of control by the local rulers.

Raffles, during the British period in Java, also took an interest in West Borneo, lured both by the promise of gold and by incidents of piracy in Bornean waters. However, his estimate of annual gold production to be worth "half a million sterling" was certainly far above actual production (BL IOR 1817, 213–14). By this time, many of the early sites were exhausted and unprofitable.

Although the gold was probably never far from their thoughts, the Dutch put forward other reasons for asserting their authority in the area after 1818: preventing the British from getting a hold, reasserting relations with local rulers established in the late eighteenth century (and protecting the rulers' interests against those of the kongsis), preventing the Chinese from undermining the Dutch monopoly of trade, protecting the Dayaks from the Chinese, and intervening in conflicts among the kongsis themselves.

The Dutch fought three "wars" to assert their authority against the kongsis in the nineteenth century: in 1822–24, 1850–54, and 1884–85. In the decade before 1850, the Dutch limited their presence to Sambas and Pontianak, but from mid-century they extended their authority far into the interior, eliminating the last of the kongsis in 1884. With favorable sites becoming exhausted, kongsis, even as mere economic enterprises, were no longer viable.

Without the communal structures of the kongsis to organize and finance mining, import labor, and maintain discipline, gold mining deteriorated into a small-scale activity, scattered over a large number of sites in the residency. Deposits were in general small and quickly depleted; the former kongsi locations had been worked over too many times.[13] Western firms never got a foothold in gold mining. Instead, smallholder rubber became the basis of the

local economy and mining became a minor pastime, mostly beyond the control of the state.

Demographically, the Chinese made a mark on sparsely populated West Kalimantan, but not as decisively as on Bangka. In the mid-nineteenth century there were about 25,000 Chinese, and in 1890 they were less than 8 percent of the population. By 1930, however, they had increased to 13.5 percent or 180,000 persons. The Chinese grew proportionally during the twentieth century because opportunities opened in trade and agriculture, especially smallholder rubber, which encouraged immigration. By the census of 2000, they were still 9.5 percent of the population or more than 350,000 persons (Suryadinata, Arifin, and Ananta 2003, 81), although here, too, this may be an underestimate of the actual numbers of ethnic Chinese.

The ecological damage from gold mining was less than that of tin mining, not because it was less destructive, but because West Kalimantan, in contrast to the small islands of Bangka and Belitung, was so vast. Extensive deforestation of the island took place only in recent decades, as the Suharto government (1967–98) opened forests to intensive—and predatory—exploitation, quite unrelated to gold mining.

On the other hand, the presence of outsiders led to positive developments. Chinese traders helped propagate rubber planting by Malays and Dayaks from the beginning of the twentieth century. The importance of gathering forest products for income had receded and the new cash crop spread, by the 1920s, even to interior districts. West Kalimantan was a major exporter of rubber in prewar years, although the area had practically no plantation rubber, only that of smallholder farmers. Rubber proved to be well suited to indigenous farming methods, although itinerant Chinese traders organized the buying and export of the product (Heidhues 2003, 154–57).

As in Bangka and Belitung, West Kalimantan saw its people increasingly integrated into the colonial state and subject to influences from beyond the island. Many Chinese married local women from among the Dayaks, especially in the early years, forming links with local people but usually raising the children as Chinese. Immigrants also arrived from elsewhere in the Archipelago, finding niches in local society. The people of the interior, the Dayaks, were for the most part not converted to Islam; instead, the colonial government encouraged missionaries to propagate Christianity in the area.

Some Recent Developments

As mentioned, local tradition, colonial law, and the Indonesian Constitution of 1945 all ascribed ownership of natural resources at first to the local sultan, then to the colonial administration in Batavia (and the mother country), and finally to the Indonesian government in Jakarta. When the exploitation of all natural resources in various parts of the Archipelago took off under the Suharto administration, the regions, seemingly so richly endowed, looked with dismay at the siphoning off of profits to Java and the center. Tin was no exception, as PT Timah, the state-owned mining company, maintained a

multistory headquarters in Jakarta until in the 1990s low tin prices forced them to close operations in the capital and concentrate their administration in Bangka.

PT Timah is a holding company for the mining and marketing of tin. It is now 35 percent privately owned and plans exist to reduce the state's share to 51 percent. In addition, it has discharged much of the workforce in the past decade. The company is also trying to diversify into new products (Sinar Indonesia Baru 2004).

Decentralization laws passed after Suharto left office promised to divide the income from regional resource exploitation with local governments. As mentioned, Bangka-Belitung is now a province in its own right, no longer part of South Sumatra. A major goal of the movement to become a separate province, as in other areas, was to participate in the fruits of the exploitation of local resources. With prices now somewhat recovered from bad times, the province looks forward to benefiting from the new profitability of tin.

These hopes may not be fulfilled, as the example of West Kalimantan shows. When high gold prices led to a reopening of mining activity, illicit operators became the rule, and legal concessionaires have had little success in making their claims felt. Wildcat gold mining, which not only churns up the landscape but uses poisonous chemicals that leak into the water supply, is far more destructive than even traditional Chinese methods.

As for tin, the new province encouraged small-scale mining. Smuggling and illicit activity also seem to be frequent, and the profits do not go to either the central authority or to PT Timah. Only a limited amount reaches the provincial budget through the sale of licenses, although other payments may pad the pockets of local officials.[14]

Since the liberalization of mining licenses, Bangka is being turned over by small operators who rent the necessary machines and work the soil, with or without an official license. Certainly, ethnic Chinese, as capital-givers and organizers, are involved in the operations. PT Timah buys most of its tin ore from these so-called *tambang inkonvensional*, who first sell their ore to middlemen-collection-agents, who in turn are supposed to deliver it to PT Timah. The great sea-going dredges are being phased out as too expensive.[15]

In addition to being open to smuggling, most small operators fail to restore the sites as they are supposed to when the tin is exhausted, and often they destroy fields and plantings without permission of the owner. As one victim summarized the problem (Timah 2004), "We have just realized that later, when the tin is all gone, all Bangka will be riddled with [water-filled] holes. Even planting cassava will be impossible."

CONCLUSION

Before the mid-eighteenth century, minerals were not in the way of local peoples and their activities; any exploitation of the metals was carried out on a small scale and in a rather desultory manner. Later, outsiders who introduced

new technologies were able to exploit tin and gold on a medium-to-large scale with little participation of the people residing there. At first the Chinese had a technical advantage for working the mines; later European technology and capital gained the advantage, at least in tin.

The situation in West Kalimantan is somewhat different from that of Bangka-Belitung. Gold mining panned out during the nineteenth century and did not experience an influx of Western capital. Some Western or other firms tried to mine gold in West Kalimantan in recent years, but the competition of illegal, wildcat operations defeated their attempts. Given the size of the province, the entire experience with gold mining made comparatively little difference to the indigenous people, although there is some evidence of tension between Chinese and Dayaks at certain sites and in the early decades of mining. However, gold did attract the attention, and in the end intervention, of the colonial administration.

Interesting is the crucial role of Chinese labor in mining. Because the mineral deposits in the Outer Islands of the East Indies were usually in sparsely populated areas, it was virtually impossible to recruit local labor for mining, nor was there an indigenous technology that was suitable for larger-scale exploitation. Because local labor was scarce and relatively expensive, before the late nineteenth or twentieth century Chinese immigrants dominated the market for paid, unskilled labor in Southeast Asia. This was true not only in mines, but also in plantations and, in some cases, urban areas as well.

Especially in the case of tin mining, the enterprises did employ local people for auxiliary tasks such as prospecting, and later some benefited from technical or clerical training. The elimination of the sheer back-breaking labor of digging and hauling the ore and the widespread introduction of machines opened better opportunities to employ local people; after World War II they found work in the mines, but other "native" employees also entered the islands from elsewhere in the Archipelago.

Finally, it may be appropriate to speculate whether the presence of mineral resources acted as a brake on other kinds of development in these two areas. True, the mining companies did develop some kinds of infrastructure and this might have attracted other investments or activities. In the end, however, these new activities seem to have been limited to the introduction of new cash crops and, especially in the case of West Kalimantan in recent decades, the exploitation of forests—another kind of extractive activity. Since both areas had generally poor soils, suitable only for a few crops, and little population, which meant relatively high labor costs, it is difficult to imagine what other kinds of development investments might have offered attractive prospects.

Ecological damage from tin mining, beginning with early deforestation, would in the long run have made continuation of traditional swidden farming on Bangka and elsewhere problematic. Not the European enterprises but the Chinese miners and their bosses pioneered and expanded alternatives, especially cash crops such as pepper and, elsewhere, rubber. Colonial administrators were skeptical of the value of these innovations, especially because

Chinese traders and exporters, who monopolized the sale of the product, worked on a system that tended to keep farmers indebted to the dealers who bought their crops. In addition, world market prices fluctuated greatly. In years of good prices, however, these crops brought benefits to local farmers, far beyond what mining may have done for them.

NOTES

1. Andaya 1993, 123–24, believes there were two to three thousand Makassarese and Buginese in Palembang at this time.
2. Although annual amounts varied considerably, deliveries were well over 8,000 piculs in 1745. After 1749 they remained above 10,000 piculs for decades, reaching a peak of over 35,000 piculs in 1770. Production in the year 1782 was poor (less than 7,000 piculs) and, in the 1790s, deliveries fell sharply. See Heidhues 1992a, 9, Table 1.
3. "Kongsi" is a generic term for a cooperative endeavor or "company." For references to the literature on these groupings, see Trocki (1990, 11–19, 185–86) and Heidhues (1993, 68–88). As Trocki points out, for the kongsis that worked in the plantation economy of Singapore and Riau, the sale of the product paid the laborers, but the sale of opium to the laborers guaranteed that operations remained profitable by recycling wages to the bosses. Opium was used on Bangka, probably to similar effect.
4. Mines were around the most important settlement, Mentok, and exploitation moved along the coast in the direction of Klabat Bay. The rich sites around Pangkalpinang were opened later.
5. Leong (1997, 99). Leong believes the Hakka in China allied with the minority She people who, like those of Bangka, were slash-and-burn farmers, and this helped them survive under difficult conditions. A similar strategy may have been used in Bangka and West Kalimantan.
6. According to *Koloniaal Verslag* (1852/53, 111), annually coffee brought in over 20 million Dutch guilders, sugar 7 million Dutch guilders and tin, as the third source of profit, 3 million Dutch guilders.
7. Wong (1965, 201–3, 208–11) describes the use of monitors and dredges in Malaya and of other labor-saving machines, all of which gave Western producers an edge over their Chinese competitors.
8. As translated in Lev (1966, 297).
9. The company's official histories are Gedenkboek 1927 and Kamp 1960. See also Heidhues (1991).
10. For a critical view of labor organization and labor relations on Belitung, see Erman (1995).
11. Borneo is the name for the entire island and was used by the Dutch in colonial times. Indonesians call their territory "Kalimantan." The northern part of the island, Sarawak and Sabah (Malaysia), and Brunei Darussalam, is still called Borneo.
12. The classic study of these cooperative organizations in western Borneo is de Groot (1885).
13. The geographer Enthoven traveled extensively in the Kapuas River basin at the turn of the century, finding small settlements of miners in the interior. See Enthoven (1903, 817–19). At about the same time, a French businessman-adventurer crossed

the island, avoiding all contact with the Dutch, and also found Chinese miners at work in the interior (Combanaire 1910).

14. For a recent instance of a smuggler caught, see Penyelundupan 2004. In this case, the attempt to smuggle through Riau to Malaysia failed. Another possibility is to ship tin ore through Java, but to declare it as something less valuable, for example, silica (as reported in Bea Cukai 2004). The amount of smuggled tin that escapes detection can only be guessed, but higher world prices are a strong incentive to smuggle. In addition to problems of decentralization (since 2001), the government repealed its previous mining law in 1999, leaving the industry without any regulatory framework (Hill 2004, 57).
15. Press Release 2004. In the first three-quarters of 2004, 82 percent of the tin ore came from small operators.

Bibliography

Archival Sources

Great Britain

BL IOR. British Library, India Office and Records, European Manuscripts, Eur D 199, Thomas Stamford Raffles report on the Indies, 1817.

Indonesia

ANRI Bangka 21. Arsip Nasional Republik Indonesia, Bangka 21, J. van den Boogaart, Report to Governor General Siberg on Bangka, 1803.

Netherlands

NA AA 246. Nationaal Archief, Tweede Afdeling 2.10.39, J. E. Edie, Memorie van Overgave 246, Pangkalpinang, 1928.

NA Collectie Elout. Nationaal Archief, Tweede Afdeling, Collectie Elout 57–121, De la Fontaine (Resident of Bangka) Report on Bangka (unpaginated), 1823.

NA MR 1881:1047. Nationaal Archief, Tweede Afdeling, 2.10.10 Mailrapporten 1881:1047.

NA MR 1918:2583, I. Nationaal Archief, Tweede Afdeling, 2.10.10 Mailrapporten 1918:2583, Part I.

NA MR 1929:3274. Nationaal Archief, Tweede Afdeling, 2.10.10 Mailrapporten 1929:3274.

Internet Sources

Bea Cukai. "Bea Cukai Gagalkan Penyelundupan Pasir Timah." 2004, http://www.djgsm.esdm.go.id/id/berita/media/33,1191,id,1.html?wmt, accessed 25 November 2004.

Penylendupan. "Penyelundupan 100 Ton Pasir Timah Digagalkan." Direktorat Jenderal Geologi dan Sumber Daya Mineral/Departemen Energi dan Sumber Daya Mineral, Berita Media (extracted from *Kompas*), 2004, http://www.djgsm.esdm.go.id/id/berita/media/33,1196,id,1.html.?wmt0cetak, accessed 25 November 2004.

Press Release. PT Timah TBK, 29 October 2004, http://www.timah.com/shareholder/PR/2004-PTTimahTbk-Release-30-pg0.htm, accessed 25 November 2004.

Sinar Indonesia Baru. *Sinar Indonesia Baru* (Medan) online, 9 March 2004, http://www.hariansib.com/date09/ekuin2.htm accessed, 9 March 2004, accessed 25 November 2004.

Timah. "*Timah yang Terus Dijarah*," *Kompas*, 22 October 2003, http://www.kompas.co.id/kompas-cetak/0310/22/daerah/639662.htm, accessed 25 November 2004.

Books and Articles

Andaya, Barbara. *To Live As Brothers: Southeast Sumatra in the Seventeenth and Eighteenth Centuries*. Honolulu: University of Hawaii Press, 1993.

Braake, A. L. ter, *Mining in the Netherlands Indies*. New York: Institute of Pacific Relations, 1944.

Coedès, G. "Les inscriptions malaises de Çrivijaya." *Bulletin de l'École Française d'Extrême Orient* 30, 1–2 (1930): 29–50.

Combanaire, Adolphe. *Au pays des coupeurs de têtes: À travers Borneo*. Paris: Librarie Plon, 1910.

Enthoven, J. J. K. *Bijdragen tot de Geographie van Borneo's Wester-Afdeeling*. Supplement to *Tijdschrift Aardrijkskundig Genootschap*. Leiden: Brill, 1903.

Epp, Franz. *Schilderungen aus Ostindiens Archipel*. Heidelberg: J. C. B. Mohr, 1841.

Erman, Erwiza. *Kesenjangan Buruh Majikan: Pengusaha, Koeli dan Penguasa: Industri Timah Belitung, 1852–1940*. Jakarta: Pustaka Sinar Harapan, 1995.

"Etnografi: kehidupan petani lada di kampung Bencah dan kampung Tokak, Bangka Selatan." Typescript. Jakarta: Fakultas Sastra, Universitas Indonesia, 1982.

Gedenkboek Billiton, 1852–1927. The Hague: Nijhoff, 1927.

Groot, J. J. M. de. *Het Kongsiwezen op Borneo: Eene verhandeling over den grondslag en den aard der chineesche politieke vereenigingen in de koloniën*. The Hague: Nijhoff, 1885.

Heidhues, Mary F. Somers. "Company Island: A Note on the History of Belitung." *Indonesia* 51 (1991): 1–20.

———. (a). *Bangka Tin and Mentok Pepper: Chinese Settlement on an Indonesian Island*. Singapore: Institute of Southeast Asian Studies, 1992.

———. (b). "From Orang Gunung to Orang Bangka: Changes in Bangka's Landscape in the 19th Century." In *Regions and Regional Developments in the Malay-Indonesian World*, edited by Bernhard Dahm, 63–74. Wiesbaden: O. Harrassowitz, 1992.

———. "Kongsis and Hui in 19th Century West Borneo and Bangka." In "*Secret Societies*" *Reconsidered: Studies in the Social History of Early Modern China and Southeast Asia*, edited by David Ownby and Mary Somers Heidhues, 68–88. Armonk, NY: M. E. Sharpe, 1993.

———. *Golddiggers, Farmers, and Traders in the "Chinese Districts" of West Kalimantan, Indonesia*. Ithaca, NY: Cornell University Southeast Asia Program, 2003.

Hill, Hal. "Yudhoyono's Six Challenges to Get Indonesia Growing." *Far Eastern Economic Review* 168, 1 (December 2004): 55–58.

Horsfield, Thomas. "Report on the Island of Banka." *Journal of the Indian Archipelago* 2 (1848): 299–336, 373–427, 705–25, 779–824.

Huitema, W. K. "De Pepercultuur op Banka: Rapport van den landbouwkundige Ir. W. K. Huitema naar aanleiding van een dienstreis in Augustus 1932." Typescript, 1933.

Hullu, J. de. "Over den chinaschen handel der Oost-Indische Compagnie in de eerste dertig jaar van de 18e eeuw." *Bijdragen tot de Taal-, Land- en Volkenkunde* 73 (1917): 32–151.

Jaarverslag Banka Tinwinning. Pangkalpinang, 1940. Mimeo.

Jackson, James C. "Mining in Eighteenth-Century Bangka: The Pre-European Exploitation of a 'Tin Island'." *Pacific Viewpoint* 10, 2 (1969): 28–54.

Kamp, A. F. *De standvastige tinnen soldat: 1860–1960 N. V. Billiton Maatschappij*. The Hague: Billiton Mij, 1960.

Kern, H. "Inscriptie van Kota Kapoer." *Bijdragen tot de Taal-, Land- en Volkenkunde* 67 (1913): 393–400.

Koloniaal Verslag van Nederlandsch-Indië. The Hague: Algemeene Landsdrukkerij, 1852/53; 1898.

Lange, H. M. *Het eiland Banka en zijne aangelegenheden*. Den Bosch: Muller, 1859.

Leong, Sow-Theng. *Migration and Ethnicity in Chinese History: Hakkas, Pengmin, and Their Neighbors*, edited by Tim Wright. Stanford: Stanford University Press, 1997.

Lev, Daniel S. *The Transition to Guided Democracy: Indonesian Politics, 1957–1959*. Ithaca, NY: Cornell University Southeast Asia Program, Modern Indonesia Project, 1966.

"Mededeelingen, eenige, omtrent de tinwinning en de behandeling der mijnwerkers op Banka." *Tijdschrift voor Nederlandsch-Indië* 64, 1 (1902): 331–83.

Meyier, J. E. de. "De terugkeer van mijnwerkers van Banka in Zuid-China." *Indische Gids* 29, 1 (1907): 224–27.

Milburn, W. *Oriental Commerce*. London: Black, Parry and Co., 1813.

Schuurman, J. A. "Historische schets van de tinwinning op Banka, II." *Jaarboek van het Mijnwesen in Nederlandsch Oost-Indië* 48 (1919): 1–388.

Suryadinata, Leo, Evi Nurvidya Arifin, and Aris Ananta. *Indonesia's Population: Ethnicity and Religion in a Changing Political Landscape*. Singapore: Institute of Southeast Asian Studies, 2003.

Teijsmann, J. "Aanteekeningen uit het dagboek meijner reis over Banka." *Natuurkundig Tijdschrift voor Nederlandsch-Indië* 32,4 (1859): 1–96.

Trocki, Carl A. *Opium and Empire: Chinese Society in Colonial Singapore, 1800–1910*. Ithaca and London: Cornell University Press, 1990.

Waal, E. van der. *Onze Indische Financiën*. The Hague: M. Nijhoff, 1876.

Warren, James. *The Sulu Zone, 1768–1898: The Dynamics of External Trade, Slavery, and Ethnicity in the Transformation of a Southeast Asian Maritime State*. Singapore: Singapore University Press, 1981.

Wong, Lin Ken. *The Malayan Tin Industry to 1914: With Special Reference to the States of Perak, Selangor, Negri Sembilan and Pahang*. Tucson: University of Arizona Press, 1965.

4

Making Places and Making States

Agriculture, Metallurgy, and the Wealth of Nature in South India

Kathleen Morrison

The environmental dimensions of South Asian history have attracted a great deal of attention in the last decade or so, with the result that we now have a greatly improved understanding of, for example, the ecological as well as social and political consequences of European colonialism and the continuing impact of differential power relations on both people and local landscapes. Not only has this scholarship been useful for putting contemporary resource struggles and ecological crises in broader perspective, but also has added to our understandings of the relations between local environmental conditions and both local and supralocal politics and economics. Building on these insights, I focus here on the connections between the very local constitution (or making) of *places*, culturally meaningful locales, and the establishment and maintenance of larger political-economic orders, what we may call *making states.* At both local and larger scales, ideas about what natural resources are, as well as the specifics of their exploitation, create conditions of possibility for social and political orders. At the same time, local landscapes may be radically altered by the demands of states; over the long term, these complex and imbricated relationships create novel environmental conditions that continue to affect human livelihoods into the present.

For the most part, current perspectives on the environmental history of South Asia suffer from an extremely truncated chronological focus, usually no more than the past 300 years, a limitation that makes certain assumptions highly suspect. Among these assumptions is the novelty of colonial-era environmental degradation (cf. Gadgil and Guha 1992) as well as presumptions about the stability of many precolonial environments. In a recent study of the environmental impact of British colonial policies toward agriculture in northern India, Mann (1999), for example, argues that British policies in the Doab region of northern India led to the destruction of

precolonial subsistence agriculture, deforestation, erosion, and ultimately climate warming and greater risk of famine.[1] Based on our knowledge of the longer-term histories of other regions, however, it seems highly unlikely that these trends were unique. I do not dispute that colonial revenue and other practices had profound effects on South Asian environments; I merely point out that South Asian environments have seen other, sometimes equally serious, perturbations in the past. Production for subsistence, furthermore, was not always the primary form of agriculture for much of India prior to colonization and had been "destroyed" over and over. As I will discuss, in northern Karnataka, and probably elsewhere, there had been multiple episodes of large-scale deforestation and erosion prior to the colonial period; in this region both forest loss and erosion were far more severe in the early sixteenth century than they are at present. Although much recent research has focused specifically on colonial forest dynamics, there is as yet little comparable information for earlier periods (Morrison 2002). Here, however, there seems to be more ground for suggesting that colonial-era changes were significantly more dramatic and consequential than those of any previous period.

The importance of situating more recent environmental history within longer-term contexts is illustrated here with a sketch of some aspects of the long-term landscape history of one part of southern India. There, in the semiarid interior of the peninsula, in what is now northern Karnataka, a (changing) landscape blessed with a rather unpromising suite of environmental conditions intermittently supported 6,000 years of agricultural production, nearly 3,000 years of urbanism, and nearly 300 years of the existence of one of the largest cities in South Asia, the imperial capital of Vijayanagara (figure 4.1). In so doing, local people created a complex anthropogenic landscape, a place where the consequences of past actions have had profound implications for later inhabitants.

Although I frame this discussion in terms of a 5,000-year period between about 3000 BCE and the end of the twentieth century, my primary focus will be on the centuries 1300–1600 CE, when this region was dominated by the city of Vijayanagara; the late Middle Period, when human modification of the regional landscape was the most dramatic. Specifically, I highlight some of the changes we have documented in regional vegetation, soils and landforms, and hydrology, linking these (in a necessarily greatly simplified way) with changes in settlement and political organization. In laying out aspects of this long history, I hope to illustrate the possibilities of a broad approach that integrates information not only from written texts, maps, and other visual representations, but also from material evidence of human manufacture (structures, features, artifacts) as well as modifications of the landscape itself. In addition to information from texts and material culture, I also include data from paleoecology, particularly the proxy records of past vegetation and fire history (Morrison 1994, 1995) provided by pollen and plant macrofossil analysis. The nature of this evidence is extremely diverse, ranging from the expressive and intentional to the unplanned and unintended.

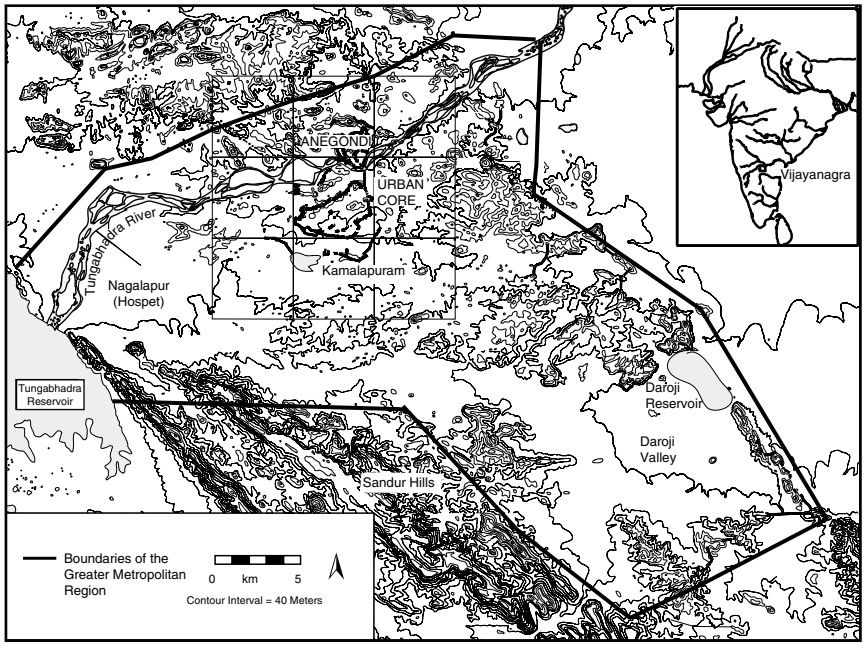

Figure 4.1 Map of the Vijayanagara Region Showing Both the Intensive and Extensive Survey Area Surrounding the Walled City.

In this area, as elsewhere, landscapes were (and are) complex accretional products that cannot be fully understood without reference to longer-term human and environmental history. Arguments about, for example, the contemporary extent of deforestation or erosion are necessarily made with reference to some past condition, often to some presumed baseline condition unaffected by humans. No such condition exists, however; there is no true "beginning" to landscape anthropogenesis. If there is no origin point for environmental history there are, however, distinctive historical moments. In this region, the colonial period did not see the first, or even the most significant, episodes of large-scale deforestation, erosion, and reworked hydrological regimes. The early shift to rice agriculture in this region radically transformed local environments, creating the conditions of possibility faced by Middle Period residents, whose changes to landforms, watercourses, and vegetation assemblages in turn shaped later productive options in significant ways. Some changes were partially reversible but others, clearly, were not; a pattern perhaps most poignantly illustrated by the impact of twentieth and twenty-first century mining in this area.

Natural Resources and Indian History

As Bankoff and Boomgaard (in this volume) point out, natural resources have helped shape Asian histories, in part because they underwrite state

formation and operation. The power of this observation is clear, for example, in the striking similarities between the smaller coastal trading states of the southwest coast of India and some of their Southeast Asian counterparts (Morrison 2002; cf. Boomgaard, Columbijn, and Henley 1997; Knapen 2001). In both regions, the long-distance, external exchange of (a similar suite of) forest products constituted a major financial basis for local states, most of which were also involved in the bulking and transshipment of goods from across the Indian Ocean.

A very different context is provided by the large inland and agrarian-based states and empires of South Asia (and elsewhere, China for example), where agricultural production and, to a lesser but still important extent, the production of goods such as cotton textiles, metal objects, and other manufactures provided the financial props for state support. Like many other agrarian states, the Vijayanagara empire pursued a course of territorial expansion and conquest as a means of extending its power. An important consumer of imported goods brought from both coasts, the Vijayanagara state did not usually participate directly in long-distance trade, but instead focused on direct and indirect taxation as well as raiding to support the activities of central elites. Ruled over by four successive dynasties of kings, the Vijayanagara empire transformed itself from a small regional kingdom to the major political and military power in southern India within the space of about 200 years. Its eponymous capital city was located at the northern frontier of the empire within what has been called the "scarcity tract" (Kanitkar 1960, 1). Not only was this region more arid than that supporting most earlier Indian capitals, but the very limited strip of alluvium along the Tungabhadra river also contrasts with the productive alluvial deltas that constituted the core area of, for example, the early Middle Period Chola empire.

As we have found, the area around the capital city was a critical zone of production for a range of foodstuffs as well as for cotton and a variety of manufactured goods such as ceramics and objects of iron and steel. The production of these critical resources radically reshaped the local landscape: as regional population grew, settlement expanded to outlying areas, irrigation facilities were constructed, and grazing, agriculture, and craft production all intensified. The initial establishment of the capital city and its later phenomenal growth were built on a complex mosaic of intensive, irrigated agriculture, extensive dry farming, grazing and collecting (Morrison 1995). However, even before the establishment of the city in the 1300s, local vegetation and soils had already been significantly transformed. Strategies of production were (and are) always built on a changing substrate.

It is certainly worth considering what we mean by "resources." Resources are culturally defined—foods valued by some may be seen as inedible by others, such as the birds' nests from the Andaman Islands sold as delicacies in East and Southeast Asia but never consumed locally (Cooper 2002). Resources are also historically specific, tied both to changing technologies as well as to local landscapes and their histories. The rich manganese ores of the Sandur Hills, for example, whose exploitation has created very serious

environmental consequences, were of no interest at all until the twentieth century even though Sandur iron ores have been exploited since the first few centuries CE. Rice, the production of which was the great goal of Middle Period farmers and investors, became an object of culinary desire only during the Early Historic period; indeed, it may be argued (Morrison 2001; 2006) that the drive to produce rice has been one of the most significant environmental forces in this region over the past 600 years, if not longer.

Landscape History in Northern Karnataka

The region considered here is part of the semiarid uplands of the Karnatak plateau, a region with a basal geology consisting largely of granite. This granite forms the Hampi-Daroji Hills, a series of low outcrops that create the dominant physical impression of the landscape today. These granitic hills have weathered into what look like large heaps of rounded boulders. There appears to have been significant deforestation and erosion off of these hills; a process that may have begun in the Iron Age by about 800 BCE. It would, therefore, be a mistake to directly map the stark, striking, hilly landforms of today onto all past landscapes.

Striking across the granitic base of the Karnatak plateau are two narrow bands of metamorphic schist, one of which forms the Sandur Hills, the highest prominences in the region (600–900 meters, above a base elevation of 300–600 meters). The Sandur Hills not only support a more stable and developed soil and vegetation than the Hampi-Daroji Hills, but also contain rich manganese and iron ore deposits. These hills are currently under intense pressure from strip mining and are literally being blown away each day by mine blasting. Sandur iron ores were subject to intensive human exploitation by the Early Historic period and perhaps as early as the Iron Age. Archaeological evidence of intensive iron-working at VMS-110 in the Daroji Valley begins in the Early Historic period (Morrison and Johansen, in press). Chemical analyses of slags and ores from smelting locations throughout the region indicate that Sandur ores continued to be employed through the Vijayanagara period. The Sandur Hills also constitute important watersheds for monsoon runoff, much of which was captured in runoff-fed reservoirs and other facilities.

The dry and warm south Indian climate is dominated by the tempo and intensity of the summer monsoons. Our region experiences one major rainy season each year, between June and September. Although there is a minor contribution made by winter rainfall, this is of less importance than elsewhere in the south. Average annual rainfall hovers around 500 millimeters, but this figure is highly variable, a dilemma common to many semiarid regions. Rain showers may also be very localized. Partly because of this aridity, the Tungabhadra river and its tributaries formed the major foci of settlement in the region until the thirteenth century and, until the middle of the twentieth century,[2] the Tungabhadra was the only source of water for perennial

irrigation. The Tungabhadra dam project, begun prior to Indian independence in 1947 and completed afterward, has had a significant effect on the river regime, regulating the flow of this once-turbulent river.

Regional vegetation is now characterized as part of the *Harwickia-Anogeissus* series, a dry deciduous type (Gaussen et al. 1960). Although there are several reserved forests, few of these have any substantial tree cover. In this area today, the lush green of canal-irrigated fields contrasts sharply with the browns and grays of the more extensive unwatered areas, soil, and rock broken only by clumps of grass and scrubby xerophytic vegetation. These latter areas are, however, no less anthropogenic than the artificially watered paddies and fields and are under intense pressure created by grazing, firewood collection, and dry farming. There is almost no scrap of the landscape that does not experience human use on a regular basis. The Sandur Hills stand in contrast to the surrounding vegetation; even today they support remnant stands of the *Anogeissus-Terminalia-Tectona* series, a relatively moist forest association also found in the Western Ghat foothills. The Sandur flora, then, constitutes a small island of mesic vegetation in the drier vegetation types of the Karnataka *maidan* (plain).

Agriculture, Settlement, and Polity in Northern Karnataka

The earliest agriculture in southern India dates only to the second millennium BCE, the beginning of the Southern Neolithic (ca. 2700–1000 BCE), when extensive dry farming of millets and pulses supplemented an economy based largely on cattle pastoralism (Korisettar et al. 2001). The earlier part of the Southern Neolithic appears to have been a period of relative aridity in this already dry region, making dry farming somewhat more problematic than it is at present. Relative to later periods, the Southern Neolithic was marked by low population densities and high mobility. Residential locations cluster in places where there was access to the bases of granitic hills where runoff could be harvested for farming. Neolithic sites are not, in general, associated with the banks of major rivers such as the Tungabhadra, though they are sometimes located near (but not on) minor streams.

Although the landscape of interior southern India was inhospitable to rice, as indeed it was to other mesic crops such as coconuts, sugarcane, bananas, and areca nut palms that make up a minor, but significant, part of the cultivated flora today,[3] rice is nevertheless found in some botanical assemblages of the Southern Neolithic. Never more than a trace amount, rice was better known elsewhere on the subcontinent where its pedigree is longer. By some time in the Iron Age (1000–300 BCE) and certainly by the Early Historic period (300 BCE–CE 500), rice cultivation became well-established in northern Karnataka. It was irrigated using a range of strategies, from annual river inundation to watering from wells and perhaps runoff-fed reservoirs. Small areas of intensive rice production, as well as more extensive farming of pulses, millets and other grains, appear to have underwritten the trend

toward settlement aggregation and to have allowed the establishment, during the Iron Age, of large towns or small cities such as Kadebakele, which sprawled more than 40 hectares across a high granitic outcrop on the river's edge. Iron Age and Early Historic settlements cluster densely along the banks of the Tungabhadra, the only perennial water source in the region and the only river reliable enough to provide irrigation for water-demanding crops such as rice.

This new trend toward large, permanent settlements created significant (but localized) environmental effects including deforestation and erosion. Our ongoing research suggests that there may have been significant soil loss off of (some of) the granitic Hampi-Daroji Hills at this time. In addition to the impact of the many large settlements and mortuary/ceremonial complexes perched atop granitic outcrops, the expansion of rice agriculture certainly also affected local vegetation, soils, and hydrology.

Early Historic iron production is somewhat better-understood than is contemporary agriculture. In the Daroji Valley, just north of the Sandur Hills and some 25 kilometers away from the Tungabhadra where most Early Historic villages and towns were located, we have documented a specialized iron smelting site where Sandur ores were processed into iron to be smithed in large towns such as Kadebakele. The scale of this facility (VMS-110, Ingaligi) is substantial; the mountain of slag and other smelting by-products was substantial enough to later be made into a reservoir embankment. Although mining did not have a significant impact on local environments—the ore that fed the Ingaligi operation was derived from iron-rich cobbles gathered from streams coming down from the Sandur Hills—iron workers did use charcoal to roast the ores and fire their small, ad hoc furnaces. The production of charcoal to fuel an operation of this size must have had an appreciable effect on the Sandur forests.

The city of Vijayanagara was founded in the early 1300s at the site of the Pampa *tirtha*, a sacred place of local importance for the previous 600 years but not a major locus of settlement. The huge walled city of Vijayanagara grew from its initial locus around the Pampa *tirtha*, this spatial appropriation constituting an important strategy of legitimation and positioning vis-à-vis the past and the local sacred power. The Vijayanagara period saw a massive transformation of the agricultural landscape, a significant shift in the kinds of facilities used and their distribution, in the scale of forest clearing, and indeed in the very structure of the landscape itself.

Beyond the walled city lies the greater metropolitan region of Vijayanagara, an area more than 350 square kilometers in extent (figure 4.1). Contained within extensive fortifications, this area constituted much of the immediate agricultural sustaining area of the city. An area of approximately 20 square kilometers immediately surrounding the capital city was subjected to an intensive, systematic archaeological survey[4] (Sinopoli and Morrison 2001) while the outer blocks were studied by more extensive methods. Using the survey results as well as historical and paleobotanical data (Morrison

1995), it is possible to establish two major periods of settlement expansion and agricultural intensification in and around the city.

The first major burst of population and construction came in the early fourteenth century, with the formal establishment of the city and construction of the urban core walls. Around the city, we see a distinctive pattern of fourteenth century settlement that includes small villages and towns near the river and a scattering of walled towns further inland. Agriculturally, the early Vijayanagara period was marked by the construction of several major canals and by the Kamalapuram *kere*, a large canal-fed reservoir, one of only two such perennial facilities in the entire region. Canal-irrigated areas supported wet rice production. Settlements clustered most closely near these zones of intensive irrigated agriculture. However, this period also saw the construction of a number of runoff-fed reservoirs (especially north of the river), facilities that made dry farming more stable (figure 4.2); there was also dry farming of millets in upland zones further away from the river. The early focus on labor- and facility-intensive wet rice is significant; the early Vijayanagara period established a spatial framework of roads and settlements, temples and agricultural zones, that was only slightly filled out during the fifteenth century, or middle Vijayanagara period.

The fifteenth century was a period of relative stasis (Morrison 1995, 2000) in the material record, and only one settlement, associated with a large runoff-fed reservoir, clearly dates to this period. The second major expansion of both the urban and rural populations took place in the early sixteenth

Figure 4.2 Masonry-Faced Embankment of an Abandoned Sixteenth-Century Reservoir in the Daroji Valley. The Sandur Hills, in the Distance, Show Scars from Recent Mining.

century, this growth eclipsing the city's initial surge of in-migration. The impact of this dense population aggregation on the surrounding landscape was considerable and it may be fair to say that the people of the sixteenth century transformed the land in ways that have significantly restructured all subsequent experiences of it. The early sixteenth century expansion of the city of Vijayanagara is reflected both in the construction of monumental architecture, including several large temple complexes, and in a pattern of filling in and spilling out of the walled space of the city. In the survey area, we see a phenomenal growth of settlement—again a dual pattern of infilling and expansion—with entire valleys becoming saturated with villages, complex systems of interconnected reservoirs, and other agricultural facilities, temples, roads, and fortifications.

Clearly, much of the agricultural production in the region was geared toward the provisioning of this massive city. As the botanical and historical data suggest, much of the irrigated land seems to have been focused on the production of rice, orchard crops, and vegetables. Cotton was grown on dry fields for industrial-scale textile production, and large flocks of animals destined for the city's markets were grazed outside the city. Vijayanagara served as a major locus of consumption, not only of local produce, but also of craft goods from across South Asia and beyond (Morrison 1997; Sinopoli 2003). The sixteenth century, in particular, was a time of increasing monetization of the economy (Karashima 1992; Palat 1987), and agricultural production and exchange were partly, though not entirely, enmeshed in cash-based market relationships. These relationships varied significantly across classes of produce, especially rice versus other food grains (Morrison 2001), and also across regions, so that areas further from large towns and cities were less involved in large-scale exchanges of foodstuffs (though not necessarily other goods). In the area around the city, however, almost no producers were able to grow crops simply for their own subsistence; market-based production was common even in dry-farmed areas.

Late Vijayanagara agricultural change played out differently across the study area. For example, north of the river agricultural intensification took the form of an expansion of canal irrigation, with the construction of the Anegondi channel as well as a large aqueduct. This canal made many reservoirs in this area redundant, and they fell out of use (figure 4.3). A major form of agricultural expansion into areas out of reach of canals was the construction of long, complex chains of reservoirs; both the Daroji Valley reservoir systems and the Dhanayakanakere system date largely to the sixteenth century. The building of agricultural facilities, both these large ones as well as the many smaller features such as terraces, check dams, and bordered and gravel-mulched fields, significantly reshaped the surface of the land, altering patterns of drainage, soil development, and vegetation. In short, human activity during the Vijayanagara period, and particularly the sixteenth century, transformed the regional landscape in a number of dramatic ways—for example, through slope modification, changes in the patterns of water movement and drainage, the manipulation of routes

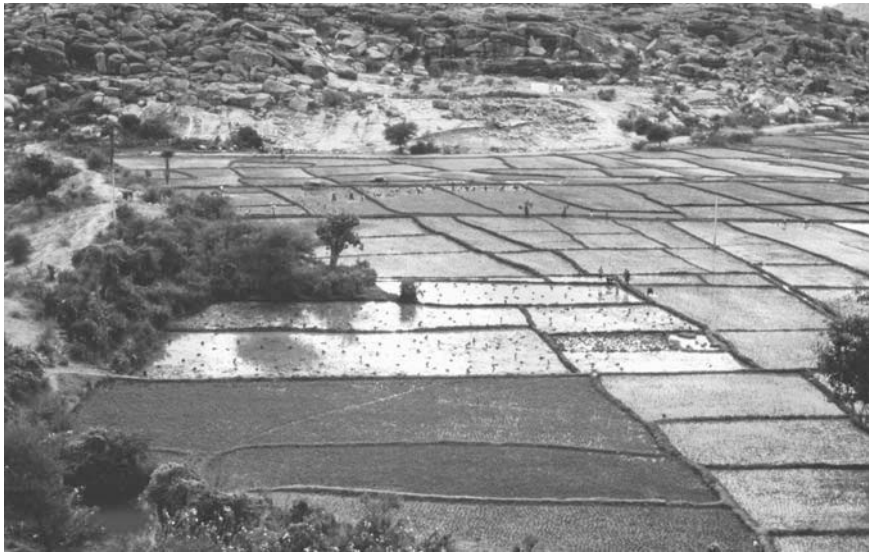

Figure 4.3 Abandoned Reservoir (left side of the image) Made Redundant by the Sixteenth Century Anegondi Channel. Fed by the Tungbhadra River, This Canal Made Rice Production Near the City Possible North of the River and Has Continued in Use until Today.

of movement, the construction of temples and shrines, and the consecration of new sacred places.

The city of Vijayanagara was largely abandoned following the defeat of the imperial army in battle in 1565. The elite core of the city was burned and looted and sporadic attempts at reoccupation proved short-lived. Most of the small agricultural settlements in the region continued to be occupied, however. Only selective portions of the agricultural landscape were abandoned—for example, the reservoirs of more distant valleys such as Daroji and Dhanayakanakere. On the other hand, the canal system continued in use and was even expanded slightly under British rule. Although we see some continuity in facility use, it is also clear that the contexts of agricultural production changed significantly with the abandonment of the city and the loss of urban food markets. Subsistence production became more common, although farmers were by no means isolated from larger political forces. This transition also had major environmental consequences in that the abandonment of dry areas that were marginal for agricultural production allowed some regeneration of woody plants. At the same time, however, discontinued maintenance of terrace systems, especially those systems upstream from reservoirs, only exacerbated already severe problems of erosion and reservoir siltation.

After the abandonment of the city, and as the zone of Vijayanagara control moved south, the capital of the empire was also shifted southward in a series of moves as the power and spatial scale of the empire slowly contracted. The study area came under the control of the Sultanate of Bijapur and later

various local leaders during the Nayaka period. Although the territory south of the Tungabhadra (part of present-day Bellary district) was briefly claimed by the Nizam of Hyderabad, it became one of the districts ceded by him to the British in 1800. The Raichur district north of the river, however, remained part of the Nizam's dominions until Indian independence in 1947. Under the British there was some reorganization of settlement as Bellary and, secondarily, Hospet, grew as the district and *taluk* headquarters respectively and a few agricultural villages in dry-farmed areas were abandoned.

Up until 1930, no more than 2.5 percent of cultivated land in Bellary District (less in Raichur District) was irrigated (Washbrook 1994, 132). In the middle of the twentieth century, spanning a period before and after Independence, the Tungabhadra dam was built,[5] submerging a large area. The irrigation supported by this dam, together with the twentieth century expansion of the town of Hospet and the growth of mining in the area, have led to a new period of intensive settlement and landscape transformation that both builds from existing landscape forms and is rapidly transforming them.

Changes in Vegetation and Soil: An Overview

Vegetation

Without reviewing the evidence for climate change here (Morrison, in press), it is worth noting that the only evidence for significant directed change in precipitation was a weakening of the monsoon around 2500 BCE (Caratini et al. 1994). Although vegetation patterns are certainly influenced by climate change, it is probable that only large-scale changes in rainfall patterns would have significantly modified vegetation in the study area. Most marked, perhaps, during the Neolithic dry period would have been the retreat of the distinctive vegetation of the Sandur Hills upslope and perhaps even its replacement by a more xeric group of plants. Further, there would have been significantly less surface runoff in these centuries and it may be no coincidence that runoff-harvesting strategies did not become important until after 1000 BCE. It is difficult to say precisely what the nature of later Little Ice Age effects, if any, may have been, and although I do not discount the potential importance of changes in rainfall—indeed, I think they were probably crucial for dry farmers—it is also probable that the most significant factor restructuring regional vegetation was human action and not climate change in itself.

In this region, the best evidence for past vegetation comes from a series of pollen cores taken from Vijayanagara reservoirs (Morrison 1995). Reservoirs, like natural lakes and bogs, act as traps for pollen produced by the surrounding vegetation. Airborne pollen settles onto the surface of the water, eventually settling to the bottom. Inwashed sediments also carry pollen; together these aggrading materials create a complex stratified record that carries information about past vegetation. The analysis of sediment and pollen

profiles from these reservoirs affords a uniquely detailed view of land use patterns and of human impact on the South Indian countryside from the onset of reservoir infilling to the present. Charcoal particles from local and regional fires—caused by, among other things, agricultural clearing, sugarcane burning, charcoal production, and domestic burning—also settle into reservoir settlements, leaving a proxy record of the intensity of past burning (MacDonald et al. 1991; Morrison 1993; Patterson et al. 1987). Such records can be dated by radiometric methods as well as by internal evidence such as evidence of introduced New World plants or correlation with reservoir construction dates.

The most continuous pollen record comes from the Kamalapuram reservoir, one of the few canal-fed reservoirs in the study area. This artificial lake lies adjacent to the city of Vijayanagara and has a water-spread of some 200 hectares. As a relatively large body of water and one that takes in significant quantities of pollen from its feeder canal (the Raya canal) as well as from runoff, the Kamalapuram *kere* pollen record can be considered representative of the regional vegetation. Further, the watershed of the Kamalapur reservoir draws from both the granitic Hampi-Daroji Hills that border the north side of the Daroji Valley and, in part, from the Sandur Hills themselves, where the Hampi-Daroji Hills recede at the western end of the valley. The sediment contribution from the iron- and manganese-rich Sandur Hills can be seen quite clearly in the red, iron-rich water of the Kamalapuram reservoir.[6]

Beginning in the fourteenth century, the Kamalapur pollen sequence (Morrison 1995) shows a pattern of open vegetation, dominated by grasses and cultivated fields. Weedy flora are consistent with the production of wet rice under the reservoir, in contrast to the current focus on commercial sugarcane production. The Vijayanagara period witnessed significant and sustained pressure on woody plants—trees and shrubs declined throughout the period, virtually disappearing at the height of the city's occupation, rebounding only after the abandonment of the city. This pattern also corresponds with the evidence of microscopic charcoal, which suggests intense regional burning during the Vijayanagara period (Morrison 1994). It is worth stressing that sixteenth century deforestation was more severe than that of the late twentieth century (though if present trends continue, the twenty-first century will surpass both).

Coconut (*Cocos nucifera*) trees, which require supplemental watering in this dry region, show up in significant numbers during both the Vijayanagara period and the twentieth century; but they do not occur in large numbers in the centuries between. Other nongrain cultivated plants from the Vijayanagara period include *Ricinus* (castor oil bean) and *Arenga* (an edible palm).

Importantly, the initial picture of vegetation from the Kamalapuram cores, a pattern dating to the early Vijayanagara period, is one of extensive fields and open areas with grasses and weeds. The agricultural expansion and intensification associated with the establishment and expansion of the city in the fourteenth century did not begin from a point of "untouched" natural vegetation

but was instead built on a long history of anthropogenic transformation of the local flora.

Post-Vijayanagara vegetation changes are also marked and are particularly interesting between the nineteenth and twentieth centuries. Summarizing these patterns, the colonial and postcolonial palaeobotanical records show a renewed focus on burning and changes in charcoal particle sizes, very possibly a result of large-scale commercial sugarcane production (Morrison 1994). We also see the introduction of new weed taxa, including New World weeds, and a shift within the irrigated zones away from wet rice and toward large-scale cultivation of coconuts and sugarcane (bananas are also important now, but because they do not produce pollen their past importance is difficult to assess).

In addition to the pollen data, documentary evidence, historical photographs, and oral histories make it clear that there has been an ongoing and significant trend toward deforestation of the Sandur Hills throughout the twentieth century. These sources recall locally dense forests on hills now vegetated primarily by grasses and thorny scrub. The *raja* of Sandur, a small princely state during the British period, hunted leopards and other large animals in the Sandur Hills that now support almost no large mammals.[7] As noted, the present treeless condition of the Sandur Hills was duplicated and even surpassed during the Vijayanagara period. That regeneration *was* to some extent possible is certainly worth noting, though the nature of contemporary mining practices may make any future forest resurgence highly unlikely.

Soils and Erosional Regimes

Like vegetation, soil is also a vulnerable landscape element in this semiarid setting. In our current project on the Iron Age and Early Historic periods we are working on the problem of soil formation on and erosion off of the Hampi-Daroji Hills, but are not at present in a position to say for certain how much of a problem soil movement presented prior to the Middle periods. By the fifteenth and especially sixteenth centuries, however, we have good evidence[8] for severe erosion in the study area, especially in the more densely settled areas. In the northeast valley of the urban core of the city, a combination of cultural debris and colluvial inwash from the rocky hills has buried several small fifteenth and sixteenth century temples right up to the tops of their doors.

As a recent analysis of reservoirs (Morrison 1993; in press) has made clear, erosion and colluviation were serious concerns wherever reservoirs or terraces were built, and there is evidence for locally variable, but often very severe erosion and redeposition of soil cover. It is possible to map the pattern and speed of runoff into a reservoir by mapping sediment particle size distributions in its bed; regular patterns of these size distributions show not only a history of bed siltation but also something of the changing patterns of water flow into reservoirs through time. It is possible, in fact, to attribute the

Figure 4.4 Avinamodugu Reservoir Sluice Gate Buried In ca. 3 Meters of Silt. Despite Extensive Renovations, This Sixteenth-Century Reservoir Now Operates at only a Fraction of its Original Capacity.

majority of cases of reservoir abandonment to the effects of erosion, either because of loss of capacity (figure 4.4) or because changed flow patterns led to catastrophic dam breaches. In some cases, such as that of the massive Daroji reservoir,[9] originally built in the sixteenth century and still in use, there has been a sustained effort to maintain the facility in spite of catastrophic events such as the dam breach and flood of 1851 that destroyed the entire village. In most cases, though, the Vijayanagara reservoirs, and especially the sixteenth century reservoirs built during the wave of agrarian expansion, lie abandoned, their embankments breached or their sluices buried in as many as three meters of silt.

Much of this erosion is no doubt related to the large-scale destabilization and degradation of the local vegetation cover, especially the loss of woody taxa. Local responses to such sedimentary processes are evident from the many archaeological features designed to retard erosion and protect downstream facilities as well as, more immediately, to channel, slow, and/or collect runoff for agriculture, livestock, or people. Losses to erosion were therefore a widespread and serious problem in the Vijayanagara period, much more so than they appear to be today, though as I describe below, the potential consequences of contemporary siltation problems are extremely serious.

The Kamalapuram reservoir pollen core, in addition to what it tells us about vegetation and fire history, can also shed some light on long-term erosional trends. In brief, inwashed sediment in the reservoir was primarily brown and only moderately iron-rich from the fourteenth century until sometime after the abandonment of the city and the (partial) regeneration of

regional tree cover. Following this, approximately around the eighteenth century, there were a number of changes: (1) woody plants again came under attack; (2) burning patterns changed to those mostly likely associated with commercial-scale production and burning of sugarcane; (3) herbaceous plants increased at the expense of grasses; (4) several introduced New World weeds entered the regional flora; and finally, (5) reservoir sediments changed to a red iron- and manganese-rich matrix. This latter material almost certainly derives from the Sandur Hills.

Although a detailed history of Sandur mining has yet to be carried out, the mineral wealth of the Sandur Hills quickly attracted the attention of British geologists, including the energetic R. Bruce Foot, who also conducted early archaeological research in South India. Krishnan (1948, 3) notes that "nearly half of India's pre-war output of manganese was from Sandur . . ." The volume of material, from 100,000 tons of ore exported annually in 1948, grew significantly in the latter part of the century. Most of the ore is still carried away in railroad cars but a local steel industry has also been established, moving production closer to the raw material. The technology of extraction too has become more effective and more quickly destructive so that today the treeless northern slopes of the Sandur Hills are crisscrossed with bright red mining scars (figure 4.2). Again, however, older forms of extraction also left major scars on the landscape as the barren pockmarks left by small-scale opencast ore mining in the Daroji Valley attest. Little vegetation grows in or around these shallow pits even though they do capture rainwater; reclamation of this land for agriculture would require a significant effort.

More recent erosion problems are also evident in the operation of the Tungabhadra dam, where a government proposal to raise the height of the dam has recently been accepted. Like Vijayanagara reservoirs before it, the Tungabhadra dam has also experienced a loss of capacity through siltation, a loss variously estimated at 28–30 percent. The recent rapid siltation of the upstream Bhadra reservoir (the Tunga and Bhadra rivers join to form the Tungabhadra), which has been affected by mining in the Kudremukh area of the Western Ghats, also threatens the Tungabhadra dam. Thus, although the spatial scale of erosional processes affecting reservoirs, farming, and the basic safety of local residents has grown in recent centuries, the basic processes and problems are similar to those faced by area residents as far back as the sixteenth century. Many of those sixteenth-century changes—reworked local floras, changed hydrological patterns, a new cultural landscape of temples, town, roads, and other features, hillsides finally stripped of almost all soil and tree cover, and many others—created a template for both the colonial period and for the present.

Discussion

Although this review has been necessarily brief, I hope to have demonstrated, in the context of a small region of southern India, that an appreciation of

environmental change and of the possibilities for human-environment relationships requires some attention to long-term landscape histories. While this chapter focuses on environmental change, these histories are no less important for understanding changing cultural landscapes. Although there were significant and far-reaching changes in north interior Karnataka under the British, not all of these changes were novel. Subsistence agriculture, for example, had appeared and disappeared repeatedly, standing in complex and changing relationships to production for markets. Deforestation has been a feature of this landscape since at least the first millennium BCE and, if our present notions about the timing of erosion off the Hampi-Daroji Hills are correct, there were at least two major episodes of mass wasting that dwarf twentieth-century erosional effects. Humans have also been modifying the local vegetation for at least 5,000 years. Some changes, such as the introduction of New World plants, seem to be irreversible although others may be less so. Finally, I hope to have demonstrated the importance of multiple sources of information, including archaeological and paleoecological indices. In this region, texts appear only in the third century B.C.E and the historical record presents many challenges even much later. By combining the perspectival evidence of written sources with an analysis of the material record and the proxy environmental records of paleoecology, we may be able to triangulate toward a fuller picture of the past in this long-settled and much-transformed region. In the Vijayanagara region, as elsewhere, resources have certainly influenced the making of states, but states have also had a hand in both the constitution and transformation of these same resources. The processes of locality construction, the long-term "making of places" (which includes the assignment of cultural meanings and the creation of built environments as well as physical transformations of rock, soil, plants, and water), constitute the ground on which this reciprocal political action takes place.

NOTES

1. Mann writes:

> Extensive commercial deforestation in north India and the destruction of economically unprofitable and therefore unvalued woodland areas in the Doab caused a warming of the region within a few decades. This had far-reaching consequences for the soil, the amount of available water and finally the fertility of the area. Both the causes of deforestation led to a catastrophic famine in the event of a poor monsoon, especially after the establishment of British power in northern India. (1999, 11–12)

He goes on to describe (1999, 12) what he calls "the transformation of the pre-colonial subsistence economy through the merciless extraction of revenue under the British," a statement that may accurately reflect colonial practice but which homogenizes thousands of years of agricultural history into a composite category (precolonial) as well as misrepresents the complex history of both subsistence and commercial production that supported villages, cities, and towns in this region prior to the coming of the British.

2. Now electric pumps attached to deep bore wells are locally important for agricultural production.
3. All of these water-loving crops, including rice, could be grown only under irrigation.
4. In the intensive survey area, we selected a 50 percent random sample of transects, each surveyed by teams of archaeologists spaced at intervals of 20 meters who walked systematically back and forth, documenting all archaeological remains. We recorded 645 archaeological sites in this area, including sites outside the sample transects. This level of intensity and systemization of coverage is a first for South Asia.
5. Originally proposed in 1860, work on the dam began only in 1945. The bulk of the construction took place between 1950 and 1953; by 1958 the dam was fully operational: 90 villages and 54,452 people were displaced. (Tungabhadra Board, http://www.tbboard.org/annex2_1.html, last accessed 1 October 2005.)
6. Significantly, although the Kamalapuram reservoir lies further away from the Sandur Hills than do the Daroji reservoirs, its sediments are significantly redder and more iron-rich. Not only were the Daroji facilities mostly abandoned prior to the recent expansion of mining, but the runoff from the Sandur Hills to the Kamalapuram reservoir lies in the area of most intensive blasting, near Hospet and the railroad line.
7. Established around 1700, the princely state of Sandur joined the Indian republic in 1949. Early-twentieth-century forests were limited in extent; the Sandur Hills also had large expanses of grassland at this time (Krishnan 1948).
8. Our database derives in part from a series of reservoir sediment cores. In addition to pollen and charcoal analysis, we collected information on sediment color, carbon content, pH, particle size distributions, and carbonate levels.
9. Prior to the construction of the Tungabhadra dam, the Daroji reservoir was entirely runoff-fed, capturing runoff from three seasonal streams derived from the Sandur Hills. It contains water year-round in a pool more than 1.5 by 4 kilometers in size; expanding to 2 by 5 kilometers, or 1,000 hectares in the rainy season. In 1868–69, this reservoir was reported (Kelsall 1872, 16) to water 1,639 acres (663.3 ha.) of agricultural land. The embankment is 3.6 kilometers long, 12 meters high, and more than 60 meters wide; the widest in the region, although the sixteenth-century Raya *kere*, near Hospet, is higher at 28 meters.

Bibliography

Boomgaard, Peter, Freek Colombijn, and David Henley, eds. *Paper Landscapes: Explorations in the Environmental History of Indonesia*. Ledien: KITLV Press, 1997.

Caratini, C., I. Bentaleb, M. Fontugne, M. T. Morzadec-Kerfourn, J. P. Pascal and C. Tissot. "A Less Humid Climate since 3500 years BP from Marine Cores off Karwar, Western India." *Paleography, Paleoclimatology, Paleoecology* 109 (1994): 371–84.

Cooper, Z. *Archaeology and History: Early Settlements in the Andaman Islands*, Delhi: Oxford University Press, 2002.

Gadgil, Madhav and Ramachandra Guha. 1992. *This Fissured Land: An Ecological History of India*, Delhi: Oxford University Press, 1992.

Gaussen, H. P. Legris, M. Viart. *Carte Inernationale Du Tapis Vegetal, Notice de la Feuille: Mysore. Extrait des Travaux de la Section Scientifique et Technique de L'Institut Francais de Pondicherry*, *Hors Serie* 7, 1966.

Kanitkar, N. V. *Dry Farming in India*. Second edition New Delhi: Indian Council of Agricultural Research, 1960.

Karashima, N. *Toward a New Formation: South Indian Society under Vijayanagar Rule*. Delhi: Oxford and IBH, 1992.

Kelsall, J. *Manual of the Bellary District: Compiled under the Orders of Government*. Madras: Lawrence Asylum Press, 1872.

Knapen, H. *Forests of Fortune? The Environmental History of Southeast Borneo, 1600–1880*. Leiden: KITLV Press, 2001.

Korisettar, R., P. C. Venkatasubbaiah, and D. Q. Fuller. "Brahmagiri and beyond: The Archaeology of the Southern Neolithic." In *Indian Archaeology in Retrospect, vol. I, Prehistory: Archaeology of South Asia*, edited by S. Settar and R. Korisettar, 151–238. Delhi: Manohar and Indian Council of Historical Research, 2001.

Krishnan, M. *Sandur State 1948*. Sandur: Government of Sandur, 1948.

MacDonald, G. M., C. P. S. Larsen, J. M. Szeicz, and K. A. Moser. "The Reconstruction of Boreal Forest Fire History from Lake Sediments: A Comparison of Charcoal, Pollen, Sedimentological, and Geochemical Indices." *Quaternary Science Reviews* 10 (1991): 53–71.

Mann, M. *British Rule on Indian Soil: North India in the First Half of the Nineteenth Century*. Delhi: Manohar Press, 1999.

Morrison, K. D. "Supplying the City: The Role of Reservoirs in an Indian Urban Landscape." *Asian Perspectives* 32, 2 (1993): 133–51.

———. "Monitoring Regional Fire History through Size-specific Analysis of Microscopic Charcoal: The Last 600 Years in South India." *Journal of Archaeological Science* 21 (1994): 675–85.

———. *Fields of Victory: Vijayanagara and the Course of Intensification*, Berkeley: Contributions of the University of California Archaeological Research Facility, No. 53, Berkeley, 1995.

———. "Commerce and Culture in South Asia: Perspectives from Archaeology and History." *Annual Review of Anthropology*, 26 (1997): 87–108.

———. "Naturalizing Disaster: From Drought to Famine in South India." In *Environmental Disaster and the Archaeology of Human Response*, edited by G. Bawden and R. M. Reycraft, Anthropological Papers No. 7, 21–33 Albuquerque: Maxwell Museum of Anthropology, 2000.

———. "Coercion, Resistance, and Hierarchy: Local Processes and Imperial Strategies in the Vijayanagara Empire." In *Empires: Perspectives from Archaeology and History*, edited by S. Alcock T. D'Altroy, K. Morrison, and C. Sinopoli, 253–78. Cambridge: Cambridge University Press, 2001.

———. "Pepper in the Hills: Upland-Lowland Exchange and the Intensification of the Spice Trade." In *Forager-Traders in South and Southeast Asia: Long-Term Histories*, edited by K. D. Morrison and L. L. Junker, 105–30. Cambridge: Cambridge University Press, 2002.

———. "Intensification as Situated Process: Landscape History and Collapse." In *Agricultural Strategies*, edited by J. Marcus and C. Stanish, 71–91. Los Angeles: Cotsen Institute of Archaeology, University of California, 2006.

———. *Daroji Valley: Landscape History, Place, and the Making of a Dryland Reservoir System*. Delhi: Manohar Press, Vijayanagara Research Project Monograph Series (in press).

Morrison, K. D. and L. L. Junker, eds. *Forager-Traders in South and Southeast Asia: Long-Term Histories*. Cambridge: Cambridge University Press, 2002.

Morrison, K. D. and P. G. Johansen. "Recent Excavations at Ingaligi (VMS-110): General Introduction." In *Recent Research on the Archaeology and Bioanthropology of South India*, edited by V. V. Rami Reddy and K. D. Morrison, Delhi: Munshiram Manoharlal (in press).

Palat, R. "The Vijayanagara Empire: Re-integration of the Agrarian Order of Medieval South India." In *Early State Dynamics*, edited by H. J. M. Claessen and P. van der Velde, 170–86. Leiden: E. J. Brill, 1987.

Patterson, W. A., K. J. Edwards, and D. J. Maguire. 1987. "Microscopic Charcoal as a Fossil Indicator of Fire." *Quaternary Science Reviews* 6:3–23.

Sinopoli, C. M. *The Political Economy of Craft Production: Crafting Empire in South India, c. 1350–1650*. Cambridge: Cambridge University Press, 2003.

Sinopoli, C. M. and K. D. Morrison. "The Greater Metropolitan Region." In *New Light on Hampi: Recent Research at Vijayanagara*, edited by J. M. Fritz and G. Michell, 100–111, Mumbai: Marg Publications, 2001.

Washbrook, David. "The Commercialization of Agriculture in Colonial India: Production, Subsistence and Reproduction in the 'Dry South' c. 1870–1930." *Modern Asian Studies* 28, 1 (1994): 129–64.

Part 2

Forests and Development

5

Almost an Embarrassment of Riches

Changing Attitudes to the Forests in the Spanish Philippines

Greg Bankoff[1]

Spaniards came to the Philippines as elsewhere in the New World (and Old) in search of "god, gold and glory." God they found aplenty in the number of indigenous souls ready for conversion to the "true faith." The glory was less certain; there were few opportunities for gallant feats of arms and no mighty empires to topple. As for gold, that was an entirely different matter: There did not seem to be any worth mentioning.[2] Instead, there was a lot of wood: forests full of timber that nobody really seemed to value or wanted to have. Spanish forester Sebastían Vidal y Soler, summing up public sentiment in 1874, comments that "there is no lack of those [here] who see the tree as the enemy of man" (1874, 37). In fact, there is an accepted notion that the exploitation of Philippine tropical forests commenced with the establishment of American colonialism in 1898. Prior to that date, the forests were seen as so much timber, the properties of which made them suited for a particular purpose, such as ship building or church construction; after that date, as so much lumber that could be gainfully cut for profit and export. Thus George Ahern, reflecting back on his career as chief of the Insular Bureau of Forestry, wrote of the "vast stretches of unmapped and sparsely inhabited forests" that he had encountered in 1900 and lamented that "no effort has been employed to make use of [them]" (1917: III, 492). Dean Worcester even went so far as to compare Philippine forests to so much "money in the bank" (1914, 847).

What is implicit in all these statements is that a change in attitude paralleled a change in colonial regime: that American sovereignty over the islands signifies a clear break with the past—the triumph of capitalism over mercantilism so to speak. In the event, it was far less dramatic than this. The fundamental change in attitude toward the archipelago's extensive forests, that trees also represented wealth, albeit of a different magnitude to the

long sought-after mineral kind, and that timber was a valuable resource waiting for commercial exploitation, took place during the second half of the nineteenth century when the Philippines was still under Spanish colonial rule. Moreover, it was a change that was increasingly reflected in altered practice at both the government and community levels. Instead, what really came to separate the two colonial administrations was more a matter of organization and technology than fundamental disagreement over what should be done. The processes that transformed "worthless" trees into saleable timber were already at work and the forest already turned into an arena for competing interests prior to 1898. While studies on colonial forestry in the region are reasonably extensive, less attention has been paid to the Philippines.[3] The comparative lack of research on the period prior to independence in 1946 has helped propagate the myth that Spanish forest policy was not commercially orientated and that widespread deforestation began only under American auspices.

WOOD FROM THE FORESTS 1565–1863

At the time of European contact in 1521, forests covered most of the Philippines and early visitors were struck both by its extent and variety. Miguel Lopez de Legazpi and others wrote to Philip II soon after the establishment of the Spanish colony praising the "abundance of timber" to be found in them, their fecundity, and the excess of "incorruptible woods."[4] While reports generally continue to be struck by this profusion throughout the seventeenth and eighteenth centuries, there are already early indications of localized deforestation, of mountains "almost everywhere destitute of forests" and of peaks "cleared and despoiled of trees." More especially, there are complaints about the scarcity of timber around Manila that suggest resources in the immediate environs of the capital were already under some stress. Even the remarks that continue to extol the great stands of molave (*Vitex parviflora*) or the extensive mountain forests tend to increasingly recede from the main centers of Spanish power.[5] Much of this forest was simply felled for agricultural and settlement purposes as the population of the archipelago rose from under a million in the mid-sixteenth century to about 7 million by the end of the nineteenth. Similar clearances were taking place all over the tropical world, where some 222 million hectares of forest were brought under cultivation or transformed into grasslands between 1700 and 1920 (Williams 2003, 334–35). In the Philippines, the sheer weight of human numbers and the extent of their activity gradually contributed to the clearance of forest from many coastal and fluvial locations, especially in the northern and central parts of the archipelago.[6]

Although much land was cleared for cultivation, a great deal of timber was also required for construction purposes. Indigenous houses were primarily built from bamboo, roofed with nipa palm (*Nypa fruticans*) and raised on hardwood poles known as *haligues*. Molave was the preferred wood as it was resistant to attack by *anay* (white ants) and was perceived as a valuable

enough commodity to be left as heirlooms to one's descendants (Medina 1630, 241). The Spanish also built their towns and churches primarily of wood; even quite notable buildings such as the cathedral in Cebu were timber constructions (Gentil 1781, 207). These structures were expensive to maintain as many of the softer or lighter-colored woods simply rotted within five to six years and needed replacement.[7] Wood, however, continued to be the favored building material on account of its elasticity during earthquakes such as the devastating one that largely leveled Manila on 30 November 1645 (Diaz 1718, 167–68).

Unfortunately, these structures were also highly flammable and fire was a constant danger. Manila itself was menaced at least three or four times by major conflagrations, one of which in 1583 virtually destroyed the capital and another in 1603 of "such magnitude that before nightfall half the city had burnt."[8] Again, in 1628, a terrible fire burnt down practically the whole of the Parian, the Chinese quarter of the capital "since it was at that time built of reeds and nipa, or of dry boards, which burn like a torch" (Aduarte 1640, 83). Fire posed such a persistent hazard that Spaniards began to replace wood with stone whenever practical, knowingly increasing the risk they faced in earthquakes until the mid-nineteenth century, when events caused something of a reversal in preferred building materials.[9] The threat of fire, however, remained ever-present in urban areas like Manila whose *ayuntamiento* (town council) banned the construction of houses made of *materiales ligeros* (bamboo and nipa) in the same neighborhood as those of *materiales fuertes* (stone and tile) and so effectively created a walled European city (*Intramuros*) and an outer Asian one (*Extramuros*). Even into the nineteenth century, fire continued to be a major hazard, especially during the dry months preceding the monsoons, with devastating conflagrations occurring in 1847 (Santa Cruz), 1854 (Tondo), 1863 (San Nicolás), 1865 (Ermita), 1866 (Meysig), and 1869 (San Miguel) (González Fernández 1875, 173–78; Huetz de Lemps 1998:I, 170, n22).[10] The lack of urban planning, frequently lamented by the authorities, ensured that once lit the flames spread rapidly so that "not a day passes without, unfortunately, a report of fires" (*El Comercio* 30 April 1891).

Wood was needed not only for construction but also for ships; lots of them were needed to defend Spain's new possessions in the East. Ever mindful of the need for suitable timber, early accounts of the islands were quick to appreciate their potential for naval purposes.[11] In a letter to Philip II, Juan Pacheco Maldonado estimated there was enough timber to construct three or four galleons each year (Maldonado 1575, 303).[12] Not only was there an "abundance of wood for all kinds of vessels," but Filipinos proved to be "very skilful in making ships" (Santiago de Vera 1586, 206). Shipyards were first established at Cavite and Oton but by the early sixteenth century vessels were also constructed at Masbate, Marinduque, Camarines, and Albay. These were not just small crafts and galleys but larger ships as well: the *Santa Rosa*, begun in 1674, was one of the finest ships of its age, while the *San José*, launched in 1694, was reputedly the tallest ship afloat anywhere

in the world (Corpuz 1989:I, 92–93). By as early as 1616, six of the seven galleons stationed at Manila for its defense were built in the islands (Pineda 1619, 180). All these vessels, moreover, required continual repair due to wartime losses, the need to replace timbers in tropical waters, and the frequency of shipwreck.[13]

The quality of Philippine timber was especially suitable for ship construction. If properly seasoned, timbers could withstand the sea and the elements for more than 50 years. Ramón Jordana y Morera mentions two brigantine-schooners, the *Soledad* and the *Feliz Esperanza*, constructed in Pangasinan between 1825 and 1826 and still in active service in 1877 (Jordana y Morera 1891, 226). But such was the demand for vessels and the haste with which they were frequently built that unseasoned wood was often used, necessitating that "one must tear up the decks every two years and put down new ones" (Tenza 1618, 131; Pineda 1619, 173). The amount of timber consumed in naval construction was prodigious. Michael Williams estimates that a seventeenth- or eighteenth-century European warship of 1,000 tons required about 2,000 mature oak trees or the equivalent timber from 16 to 20 hectares of woodland (Williams 2003, 193).[14] In the Philippines, the scale of the endeavor can be partly estimated by the amount of labor required. Municipalities had to provide people to work in the shipyards or fell timber—the dreaded *corte de madera* (Sant Pablo 1620, 71–76; Cushner 1971, 117–26). The manpower required was immense: the masts of one galleon reputedly involved the efforts of 6,000 Filipinos for three months simply to transport them (Rios Coronel 1621, 203)![15] So onerous were the labor exactions, especially in the provinces closest to Manila, that they caused insurrections on more than one occasion with major revolts in 1614 and 1649 (Vila 1701, 126; Corpuz 1989: I, 124–28).

The extent of deforestation prior to 1946 is difficult to assess and the subject of considerable debate (Bankoff 2007). More elaborate figures do exist for the second half of the nineteenth century, from which it is possible to reconstruct some indication of the state of forest cover across the archipelago. An attempt at systematically describing the provinces is first provided by Jordana y Morera's *Memoria sobre la Producción de los Montes Públicos de Filipinas* for 1871–72 (figure 5.1). The areas around Manila including Bataan, Cavite, Morong, and the Isla de Corregidor were largely deforested. Abra and Laguna, too, had lost much of their cover while Cebu and Bohol were already mainly denuded. The main timber-producing areas were Bulacan, Masbate/Ticao, Mindoro, Nueva Ecija, Pampanga, Romblon, Zambales, and especially Tayabas. Agriculture was encroaching upon the woodlands of Batangas, Isabela, Panay, and the Ilocos region. Usage was still primarily for local purposes in Camarines, La Union, Pangasinan, Lepanto, Tiagan, and Balabac. Primary forest was to be found only in central Luzon (Cagayan, Infanta, and Nueva Vizcaya), parts of the Visayas (Siquijor, Negros, Samar, and Leyte) and some of the smaller districts and island chains. The potential of Mindanao remained largely unexplored (Jordana y Morera 1873–74).

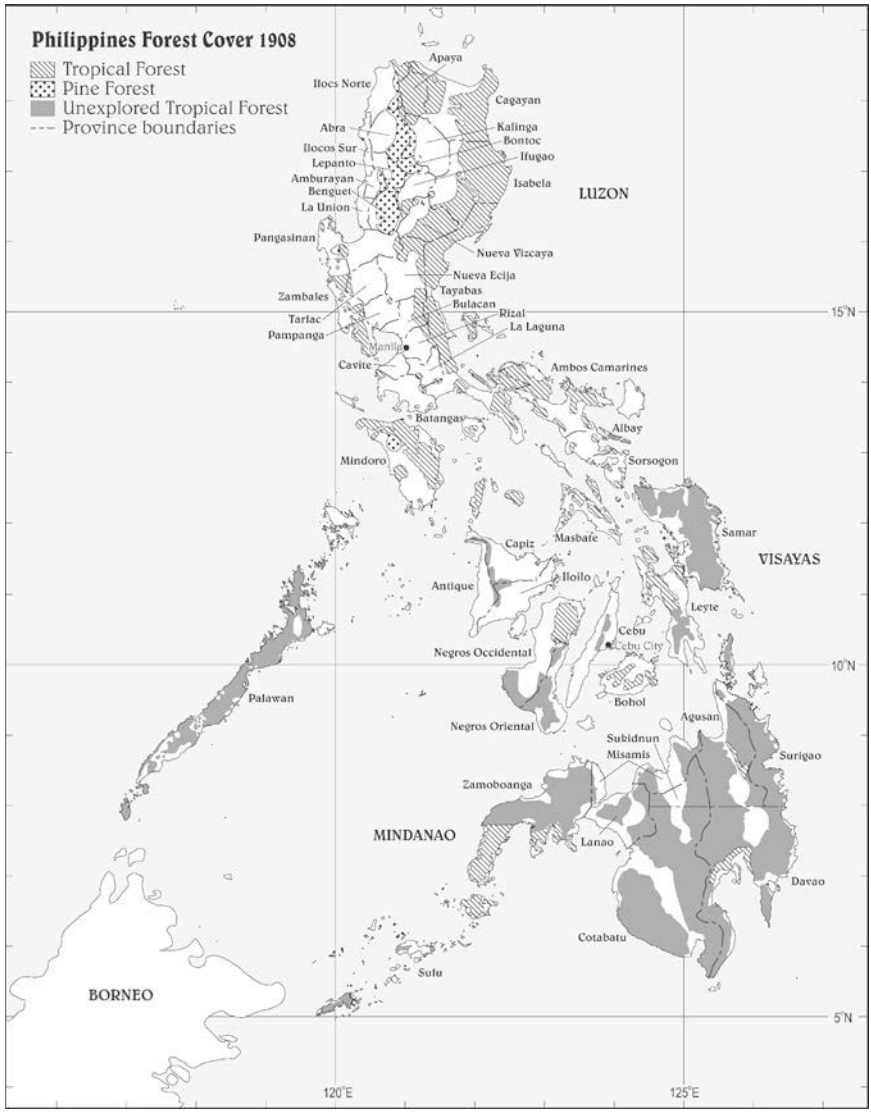

Figure 5.1 Philippines Forest Cover 1908.

In fact, considerable areas of Luzon were already deforested prior to the twentieth century, an impression corroborated by the more descriptive account provided by Vidal y Soler's *Memoria sobre el Ramo de Montes* that records how in the destruction of the forest the "axe and fire have no moment of repose." He elaborates on the scale of logging activities in the provinces of Tayabas and Nueva Ecija, the lost forest cover of Batangas, Cavite, the greater part of Bataan, and nearly all the mountain sides on the

Pacific west coast. He observes how deforested slopes caused rivers to run dry or turn into raging torrents and floods like the one that devastated Pampanga in 1871. He remarks on how navigability along rivers such as the Pasig and the Rio Grande de Cagayan had deteriorated, how schooners could no longer reach Pagalungan on the Rio Grande del Sur on Mindanao, and how gunboats frequently ran aground near the river-mouth in Cotabato. On a visit south, he noted how progress upstream further than two kilometers was no longer possible on the Parang-Parang river near Pollok as "the water level scarcely reached half way up one's leg." As elsewhere in the nineteenth century, people in the Philippines had begun to associate loss of forest cover with decreased precipitation, citing Cebu as a case in point.[16] In Manila, longtime residents complained of climate change, that hot spells were more extreme and the rains less. Others lamented the loss of defense against strong winds, how the forest acted as a barrier against the typhoons that regularly strike the archipelago between July and November.[17] All this real and anecdotal evidence pointed to the conclusion that the "myth" of an archipelago covered in an inexhaustible mantle of tropical forest "could not be further from the truth" (Vidal y Soler 1874, 11, 28, 36, 38–41).

It is only in the second half of the nineteenth century that the first quantitative figures on the rate of deforestation are available (table 5.1). A detailed provincial breakdown of forest cover compiled by the Spanish forestry department was published in 1875 on the occasion of the Philadelphia Universal Exposition. It estimated that 19,405,915 hectares or 70 percent of the islands were still forested after more than 300 years of Spanish rule (Vidal y Soler 1875, 40). These figures, however, are based on the total land area of the present nation state and not on the territories under effective colonial administration. Until the early twentieth century, much of Mindanao, the second-largest island in the archipelago and still largely forested, lay beyond the control of authorities in Manila. Subtracting the latter's 9,463,000 hectares from the approximate 30 million hectares total and recalculating the extent of forest cover yields a much lower figure. According to this calculation, about half the forest cover had already disappeared prior to the American era (Bankoff 2007, 330). Indeed, it was the scale of this destruction that partly prompted Spain to create a colonial forestry department (Garcia 1903, 1).

Table 5.1 Forest Cover and Population, 1565–1950[18]

Year	Forest Cover (ha.)	Percent Cover	Population
1565	27,500,000[a]	92	800,000[b]
1875	19,405,915[c]	70	6,173,632[d]
1903	20,740,720[e]	70	7,635,426[f]
1918	18,819,281[f]	64	10,314,310[f]
1932	16,950,873[f]	57	13,636,350[f]
1950	14,814,800[g]	50	20,275,000[h]

Lumber from the Trees 1863–98

Spanish forest law was based on the *Recopilación de las Leyes de Indias*, specifically Law 14, Chapter 17, Book 4, promulgated in 1594. It had two provisions: the first protected indigenous peoples' right to cut timber in the forest for their own use and the second forbade all activities that might impede the growth of forests. By the late nineteenth century, the widely held belief that timber was an inexhaustible resource was being challenged by some in the Philippines who held the government responsible for the wanton destruction of the forest and for not enforcing the law that protected it from both those who abused their customary rights of access to cut timber commercially and from a pernicious new class of speculators who were able "to grow rich at the expense of the state" (Jordana y Morera 1891, 228). From modest beginnings in 1863, the forestry department, the *Inspección general de Montes* grew to be an agency of considerable size, by 1891 comprising 9 engineers, 56 assistants, 6 senior guards, and 50 minor ones plus any number of clerks, porters, and orderlies. Its effectiveness, however, was always hampered by a shortage of manpower (Garcia 1903, 9).[19]

The task that confronted the new service was daunting. On the one hand, it was charged to protect indigenous peoples' rights and, on the other, to stop flagrant breaches of the law and better manage forests for the benefit of state, agriculture, and industry. Under the *Leyes de Indias*, all Indios (indigenous people) had the right to cut timber and collect forest produce for their own needs without license or permission. At the same time, each *pueblo* (municipality) was considered to possess a certain amount of community land for the use of its inhabitants. The precise nature of these privileges and the exact dimensions of these areas were not defined in law and had come to be considered customary rights over the centuries. Though conflicts of interest must have arisen from time to time, secular and ecclesiastical authorities had always been careful to respect these privileges. Moreover, there seemed to be no shortage of timber to meet needs. Troubles arose parallel to the growth of an internal timber market as a steadily rising population, centuries of unrestrained forest exploitation, and a new spirit of commercialism heightened demand for timber by the mid-nineteenth century and possibly earlier. Legal ambiguity and the desire for profit provided opportunities for some and problems for others, and often brought colonial official, timber merchant, and local inhabitants into collision.

During the nineteenth century, state attempts to foster economic development and raise revenue through the promotion of agriculture led Spanish authorities to sell off what they regarded as underutilized land, *terrenos baldíos*, literally barren or wastelands but actually mainly "state" forests.[20] A series of legislative measures were passed to facilitate their alienation and the forestry department was charged with surveying each province to reveal the extent of the "anarchy and arbitrariness that reigned in the forest" and subsequently to classify which lands were best suited for cultivation and which should remain timbered for reasons of climate,

health, or hydrology (Vidal y Soler 1874, 67–68, Jordana y Morera 1891, 228, 242, 246).[21] In more populated areas, this effectively meant demarcating land regarded as communal from that which could be sold. Inevitably, municipalities whose lands were designated alienable protested vigorously, "giving rise to interminable questions that are impossible to resolve" (Jordana y Morera 1891, 263). So protracted did the process of legal adjudication become that the sale of state land effectively came to a halt in the late 1880s, resulting in a "paralysis of administrative functions and the impossibility of realizing the most promising course of agricultural development" (Jordana y Morera 1891, 234, 264). However, the revenue generated by lands sales between 1867 and 1897 still amounted to a substantial amount (figure 5.2).

What made this competition between indigenous farmers and colonial state all the more acute, and the ambiguities in the law all the more necessary to resolve, was a new commercialism that began to pervade attitudes and outlooks by the second half of the nineteenth century. On the one hand, the Indio discovered he could sell the timber he cut over what he needed for money. On the other hand, a new forest entrepreneur appeared as a response to market forces, the *contratista* or timber contractor, himself part of a larger commercial class then emerging in the archipelago. As private demand exceeded state exactions for wood, it fuelled a timber market, a boom in licensed logging, and a problem with illegal cutting. Profit constituted a powerful new force in forest destruction and the *contratista*, a third force in the forest equation—one whose interests were frequently opposed to both those of the state and local communities.

Certainly, too, a timber market had emerged by mid-century. Wood for sale was primarily transported by water to the capital as provincial markets remained relatively small and insignificant.[23] Joseph Burzynski's study of local shipping records for the period shows how what began as a fragmented, poorly ordered, and inefficient trade in 1864 developed into a more

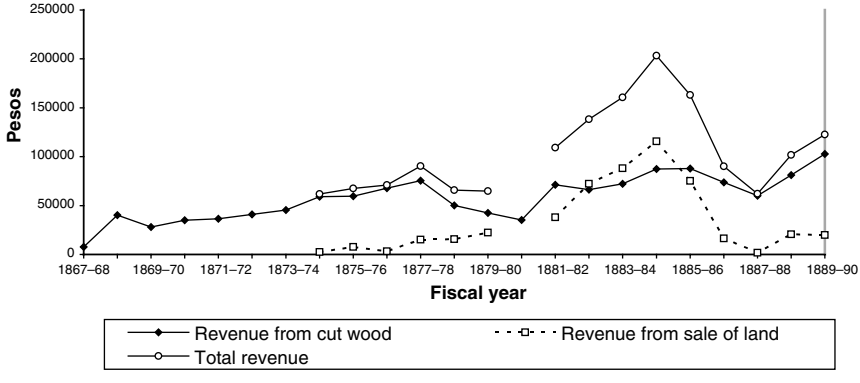

Figure 5.2 Revenue Generated by the Inspección General de Montes, 1867–97.[22]

coherent, better structured, and increasingly specialized one by the late nineteenth century; a trade, moreover, increasingly synchronized and responsive to the forces of supply and demand (Burzynski 2002, 171–80). The stimulus for this market was the growth of Manila and, to a lesser extent, other urban centers. The capital's population rose from 93,000 in 1814 to over 190,000 inhabitants by 1896.[24] As the population of the capital doubled, it became an ethnic melting pot where Spaniards, Chinese, and other foreigners mixed with migrants from around the archipelago (Leroy 1968, 53). The rapid urbanization of the capital generated a strong demand for timber that only soared in the aftermath of the great earthquakes that shook Manila in 1863 and again in 1880 (figure 5.2). Owners with substantial houses to repair turned to the market for the timber they required. Prices rose and local merchants saw an opportunity to make substantial profits. Such was the devastation in 1863, moreover, that it prompted a change in house design and the replacement of stone by greater quantities of wood to give buildings extra flexibility to withstand seismic movements (Zialcita and Tinio 1980, 66–67). A calamity fund was even suggested after the 1880 earthquake, a proposal to stockpile timber on the island of Masbate to prevent future profiteering. So great was the destruction on these occasions that it proved a significant impetus to the timber market and encouraged the reckless felling of trees, many of which were subsequently left to rot on mountain sides or beaches (Jordana y Morera 1891, 252–53).

The newly established forestry department imposed a system of logging permits shortly after its establishment in December 1867 but a more comprehensive set of regulations took longer to draw up and was not introduced till 13 November 1884. The law classified timber into one of five revenue groups, imposed a tax of 10 percent on a log's assessed value, initiated imposts on the use of wood for certain purposes and on minor forest produce, and set a limit of 1,000 cubic feet on the amount cut for personal use. More importantly, it mandated that future directives must conform to these provisions. The problem, however, was one of poor enforcement compounded by a chronic shortage of personnel. Customary rights proved difficult to reconcile with legal proscriptions and logging continued apace with or without licenses. There were ample opportunities, too, for those in authority to either circumvent the rules or simply ignore them. In particular, it was often hard to convince those long-accustomed to seeing the forest as their own of the need to conform to regulations that were deeply resented and viewed as an infringement on their rights (Jordana y Morera 1891, 235, 238, 242). Thus the *gobernadorcillo* (mayor) of Catbalogan (Samar) was accused of constructing a boat from illegally cut timber in July 1874. In this case, his defense that the wood had been cut two years previously when "it wasn't necessary to get such permission" was upheld (Corte de Maderas 1874). Less fortunate was Antonio Lasan, whose plea of ignorance of the law was dismissed when he was found to have supplied 455 poles cut from illegal timber for the repair of the telegraph line in Cagayan in 1883 (Corte de Maderas 1883a). In a routine letter to the Civil Governor of Manila

Province, Manuel Arroyo commented on the quantity of cut timber found lying around Montalban and the urgent need to discover where it came from (Corte de Maderas 1896). Even people who obtained the necessary permits might still cut more timber than their licenses entitled them to. Elaborate precautions were instituted to limit underreporting but the practice was still widespread. The brigantine *Librada*, outward bound from Paluan (Mindoro), was found to be carrying 805 cubic feet more timber than listed on its manifest and its owner was fined accordingly. Likewise, the brigantine, *Julia*, sailing from Guinayangan in Tayabas, had underreported the dimensions of its cargo by over 1,000 cubic feet (Corte de Maderas 1885).

On the other hand, overzealous application of the law carried its own risks and brought the forestry service and its agents into disrepute. People accused rangers of retrospectively charging them for timber used in already completed houses, causing much public bitterness (Corte de Maderas 1884a). Sometimes, though, it was expedient to simply ignore certain activities. In 1882, the political-military governor of Zambales reportedly overlooked collecting the mandated forest duties on timber and firewood sold by upland peoples to lowland townsfolk. As the money raised was used to meet tax obligations, he was worried that precipitous action on his part might drive them back into the mountains beyond the reach of the colonial state altogether (Corte de Maderas 1882). Reports also suggest that trade in illegal logging increased considerably during the second half of the nineteenth century causing significant localized damage to the forest through loss of the most valuable trees, inhibiting regrowth and facilitating the spread of unproductive cogan grasslands. Perhaps more significantly, the same officials now spoke of the forest with a heightened appreciation of its potential, condemning such activities as "destroying a wealth that if well administered could be considered as a permanent source of production and prosperity" (Corte de Maderas 1876).

It was the wealth that could be made from the timber trade that attracted a new group of entrepreneurs. As Adolph von Bosch, a Belgian merchant of 10 years standing in the Philippines declared in his evidence before the Philippine Commission in 1899, "I think it is the best business" (1901: II, 114). Though there was also a significant minority of Chinese and Chinese mestizos, most of the early *contratistas* were Spaniards (Burzynski 2002, 177–78). Many were men like Manuel Soler, who lacked money to return to Spain and who started a small business collecting firewood in state forests already logged over for naval purposes (Corte de Maderas 1870).[25] Over time, however, as the timber business became more lucrative and more specialized, Chinese merchants increasingly assumed a greater share of the trade, prompted no doubt by what had become "an extensive export to China" (Garcia 1903, 1; Wickberg 1965, 104). Already by 1874, Domingo Vidal y Soler observed that now most of the timber yards in Tanduay, Santa Cruz, and Echague were owned by Chinese, while his brother, Sebastian, remarked on their prominent role in forest products (Vidal y Soler 1874, 87; Zialcita and Tinio 1980, 37). There were at least nine important Chinese

timber merchants, mainly located on the Calle Lacoste, by the 1890s, and they even formed their own business association, the *Ch'ung Ning She* to better increase their bargaining power with logging contractors. Chinese were also involved in other aspects of the trade, providing cordwood and charcoal for sale to *sari-sari* and other small stores (Wickberg 1965, 104). Equally, they came to monopolize sawing, preferring to cut the wood by hand to minimize the prodigious losses in sawmills.[26] It was Thomas Collins's opinion, an American with 25 years' logging experience in the islands, that "the Chinese pretty much run the wood yards" (Collins 1901:II, 80, 83). Nor were they well liked as a consequence: they were held to be "inclined towards all types of fraud"; driven only by motives of profit that "makes living almost impossible for a rational human being"; and as living in overcrowded dwellings that "convert various streets of Manila into veritable sewers" (Vidal y Soler 1874, 85, 87).[27] Their activities always attracted the suspicion of the authorities. On return to his posting in the south of Palawan in February 1892, José de Ibarra wrote to his superiors complaining about the Chinese he saw "hanging about virtually every stairway" aboard the mailboats plowing the southern routes, implying that they must be smuggling forest produce. He noted how the *cedulas* or identification papers of many of the Chinese within his jurisdiction on Balabac marked them as domiciled in Manila or some other distant place, but who were resident on the island for months or even years without any visible means of support (Corte de Maderas 1892).

Although the timber merchants were the most visible sign of this new commercialism, the actual logging in the provinces was done by local contractors, men who were equally imbued with the new spirit of entrepreneurship. They worked mainly on a piece-work system using labor gangs that the Chinese called *paqueao* (Wickberg 1965, 104). Trees were felled using axes and cross-saws, squared and then hauled to the beach by *carabao*, an average log requiring 8–10 animals. Often rough "roadways" were first hewn out of the forest to facilitate transport. Contracts always specified delivery to the water's edge (Bosch 1901: II, 112; Collins 1901: II, 82). Some of these provincial contractors were also Chinese; men such as Lorenzo Cheng-Guatco, resident of Moron, who obtained 21 licenses to cut 886 beams in 1887 or Manuel So-Tuico, resident of Binondo, who solicited 14 licenses to cut 547 beams in 1889 (Corte de Maderas 1887a, 1889b). Others, however, were from a wider variety of ethnic backgrounds; people who were quick to see the opportunities presented by an expanding timber market—contractors like Julian Andreas of Navotas, who was granted 9 licenses to cut 195 beams (11,164 cubic feet) from the public forests of Bagac and Orion in 1888 (Corte de Maderas 1888b). These were "professionals" loggers in the sense that they engaged in this pursuit year after year: men such as Doroteo Inocencio, a contractor who logged over 300 beams a year (13,000–17,000 cubic feet) in the late 1880s. Most of the trees he felled were lesser quality hardwoods but others were more value like amugis (*Koordersiodendron pinnaturo*) and guijo (*Shorea guiso*) (table 5.2).

Table 5.2 Type and Amount of Timber Cut by Doroteo Inocencio, 1888–89[28]

Species	1888	Cubic Feet	Average Beam	1889	Cubic Feet	Average Beam
Amugis	10	377	37.7	13	610	46.9
Guijo	15	602	40.1	32	2,187	68.3
Lauan	12	612	51.0	32	3,120	97.5
Maniknik	181	8,119	44.9	228	9,722	42.6
Tangile	83	4,064	49.0	33	1,402	42.5
Total	301	13,774		338	17,041	

The timber market, moreover, was not without its distortions. Vidal y Soler complained as early as the 1870s that the small number of merchants in Manila constituted a monopoly that unduly influenced prices (Vidal y Soler 1874, 57). Likewise, Collins decried the cartels that set the cost timber sold for export to China—the only overseas market of any note for Philippine woods prior to the twentieth century (Collins 1901:II, 84). The state, too, remained a formidable player, especially with respect to shipbuilding. In fact, it was the growing difficulties encountered in securing hardwoods for naval construction and the need to secure them from overseas at higher prices that occasioned the first real official anxiety at declining forest resources (Jordana y Morera 1891, 235). The authorities also required large stocks of timber for public works and to repair infrastructure damaged by the frequent floods and typhoons (Corte de Madera 1887b). Some of this "public" wood also found its way onto the market with consequent effects on supply and demand, causing prices to constantly fluctuate, varying as much as 30 cents a board foot in a single year (Jordana y Morera 1891, 231; Bosch 1901:II, 114).

COMPETING FOR THE FOREST

All these different interests that together represent the new commercialism at work were often difficult to reconcile and the forest became an arena in which many of the conflicts associated with modernity were played out: traditional rights versus market-driven imperatives, local needs versus external demands, development versus conservation. Not, of course, that these issues were portrayed in such a clear-cut manner. The *contratista*, for example, fretted over the new regime of taxes and licenses and objected to state attempts at regulating his activities, claiming that it raised prices (Vidal y Soler 1874, 33). Thus Luis Ora, one of the new entrepreneurial elite, blamed the decree of 1866 that levied government imposts on timber for adversely affecting its availability on the market and so preventing him from fulfilling a contract to supply cigar boxes (Corte de Maderas 1868). But opposition also came from communities who viewed the activities of timber contractors as an infringement on their customary forest rights. The case of the *principales* (town elders) of Cardona (Morong) is

interesting in this respect. In 1870, they complained that a timber license granted to Manuel Soler (already mentioned) was prejudicial to their pueblos' interests. In particular, they accused him of exceeding his licensed quota, of employing an "excessive number" of Chinese loggers, of collecting timber from communal lands, and of felling trees earmarked for the completion of their church. Investigation, however, revealed a somewhat different story: that Soler had taken no more than the specified three shiploads of firewood and had not engaged any more workers than permitted. What is more, officials found that the community had undertaken no new work on the local church since 1857! The report concluded that there was no danger of depleting the nearby forest, not even if "Señor Soler lives to the same great age as of some of these elders or had as many workers as those that the residents of Cardona falsely claim he has". Apparently, too, it was not the first occasion on which the community had had recourse to such "calumnies and falsehoods" in an attempt to impede contractors from cutting "their" wood. A recommendation was duly made to punish all those who had signed the complaint "so that in future they will refrain from annoying without cause the attention of the authorities" (Corte de Maderas 1870).

Many of the problems faced by the *Inspección general de Montes*, however, lay more with the indifference or outright hostility of local officials to the new forest laws. As Jordana y Morera comments, "these measures and others like them . . . remained in reality completely useless due to the hostility or little zeal that provincial and municipal authorities exhibited in their implementation" (1891, 244–45). Far from facilitating the work of rangers, local officials withheld their support or even openly hindered its realization. The state found its policies frustrated by its own employees, who were both attracted by the opportunities for self-enrichment the new timber market offered or who sided more with the interests of their respective communities. A Ministry of Ultramar circular dated 30 May 1883 urged magistrates to expedite the cases of the many public officials charged with dereliction of their duties and to impose severe disciplinary measures on those found guilty of this "deplorable corruption" (Corte de Madera 1883b). Alternatively, others were admonished for not enforcing the laws stringently enough ("that you have been interpreting the law crookedly and perhaps not fairly, granting excessive consideration"), of ignoring instructions, and of being excessively lenient toward Indios (Corte de Maderas 1884b). Jordana y Morera concluded that most provincial and district heads simply did not comply with the forestry regulations and issued licenses arbitrarily, giving free reign to commercial interests (1891, 278). All this amounted to a great deal of lost revenue that the colonial state was anxious to raise and that the forestry department could ill-afford to lose. The annual value of untaxed timber collected ostensibly for people's own usage was assessed at 300,000 pesos, half of which was estimated to have been cut fraudulently. That is to say, the amount of illegally cut timber was nearly 50 percent greater than the total revenue of 102,712 *pesos* generated by the forestry department for wood in 1889–90 (Jordana y Morera 1891, 275, 278).

CONCLUSION

Attitudes toward the forest changed during the second half of the nineteenth century. No longer was wood viewed simply as a resource out of which the principal needs of material civilization were fashioned: the utensils, furnishings, housing, churches, and ships. It still met most of these requirements, though iron and steel were beginning to replace timber in certain usages. The notion, however, that the forest had worth and that wood was a commodity with a monetary value gave rise to a market in timber, one that may still have been largely domestic at this stage but nonetheless was driven by the notion of profit. This new commercialism was to be seen in the timber yards of the Manila merchants, in the professionalism of local contractors, in the abuse of customary rights, and above all in state attempts to raise revenue from forests. If this commoditization was not complete by the end of the Spanish colonial period, and clearly it was not, the process that transformed the archipelago's extensive forests from useful but "valueless" wood into marketable lumber sold for a profit was well under way. Nor after 1898 did the nature of this market change substantially. Although the volume of timber cut increased markedly, especially between 1918 and World War II, exports still represented less than a quarter of the total amount. In other words, three-quarters of the timber cut during the American colonial period went to supply the domestic market just as it had done during the second half of the nineteenth century (Bankoff 2007, 328). Moreover, the Spanish *Inspección general de Montes* was as much a modern agency informed by the principles of scientific forestry as was its successor, the Insular Bureau of Forestry. It is interesting to note that the interim American military government (1898–1901) assessed the laws and regulations in force in 1898 to be "excellent, practicable and in line with the most advanced legislations of Europe where forestry had reached a high state of development" (Nano 1951, 23). The problem faced by Spanish foresters was mainly one of enforcement not intention, and the new U.S. regime did not represent so much a break with the past as an intensification of operations. The Americans did not "discover" in the Philippines an archipelago devoid of natural wealth but one already seen as full of potential resources; so much timber that it was almost an embarrassment of riches.

NOTES

1. Research for this chapter was partly funded by the Netherlands Institute for Advanced Study as a fellowship-in-residence 2003/2004. An earlier version of this chapter appeared as a paper (Bankoff 2005).
2. In fact, there was gold but in the mountains, a bonanza largely left for the Americans to exploit in the early twentieth century (Habana 2001).
3. On the Netherlands East Indies, see Boomgaard (1992), Peluso (1992); on Burma, see Keaton (1974), Bryant (1997); on Malaysia, see Kathirithamby-Wells (2005); on India, see Guha (1989). More generally, see Tucker (2000), Potter (2003), Rajan (2006), Vandergeest and Peluso (2006). On forestry in the

Philippines during the American period, see Roth (1983), Tucker (1988), Tucker (1992). On the Spanish period, see Orillos (1999).

4. Legazpi (1568, 242; 1569, 59), Mirandaola (1574, 225), San Nicolas et al. (1664, 197, 227).
5. Quirante (1624, 267–68), Perez (1680, 292–93), Velasco (1760, 9).
6. For a study of agricultural expansion, see McLennan (1980), Lataillade et al. (2002).
7. Salazar y Salcedo (1599, 98), Medina (1630, 283), Aduarte (1640, 142).
8. Vera (1587, 298), Salazar (1588, 66), Felipe II (1590, 205), Acuña et al. (1604, 129).
9. Acuña et al. (1604, 130), Medina (1630, 278), Fayol (1647, 217).
10. On arson, see Bankoff (1996, 73–75).
11. Legazpi (1569, 5), Mirandaola (1574, 225), Sande (1576, 59).
12. Francisco de Viana (1765, 296) maintained that there was enough for "at least ten" ships a year.
13. Pineda (1619, 171, 173), Medina (1630, 85), Corcuera (1636, 286), Diaz (1718, 211).
14. This figure may be overly conservative as Carla Phillips cites a figure of 25,900 *codos* (one *codo* equals 56 centimeters) of wood, equivalent to several thousand trees for a smaller vessel (Phillips 1992, 80).
15. The labor seems excessive and possibly refers to the total number of people rotated over the three-month period.
16. On the debate about the climatic benefits of forests, see Grove (1995), and Rajan (2006, 21–35).
17. On the effect of typhoons in the Philippines, see Bankoff (2003, 41–47).
18. Sources: a Ibon (2000, 2); b Junker (1999, 62); a higher figure of 1,250,000 is given in Corpuz (1989:I, 29); c Vidal y Soler (1875, 40); d Montero y Vidal (1886, 156–60) data for 1877; e Bureau of the Census (1905:I, 77); f Bureau of Forestry (1933: 676, 732–37); g Kummer (1992, 187); h Lahmeyer (2003).
19. A comparison of staff to forest showed that the equivalent service on Java in the Netherlands East Indies had three times more personnel (Jordana y Morera 1891, 286).
20. On *terrenos baldíos*, see Owen Lynch "Land Rights, Land Laws and Land Usurpation" (1988, 87–88).
21. Land transactions were made subject to a single jurisdiction (1803), its purchase facilitated (1813), claims to the possession of nontitled lands limited (1819), a large tract of forest in Nueva Ecija disposed of (1858) and the price of land set at 50 pesos a quiñon (1862) (Vidal y Soler 1874, 67–68). One *quiñon* equals 10,000 square feet or 3,048 square meters. This figure represented an enormous increase over the amount of half a peso per *quiñon* established in 1769 (Jordana y Morera 1891, 233).
22. Source: Jordana y Morera (1891, 240, 254, 275), Nano (1951, 20).
23. Cebu, Iloilo, Albay, and Bulacan are mentioned as minor markets (Vidal y Soler 1874, 32).
24. Montero y Vidal (1886, 157), Foreman (1899, 355), Doeppers (1972,788), Fenner (1985, 130–31), Foronda (1986, 135).
25. Likewise Clifford Pinchot mentions meeting just such a man on Palaui island near the Cape Engano Lighthouse on the north coast of Cagayan in December 1902, whom he described as a man that "seemed to have no objection whatever to being caught in the most flagrant and useless lies" (Pinchot 1902, 136).

26. Pinchot reports 50 percent waste from traditional methods of making boards out of logs (Pinchot 1902, 110–11).
27. On rising anti-Chinese sentiments during the second half of the nineteenth century, see Bankoff (1996, 45–48).
28. Source: Corte de Maderas (1888a), Corte de Maderas (1889a).

BIBLIOGRAPHY

Acuña, Pedro de, Antonio de Ribera Maldonado, Tellez Almacan, Andres de Alcaraz, and Manuel de Madrid y Luna. "Letter to Felipe III, Manila, 30 June, 1604." In *The Philippine Islands, 1493–1803*, edited by Emma Blair and Alexander Robertson [hereafter B&R], vol. 12. Cleveland, OH: A. H. Clark Co., 1903–9, 127–41.

Aduarte, Diego. "Historia de la Provincia del Santo Rosario de la Orden de Predicadores, Manila, 1640." In B&R, vol. 30, 115–322.

Ahern, George. "The Lesson of Forestry in the Philippine Islands." In *Proceedings of the Second American Scientific Congress*. Washington: Government Printing Office, 1917.

Bankoff, Greg. *Crime, Society and the State in the Nineteenth Century Philippines*. Quezon City: Ateneo de Manila University Press, 1996.

———. *Cultures of Disaster: Society and Natural Hazard in the Philippines*. London: Routledge, 2003.

———. "'The Tree as the Enemy of Man': Changing Attitudes to the Forests of the Philippines 1565–1898." *Philippine Studies* 53, 1 (2005): 321–45.

———. "One Island Too Many: Reappraising the Extent of Deforestation in the Philippines Prior to 1946." *Journal of Historical Geography* 33, 2 (2007): 314–34.

Boomgaard, Peter. "Forest Management and Exploitation in Colonial Java." *Forest and Conservation History* 36, 4 (1992): 4–14.

Bosch, Adolph von. "Testimony of Adolph von Bosch to the Philippine Commission, Manila 16 May 1899." In *Report of the Philippine Commission*. Washington: Government Printing Office, 1901, 2 vols.

Bryant, Raymond. *The Political Ecology of Forestry in Burma*. London: C. Hurst, 1997.

Bureau of Forestry. *Annual Report of the Director of Forestry of the Philippine Islands, 1902–1936*. Manila: Bureau of Printing, 1903–37.

Bureau of the Census. *Census of the Philippine Islands, 1903*. Washington: Government Printing Office, 1905.

Burzynski, Joseph. "The Timber Trade and the Growth of Manila, 1864–1881." *Philippine Studies* 50, 2 (2002): 168–92.

Collins, Thomas. "Testimony of Thomas Collins to the Philippine Commission, 12 May 1899." In *Report of the Philippine Commission to the President*. Washington: Government Printing Office, 1901, 2 vols.

Corcuera, Sebastian Hurtado de. "Letter to Felipe IV, Cavite, 11 July, 1636." In B&R, vol. 26, 265–90.

Corpuz, Onofre. 2 vols. *The Roots of the Filipino Nation*. Quezon City: Aklahi Foundation, 1989.

Corte de Maderas. "Opinión de Felipe Joyantes, Binondo 18 June, 1868." Philippine National Archives [hereafter PNA], Corte de Maderas, Bundle 7, 1868.

———. "Acuerdo de l. Incidente Promovido por Don Manuel Soler en Solicitud de Permiso para Cortar y Estraer Leñas en los Montes del Estado que Radican en el Distrito de Morong." PNA, Corte de Maderas, Bundle 7, 1870.
———. "Expediente Instruido á Consecuencia de haber Denunciado el Guarda Mayor de Montes que el Gobernadorcillo Actual de esta Cabecera Don Nicolás Cárdenas, se hallaba Construyendo un Bote con un Árbol Nombrado Banaba, que según Cree ha Extraído Fraudulentamente de los Montes del Estado." PNA, Corte de Maderas, Bundle 5, 1874.
———. "Reglamento Redactado por la Inspección de Montes y Comandancia General del Resguardo para Encomendar al Cuerpo de Carabineros la Vigilancia del Fraude de Productos Forestales y Persecución del Mismo." PNA, Corte de Maderas, Bundle 3, 1876.
———. "Expediente sobre Propuesta de [illegible] en el Pago de Derechos de Corte de Maderas Solicitada por Moros de 1er. Distrito." PNA, Corte de Maderas, Bundle 6, 1882.
———. "Gabriel Olivas to Jefe de la Sección de Cagayan, Tuguegarao, 12 November, 1883." PNA, Corte de Maderas, Bundle 5, 1883a.
———. "Gabriel Olivas to Inspector General del Ramo, Tuguegarao, 10 August, 1883." PNA, Corte de Maderas, Bundle 5, 1883b.
———. "Gabriel Olivas to Ayudante del Ramo de Cagayan, Manila, 2 October, 1884." PNA, Corte de Maderas, Bundle 5, 1884a.
———. "Maderas, Gabriel Olivas, Tuguegarao, 14 February, 1884." PNA, Corte de Maderas, Bundle 5, 1884b.
———. "Barrantes to Provincial Governor, Manila, 25 May, 1885." PNA, Corte de Maderas, Bundle 6, 1885.
———. "Expediente sobre Aprovechamientos Ordinarios de Maderas, Bataan, Lorenzo Cheng-Guatco." PNA, Corte de Maderas, Bundle 3, 1887a.
———. "Expediente Promovido por el Gobernador Civil de Nª. Ecija en Solicitud de Autorización para el Aprovechamiento de Maderas que se Destinan a la Reconstrucción de los Puentes Derruidas por el Temporal, Nueva Ecija." PNA, Corte de Maderas, Bundle 6, 1887b.
———. "Expediente Aprovechamiento Ordinario de Maderas, Orion, Don Doroteo Inocencio." PNA, Corte de Maderas, Bundle 6, 1888a.
———. "Expediente sobre Aprovechamiento Ordinario de Maderas, Orion, Don Julián Andreas." PNA, Corte de Maderas, Bundle 8, 1888b.
———. "Expediente sobre Aprovechamiento Ordinario de Maderas, Orion, Don Doroteo Inocencio." PNA, Corte de Maderas, Bundle 7, 1889a.
———. "Expediente sobre Aprovechamientos Ordinarios de Maderas, Orion, Manuel So-Tuico." PNA, Corte de Maderas, Bundle 7, 1889b.
———. "José de Ibarra to Sr. Ador. Central de Rentas Propiedades e Impuestos de Estas Islas, Balabac, 19 February, 1892." PNA, Corte de Maderas, Bundle 6, 1892.
———. "Manuel Arroyo to Civil Governor of Province, Mariquina, 22 June, 1896." PNA, Corte de Maderas, Bundle 7, 1896.
Cushner, Nicholas. *Spain in the Philippines: From Conquest to Revolution*. Quezon City: Institute of Philippine Culture, Ateneo de Manila University, 1971.
Doeppers, Daniel. "The Development of Philippine Cities Before 1900." *Journal of Asian Studies* 31, 4 (1972): 769–92.
Diaz, Casimiro. "The Augustinians in the Philippines, 1641–1670 and 1670–1694, Manila, 1718." In B&R, vol. 37, 149–284, vol. 42, 117–312.

Fayol, Joseph. "Affairs in Filipinas, 1644–47, Manila, 1647." In B&R, vol. 35, 212–75.

Felipe II. "Decree Ordering a Grant to Domingo Salazar, Madrid 12 April, 1590." In B&R, vol. 7, 205–7.

Fenner, Bruce. *Cebu under the Spanish Flag, 1521–1896: An Economic-Social History.* Cebu: San Carlos Publications, 1985.

Foreman, John. *The Philippine Islands: A Political, Geographical, Ethnographical, Social and Commercial History of the Philippine Archipelago and Its Political Dependencies, Embracing the Whole Period of Spanish Rule.* New York: C. Scribner's Sons, 1899.

Foronda, Marcelino. *Insigne y Siempre Leal: Essays on Spanish Manila.* Manila: De La Salle University, History Department and the Research Center, 1986.

Garcia, Regino. "Brief Review of the Forestry Service during the Spanish Government from 1863 to 1898." Library of Congress, Pinchot Papers, Box 586, File: Forestry, Philippine Islands, Bureau of Forestry, General Organization, 1903.

Gentil, Guillame Le. "Voyage dans les Mers d'Indie, 1781." In B&R, vol. 28, 192–225.

González Fernández, Ramón. *Manual del Viajero en Filipinas.* Manila: Establecimiento Tipográfico de S. Tomás á cargo de P. Memije, 1875.

Grove, Richard. *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600–1860.* Cambridge: Cambridge University Press, 1995.

Guha, Ramachandra. *The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya.* Delhi: Oxford University Press, 1989.

Habana, Olivia. "Gold Mining in Benguet: 1900–1941." *Philippine Studies* 49, 1 (2001): 3–41.

Huetz de Lemps, Xavier. "Materiales Ligeros vs. Materiales Fuertes: The Conflict between Nipa Huts and Stone Buildings in 19th-century Manila." In *The Philippine Revolution and Beyond vol. 1*, edited by Elmer Ordoñez, 160–72. Manila: Philippine Centennial Commission, National Commission for Culture and the Arts, 1998.

Ibon. *The State of the Philippine Environment.* Manila: Ibon Foundation, 2000.

Jordana y Morera, Ramón. "Memoria sobre la Producción de los Montes Públicos de Filipinas en el Año Económico de 1871–72." *Boletin Oficial del Ministerio de Ultramar*, 27 November 1873: 6–9, 12 December 1873: 1–6, 27 December 1873: 1–10 and 12 January 1874, 1–10.

———. *Estudio Forestal acerca de la India Inglesa, Java y Flipinas.* Madrid: Imprenta de Moreno y Rojas, 1891.

Junker, Laura. *Raiding, Trading, and Feasting: The Political Economy of Philippine Chiefdoms.* Honolulu: University of Hawaii Press, 1999.

Kathirithamby-Wells, Jeyamalar. *Nature and Nation: Forests and Development in Peninsula Malaysia.* Honolulu: University of Hawaii Press, 2005.

Keaton, Charles. *King Thebaw and the Ecological Rape of Burma: The Political and Commercial Struggle between British India and French Indo-China in Burma 1878–1886.* Delhi: Manohar, 1974.

Kummer, David. "Measuring Forest Decline in the Philippines: An Exercise in Historiography." *Forest and Conservation History* 36, 4 (1992): 185–89.

Lahmeyer, Jan. *Population Statistics: The Philippines, Historical Demographical Data of the Whole Country.* http://www.populstat.info/Asia/philippc.htm last accessed 5 April 2007.

Lataillade, Camille, Alexandre Dumontier, and Nicolas Grondard. *L'Agriculture des Philippines La Plaine Centrale: Histoire et Perspectives*. Paris: Les Indies Savantes, 2002.

Legazpi, Miguel de. "Letter to Felipe II, Cebu, 26 June, 1568." In B&R, vol 2, 232–43.

———. "Relation of the Philippine Islands, Cebu, 7 July, 1569." In B&R, vol. 3, 54–61.

Leroy, James. *The Philippines circa 1900*. Manila: Filipiniana Book Guild, 1968 (originally published as *Philippine Life in Town and Country* 1905).

Lynch, Owen. "Land Rights, Land Laws and Land Usurpation: The Spanish Era (1565–1898)." *Philippine Law Journal* 63, 1 (1988): 82–111.

Maldonado, Juan. "Letter to Felipe II, Manila, 1575." In B&R, vol. 3, 295–303.

Medina, Juan de. "History of the Augustinian Order in the Filipinas Islands, 1630." In B&R, vol. 24, 29–182.

McLennan, Marshall. *The Central Luzon Plain: Land and Society on the Inland Frontier*. Quezon City: Alemar-Phoenix Publishing, 1980.

Mirandaola, Andrés de. "Letter to Felipe II, 8 January, 1574." In B&R, vol. 3, 223–29.

Montero y Vidal. José. *El Archipíelago Filipino y las Islas Marianas, Carolinas y Palaos; su Historia, Geografía y Estadística*. Madrid: *Imprenta y Fundación de Manuel Tello*, 1886.

Nano, Jose. "Brief History of Forestry in the Philippines." *The Philippine Journal of Forestry* 8, 1–4 (1951): 9–128.

Orillos. Ma. Florina. "*Inspección General de Montes: Isang Institusyonal na Kasaysayan*." Masters Dissertation, Department of Geography, University of the Philippines, 1999.

Peluso, Nancy. *Rich Forest, Poor People: Resource Control and Resistance in Java*. Berkeley: University of California Press, 1992.

Perez, Domingo. "Relation of the Zambals, 1680." In B&R, vol. 47, 289–332.

Phillips, Carla. *Six Galleons for the King of Spain Imperial Defense in the Early Seventeenth Century*. Baltimore: The Johns Hopkins University Press, 1992.

Pinchot, Clifford. "Philippine Islands." Library of Congress, Pinchot Papers, Box 640.

Pineda, Sebastian de. "Philippine Ships and Shipbuilding, Mexico, 1619." In B&R, vol. 18, 169–88.

Potter, Lesley. "Forests versus Agriculture: Colonial Forest Services, Environmental Ideas and the Regulations of Land-Use Change in Southeast Asia." In *The Political Ecology of Tropical Forests in Southeast Asia; Historical Perspectives*, edited by Lye Tuck-Po, Wil de Jong, and Abe Ken-ichi, 29–71. Kyoto and Melbourne: Kyoto University Press and Trans Pacific Press, 2003.

Quirante, Alonso. "Expedition to the Mines of the Igorotes, Alingayen, 5 June, 1624." In B&R, vol. 20, 262–304.

Rajan, S. Ravi. *Modernizing Nature; Forestry and Imperial Eco-Development 1800–1950*. Oxford: Clarendon Press, 2006.

Rios Coronel, Hernando de los. "Memorial y Relacion para su Magestad, Madrid, 1621." In B&R, vol. 19, 183–298.

Roth, Dennis. "Philippine Forests and Forestry: 1565–1920." In *Global Deforestation and the Nineteenth-Century World Economy*, edited by Richard Tucker and John Richards, 30–49. Durham, NC: Duke Press, 1983.

Salazar, Domingo de. "Letter to Felipe II, Manila 27 June. 1588." In B&R, vol. 7, 64–78.

Salazar y Salcedo, Hieronimo. "Letter to Felipe II, Manila 21 July, 1599." In B&R, vol. 11, 86–119.

San Nicolas, Andrés de, Luis de Jesús, and Juan de la Concepción. "General History of the Discalced Augustinian Fathers, 1664." In B&R, vol. 21, 111–318.

Sande, Francisco de. "Relation of the Filipinas Islands, Manila, 7 June, 1576." In B&R, vol. 4, 21–97.

Sant Pablo. "Compulsory Service by the Indians, 1620." In B&R, vol. 19, 71–76.

Santiago de Vera. "Memorial to the Council by Citizens of the Filipinas Islands, Manila, 26 July, 1586." In B&R, vol. 6, 157–233.

Tenza, Alonso Farjado de. "Letter to Felipe III, Cavite 10 August, 1618." In B&R, vol. 18, 116–49.

Tucker, Richard. "The Commercial Timber Economy under Two Colonial Regimes in Asia." In *Changing Tropical Forest: Historical Perspectives on Today's Challenges in Asia, Australasia and Oceania*, edited by John Dargavel, Kay Dixon, and Noel Semple, 219–29. Canberra: Centre for Resource and Environmental Studies, Australian National University, 1988.

———. "Managing Subsistence Use of the Forests: The Philippines Bureau of Forestry, 1904–60." In *Changing Pacific Forests: Historical Perspectives on the Forest Economy of the Pacific Basin*, edited by John Dargavel and Richard Tucker, 105–15. Durham, NC: The Society, 1992.

———. *Insatiable Appetite: The United States and the Ecological Degradation of the Tropical World*. Berkeley, CA: University of California Press, 2000.

Vandergeest, Peter and Nancy Peluso. "Empires of Forestry: Professional Forestry and State Power in Southeast Asia, Part 1." *Environment and History* 12, 1 (2006): 31–64.

Velasco, Pedro. "Later Augustinian and Dominican Missions, Tondo, 16 April, 1760." In B&R, vol. 48, 59–136.

Vera, Santiago de. "Letter to Felipe II, Manila, 26 June, 1587." In B&R, vol. 6, 297–310.

Viana, Francisco de. "Memorial of 1765, Manila, 10 February, 1765." In B&R, vol. 48, 197–338.

Vidal y Soler, Sebastián. *Memoria sobre el Ramo de Montes en las Islas Filipinas*. Madrid: Imprenta, Estereotipia y Galvanoplastia de Aribau y Ca., 1874.

———. *Memoria de la Colección de Productos Forestales Presentada por la Inspección General de Montes de Filipinas en la Exposición Universal de Filadelfia*. Manila: Imprenta de la Revista Mercantil de J. Loyzaga y Ca., Manila, 1875.

Vila, José. "Letter to the King, Manila 7 October, 1701." In B&R, vol. 44, 120–40.

Wickberg, Edgar. *The Chinese in Philippine Life 1850–1898*. New Haven and London: Yale University Press, 1965.

Williams, Michael. *Deforesting the Earth: From Prehistory to Global Crisis*. Chicago, IL: Chicago University Press, 2003.

Worcester, Dean. *The Philippines Past and Present*. 2 vols. London: Mills and Boon Ltd., 1914.

Zialcita, Fernando and Martin Tinio. *Philippine Ancestral Houses (1810–1930)*. Quezon City: GCF Books, 1980.

6

Seeing the Timber for the Forest

The Wood in Japanese Capitalism

Gregory Clancey

Generalist descriptions of Japan often begin with two seemingly contradictory statements. One is that "Japan is a heavily forested country," an observation that is by any measure indisputable. The second is that "Japan is a country largely lacking in natural resources," a lesson taught not only by geographers and economic historians, but by virtually all narrative histories of World War II, in which Japan conquers large areas of the rest of Asia because of its need for "strategic (natural) resources." Working both formulaic statements into a single introductory paragraph, a common device of Japanese and foreign writers alike, presupposes that Japan's forests are not a "natural resource," or at least not one suitable to the sustenance of a modern, industrial economy. The singularity of this formula is apparent only when one compares it to generalist descriptions of other forested places. A discussion of, say, Indonesia, could not possibly separate the "heavily forested" observation from a "natural resource" statement so blithely.

It is true that much of Japan's forest land, in the early twenty-first century, has ceased to be a "natural resource" in the sense of being a significant factor in economic life. The deliberately planted yet still unharvested postwar forests that cover large portions of the archipelago are referred to by some Japanese as "green deserts" (*midori no sabaku*): neither satisfyingly "natural" on the one hand nor "productive" on the other, but examples of artificial landscaping left to ruin (Knight 1996, 221). Yet the common statement that heavily forested Japan is lacking in natural resources predates the postwar creation of these "green deserts" and should not be mistaken for a description of this new physical reality. One might even argue that contemporary Japanese forests are more a product of the statement than the other way round: that imagining Japanese forests as *not* natural resources is only truly possible once modern Japan has been pinpointed as a place where *natural resources* do not (and perhaps should not) exist.

Ignoring forests has a very long history in resource-related writing about Japan. E. F. Penrose noted in 1940 "the popular tendency to confine attention too largely to arable land and minerals in discussions of Japan's natural resources" (1940, 190). When woodlands appeared in economic geographies, they were often as a national problem rather than an asset. Again, to quote Penrose,

> . . . the economic importance of non-arable (forested) land in Japan has been underestimated in Western literature . . . The impression has been created by some writers that Japan is gravely hampered by the fact that a large proportion of the land cannot be advantageously cultivated. (Penrose 1940, 188)

Penrose had to remind readers that "charcoal and wood fuel are still extensively used in Japan," where the production of coal was much more restricted than in Britain or America (1940, 188). In fact industrial uses of wood, on a per capita basis, in prewar Japan outpaced that of nearly all other industrialized countries save the United States. Yet not only in Penrose's time but our own, the forests of Japan commonly appear on explanatory maps as simply mountains. Indeed, maps that portray Japanese forests as "grey" so as to better accent the very small amount of "white" arable or urbanized land in Japan are a standard feature of geography texts. This is not entirely a foreign prejudice. Eliding forests and mountains is typical in the Japanese language, where the word for mountain (*yama*) is often used to describe forests as well. This reflected a common Japanese sense that all mountains are forested, and all forests are on mountains (see discussion in Knight 1996, 223). To many foreign mapmakers, however, for whom "mountains" and "forests" are distinct categories, it often comes down to a choice of descriptors, and mountains invariably win out.

Geography and language are not the only realms in which the extent and character of Japanese forests have been obscured. Writing 10 years earlier than Penrose, in 1930, Kobayashi Ushisaburo noted that "forestry, as compared with other branches of industry, is not given the consideration and respect it deserves." He was referring mainly to a failure in Japanese statistics-gathering, by way of apologizing for the approximation of his figures relating to forestry as opposed to the precision of those for mining or rice production. Indeed, the difficulty of gathering proper statistics on Japanese "forest production," at least through the early twentieth century, may explain why economically-centered accounts of Japanese industrialization either ignored forestry altogether, or assigned it the shortest chapter in books that were prolific in their discussions of silk, rice, iron, and so on. Despite the large percentage of National Forest land, where statistics were more likely to be gathered, the majority of Japanese forests have always been in private hands. How, when, and where wood was extracted from them, and for what specific purposes, was scarcely monitored as carefully by the government as was the production of rice in the valleys or pig iron in industrial centers (Kobayashi 1930).

We need to look even deeper, however, and go back even further, in order to understand the difficulty of foreigners and Japanese alike in seeing Japan's forests as a "natural resource," despite their having long served that role in a stunning variety of ways. Indeed, extending all the way to the Meiji Period (if not especially then), discussions of "natural resources" on the one hand and wood, lumber, and forests on the other have been carefully segregated. This is neither accidental nor incidental, but relates in a fundamental way to how foreigners and Japanese both have told "the history of Japanese industrialization"; how they have demarcated the "foreign" from the "Japanese," the "traditional" from the "modern," the "natural" from the "artificial," and so on. It even relates, in the Japanese context, to class; to whom agency is assigned or extended in the story of Japanese change.

The problem of how to discuss the triad "forests/lumber/wood" in stories of industrial change has not been unique to Japan. Indeed, much of what I will call the "wood problem" in Japanese historiography is a larger problem of Western historiography transferred to Japan along with steam engines and Darwinian theory. "Wooden" came to represent the opposite of "industrial" in a dominant nineteenth and early twentieth century discourse, even as woodcraft or woodworking itself became an industry. The Western habit of historicizing materials (e.g., "the age of wood" and "the iron age"), combined with the geographic assumptions of colonialism ("the forest" as a peripheral, colonized zone), has made ubiquity of forestland and wooden objects in Japan a delicate, contradictory, and perhaps still-unresolved cultural dilemma.

Before untangling these issues with regard to Japan, however, we need to start with the larger problem of wood in the historical discourse on "industrialization" more generally. As Robert Friedel has pointed out, and Eric Schatzberg has more recently demonstrated in his history of wooden and metal airplanes, ideologies attach themselves not only to materials, but even to the supposedly neutral research projects of materials science and engineering (Friedel 1993; Schatzberg 1999). The ideology or symbolic values of different materials likewise influence how they have been discussed (and not discussed) in academic literature, including histories. And few materials have been as loaded with symbolic content in the modern period as wood.

The Missing Wood in "the History of Industrialization"

If there is a master narrative of "industrial revolution," it is largely crafted to fit eighteenth and early nineteenth century England. Wood and forests do not significantly figure in this story because Britain was already largely deforested before its "industrial revolution" began, and was then relying on faraway places such as Canada and the Baltic countries to supply its continuing (though lessening) need for lumber. The historian John U. Nef long ago argued that the deforestation was indeed one important catalyst in Britain's proto-industrialization, spurring as it did a shift from wood to coal as a basic

fuel, a process that began as early as the Elizabethan period. Relatively few historians of industrialization have followed Nef's lead in emphasizing the connection between British technological change and environmental crisis, however, for to do so would mean describing the momentous events that subsequently took place as a consequence of the lack of something (forest resources) rather than a series of positive additions (of coal, steam, inventiveness, entrepreneurship, etc). But clearly the crisis of deforestation in England (and even more so in Scotland) was one important condition, if scarcely the only one, the "industrial revolution" rose to address (Nef 1932; Perlin 1989).

As the economist Nathan Rosenberg has pointed out, Britain's ability to conduct industrial revolution without forests (or as a latent response to their absence) may have been the exception to the subsequent rule. If we look at the United States, Germany, and Japan, to take three prominent cases, we will notice that the "British model" of railroads, coal mining, stone and brick, metallurgy, steam engines, and so on, was supplemented in foreign execution by vast quantities of wood. Many of the soon-to-be industrial powerhouses that modeled themselves on nineteenth-century Britain fed their development with a bounty of cheap and available lumber and fuelwood that Britain, even in the pre-Elizabethan period, never had. It would not be going too far to say that these and other examples of successful industrializations were the British model plus forests. The historian Brooke Hindle made this point by defining "America's wooden age," in his book of the same title, as including the nineteenth century (Hindle 1976; see also Rosenberg 1976).

The work of Nef, Hindle, Rosenberg, and others suggests that adding forests to the story of transnational industrialization in the nineteenth century may indeed be crucial to explaining the phenomenon. How did the United States and Japan in particular industrialize so rapidly? At least one way was to substitute cheap wood for more expensive British-style resources such as coal and iron, in effect exploiting a preindustrial material culture in order to set the British model in place even faster, and in a greater variety of settings. Rosenberg goes even farther, suggesting in the case of American industrialization that natural resources of all types (but especially wood) were substituted for *both capital and labor*; that the Americans in effect pulled a facsimile of British industrialization directly out of their woodland. It was not that industrialization in America (and other forested places) *supplanted* wood and woodcraft, despite the retrospective propaganda of a triumphant engineering culture. Rather, industrialization, particularly in its early period, but even much later in many sectors, was *fed* and *sustained* by existing habits of forest exploitation. Industrialization might not have been possible, at least in as many places where it proved to be, except for the existence of, and common access to, forests.

The thesis that industrialization by its nature, even over the *long duree*, means the replacement of organic material, such as wood, by inorganic or synthetic material, such as metal, concrete, and plastic, is an overly simple formula that nonetheless remains widespread. Plywood may be the ultimate

unsatisfying hybrid; part wood and part glue, neither safely natural nor clearly artificial, related to carpentry but somehow subversive to the work of real carpenters. It is loved by no one (even plastic has people who love it) and yet is now used by nearly everyone. The office I am writing in is absolutely filled with plywood or its composite relatives, from the bookshelves, to the desk, to the door, as are virtually all the rooms most of us inhabit, at least if we live on Ikea budgets. We can scarcely be sure what the word "wood" refers to anymore, although given the choice, most of us can be counted on to pick out a set of bookshelves made of this artificial wood over one made of pure and natural metal.

The modernist engineering discourse of metal (and later plastic) inevitably *replacing* wood, and the modernist conservationist discourse of "preserving forests from industry," were in some sense complementary, as both idealistically (and hence incorrectly) envisioned, from opposite ends, a world in which the *urban-artificial* was carefully demarcated from the *rural-natural.* In fact the contemporary experience of encountering a wooden object in a city, and a plastic object in a village, has long had the power to trigger, even in the most worldly wise of us, a sense of disquietude, and sometimes repugnance. In the case of Japan, such feelings are partially mitigated by the modern association of wood with a *Japanese-ness* (*Nihon teki no mono*) that transcends time and place. As I will argue in the next section, however, the identification of wood as a Japanese cultural marker is in many ways a reaction to a historical discourse on modernization that rejects wood almost entirely as a relevant category.

Seeing the Wood in Meiji Industrialization

If Rosenberg is even halfway right about American industrialization substituting raw materials—especially wood—for British capital and labor, then what of Japan? In proportion to its population, Japan was as well endowed with forests as the United States by the late Tokugawa period, though unlike in America they were carefully nurtured as a renewable resource (Totman 1998). As Tokugawa turned to Meiji, Japan was in critical need of capital, but not of labor. While Americans tended to invent and build crude wooden machines that shaped other pieces of wood with great wastage, Japan had developed a carpentry tradition that relied not only on hand labor almost exclusively, but was relatively careful about preserving wood as a valuable material. Japan seems to represent a third case, beside Britain and the United States, of a country simultaneously rich in wood and woodworking labor.

Establishing the role of forests and wood in Japanese industrialization is not as easy as it might be, however, because despite a plethora of anecdotal, pictorial, and otherwise intriguing circumstantial evidence, the "woodenness" of early Japanese industrialization has heretofore been no one's research project. Most secondary sources discussing Japanese industrialization (both

Japanese and foreign-authored) treat the presence of wood as a material and locus of skill (not to mention forests as an industrial site) either incidentally or not at all. Even works that break their chapters down by sector (which is actually typical) will rarely mention the wooden material culture on which so many industrial "sectors" were actually based. Sometimes it is just a matter of not noticing materials of any sort other than those that constituted significant exports, such as silk or tea. This is a particularly common fault of econometric histories. Other times, however, the omission seems the result of a predetermined but probably unconscious bias, which, in using the categories of the British industrial revolution, edit out data that deviate from the British model. Yet barring a few exceptions (Morris-Suzuki 1994; Clancey 2005b), historians of Japan who are specifically searching for deviation, or attempting to locate a uniquely "Japanese" trigger or path to industrial success, have offered little sustained discussion of the world of wood. Why has this been so?

Part of the answer lies in the very circumstances in which "industrial revolution" was initially launched in Japan. The Meiji government, as is well known, imported hundreds of foreign, mostly European technical experts in the first two decades of the nation-building project, not only to advise and teach but initially manage a plethora of novel industrial projects, such as railroad-building and mining. Engineering expertise in this early period overwhelmingly came from Britain, and thus the model of the British industrial revolution was initially carried to Japan not by native industrial spies or emigrants (as in the United States) but by salaried Englishmen and Scotsman who were specifically tasked by government fiat with recreating the systems of their native place(s) in an utterly different environment. The emphasis, at least officially, was not to be on innovation but exact, "best-standard" replication, which meant the standard in Manchester and Liverpool.

"There are few civilized countries in which forestry is so backward, and in which the 'forest sense' is so lacking, as Britain," wrote British colonial forester R. S. Troup in 1940 (Troup 1940, 5). The very opposite might have been written about Japan, where forest management had a centuries-long history, and where a "forest sense" was deeply woven into most local cultures as well as the newer national one. In the late nineteenth century "British forestry" meant essentially colonial forestry, and British "scientific forestry" was developed largely in India. Japan, on the other hand, entered the nineteenth century as one of the most thorough-going wooden cultures on earth. In borrowing the British model of industrialization, it stands to reason that Japan's forests and its intense utilization of wood would constitute not only a point of divergence, but one of possible misunderstanding; a "problem" to overcome as well as an asset (Rajan 1998).

For many European o*yatoi* (as Meiji-period foreign experts were called) as well as their Japanese patrons, developing or modernizing Japan was virtually synonymous with overcoming or replacing the wood-based material culture and skills that had been honed to a remarkable degree during the previous Tokugawa period. Unless they came to Japan via India (which only a minority did), many of these British experts would have had little experience with

forests or woodcraft. Statements denigrating the wooden material culture of Japan as "flimsy," "temporary," and "primitive" are rife in early o*yatoi* accounts. Making Japan industrial seemed, at least in the first two decades of the modernizing project, to simply require that all that wood be substituted with materials characteristic of contemporary Britain, such as coal, metal, brick, and glass. That the Japanese students and assistants to foreign o*yatoi* were most often recruited from the former samurai class, which had little or no experience of making or doing things with their hands (other than conducting martial arts), made this process of "transfer" often a pure one, at least at official or state levels (Clancey 2006).

If a historian follows only the paper trail left by foreign o*yatoi* and their Japanese students, he or she will almost certainly construct a narrative in which wood and the ability to shape it progressively disappears before an utterly new culture of synthetic materials such as brick, glass, steel, chemicals, and, much later, petrochemicals. The near-perfect replication of foreign manufacturing and constructive processes, the official goal of foreign teaching and the subsequent goal of the indigenous engineering cultures the foreigners left behind, was indeed painstakingly arrived at in certain instances, and forms a common narrative of Japanese change that migrated intact from the nineteenth century experts themselves to the first generation of historians who, using their records, chronicled the experts' achievements.

The shortcoming of this oft-told history of radical change in materials and skills, which was recognized by some historians as early as the 1970s, is that it cannot possibly account for the actual character, and especially the rapidity, of Meiji-period industrialization (Smith 1988). The bias toward discussing radically new materials and techniques is also a bias toward the work of academically trained engineers, who were so few in Meiji Japan that they likely all knew of one another by name. There are other levels or aspects of industrial change, likely of greater significance, which although often alluded to by economic and social historians of the transition from Tokugawa proto-industry to Meiji industry, have scarcely been chronicled in systematic fashion. One is the almost ubiquitous manipulation of wood by entrepreneurial small tradesmen, particularly (but not exclusively) carpenters. Another is the intensive use of wood and charcoal as an industrial and household fuel. Both highlight the continued Japanese reliance on indigenous raw materials and types of skill that owed little to foreign knowledge, but were well-prepared to be stimulated by, and sometimes placed in the service of, foreign techniques.

Ironically it was mining, and particularly iron mining, the archetypical example of a modern Western industry spurring technological and material change, which was among the major users of forest resources. Mines required numerous pit props, platforms, ramps, laggings, and chutes, all made of wood (and constructed by carpenters) as well as massive amounts of wood fuel to power ore-crushers and other types of machinery. Japan may have had little experience at mining various types of ore (other than gold, silver, and copper) before Europeans came, but its carpenters could make mining infrastructure and its foresters could fell trees, and both these skills were as basic

to mining as was digging into the ground. As late as World War I, mining was the second-largest consumer of Japanese lumber after building-construction (Ui 1992).

The word "railroad" invokes images of iron steam engines, and many dozens of these were indeed imported into Meiji Japan from Britain and elsewhere. But railroads, as transferred to Japan and other forested places, were also intensive users of wood. Wood not only constituted the frames for rolling stock, but the sidings, stations, train-sheds, bridges, water-towers, telegraph poles, and of course the ties on which the rails were laid. In countries like Japan, where cord-wood was cheaper and more widely available than coal, it also fueled the locomotives. In terms of sheer quantity of material, there was much more wood in a Japanese railroad than there was iron or steel, just as in labor-hours there was more timber-felling and carpentry involved in railroad construction than there was metalworking (especially when both the engines and the rails were imported) (Ericson 1996).

As a fuel, wood and charcoal were crucial to many Japanese manufacturing processes well into the twentieth century. The extreme availability, and hence cheapness, of wood and charcoal in Japan is likely an underappreciated factor in "fueling" its transition from a proto-industrial to an industrial economy. The production of pig iron, as late as the World War I boom, depended largely on charcoal fuel. Even sericulture, that most Japanese of export industries, needed large amounts of wood or charcoal to heat the rooms in which the silk was produced, to dry the cocoons, and to facilitate the reeling process. In 1917, with Japanese silk-production booming, that industry used nearly as much wood and charcoal fuel as the entire manufacturing sector, which itself used a great deal. At this time 58 percent of wood harvested from Japanese forests was still supplying basic and inexpensive fuel to nearly every type of manufacturing enterprise in Japan (Kobayashi 1930, 213–15).

Despite the large amount of wood used in manufacturing, as much as 70 percent of Japanese wood-based fuel, at the time of World War I, was still consumed for household heating and cooking. Kobayashi's detailed breakdown of "The Cost of Living for the (Japanese) Worker" in July 1914, just before the outbreak of World War I and the rise in commodity prices, gives one indication of just how low the cost of wood and charcoal was before the war-induced overcuts. While urban workers paid on average 7.4 yen a month for rice, 3.8 for vegetables, 4.4 for rent (including water) and 1.3 for clothing, their fuel costs (for both cooking and heating) were only 0.57 yen. This figure was somewhere between the costs of having one's hair cut (0.48) and "social expenses, including those for gifts, entertainment, etc." (0.67). Even with fuel costs doubled by 1917, they were still below those for gifts/entertainment (Kobayashi 1930, 269).

Wood was a fuel, and a building material, but it was also "good to think with." Wood has always been par excellence the material of innovation. So much easier to work than stone and metal, and so abundant in quantity (for societies with access to lumber) that it invites experimentation and changes in

form, it is not surprising that so many basic technological innovations have been conducted with this one material. Although engineers are most immediately associated in the minds of contemporary people with "technology," in fact they were latecomers to the world of machine-building, as were even metalworkers. Machine-building from ancient times until well into the nineteenth century (and even later in many sectors) was mainly the province of carpenters. Cultures like Japan's with well-developed traditions of carpentry—for example, with many types of carpentry-based specializations, tools, literatures, and so on, supported by an extensive lumber-producing and marketing sector—likely have had basic advantages over those where such skill-cultures are small or nascent (for the broadest-ranging discussion of the role of wood in innovation see Perlin 1989).

Carpenters and others with more basic or specialized woodworking skills were indeed ubiquitous in the Meiji economy. As Takamatsu Toru has noted in regard to the Meiji period, "imported machinery existed in newly generated product fields [but] was not brought in as a superior replacement for native technology" (Takamatsu 1998, 130–36). This "native technology" was in many instances a work-product of carpenters, who continued to not only produce, but also innovate their machinery as Western-style mechanisms became more available for their inspection. Takamatsu gives a now-familiar example of British-made iron power-looms imported to produce Western-style clothing for the export market, while Japanese-style clothing for the domestic market continued to be produced on narrower, wooden hand-looms. Both sectors grew, however, and the "traditional" looms became increasingly hybridized. They did not, however, cease being wooden, because the agents of their innovation were still carpenter-mechanics. The modern car manufacturer Toyota, for example, began in the Meiji period as a small textile machinery company making narrow wooden power-looms. These were innovated in increasingly sophisticated ways, based on the inspection of foreign devices by the firm's founder, Toyoda Sakichi, who began life as a carpenter (Takamatsu 1998, 130–36; Nakaoka 1982, 45–62).

Carl Mosk has noted that in Meiji-period Osaka, "experiments in grafting Western practice upon Japanese tradition proliferated," with wooden looms being only one example. "Imitation," he recognizes, could be a "highly creative process," as it rarely resulted in the exact copy of a Western machine, but usually one better adapted to local circumstances (Mosk 2001, 64–65). Minami and Makino have pointed out that one result of this innovative process in the textile industry was that, by the early twentieth century, machines built solely of iron (on the British model) had virtually disappeared in favor of machines with both wooden and iron parts:

> It will be apparent that the shorter the lifetime of the machine or equipment, the more readily it will be replaced by a new model that has higher technological capabilities. Technological progress, therefore, penetrated more rapidly into factories equipped with wooden iron-reeling machines than it did with those of iron-machines only. (Minami and Makino 1994, 43)

In other words, shifting to cheaper machines made of wood allowed more experimentation and adaptation to local needs and conditions. A quite similar process occurred in the United States in a slightly earlier period, according to Rosenberg (1976).

Another example of how "proto-industrial" carpentry practices contributed to growth in a newly important industrial sector is shipping. Takamatsu notes that until the end of the Meiji period, "coastal maritime routes were monopolized by sailing ships, especially Japanese-style wooden ships" whose rate of production grew almost continually through the late nineteenth century (Takamatsu 1998, 131). Even the introduction of steam ships did not mean the end to wooden shipbuilding, but its further stimulation. "An extremely large percentage of the steamships produced in domestic yards came from the Settsu district (Osaka and Kobe)" notes Mosk of the Meiji period, "and almost every one of these ships was built out of wood." The Osaka area used its proto-industrial wooden shipbuilding skills to "launch" itself into leadership in industrial-scale shipbuilding by late Meiji, a sector that turned only gradually to steel hulls (Mosk 2001, 99).

JAPANESE WOOD AS INDUSTRIAL ASSET BUT SYMBOLIC PROBLEM

That industrializing Japan continued to rely so heavily on wood and woodcraft well into the twentieth century was something of a dirty little secret to those for whom wood still symbolized economic and cultural backwardness. In an economic geography of Japan written by John Orchard of Columbia University in 1930, this Japanese "secret" of substituting traditional resources and labor organization for capital and Western "best-practice" engineering is not only exposed to a Western audience, but its implications are extended to the cognitive realm. Orchard was actually one in a long line of academic "Japan hands" who saw the historic and continuing use of wood by Japanese people as evidence that they lacked real mechanical aptitude. This was because, as he puts it,

> [wood] is not a material that lends itself to mechanical experimentation or the advancement of engineering knowledge. It does not lend itself readily to the construction of machines with moving parts. . . . No transition necessitated by the invasion of [Japan by] European industry was more fundamental than the change from wood to iron. It was more than a change in materials. It was a change from an ancient economy based upon wood and, for that reason, without any special mechanical background, to an economy based on iron and steel and mechanical to the highest degree. It involved the displacement of the artisan by the engineer and the mechanic. It is a transition that even today had not been entirely accomplished, for the Japanese have developed no great mechanical or engineering skill.(482)

Orchard not only got the past wrong, ignoring the centrality of wood and carpentry to the history of machine-building (especially that of his own

country!), but the future as well. "Her possibilities for industrialization are limited" he concluded, "and there seems no possibility that Japan can attain a position of major importance as a manufacturing nation" (Orchard 1930, 482). Such simple formulas as wood equals backwardness and metal equals progress were taken to heart not only by twentieth century foreigners, but by many Japanese, especially those in engineering and business circles who broadly shared Orchard's values. Japanese came to see their country as wooden and organic, not just because of Shinto or nature-based nativist discourses, but at least equally because foreigners (and imported foreign value systems based on a misreading of modern history) were constantly contrasting Japan with an "inorganic" West (Clancey 2006).

As in virtually every forested or formerly forested country that has undergone industrialization, wood and its use in any form came to be associated in Japan with historicity. Depending on who was talking and what sort of values they were intent on projecting, however, the historicity of wood could be taken as "backwardness," as a touchstone for a pleasant nostalgia, or as a very positive rebuke to unwanted industrial change (for example, "the natural beauty of wood"). But in Japan, the historicity of wood also took on a strongly nationalist coloring over time, so that by the early twenty-first century, the material has come to represent not only (and perhaps not even primarily) the past, but "Japan" itself. This is a situation quite different from that in Britain or even the United States, where although wood remains *olde*, and has a central role in ceremonies or illustrations of historicism, it is not so contiguous with national identity. Yet it would not be going too far to say that in Japan, by the late twentieth century at least, to be in the zone of "tradition" meant somehow to be with wood, especially, and perhaps exclusively, *Japanese* wood. From the wooden roof-frame above the sumo ring to the wooden chopsticks ubiquitous in Japanese restaurants, this material has infiltrated the symbolic order around the performance of "Japan" to a degree that it has not in similarly forested places (Nakashima 2000 and 1999; Sasaki 1982; Sugewara 1996).

The *Japanese-ness* of wood in Japan has partly to do with the clear distinction that people grew used to drawing, from the Meiji period onward, between objects of the imported material culture, which were rarely wooden, and those produced at home, which so often were. Imported machines, especially those brought from Britain, were invariably metal. Thus a "Japanese" machine was usually a wooden one, and a "wooden" machine Japanese, even though countless machines in the West remained wooden as well. In the realm of architecture, to take an even more popular example, a "foreign" house, either lived in by a foreigner or built for a Japanese by a foreign architect, was often brick or stone; two materials utterly alien to Japanese building traditions before the late Tokugawa period. It became common to conflate "Japanese" houses with "wooden" ones, even though the vast majority of houses in the United States, for example, were also built of wood. Indeed, nineteenth-century Japan was arguably no more or less wooden than nineteenth century America. And yet few Japanese would

likely have known this, given that "best-practice" machine-building and construction in the United States, based as it was on "best-practice" in Britain, was more often encountered in textbooks and actual imported objects than the wood-based mundane objects that constituted so much of nineteenth-century American material culture.

DEFORESTATION AND WAR

Nothing better illustrates the continuing need for wood in the mature Japanese industrial economy than the intensified tree-cutting that accompanied both World Wars. The relationship between deforestation and modern war is one rarely considered—partly because discussions of technology and warfare are dominated by the theme of "cutting edge" competition—but this relationship seems particularly operative in the case of Japan (for an exception, see the discussion of wooden airplanes in Schatzberg 1999). Domestic consumption of "industrial wood" from the Meiji through early Showa periods actually peaked in the war years of 1939–44, causing the widespread deforestation that postwar planting was meant to correct. But even prior to the outbreak of the second Sino-Japanese War in 1937, domestic production had risen 43 percent, while imports fell by 75 percent (Forestry Agency 1952, 95). Much of this is accounted for by the development of newly conquered Manchukuo, which required huge timber imports from Japan (especially Sakhalin). Japan's last great colonial expansion, in other words, was remarkably wood-intensive. Moreover, the wartime clear-cutting of Japanese forests and their need for replanting was a major reason for Japan's turn toward Southeast Asian lumber in the 1950s.

In Japan and elsewhere, not only did "normal" prewar uses of lumber continue at higher levels during both World Wars, but wood and carpentry came to be substituted for a wider range of more "modern" synthetic materials, which had become subject to rationing. The Pacific War also had the odd effect of cutting Japan off from its normal lumber trade with Southeast Asia, even though that area was now fully under Japanese control. This was partly because the already-strained Japanese merchant marine had other priorities, and partly due to an intensified wartime need for lumber in the occupied territories themselves. Cut off from regular supplies of iron and other manufactured materials from the Home Islands (just as the Home Islands were cut off from supplies of imported lumber), the Japanese army and navy conducted a wood-intensive occupation of Southeast Asia, marshalling tens of thousands of locals to cut, haul, and build things from the area's extensive forests (Kratoska 1998, 164 cites the example of wooden coasting vessels).

The wood-intensive nature of twentieth-century "total war" was not simply a Japanese experience. Even in Britain, a country that imported over 95 percent of its lumber by 1940, and that arguably made the most restricted use of wood of any country in northern Europe, disruptions in lumber supplies caused huge concern during both World Wars. During and immediately after

World War I, Britain instituted a state-directed reforestation scheme, "with the view of rendering the country self-supporting in the event of another national emergency". The recruitment of "forest officers" in Britain and throughout the Empire began "on a scale previously unknown" following the Great War. And this in a country where the annual cubic feet of wood consumed per person in 1940 was only 15, compared to 228 in the United States and 129 in Sweden (Troup 1940, 5, 8, 13).

In Japan, likewise, World War I set off an overcutting and shortage that presaged in many ways the more drastic overcutting of the Fifteen Years War. The boom in production of all sorts that accompanied World War I caused such a significant increase in the need for wood fuel and lumber that, perhaps for the first time since the Meiji Restoration, cutting outpaced replanting. In the words of Kobayashi Ushisaburo, "lumbering in its most reckless phase became the regular thing" (1930, 215). The wartime overcutting, combined with the unexpected need to rebuild Tokyo after the Great Kantō Earthquake of 1923, turned Japanese attention strongly to lumber imports. While some lumber had always been imported from North America, now foreign lumber sources expanded to include "the South Seas," and the imported product no longer served an exclusively luxury market, but supplemented regular Japanese lumber supplies as well (Takayama 1942; Misawa 1963).

World War II overcutting of Japanese forests was so critical that it required a sustained postwar replanting campaign to revive the "bald hillsides." The abandoned plantation forests of *sugi* and *hinoki* that largely characterize the country today are thus a wartime legacy. And like the previous overcutting of World War I, this one was accompanied by the need to rebuild Tokyo (and now 60 other Japanese cities) nearly from the ground up. As much as 45 percent of Japanese forestland was cut for wartime needs, a figure that increased even further in the immediate postwar period, given the rebuilding. Add to this the loss of valuable forests in Sakhalin, the Kuriles, Korea, and Taiwan as a result of the postwar settlement, and the total volume of "Japanese" timber decreased by as much as 66 percent between 1937 and 1952. The only solution in such circumstances was to turn even more strongly, indeed permanently as it turned out, to forests farther afield. North America was not forgotten, but now the main source of logs was to be Southeast Asia, a place that Japan had new familiarity with through its recent occupation (Food and Agriculture Organization 1952).

This second twentieth-century rebuilding of Tokyo, and now virtually all of urban Japan, was to be no less wooden than the previous one. In fact it was not until 1963 that the percentage of floor-space in new buildings of wood was outpaced by floor-space in buildings of other materials, mainly concrete. Even then, "concrete" in 1963 most often meant concrete block structures whose infill and roof framing were still, generally, of wood (Muramatsu 1968, 139–46). Just as the cities were abandoning wood framing altogether in the late 1960s and early 1970s, construction of wood-framed suburban

houses began to accelerate, providing protection for the small "father and son" carpenter-builders who had long been central to Japanese building of all sorts.

WOODEN HOUSING: FROM PROTO-INDUSTRY TO "HIGH-TECH"

Accounts of "industry" in every country nearly always neglect building-construction, because it seemingly has little to do with international commerce or factory-based production. Buildings are not traded across borders, by and large, even if the materials that constitute them often are. Most of them are produced not in central locations by large companies but on dispersed sites by a confusing array of generally small operators. "Housing starts" are now recognized as a factor of domestic economic health by statistics-keepers, but the integration of housing, or building of any sort, in econometric, commercial, or technological accounts is still remarkably fitful and awkward, for reasons having to do more with disciplinary cultures, traditions, and categories than the importance of such activity to national economies.

Despite a common image of Japan as a concrete, steel, and neon wonderland, Japanese building construction still maintains a very large carpentry sector, and wooden frames are still one of its principle products. Since especially the 1970s, home-ownership has become a goal for an increasing percentage of Japanese, a stunning development in a country where even well-paid urban dwellers traditionally rented. The vast majority of these new owner-occupied houses are wooden, and built by carpenters. Although owner-occupied houses are a new phenomenon, the wooden house itself—the "frame" within which this new ideal is realized—is among the very oldest surviving Japanese material or technical artifacts (Clancey 2005b; Sand 2003).

No sector illustrates so well the evolutionary transition from Tokugawa *proto-industry* to post-Restoration *industrial* production as Japanese house-carpentry. This is true whether one approaches the issue from the technical or social sides. Technically speaking, the typical contemporary wooden house-frame in Japan—called *zairai-koho* (literally "the way we build")—clearly descends in both form and detail from early modern structures. It remains post-and-beam, held together by a variety of wooden joints unique to Japanese carpentry, and often still uses round logs with complex cuts for its roof portion. Although both the lumber and their joints are far more regularized in type and dimension than at any time in the past, and are now festooned with a variety of metal fasteners (*kanamono*) to better guard against earthquakes, there are still more similarities between a typical Japanese house-frame of 2004 and one of 1864, say, than between two contemporary house-frames from Japan and California. And this is despite the fact that the two houses on either side of the Pacific Ocean are coming increasingly to resemble one another in elevation and floor-plan. (Clancey 2005b).

The technological and material continuity in the *zairai-koho* house-frame is mirrored by an equally remarkable continuity in its producers: small firms of carpenters (called *daiku*, literally "great artisan") who are well spaced in every Japanese region. A variety of organizational changes have occurred above and among such firms over the past two centuries, particularly the growth of complex subcontracting networks and national trade associations. And yet the "core" units of Japanese house-production, the small carpentry crew, has remained remarkably resilient. The majority of *daiku* are still either self-employed or part of a very small enterprise, and arrive on their worksites with a toolbox that, though supplemented by power-saws, still contains working tools that a *daiku* of two centuries before would recognize (Clancey 2005b).

Daiku have survived and prospered not because of stubbornness or "tradition," however, but because they have made a hundred small, incremental concessions and changes in organization and technique, although all the time preserving a socially recognizable identity and product that still has great appeal, and commands respect, among Japanese consumers. At the same time, this complex and successful holding action of *daiku* has taken place against attempts by other more elite groups to essentially do them in, or at least greatly reduce their influence within the Japanese economy. Foremost among these groups have been university-trained architects and engineers; professions that sprung into being in the Meiji period at the expense of an existing, dense, *daiku* culture. Architecture in particular has remained a relatively small and weak, if high-status, profession because of its inability to make real inroads into the huge housing sector that *daiku* continue to dominate. This partly explains the intense interest on the part of Japanese architects, from the Meiji period until now, on finding cheap artificial housing materials that might replace the wooden frame, and/or developing techniques, such as prefabrication, by which *daiku* control over building technology might be circumvented (Clancey 2005a; Muramatsu 1968).

More recently, however, architects have receded in importance as *daiku* rivals, and more powerful threats have risen from two distinct but increasingly like-minded sets of actors. The first are bureaucrats in the Ministry of Construction (and likely elsewhere in the Japanese government) who have long considered the small wooden house-producers "backward" in comparison to the high-tech and generally more consolidated sectors that produce other classes of Japanese buildings. Indeed, at its upper levels, Japanese construction is among the most consolidated and technically sophisticated in the world. This puts the wooden house-building sector into starker contrast than it might otherwise be, especially among planners who share the "synthetics equals progress" mindset of modern engineering. There is much circumstantial evidence that planning bureaucrats have long considered *daiku* firms a reverse-salient in the moving front of progressive Japanese technological change, despite famously cozy relations between local building firms and Liberal Democratic Party (LDP) politicians. Only recently,

however, has the bureaucracy discovered a practical way to "rationalize" this sector (Wright 1998, 1–4; Clancey 2005b).

The agents of "rationalized" house-production in contemporary Japan are a new group of very large housing companies, such as Misawa Homes, Mitsui Homes, and Sekisui House. Fully consolidated and international in their investments, these firms cut lumber from their own Canadian or Scandinavian forests, turn it into wood-framed panels in their own (often offshore) factories, ship the panels to Japan and assemble them into nationally-marketed "product" houses, all for prices that undercut those of local carpentry-oriented builders. Such houses are marketed on television and in newspapers much the same way as any other product, but with appeals meant specifically to undermine consumer attraction to *daiku*-built structures. The "2 × 4" houses of Misawa or Mitsui, claim various advertisements, are more "international" (stylistically up-to-date and comparable to the housing of Europeans and North Americans), safer (more earthquake-resistant), tighter (better at retaining heat), and faster to construct.

So far I have been describing "internal" factors in sustaining *daiku* and their *zairai-koho*. There has also been a very large external one, at least since the appearance of the first Japanese timber shortages in World War I: the import of round-log lumber. Technical details are always important to the sustenance of particular social groups and their practices, and here the crucial detail is "round-log." Few sawmills in the world, outside of Japan, have had a sufficient understanding of Japanese house-carpentry to cut their logs in the exact array of dimensions that Japanese building custom or practice requires. American sawmills, for example, have a standard array of lumber cuts, based on the measurement of 2 inches (for example, 2 × 4, 2 × 6) that are largely useless in Japan. Thus Japanese lumber dealers have always found it most convenient (and profitable) to import lumber in log form and custom-cut it in their own sawmill ports for sale to the domestic building-carpentry market.

The cultivation of foreign sources of round-log lumber, particularly in Southeast Asia, and particularly after World War II, has been crucial in allowing *daiku*-controlled house-production in Japan to continue along familiar lines. Almost all postwar prefabrication projects have had as their technical goal the reduction in the variety and complexity of wooden framing members, taking the American "2 × 4" frame as their basic model. Reduced in complexity, variety, and dimension, wooden framing members can be fastened together with nails, even in a factory. Japanese carpenters have successfully resisted these attempts to "Fordize" or "Taylorize" their profession by keeping lumber inexpensive (so as to preserve the cost of skill). More precisely, they needed Japanese framing members to remain cheap without any sacrifice to their complexity and variety, thus preserving the necessity for skilled intervention in order to arrange them into buildings. This has been facilitated, since the 1950s, by massive imports of Southeast Asian lumber in round-log form.

The big contemporary housing companies do not import lumber, but prefabricated panels, and their normal sources of supply are not Southeast Asia but North America and Scandinavia. Promoting the large companies over the small *daiku* firms serves two interrelated purposes for the Japanese government, besides the ideological one of "rationalization". One is to use imported lumber to help even out the trade imbalance with the United States. The other is to deflect criticism from international environmental organizations that are most concerned with Japanese involvement in the tropical timber trade, a trade that benefits the small *daiku* (and the huge general trading firms that import his lumber) more than the large, consolidated building companies that deal in prefabricated panels from northern forests.

Conclusion

This chapter has been an argument for a particular research perspective more than a demonstration of what sustained work in that direction might yield. My concern has been as much with discursive absences and conceptual barriers as with the crafting of new programs. I have attempted—if you will allow a forestry metaphor—to create more space by clearing underbrush and thinning out dense patches in the scholarly record. My methodological challenge—which I direct to others as well as myself—has been to discuss forests (the ecosystem), lumber (the commodity), and wood (a materiality both highly symbolic and absolutely mundane) in a single chapter, though one grounded in specific cultures, groups, times, and events. The discussion I have initiated could be extended in many directions, most notably toward Southeast Asia and those parts of Pacific Canada that have become increasingly critical to the maintenance of Japan's wooden material culture.

Wood was (and is) clearly "wealth" to Japan, and hardly the "resource curse" it has been in some forested societies (including many that continue to ship their most valuable lumber to Tokyo). Japanese forests themselves have not been without politics, and unequal access has clearly affected the fates of localities and regions. But the ubiquity of wood in Japan, and the development of widespread and varied competencies in its crafting or working, was surely a "hidden" (because not often-commented) factor in the development of not only the Tokugawa economy, but the Meiji, Taisho, and Showa ones as well. That similar access to wood and woodworking skills in other forested societies did not result in economies like Japan's advises us against seeing woodland alone as a spur to development. But writing wood out of the industrial record will not do either, and more imaginative models of technological development (building on the work of Nef, Rosenburg, Hindle, and others) that look at similarities and differences in forest access, and how timber came to be used and by whom, are clearly overdue.

BIBLIOGRAPHY

Clancey, Gregory. "Designing a Home for the *Yamato Minzoku*: Race, Housing, and Modernity in Wartime Japan." *Asian Studies Review* 29,5 (June 2005a).

———. "The Modernity of Carpenters: *Daiku* Technique and Meiji Technocracy." In *Building a Modern Japan: Science, Technology, and Medicine in the Meiji Era and Beyond*, edited by Morris Low. New York, London: Palgrave Macmillan, 2005b.

———. *Earthquake Nation: The Cultural Politics of Japanese Seismicity, 1868–1930.* Berkeley, CA: University of California Press, 2006.

Ericson, Steven J. *The Sound of the Whistle: Railroads and the State in Meiji Japan.*Cambridge, MA: Council on East Asian Studies, Harvard University, 1996.

Food and Agriculture Organization of the United Nations. *The Growth of Forest Industries and Their Impact on the World's Forests.* Rome, 1952.

Forestry Agency, Ministry of Agriculture and Forests (Japan). *Report on Japan's Forests.* Tokyo, 1952.

Friedel, Robert. "Some Matters of Substance." In *History from Things: Essays on Material Culture*, edited by Steven Lubar and W. David Kingery, 41–50. Washington, DC: Smithsonian Institution Press, 1993.

Hindle, Brooke. "Introduction: The Span of the Wooden Age." In *America's Wooden Age: Aspects of Its Early Technology*, edited by B. Hindle, Tarrytown, NY: Sleepy Hollow Press, 1976.

Knight, John. "When Timber Grows Wild: The Desocialization of Japanese Mountain Forests." In *Nature and Society: Anthropological Perspectives*, edited by Phillipe Decola and Gisli Palsson, 221–39. London: Routledge, 1996.

Kobayashi Ushisaburō. *The Basic Industries and Social History of Japan, 1914–1918.* New Haven, CT: Yale University Press, 1930.

Kratoska, Paul H. *The Japanese Occupation of Malaya, 1941–1945.* London: C. Hurst & Co., 1998.

Minami Ryoshin and Makino Fumio. "The Developments of Appropriate Technologies for Export Promotion in the Silk-Reeling Industry." In *Acquiring, Adapting, and Developing Technologies: Lessons from the Japanese Experience,* edited by Minami Ryoshin, Kwan S. Kim, Fumio Makino, and Joung-Hae Seo. NY: St. Martin's Press, 1994.

Misawa Tōru. *Tonan Ajia ni okeru wagakuni kigyo teikei no gittai.* Tokyo: Ajia Keizai Kenkyū jo, 1963.

Morris-Suzuki, Tessa. *The Technological Transformation of Japan: From the Seventeenth to the Twenty-First Century.* Cambridge: Cambridge University Press, 1994.

Mosk, Carl. *Japanese Industrial History: Technology, Urbanization, and Economic Growth.* Armonk, NY: M. E. Sharpe, 2001.

Muramatsu Teijiro. "The Japanese Construction Industry IV." *The Japan Architect* 318 (January–February 1968): 139–46.

Nakaoka Tetsuro. "The Role of Domestic Technical Innovation in Foreign Technology Transfer: The Case of the Japanese Cotton Textile Industry." In *Osaka City University Economic Review* 18 (1982): 45–62.

Nakashima Kōji. "Representing Nature and Nation: National Land Aforestation Campaign and the Production of Forest in 1960s–1970s Japan." In *Nation, Region, and the Politics of Geography in East Asia*, edited by T. Mizuushi. Osaka: Osaka City University Press, 1999.

———. "Nationalism, Colonialism, and the Representation of Nature: Forest and Country in the Afforestation Campaign in Modern Japan." Paper presented at the

ICGG Taegu 2000 Conference, accessible online at http://econgeog.misc.hit-u.ac.jp/icgg/intl_mtgs/KNakashima.pdf last accessed 6 April 2007.

Nef, John U. *The Rise of the British Coal Industry*. London: Routledge, 1932.

Orchard, John E. *Japan's Economic Position: The Progress of Industrialization*. NY: McGraw Hill, 1930.

Penrose, E. F. "Forestry Resources." In *The Industrialization of Japan and Manchukuo, 1930–1940*, edited by E. B. Schumpeter, NY: Macmillan Co., 1940.

Perlin, John. *A Forest Journey: The Role of Wood in the Development of Civilization*. New York: W. W. Norton, 1989.

Rajan, Ravi "Imperial Environmentalism or Environmental Imperialism? European Forestry, Colonial Foresters and the Agendas of Forest Management in British India 1800–1900." In *Nature and the Orient: The Environmental History of South and Southeast Asia*, edited by Richard H. Grove, Vinita Damodaran, and Satpal Sangwan, 324–71. Delhi: Oxford University Press, 1998.

Rosenberg, Nathan. "America's Rise to Woodworking Leadership." In *America's Wooden Age: Aspects of Its Early Technology*, edited by Brooke Hindle, 37–62. Tarrytown, NY: Sleepy Hollow Press, 1976.

Sand, Jordan. *House and Home in Modern Japan: Architecture, Domestic Space, and Bourgeois Culture, 1880–1930*. Cambridge, MA: Harvard University Asia Center, 2003.

Sasaki Komei. *Nihon bunka no kisō o saguru*. Tokyo: NHK Books, 1982.

Schatzberg, Eric. *Wings of Wood, Wings of Metal: Culture and Technical Choice in American Airplane Materials*. Princeton, NJ: Princeton University Press, 1999.

Smith, Thomas C. *Native Sources of Japanese Industrialization, 1750–1920*. Berkeley: University of California Press, 1988.

Sugawara Satoshi. *Shinrin, nihon bunka toshiteno*. Tokyo: Chijin Shokan, 1996.

Takamatsu Toru. "The Way Japan Joined Mechanized Civilization." In *Japanese Civilization in the Modern World*, vol. X (Technology), edited by Tadao Umesao, James Bartholomew, and Shigeharu Sugita, 127–40. Osaka: National Museum of Ethnology, 1998.

Takayama Keitaro. *Nanyo no ringyo*. Tokyo, 1942.

Totman, Conrad. *The Green Archipelago: Forestry in Pre-industrial Japan*. Athens, OH: Ohio University Press, 1998.

Troup, R. S. *Colonial Forest Administration*. Oxford: Oxford University Press, 1940.

Ui Jun, *Industrial Pollution in Japan*. Tokyo: United Nations University Press, 1992.

Wright, Eugene H. "Foreign Construction Industrialization and Its Potential Effect on the United States Construction Industry." In *ASC, Proceedings of the Annual Conference*, April 1998, 1–4.

7

Burma and the Politics of Teak

Dissecting a Resource Curse

Raymond Bryant

Burmese history is closely associated with the teak tree. Identification of the country as "the land of teak" was reinforced in numerous fiction and nonfiction accounts. The elaboration of a large-scale exported-oriented timber industry in the nineteenth and twentieth centuries demonstrated the economic importance of this resource. Teak was popularized and romanticized even as its commercial value was realized (Brandis 1888; Kelly 1912; Orwell 1987).

Political interest centered on controlling teak forests and their inhabitants. Burma's rulers—precolonial monarchs, British officials, postcolonial civilian and military elites—have all grappled with this problem, even as forest residents—shifting cultivators, villagers, and timber traders—have sought to evade central control. In short, teak has been a perennial focus of struggle (Bryant 1997; Global Witness 2003).

Indeed, as often happens where valuable natural resources are involved, teak exploitation in Burma has been associated with the disruption if not devastation of the livelihoods of the rural poor living in or near the teak forests. True, some forest residents earned an income in the timber industry as they felled, processed, and transported teak to market. Others were involved in shipbuilding as well as the "sustainable" management of teak forest—Karen shifting cultivators being a case in point (discussed below). And yet, it would be wrong to exaggerate the importance of these benefits given the overall impact of teak exploitation on resident populations. As powerful Burmese and non-Burmese elites came to prize teakwood, a series of political, military, and economic measures were taken that served to violently disrupt preexisting local "life-worlds"—comprising not only material welfare but also cultural and spiritual attachments to place. What for some was "green gold" became for others "blood timber" in a process that exposed the inescapably contested nature of this resource.

Burma's renowned association with teak has not translated into national economic prosperity. As the sustained focus of rent-seeking and rent-seizing

behavior (Ross 2001), teak has long provoked struggle among state and nonstate elites over the right to control its exploitation. A constant here has been the fact that little profit has "trickled down" to Burmese residents in terms of improved social services or infrastructure. Instead, tighter political and military control over and interference in the lives of local people has been the norm.

The history of Burmese teak exploitation thus seems to be a classic example of a "resource curse" scenario. Much has been written on the so-called resource curse thesis: natural resource abundant developing countries usually lag badly behind natural resource poor developing countries in national economic development (Auty 1993). Explanations focus notably on "policy failure" in laggard countries since "an *abundant* natural resource endowment provides greater scope for cumulative policy error" (italics in original, Auty 2002, 227). Policy error prompts, in turn, serious distortions in the national economy as well as skewed economic practices by individuals and firms—the rent-seeking behavior and corruption much bemoaned by neoliberal thinkers.

This discussion is less interested in contributing to resource-curse debates as it is intent on exploring the political processes and dynamics that surround and help to constitute that curse. Resource curse situations are deeply political in three main ways. First, they are a contingent outcome of political processes. Second, these situations are often a setting for the dramatic redistribution of economic benefits and opportunities in which "winners" and "losers" are created. Finally, they are a basis for further political change as economic redistribution feeds back into political processes. These factors can be seen in the historical and contemporary political ecology of an array of countries ranging from Angola to the Philippines (Le Billon 2001; Bryant 2005). They are also to be seen in the case of Burma, notably with reference to teak fixation (Bryant 1997; Global Witness 2003).

My goal is to assess select aspects of this set of processes. After a brief discussion of the political economy of teak exploitation, I examine the political dimensions of Burma's teak resource curse. The focus is on three interrelated topics: (1) the geopolitics of Burmese teak; (2) teak resource related militarization; and (3) forest injustices associated with the struggle over teak. Clearly, these topics do not exhaust the array of issues involved but do provide evidence of the impact and importance of politics in the constitution of a brutal resource curse scenario.

Producing a Resource Curse

To classify Burmese teak exploitation as a resource *curse* scenario—that is, as a resource whose record of exploitation can be viewed normatively as a *bad* thing—is clearly to go against numerous historical accounts extolling the virtues of such exploitation. These accounts—written by and/or for elites—present one particular version of history that is "factual" in tone, partial in scope, and depoliticized in presentation. Whether in the dry

bureaucratic form of government officials or the florid style of travel writers, "progress" in Burma's forests was often about mapping, extracting, planting, or simply experiencing the majestic teak forests (e.g., Kelly 1912; Nisbet 1901; Stebbing 1922–26). Yet this discourse of progress served to romanticize a process of systematic intervention that, when viewed from a different angle, was all about the production of a resource curse. The production of Burmese teak has thus been inescapably associated with the production of a moral geography that has been deeply politicized from the start.

It is not difficult to see why successive Burmese and British elites were enamored with the teak tree. As a durable, attractive, and long-lasting hardwood resistant to the predation of many wood-boring insects, teak (*Tectona grandis*) was used in the construction industry, notably as the preferred source for the homes of precolonial Burmese royalty and nobility. Significantly, teak was also the preferred timber of a precolonial shipbuilding industry based in southern Burma from at least the seventeenth century, as it held up well under prolonged exposure to the corrosive effects of seawater and contained an oil that prevented metal corrosion (Brandis 1888, 104; Nisbet 1901, 47).

As the reputation of teak grew, precolonial Burma became the focus of a thriving export trade in the eighteenth and nineteenth centuries. Burmese shipbuilders constructed a variety of ships from small coastal boats to larger square-rigged vessels based on the European model. Between 1786 and 1824 alone, 111 European-style vessels were built in Rangoon with an aggregate tonnage of 35,000 (Pearn 1939, 71; Lieberman 1984, 119–20). Laborers flocked to southern Burma to become part of this economic boom, attracted by the prospect of well-paid, semiskilled work (Htin Aung 1968, 10–11). A complex if fluid regulatory system was in place that was designed to tax teak production and control labor in the teak forests along the major transport routes and at the site of shipbuilding itself (Koenig 1990, 56; Taylor 1987, 44). As a valued timber, there was a royal monopoly on teak from at least the eighteenth century that was enforced unevenly in the forests by specially appointed forest guards empowered to fine or arrest anyone involved in its illegal extraction. Such extraction certainly persisted, given both the high value of teak and the relatively weak administrative capacity of the precolonial Burmese State (Bryant 1997, 39–41). And yet, however limited, it was in late precolonial Burma that a political economy of teak was crafted that has proved remarkably durable comprising great commercial value, export-oriented production, and political coercion.

Teak was thus influencing Burmese history even before the nineteenth century intervention of the British. Indeed, that intervention was itself shaped by a growing international awareness of "the land of teak." By the early nineteenth century, the international identification of Burma with teak was pronounced, setting the stage for a geopolitics of teak that I discuss below. Here, I simply note three things. First, teak was becoming a sought-after resource by the European imperial powers on military grounds. Imperial shipbuilders had discovered what their Burmese counterparts already knew—namely, that teak

was an ideal timber for the construction of warships. Second, at a time of heightened Anglo-French conflict, the British were desperately searching for new timber supplies for their navy as oak forests were depleted in Europe and teak forests were felled in southern India (Ribbentrop 1900, 64–66). Finally, eyewitness accounts by foreigners reported that Burma was home to the largest teak forests in the world. The actual extent and quality of those forests would only be known following the British conquest of Burma (between 1824 and 1886) once the Burma forest department was able to complete a systematic survey (Bryant 1997). Yet, if anything, feverish expectations of "limitless" Burmese teak forests in the early- to mid-nineteenth century only hastened the process whereby Burma became identified as the home of teak.

From the mid-nineteenth century to the Japanese invasion of Burma in early 1942, the consolidation of British control went hand in hand with the elaboration of the world's leading export-oriented teak industry. As teak became a prime *imperial* resource, the economic context for the creation of this timber as a *Burmese* resource curse took shape. There were four key elements. First, a specially created forest department facilitated a rise in teak production as forests across British-ruled Burma were systematically mapped and exploited. Whereas 20,462 tons were produced in 1859 (albeit, from British-ruled Lower Burma only) by 1900 the figure was 205,000 tons while in the early 1920s it exceeded 513,000 tons. Although production levels fluctuated (notably due to shifting market conditions), the basic situation was nonetheless a considerable increase in teak production as more and more of the national teak forest was incorporated into the realm of market activity. From a British viewpoint, teak was the main forest crop it's corollary being other timber and nontimber species were "minor forest products."

Second, virtually all teak extracted was destined for export. A classic case of export-oriented resource production, teak was shipped to markets in British-ruled India as well as in Europe where it was converted into everything from railway sleepers to park benches and warships to office paneling (Brandis 1888, 104). Burmese teak dominated the world market. Just prior to World War II, for example, Burma provided 85 percent of world teak exports (Gallant 1957, 2).

Third, foreign firms dominated the Burma teak industry, especially after 1900 as forests were "privatized." Led by the mighty Bombay Burmah Trading Corporation Limited (BBTCL), five European firms controlled the key teak forests while much smaller Burmese firms were left to fight over the residual tracts. Indeed, between 1904 and 1924, outturn by Burmese firms fell from 23 percent of total production to under 5 percent whereas outturn by European firms climbed from just under 44 percent of total production to more than 74 percent (Bryant 1997, 103). In a pattern familiar in many parts of the south today, foreign firms dominated this key natural resource sector at the expense of smaller local rivals—thereby generating local resentment. The substantial profits generated by these firms were repatriated to Europe and when global market conditions turned sour, as they did in the early

1930s, the colonial state cut their royalty rates by 30 percent—a move not extended to Burmese firms in the industry at that time.

Finally, official revenue earned from the lucrative teak industry was used to sustain the British-Indian colonial administration (of which Burma was a part) with a substantial proportion of that revenue being siphoned off to support the overall running of that administration. Indeed, in the early 1890s, the annual net revenue from Burma's forests (virtually all teak-related) amounted to 45 percent of the total for all of British India, up from 39 percent in 1870 (Bryant 1997, 57). Burma's teak forests thus helped to sustain not only the colonial administration in Burma itself but also imperial endeavors in British India as a whole. If colonial rule needed to be a "paying proposition" then teak played a notable role in the propagation of the British Empire. Relatively little of this revenue was devoted to the improvement of the lives of the conquered Burmese. Indeed, even where benefits occurred—for example, as a result of the construction of a railway network that facilitated the movement of people and goods—there is nonetheless a need to relate benefits to costs. To take the railway example, it is important to recognize its role in enabling a far more effective and systematic suppression of internal dissent than was hitherto possible.

Independence did not end Burma's teak resource curse. To the contrary, it marked the start of an increasingly bitter chapter in that history. Teak has remained a sought-after commodity destined for export that political and economic elites struggle to control at the expense of many Burmese. As in precolonial and colonial times, postcolonial teak production generates enormous profits that are not reinvested in the economic improvement of the country but are rather used to improve the lives of those who control the Burmese State as well as their political and economic allies.

Political Dimensions of a Resource Curse

It is difficult to exaggerate the impact of teak development on Burma. Although there is much more to Burmese politics than the exploitation of teak, that politics has nonetheless been notably concerned with the struggle over this natural resource for good stretches of its modern history. This discussion therefore next examines three political dimensions to the resource curse scenario in the country. These are: (1) *teak geopolitics* conditioning Burma's foreign relations; (2) *resource militarization* that links struggles over teak with the production of violent environments and social misery; and (3) *forest injustices* that oppress people living in or near teak forest. These dimensions clearly overlap even as they crisscross conventional colonial/postcolonial divisions.

Teak Geopolitics

The process of interaction between nation-states known as geopolitics has long been associated with struggles over strategically important natural

resources. The quest for oil, natural gas, minerals, and other natural resources remains a fertile source of international cooperation and conflict today. Teak has played a role in this saga for several centuries in a process that has shaped not only how Burma has related to other countries but also how other countries have related to it. The resource that helped put Burma on the international map has also been linked to economic policies of introversion and/or selective opening that have underpinned the image of Asia's "pariah" state.

If teak production helped to establish precolonial Burma as an important Asian nation in regional flows of natural resources and wealth by the late eighteenth century, growing European (especially British) interest in the country helped to catapult Burma to the forefront of imperial geopolitics in the nineteenth century. Over a tumultuous and violent 60-year period, Burma was a prime focus of imperial action as the country was forcibly incorporated into the British-Indian Empire. The geopolitical fault line shifted in three stages as Britain seized successive portions of the country as a result of winning three Anglo-Burmese Wars in 1824–26, 1852, and 1885–86.

In each case, the imperial quest for teak played a role in shaping the move to war and the subsequent contours of empire. Thus, as noted, looming timber shortages prompted increased British interest in Burma's plentiful teak forests in the early nineteenth century. A key problem from the British viewpoint was that the annual teak supply from monarchical Burma was erratic at a time when the British navy was demanding a reliable supply of timber for its shipyards in Calcutta (Pollack 1979, 54–55). If the reasons for this supply problem varied over time—shifts in royal policy, domestic timber consumption, internal political battles, and so on—the result was an unacceptable state of affairs for the British.

As Anglo-Burmese relations deteriorated the British focused on the acquisition of Tenasserim—a coastal strip of land hemmed in by mountains that was at the periphery of the Burmese Empire yet also rich in teak forest. Following the first Anglo-Burmese War (1824–26), the British swiftly set about exploiting the Tenasserim forests, with timber firms pursuing cut-and-run policies in the absence of effective regulation. These forests were all but exhausted by the 1850s and the attention of British firms shifted to the teak forests of the Pegu Yoma, a range of low hills between the Irrawaddy and Sittang valleys of southern Burma under monarchical rule.

The second Anglo-Burmese War (1852) marked a more aggressive stage in British imperialism as Burma began to be seen as being an integral part of the nascent British-Indian Empire. Valuable teak forests were again an important consideration. On the one hand, fears that unregulated extraction would simply repeat the disaster in Tenasserim, thereby leaving Britain without adequate supplies, provided one justification for war. On the other hand, when the war was swiftly concluded, British officials ensured that much of the teak-bearing Pegu Yoma was included in Britain-ruled Burma (Pollack 1979, 109). Such teak diplomacy was followed by the promotion of long-term

exploitation under a forest department specifically created for this task in 1856 (Brandis 1859; Nisbet 1901).

And yet, once again, British military conquest did not result in the capture of the key teak forests that were north of the new border, along the Chindwin River and in the Shan States. Firms led by the powerful British-owned BBTCL had already begun to snap up timber leases from a financially impoverished Burmese monarchy in 1862. Subsequent claims that monarchical Burma was sanctioning widespread deforestation that was doing irreparable damage to the forests (as well as an "unfair" fine imposed on the BBTCL by King Thebaw) provided a handy pretext for war (Geary 1886, 312; Keeton 1974, 143). For the British, it was important to seize upper Burma and its teak forests before they were exhausted through "misuse"—ironically at a time when most of the forests in British-ruled lower Burma had already been cleared for permanent agriculture (Adas 1983; Talwar 2004). This calculation, when combined with fears over French imperial designs on Burma, provided the basis for the third Anglo-Burmese war (1885–86) (Chew 1979).

In this way, British business and the British-Indian government brought Burma's teak forests—and with them the country itself—firmly into the British sphere. This process was as bloody as it was disruptive of preexisting land and forest management among the people who depended on the forests. In the years that followed, the geopolitical dimensions and implications of the nineteenth century Anglo-Burmese conflict became clearer and were to prove remarkably durable.

Aside from formally defining the eastern edge of the British Empire in continental Southeast Asia (until 1947), the Anglo-Burmese conflict led to a sharper definition of the territory of "Burma." Profound political and ecological implications followed from this territorial strategy that helped to shape both the internal and external policy environment as political power assumed a specific spatial form (on territory and power, see Storey 2001). In the process, Burma's teak resource curse has been notably played out in a geopolitical context that itself has been strongly shaped by the quest for teak.

Let me note two implications here. First, as the idea of Burma took shape under British direction, that idea was linked to the notion that the country was a "natural" primary producer of abundant natural resources. As a world-leading rice exporter, Burma was also the world's key source of teak as well as being home to a variety of precious minerals including jade. The country became indelibly associated with the extraction of natural resources from land and forest—its "free gift of nature" (Furnivall 1909). Second, as fixed national borders replaced fuzzy zones of influence, Burma's relations with its neighbors (notably Siam/Thailand, China, and India) followed a new course even as old patterns of timber extraction and human migration posed a challenge to regional relations. "Arbitrary" national borders did not necessarily mesh with preexisting timber extraction routes, let alone the migratory patterns and extended kin relationships of shifting cultivators and others who lived in the new border areas (Thongchai Winichakul 1994).

Such cross-border discontinuities were exacerbated by the British practice of "divide and rule" whereby core Burman-dominated areas were under direct British rule while peripheral areas were subject to indirect rule via British-sanctioned hereditary local rulers (or *sawbwas*) (Taylor 1987). Peripheral autonomy among Burma's "ethnic minorities" under the British became a major bone of contention in the postcolonial era and intersected in complicated ways with center-periphery relations in neighboring countries.

Postcolonial Burma's geopolitical relations have continued to be shaped by teak-related concerns elaborated during the precolonial and colonial eras. One difference from the colonial era at least has been the Burmese practice of geopolitical introversion (albeit, combined with sporadic and selective opening) behind a "teak curtain" (Thawngmung 2004).

Geopolitical introversion was taken to an extreme after a coup d'état in March 1962 brought General Ne Win and a self-styled "revolutionary council" of military commanders to power. Between independence (gained on 4 January 1948) and the 1962 coup, teak revenue had played a role in underpinning the Rangoon-based democratic government led by U Nu even though that revenue was severely limited due to pervasive violence in teak-bearing forests. After 1962, teak revenue became ever more crucial to the financial fortunes of the Ne Win–ruled state. Thus, whereas in 1951–52 teak exports accounted for only 4 percent of the value of total exports (mainly rice and minerals), by 1970 that figure was 25 percent (Trager 1954, 26; Steinberg 1981, 117). By 1984–85 the figure was 27.4 percent but soared thereafter to as much as 42 percent of the country's total official exports by value (Ministry of Planning and Finance 1985, 107; Smith 1991, 5 [figures are estimates only]).

And yet, two things can nonetheless be noted in relation to the post-1962 politics of Burma's teak resource curse. First, teak revenue provided a financial lifeline for a state beset by multiple insurgencies. Indeed, it was a key means by which the Ne Win regime mounted successful offensives against its foes (Smith 1999). Second, teak exports provided one of the few connections between Burma and the rest of the world during the Burmese Way to Socialism (1962–88). A powerful State Timber Board oversaw this vital trade and associated extraction activities and was answerable only to Ne Win and associates (Forestal International 1978, 35). In effect, teak export earnings enabled the Burmese State to fashion a quasi-autarky during this era involving minimal political, economic, and cultural links to the outside world in a classic case of geopolitical introversion.

Following the popular upheaval and brutal military crackdown of 1988, the military junta known as the State Law and Order Restoration Council (SLORC) shifted geopolitical tack in a process in which timber exports (including notably teak) loomed large. The regime had little choice. On the one hand, the SLORC-ruled Burmese State was branded an international pariah by Western countries suddenly attentive to this "hermit state." On the other hand, a small but influential Burmese diaspora in Europe, North America, and Australia campaigned actively against the SLORC and in favor

of the imprisoned Burmese opposition leader Aung San Suu Kyi—the clear winner of the country's only free and fair election held in a generation. The response by the SLORC was to develop select political and economic links with its Asian neighbors—especially Thailand and China—using Burma's abundant natural resources (including teak) as its main bargaining chip.

The political, economic, and ecological details of the post-1988 period in which Burma's military rulers have embarked on an aggressive strategy of resource geopolitics have been thoroughly documented (Geary 1994; WRI 1998; Global Witness 2003). Three things need to be highlighted about this process in relation to our theme. First, SLORC resource geopolitics ushered in a new and bloodier phase in the country's civil war as it fought its opponents with growing success. Here, teak and other resource earnings were vital as they enabled the SLORC to upgrade the military capability of the army (*tatmadaw*) with improved weaponry bought notably from China. From the vantage of the SLORC, the teak/natural resource–military hardware nexus proved to be a virtuous cycle since acquisition of the latter enabled it to conquer more and more insurgent territory opening up profitable new resource extraction activities for the *tatmadaw*. For all of those villagers caught in the middle of the ferocious battles that raged across the country, the personal consequences were often devastating.

Second, SLORC-resource geopolitics was about working to realign the political and economic interests of key neighbors such that they would become natural partners rather than opponents of the regime. In return for lucrative teak and other natural resource deals, Burma's leaders hoped thereby to win the support of its neighbors in international debates over Burma held in the United Nations and other fora (including ASEAN). The key players here were Thailand (and ASEAN) and China and support was won through a process of exploiting regional rivalries. Such resource-related diplomacy led to "constructive engagement" policies on the part of Thailand and ASEAN (leading to Burma joining ASEAN in 1997) and the opening up of the frontier between Burma and China as trade between these two sets of relations boomed (Geary 1994; Global Witness 2003).

Third, and related to this last point, SLORC–resource geopolitics since 1988 has enabled the military regime to neutralize the international influence of the Burmese opposition that had been something of a threat to it in the late 1980s. Although the Burmese opposition has enjoyed much support in Europe, North America, and Australia, it has been less influential in the Asian countries that matter to the SLORC: China, Japan, and the ASEAN nations. Thus, Burma's poor human rights record since 1988 (it was bad before that year but less visible internationally) has certainly prompted campaigns against it including boycotts against companies that work with the regime. Yet, the lack of international consensus on Burma—undermined by countries such as China, Japan, and Thailand—ensured that the SLORC (now the State Peace and Development Council) has not felt political pressure in the way that other international "pariah" states have (Seekins 1992; Geary 1994; Global Witness 2003).

Resource Militarization

How teak geopolitics has led to battles for control of the teak forests is central to the politics of the Burmese teak resource curse. Resource militarization has long been associated with the quest for teak through a process that has produced a "violent environment" in which many lives have been blighted (cf. Peluso and Watts 2001). True, forest violence is not only associated with the quest for teak—other natural resources have been at stake (such as tin and jade). Further, violence has also often been motivated by *non*resource-related objectives, notably the crushing of ethnic opposition to the Burmese State (Smith 1999).

And yet, it would be odd indeed if the economic incentives that partly influenced the geopolitics of British imperialism in the nineteenth century, and the geopolitics of regional trade in the late twentieth century, did not have a major impact on the people who dwelt in the teak forests. In practice, that impact was often quite negative in terms of peoples' livelihoods and safety. Here, I briefly examine resource militarization to underscore one point: the production of violent environments was part-and-parcel of the production of the teak resource curse.

Resource militarization was the outcome of various processes even as it held diverse implications for forest dwellers. The transformation of the teak forests into violent environments varied from place to place in terms of both the protagonists and the levels and kinds of violence involved. Still, the process was often closely associated with the politics of interethnic strife and/or state versus opposition group conflict. The details are complex and dealt with elsewhere (e.g., Lieberman 1984; Taylor 1987; Smith 1999). A brief overview will suffice here.

Teak forests have been notable hotspots in the long-standing production of violent environments. Indeed, they have long been home to individuals and groups opposed to the country's lowland rulers—"a traditional hiding-place for malcontents" (Foucar 1956, 72). Historical and contemporary accounts abound with descriptions of "bandits," "banditry," and pitched battles in the forest as weaker political opponents have retreated to areas into which powerful political groups were at a tactical disadvantage due to the terrain (Mills 1979; Adas 1982). A case in point occurred in the early 1930s—the Hsaya San rebellion was centered on the teak-bearing Pegu Yoma and took the British-Indian army several years to quell (Maung Maung 1976, 187–88). In other cases, "banditry" has been of a more "home-grown" variety, as residents mobilized against outsiders intent on disrupting local livelihoods: the Burma forest department was often a focal point of such resistance. Clearly, the circumstances and protagonists varied over space and time. However, the capture of teak logs in the forest was a favored practice. As forests were transformed into "bandit country," residents almost inevitably became ensnared in fighting even though many were noncombatants. Violence and uncertainty were the norm as teak logs were seized in an opportunistic fashion.

Teak forests were also the focus of much more systematic and far-reaching military strategizing by well-organized insurgent armies intent on capturing an important source of revenue. The most notable case concerned the long-running insurgency by Karen and other ethnic minorities against the Burman-controlled state that began soon after independence in 1948 (Smith 1999; Global Witness 2003). Indeed, the epic 50-year struggle by the Karen National Union (KNU) to establish the State of Kawthoolei—a sovereign state of the Karen people along the Thai-Burmese border—was partly reliant on teak revenue. This dependency was most notable after the 1960s as KNU forces were pushed back into the border region by the powerful *tatmadaw*. By the 1980s the KNU became ever more reliant on teak revenue to underpin the insurgency and a flourishing trade with Thai partners ensued (Falla 1991; Bryant 1997, 167–68).

Still, the greatest impetus to resource militarization was the effort by successive rulers of the Burmese State to assert central control over the teak forests. In precolonial times, the ability of the monarchical state to achieve such control was relatively limited. However, a series of organizational and technological innovations in colonial and postcolonial times meant that rulers of the Burmese State since the mid-nineteenth century have often achieved a greater degree of forest control than in the past. In particular, the combination of modern armaments and more systematic knowledge about the teak forests and their inhabitants (mainly courtesy of the forest department) were a boon for British and Burmese leaders keen to exploit the forests to the hilt (Adas 1982; Selth 1996; Bryant 1997).

Even then, teak exploitation was not easy for them. The assertion of official control as a basis for such exploitation was highly contingent—and indeed, involved much danger for forest officials caught in the line of fire. The level of violence has certainly fluctuated over time. However, chronic political upheaval and widespread social unrest—especially in the late colonial era/World War II (e.g., 1920 to 1946) and postcolonial era (since 1947)—have been associated with extreme violence in the forests. Not surprisingly, state-led efforts to extract teak have often resembled a military campaign. Forest officials and/or private lessees would enter the forest only with heavily armed escorts, sometimes to the dismay of foresters afraid that these escorts were "merely a succulent bait for the large bands of well armed rebels roaming the country" (BOF 1946). In the mid-1950s, the U Nu government mounted a large-scale military operation—code named "Operation Teak"—in insurgent "infested" southern Burma. In this campaign, units of the *tatmadaw* secured the banks of the Sittang River between Toungoo and Rangoon, even as they provided river escorts for the rafts themselves. Teak timber was rafted from the forests to Rangoon thereby earning the government precious foreign exchange (*The Nation* [Rangoon] 10 November 1955).

Such violence left a deep mark on local people. Livelihoods were disrupted while residents were sometimes forced to take up arms themselves, thereby inviting reprisals. The worst reprisals against forest dwellers have occurred since March 1962 as the *tatmadaw* has killed, tortured, and raped countless

thousands of ethnic minority villagers suspected of helping insurgents. Many thousands of villagers have also been forced to do highly dangerous work on behalf of the Burmese military (Smith 1999; Global Witness 2003).

A counterinsurgency campaign known as *Pya Ley Pya* (four cuts) was at the core of this strategy. It targeted those who lived in or near to the forests and was designed to deprive insurgents of access to local food, funds, intelligence and recruits (Smith 1999). In military terms, this campaign was highly effective and enabled the *tatmadaw* to achieve a series of victories against insurgent armies beginning in the Irrawaddy Delta in the late 1960s. The Four Cuts campaign was subsequently extended to the teak-bearing Pegu Yoma with Operation Aung Soe Moe running from late 1973 to April 1975 when the last insurgent forces were cleared from these hills. During the 1980s and 1990s, the campaign moved to northern and eastern border areas where, again, military success was achieved (Smith 1999; Global Witness 2003) and, as we saw, teak became an important part of SLORC geopolitical strategizing.

Anti-insurgency campaigns of this sort were not new—the British had mounted "pacification" campaigns to sever insurgents from "sympathetic" villages in the late nineteenth century (Aung-Thwin 1985). However, the sheer scale and brutality of the post-1962 campaign stands out, with entire villages moved to "secure" sites. In these sites, strict military surveillance was imposed while the displaced villagers faced a brutal forced labor regime (Doherty and Nyein Han 1994; Fink 2001). Extreme violence has been the norm (BCN and TNI 1999; Tucker 2001). In the teak forests, this campaign of terror has been accompanied by a strategy of large-scale and unsustainable extraction that threatens to eliminate the country's prime timber (Global Witness 2003).

Forest Injustices

If forced labor and relocation as well as arbitrary killing provide evidence of the brutal dimensions to Burma's teak resource curse, there is also an entire set of forest management rules dating from colonial times that marks a systematic attempt to control forest and people. This process involved the imposition of forest access restrictions in aid of "scientific" teak management that has been a serious blow to the subsistence and livelihood needs of residents (Bryant 1997; see also Guha 1989). The coercive nature of attempted state forest control in colonial and postcolonial times has been widely assessed (e.g., Boomgaard 1992; Peluso 1992; Sivaramakrishnan 2000). As such, only a brief and selective overview is needed here in order to underscore this third dimension to the politics of Burma's teak resource curse.

Much of what has transpired under the label "scientific forest management" from the mid-nineteenth century was designed to introduce "government" in the Foucauldian sense of the term—the introduction of disciplining and self-disciplining practices, the prevalence of widespread surveillance, and the elimination of antithetical social behavior (Dean 1999; see also Scott

1998). In Burma, as elsewhere, it entailed interlinked processes of generating forest maps, resource inventories, and population censuses that provided a basis for draconian restrictions on popular access to timber and nontimber forest products. These restrictions prompted "everyday" forms of popular resistance including arson, theft, illegal grazing, and other local resource practices that contravened the law.

This political dynamic of control and resistance was often most intense in the teak forests. To reside in or near to teak-bearing forest was usually to invite systematic state intervention in one's life precisely because the regulation of teak was seen by many officials inevitably to involve the regulation of people, with the promotion of "good conduct" by local people a key aim. The process of "internal territorialization" that was part-and-parcel of the creation of a system of reserved forests (that were focused on teak-bearing areas) involved the creation of extensive borders that crisscrossed existing villages and land use patterns. These borders were designed to facilitate the disciplining of people—*where* they could go, *when* they could go there, and *what* they could do whilst there. In one sense, these draconian measures reflected the fervent wish of forest officials in particular to design a comprehensive system of forest management that would permit long-term timber production within an intact forest estate. In another sense though, and that is our central concern in this discussion, the systemic disciplining of forest users was an integral part of Burma's deepening teak resource curse dynamic.

Two examples taken from the colonial era provide some sense of how intensive teak management impacted on the lives of local people—and how that impact reveals another facet to the bitter politics of a resource curse. The first example relates to the fire prevention campaign that was mounted in the reserved forests in the late nineteenth century in the (mistaken) belief that fire inevitably harmed teak trees. In practice, this campaign sought to regulate local practices—such as game hunting, cattle grazing, or honey gathering—involving the use of fire. Not surprisingly, it was bitterly resisted by residents. Such resistance joined with growing scientific doubts among foresters over the utility of the campaign leading ultimately to the demise of the policy (Slade 1896; Bryant 1997, 87–91).

The fire prevention campaign proved to be a serious additional burden on already hard-pressed villagers. On the one hand, the restrictions were a source of *individual* nuisance and concern. These restrictions were a nuisance inasmuch as villagers needed either to alter their practices in order to conform to the law or to ensure that those practices were safely hidden from view lest foresters should catch and punish them for "illegal" activities. The restrictions were a concern because of the omnipresent threat that they might be captured for violating the law—or indeed, that they might be pursuing practices unaware that their actions were in violation of the law. Ignorance of the law, though, was a weak defense given the publicity surrounding the fire prevention campaign: the more effective tactic was therefore to attribute fires to natural causes. Much depended here on the response of forest officials and local magistrates. The latter were often keen

to moderate the punishment of villagers mindful of the need to avoid unrest. Nonetheless, many villagers were indeed convicted under the law and faced potentially heavy punishments including a 500-rupee fine, 6 months in prison, or both as well as court damages.

On the other hand, the fire prevention campaign imposed a potentially serious *collective* burden on villagers. Under the forest rules, villagers were required to assist forest officials in fighting local fires whatever the provenance of the fires. Not only did this legal requirement involve entire villages in unpaid dangerous work, it also meant that they needed to drop whatever they were doing at short notice, thereby disrupting a variety of livelihood activities. British complaints of peasant "indolence" and "negligence" in responding to firefighting duties were legion, and suggested an additional dynamic of collective imposition and resistance that negatively affected the lives of villagers in and around the teak forests.

The second example relates to the case of Karen shifting cultivators, many of whom resided in valuable teak-bearing forests. For many British foresters, these forest dwellers were seen as *the* central obstacle to scientific teak management given that they cleared their *taungyas* (or hill clearings) with little or no thought to the protection of teak trees. As one observer remarked, the livelihoods of the Karen were "altogether unconnected with an article which is the source of wealth and industry everywhere, but in the place where it is produced" (McClelland 1855, 13). To the sheer horror of the British, such indifference meant that teak trees were routinely set on fire, along with other tree species, in the clearance of new fields. An early aim of imperial forestry was thus to stop this practice. Official attention soon centered on the 5,000 or so Karen who lived in the Pegu Yoma (ca. 1876).

Over the latter half of the nineteenth century, British foresters sought to resolve the "problem" of the shifting cultivator through use of both "sticks" and "carrots" (Bryant 1994). The "sticks" were associated with a series of punitive rules that forbade the destruction of teak trees and placed heavy restrictions on where and when the Karen could clear fields for agriculture (including the draconian fire-prevention rules noted earlier). An additional "stick" was the ever more efficient collection of taxes—amounting to about 6 rupees per individual per year—from a populace among the poorest in the country. In effect, the quest for teak led the British into imposing a system of hill management that had not existed in anything near so comprehensive a form in precolonial times. The result was fierce resistance but also flight to less regulated areas, as British rule transformed Karen lifestyles.

The British also proffered "carrots" as a way in which to elicit "voluntary" cooperation from the Karen in teak areas. The system of *taungya* forestry was the classic example here. This system required cultivators to plant and tend teak seedlings alongside their own food crops for a modest payment with the aim being that, when cultivators moved on to clear a new patch of forest, teak plantations would grow up in their wake. Cultivators were aware right from

the start that this system would undermine their way of life. As one forest official tellingly reported in 1864, Karen leaders he had met

> . . . openly admit that they look upon the sowing of teak in their [*taungyas*] as taking bread from the child's mouth. All they urge to prove this is true enough. Every one is aware of the fact of their returning to the same localities to cut [*taungyas*] after a lapse of from 10 to 15 years. (RFA 1864, 9)

With an estimated growing cycle of between 60 and 100 years until a teak tree was commercially ready for felling, both forest officials and Karen cultivators knew that the resulting plantations represented land irrevocably lost to shifting cultivation. These cultivators were also promised paid work as forest laborers—porters, fire wardens, and so on—working under the orders of forest officials. Here, too, there was a small supplementary income. Yet, for many, such payment could never adequately compensate for the loss of a locally valued way of life based on shifting cultivation.

In this way, a combination of carrots and sticks was used to transform a way of life that was not compatible with intensive teak management. In forestry accounts, the taungya forestry system has been held up as a classic example of international "good practice" in reconciling forest dwellers to new management systems (e.g., Nisbet 1901; King 1968; Evans 1982). Seen from the perspective of many Karen cultivators, however, the system was all about punishing and disciplining them until they participated in teak planting arrangements that effectively "planted out of existence" a way of life. Here too, living in close proximity to teak forest ended up being a recipe for trouble, as foresters promoted rules and practices that often blighted the lives of those affected by them.

Conclusion

When natural resources acquire great economic value, political dynamics are often set in motion, which rarely provide much benefit to those who live in or near extraction sites. Indeed, as we have seen, the international renown of Burmese teak has been an unmitigated curse for many Burmese villagers and shifting cultivators oppressed or displaced in the name of "efficient" and "scientific" forest management. Beyond the dry economic language of reports on "resource curse" situations, then, there can usually be found a set of coercive political and economic relations that produce violent environments and social misery for the many in step with the creation of fantastical profits and political success for the few. That a relatively small number of poor forest dwellers also received a limited financial reward from teak exploitation (as loggers or plantation workers, for example) scarcely alters this basic picture.

Clearly, the story of "blood" resources related in this chapter varies over space and time. Indeed, it needs to be told in relation to specific geographical settings

and resources (e.g. Tucker 2000; Le Billon 2001; Watts 2004). Our concern has been with Burma and the timber with which it is most commonly identified. By examining teak geopolitics, resource militarization, and forest injustices, it has been possible to appreciate at least some of the politics surrounding the production of a resource curse as well as the dire consequences for many forest dwellers. The account provided in this discussion is thus a far cry from one "romantic" imperial take on Burma's teak forests: "a gradual crescendo of loveliness which only increased as familiarity aided appreciation, and which no words of mine could ever give an adequate impression" (Kelly 1912, 101).

The preceding discussion has raised a number of issues that could not be addressed here. Thus, for example, Burmese teak has clearly been a passport to personal prosperity for some. The associated historical and contemporary geographies of wealth creation have encompassed an array of politicians, military rulers, insurgent groups, timber firms, financiers, traders, export-import firms, retailers, consumers, and so on in such countries as Burma, Thailand, Singapore, China, Britain, Japan, and Denmark (to name but a few). Here, we allude to the rounded global "life" of a commodity—its "commodity culture"—and the ways in which that commodity culture derives from a political ecology that is part resource "curse" and part resource "blessing" depending on the actors involved.

Finally, to what extent is the sort of resource curse politics examined here in relation to Burmese teak exceptional when compared with the more general curse of poverty and its "silent violence" (Watts 1983)? In a world in which topographies of violence and oppression abound, is there anything special about the violent environments associated with blood resources in "resource peripheries" (Hayter *et al.* 2003)? Perhaps, given great commodity values and hence temptations for rent-seeking and rent-seizing, it might be possible to suggest that it is simply the duration and level of elite-inspired violence that marks these situations out from other "everyday forms" of social and economic oppression. And yet, there was/is much brutality associated with the production of relatively less valuable commodities on plantations across the Third World. The distinctiveness of the resource curse politics on any kind of social and economic hardship scale may be questioned. Still, what does seem clear is that there is a yawning gap between the romantic narratives that frame a valued resource such as teak and the political and ecological "realities" that underpin its production but are obscured behind legitimating discourses.

BIBLIOGRAPHY

Adas, M. "Bandits, Monks, and Pretender Kings: Patterns of Peasant Resistance and Protest in Colonial Burma, 1826–1941." In *Power and Protest in the Countryside*, edited by R. P. Weller and S. E. Guggenheim, 75–105. Durham, NC: Duke University Press, 1982.

———. Colonization, Commercial Agriculture, and the Destruction of the Deltaic Rainforests of British Burma in the Late Nineteenth Century." In *Global*

Deforestation and the Nineteenth Century World Economy, edited by R. P. Tucker and J. F. Richards, 95–110. Durham, NC: Duke University Press, 1983.

Aung-Thwin, M. "British 'Pacification' of Burma: Order without Meaning." *Journal of Southeast Asian Studies* 16 (1985): 245–61.

Auty, R. M. *Sustaining Development in Mineral Economies: The Resource Curse Thesis*. London: Routledge, 1993.

———. "The 'Resource Curse' in Developing Countries." In *Companion to Development Studies*, edited by V. Desai and R. B. Potter, 224–29. London: Arnold, 2002.

BCN (Burma Center Netherlands) and TNI (Transnational Institute). *Strengthening Civil Society in Burma: Possibilities and Dilemmas for International NGOs*. Chiang Mai: Silkworm Books, (1999).

BOF (Burma Office Files). "Confidential Note on Illicit Extraction of Timber and General Lawlessness." Conservator of Forests, Sittang Circle, 8 May 1946.

Boomgaard, P. "Forest Management and Exploitation in Colonial Java." *Forest and Conservation History* 36 (1992): 4–14.

Brandis, D. *Rules for the Administration of Forests in the Province of Pegu*. Rangoon: Superintendent of Government Printing and Stationery, 1859.

———. "Teak." In *Encyclopaedia Britannica*, Ninth Edition, 103–5. Edinburgh: Adam and Charles Black, 1888.

Bryant, R. L. "Shifting the Cultivator: The Politics of Teak Regeneration in Colonial Burma." *Modern Asian Studies* 28, 2 (1994): 225–50.

———. *The Political Ecology of Forestry in Burma*. London: C. Hurst, 1997.

———. *Nongovernmental Organizations in Environmental Struggles: Politics and the Making of Moral Capital in the Philippines*. New Haven, CT: Yale University Press, 2005.

Chew, E. C. T. "The Fall of the Burmese Kingdom in 1885: Review and Reconsideration." *Journal of Southeast Asian Studies* 10 (1979): 372–80.

Dean, M. *Governmentality*. London: Sage, 1999.

Doherty, F. and Nyein Han *Burma: Human Lives for Natural Resources—Oil and Natural Gas*. n. p.: Southeast Asian Information Network, 1994.

Evans, J. *Plantation Forestry in the Tropics*. Oxford: Blackwell, 1982.

Falla, J. *True Love and Bartholomew: Rebels on the Burmese Border*. Cambridge: Cambridge University Press, 1991.

Fink, C. *Living Silence: Burma under Military Rule*. London: Zed Books, 2001.

Forestal International Limited. *Forest Feasibility Study: Forest Resources*. Vol 1. Rangoon: Government of Burma, 1978.

Foucar, E. C. V. *I Lived in Burma*. London: Denis Dobson, 1956.

Furnivall, J. S. "Land as a Free Gift of Nature." *Economic Journal* 19, 76, (1909): 552–62.

Gallant, M. N. *Report to the Government of Burma on the Teakwood Trade*. Rome: FAO, 1957.

Geary, G. *Burma after the Conquest*. London: Sampson, Low, Marston, Searle, and Revington, 1886.

Geary, K. *The Role of Thailand in Forest Destruction Along The Thai-Burmese Border 1988–1993*. Bangkok: Project For Ecological Recovery, 1994.

Global Witness. *A Conflict of Interests: The Uncertain Future of Burma's Forests*. London: Global Witness, 2003.

Guha, R. *The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya*. Delhi: Oxford University Press, 1989.

Hayter, R., T. J. Barnes, and M. J. Bradshaw. "Relocating Resource Peripheries to the Core of Economic Geography's Theorizing: Rational and Agenda." *Area* 35,1 (2003): 15–23.

Htin Aung. *Epistles Written on the Eve of the Anglo-Burmese War*. The Hague: Martinus Nijhoff, 1968.

Keeton, C. L. *King Thebaw and the Ecological Rape of Burma: The Political and Commercial Struggle between British India and French Indo-China in Burma, 1878–1886*. Delhi: Manohar, 1974.

Kelly, R. T. *Burma: Painted and Described*. London: Adam and Charles Black, 1912.

King, K. F. S. *Agri-silviculture (the Taungya System)*. Bulletin No. 1. Ibadan: Department of Forestry, University of Ibadan, 1968.

Koenig, W. J. *The Burmese Polity, 1752–1819: Politics, Administration, and Social Organization in the Early Kon-Baung Period*. Ann Arbor, MI: University of Michigan Press, 1990.

Le Billon, P. "The Political Ecology of War: Natural Resources and Armed Conflicts." *Political Geography* 20 (2001): 561–84.

Lieberman, V. B. *Burmese Administrative Cycles: Anarchy and Conquest c. 1580–1760*. Princeton, NJ: Princeton University Press, 1984.

Maung Maung. "Nationalist Movements in Burma, 1920–1940: Changing Patterns of Leadership: From Sangha to Laity." M. A. thesis. Canberra: Australian National University, 1976.

McClelland, J. "Report on the Southern Forests of Pegu." *Selections from the Records of the Government of India (Foreign Department)* IX, 1855.

Mills, J. A. "Burmese Peasant Response to British Provincial Rule 1852–1885." In *Peasants and Politics: Grass Roots Reaction to Change in Asia*, edited by D. B. Miller, 77–104. London: Edward Arnold, 1979.

Ministry of Planning and Finance. *Report to the Pyithu Hluttaw on the Financial, Economic and Social Conditions of the Socialist Republic of the Union of Burma for 1985–86*. Rangoon: Government of Burma, 1985.

The Nation [Rangoon] 10 November 1955.

Nisbet, J. *Burma under British Rule and Before*. London: Archibald Constable, 1901.

Orwell, G. *Burmese Days*. Harmondsworth: Penguin, 1987.

Pearn, B. R. *A History of Rangoon*. Rangoon: American Baptist Mission Press, 1939.

Peluso, N. L. *Rich Forests, Poor People: Resource Control and Resistance in Java*. Berkeley: University of California Press, 1992.

Peluso, N. L. and M. Watts. eds. *Violent Environments*. Ithaca, NY: Cornell University Press, 2001.

Pollack, O. B. *Empires in Collision: Anglo-Burmese Relations in the Mid-nineteenth Century*. Westport, CT: Greenwood Press, 1979.

RFA. *Progress Report of Forest Administration in British Burma for 1863–64*. Rangoon: Government Printing, 1864.

Ribbentrop, B. *Forestry in British India*. Calcutta: Superintendent of Government Printing and Stationery, 1900.

Ross, M. L. *Timber Booms and Institutional Breakdown in Southeast Asia*. Cambridge: Cambridge University Press, 2001.

Scott, J. C. *Seeing Like a State*. New Haven, CT: Yale University Press, 1998.

Seekins, D. M. "Japan's Aid Relations with Military Regimes in Burma, 1962–1991." *Asian Survey* 32 (1992): 246–62.

Selth, A. *Transforming the Tatmadaw: The Burmese Armed Forces since 1988*. Canberra: Australia National University, 1996.

Sivaramakrishnan, K. *Modern Forests: State-Making and Environmental Change in Colonial Eastern India*. Cambridge: Cambridge University Press, 2000.
Slade, H. "Too Much Fire Protection in Burma." *Indian Forester* 22, 5 (1896): 172–76.
Smith, C. F. *Report on the Myanma Forestry Sector*. Yangon: Union of Myanmar for the Food and Agriculture Organization, 1991.
Smith, M. *Burma: Insurgency and the Politics of Ethnicity*. Second Edition. London: Zed Books, 1999.
Stebbing, E. P. *The Forests of India*. 3 vols. London: The Bodley Head, 1922–26.
Steinberg, D. I. *Burma's Road toward Development*. Boulder, CO: Westview Press, 1981.
Storey, D. *Territory: The Claiming of Space*. Harlow: Pearson, 2001.
Talwar, S. "Empowerment in an Authoritarian Context? Community Forestry in Myanmar (Burma) as a Case Study." Unpublished Ph. D. thesis, Department of Geography, Cambridge University, 2004.
Taylor, R. H. *The State in Burma*. London: C. Hurst, 1987.
Thawnghmung, A. M. *Behind the Teak Curtain: Authoritarianism, Agricultural Policies and Political Legitimacy in Rural Burma*. London: Kegan Paul, 2004.
Thongchai Winichakul. *Siam Mapped: A History of the Geo-body of a Nation*. Honolulu: University of Hawaii Press, 1994.
Trager, F. N. *Toward a Welfare State in Burma*. New York: Institute of Pacific Relations, 1954.
Tucker, R. P. *Insatiable Appetite: The United States and the Ecological Degradation of the Tropical World*. Berkeley, CA: University of California Press, 2000.
Tucker, S. *Burma: The Curse of Independence*. London: Pluto Press, 2001.
Watts, M. *Silent Violence: Food, Famine and Peasantry in Northern Nigeria*. Berkeley, CA: University of California Press, 1983.
———. "Antinomies of Community: Some Thoughts on Geography, Resources and Empire." *Transactions of the Institute of British Geographers* 29, 2 (2004): 195–216.
WRI (World Resources Institute) *Logging Burma's Frontier Forests: Resources and the Regime*. Washington, DC: WRI, 1998.

8

Losing Ground

Development, Natural Resources, and the Dispossession of Malaysia's Orang Asli

S. Robert Aiken

> At the level of the nation-state, such as in Malaysia, the single-minded pursuit of an "integrationist" model of development leaves little room for indigenous minorities to evolve and actualise their own dreams and notions of "development" from below.
>
> —Zawawi Ibrahim (1995, 2)

The Federation of Malaysia comprises the 11 states of Peninsular Malaysia (hereafter called "the Peninsula") and the two Borneo states of Sabah and Sarawak. The Peninsula is the most populous and developed part of Malaysia; in 2000, close to 80 percent of the country's total population of about 23 million lived there. Although export-oriented manufacturing has propelled Malaysia "from being merely a high-growth economy to becoming one of the world's most outstanding economic performers" (Brookfield 1994, v), the exploitation of natural resources—lands, forests, minerals—has fuelled much of the country's economic success.

Malaysia's impressive economic performance has yielded some remarkable results; for example, an increasingly mobile and urbanized Malay middle class has been created; the proportion of all Malaysians living in poverty has declined sharply; and there have been major across-the-board improvements in living standards, especially in the cities. On the other hand, economic development has been geographically very uneven, there has been a substantial environmental price to pay for economic success, and the Peninsula's indigenous peoples, the Orang Asli, have been by-passed by real development or have had unwanted "development" thrust upon them.

In what, putting it bluntly, amounts to an extensive land-and-resource grab, many Orang Asli groups have been systematically dispossessed of the

resources that they depend upon for their livelihood and cultural survival. One result is that the number of disputes and conflicts over access to lands and other resources has increased sharply in recent decades. Among the important ingredients of many such disputes are contrasting conceptions of land tenure, conflicting perceptions of what land and forest resources are worth, and opposing visions of the good life. What constitutes a natural resource is largely a matter of cultural appraisal; in other words, a resource takes on meaning in the context of a group's attitudes, values, technological skills, and social organization, as well as in relation to its needs and wants. Viewed from this perspective, we can expect to find many cross-cultural and temporal variations in the utilization and meaning of natural resources.

This chapter describes the socioeconomic, political, and administrative processes and policies that have resulted in the transfer of rights over and control of lands and other natural resources from the Orang Asli to state and private interests. Focusing on the period since 1786, when Britain acquired its first foothold in the Peninsula, I show that the demands of the "outside world" for agricultural land, minerals, forest products, energy, and other resources—in brief, the penetration of the region by capitalist resource development—have led to the appropriation of or encroachment on the lands and forests of many formerly viable and autonomous Orang Asli communities, resulting in their marginalization and threatening their cultural survival. The closing section looks at how the Orang Asli are mobilizing to resist further dispossession.

THE ORANG ASLI

Numbering about 93,000 in 1993, the Orang Asli[1] make up only about 0.5 percent of Malaysia's total population (Nicholas 2000, 11).[2] They comprise at least 19 distinct cultural groups, varying in population size from less than 100 to over 25,000. Although they differ widely in many respects, including physical appearance, language, and customs, the Orang Asli have this in common: "they are non-Malay indigenous peoples who occupied the Malay Peninsula before the establishment of Malay kingdoms during the second millennium A.D." (Dentan et al. 1997, 9).[3] Also widely shared among the Orang Asli are identification with particular localities or ecological niches and profound attachment to and affinity with their ancestral lands and forests.

Ethnologists have conventionally divided the diverse Orang Asli peoples into three broad ethnic categories or divisions, namely, Semang (or Negritos), Senoi, and Aboriginal Malays (also called Proto-Malays). This tripartite classification roughly corresponds with three traditional modes of ecological adaptation: opportunistic nomadic foraging, shifting cultivation, and mixed horticulture, respectively (Carey 1976; Rambo 1988).[4] In reality, Orang Asli economies are a good deal more diverse than the foregoing economic categories would tend to suggest.

Endicott notes that the Semang, who mainly inhabit the valleys and foothills of the mountainous regions between northern Pahang and the Thai border, sometimes "gather wild food and hunt game; at other times they collect rattan and trade it for food or money. They may also work for wages or food and occasionally they plant a few crops" (1979, 170). In short, their economic strategies are diverse, flexible, and versatile. The Senoi live on both sides of the Main Range in the central-to-northern part of the Peninsula, generally at elevations above 500 meters. Traditionally shifting cultivators, they also collect forest products both for their own consumption and for trade, and many are involved in small-scale commodity production and wage labor. Finally, the diverse ecological adaptations of Aboriginal Malays, most of whom inhabit the southern third of the Peninsula, not only include mixed horticulture, with an emphasis mainly on tree crops, but also fishing, dry and wet rice farming, and rubber tapping; in addition, many are involved in the wage market. A small but growing number of Orang Asli have drifted to the towns, where they generally find that their lack of skills and rudimentary education bans them from all but the most menial jobs.

Although some Orang Asli are relatively prosperous farmers, traders, and civil servants, the great majority of them are poor and marginalized. In 1999, the incidence of poverty among the indigenes was 50.9 percent, compared with 7.5 percent nationally; and the comparable figures for what the government calls "hardcore poverty" were 15.4 percent and 1.4 percent, respectively (Malaysia 2001, 56–57, 60). In other words, half of all Orang Asli were poor, and one in approximately seven lived in extreme poverty in that year. Other measures of well-being among the Orang Asli reflect pervasive deprivation: many of their settlements lack basic amenities such as electricity, piped water, adequate sewerage, and tarred roads; housing is often of poor quality; many persons suffer disproportionately from endemic malaria, chronic malnutrition, tuberculosis, leprosy, and other serious health problems; infant and maternal mortality rates are much higher and life expectancy is considerably lower than the national average; and few receive any education beyond the primary-school level. Weighed down by poverty and neglect, the Orang Asli also suffer from being regarded as "primitive" or "backward" peoples, as a kind of blemish on the government's carefully cultivated image of Malaysia as a modern and progressive state. So viewed or constructed, the Orang Asli have long been the butt of much gratuitous scorn and ridicule.

The Wealth of Nature and the Orang Asli

The Malay Archipelago has long been famed for its natural wealth. It was the lure of gold, tin, and the riches of the forests and the seas that began to attract Arab, Indian, and Chinese traders to places such as the Malay Peninsula and the coasts of Borneo in the early centuries AD; and it was from the abundant harvest of these same natural resources that early maritime

states and empires drew much of their wealth. In the West, the aroma of the legendary Spice Islands evoked images of an opulent East, and the ineffable superabundance of plant and animal life in the luxuriant forests of the Malay world inspired some of the earliest scientific studies of tropical nature, including those of the great naturalist Alfred Russel Wallace.

Today, as in the past, Malaysia's natural wealth is a focus of much attention: governments continue to exploit it, for a heavy reliance is still placed on primary production; vested interests vie for a larger share of it, for access to resources such as timber means great wealth for a select few; conservationists strive to save and protect it, for current trends threaten to expunge much of it forever; and indigenous peoples such as the Orang Asli struggle to hold on to their fair share of it, for continued possession of lands and forests not only ensures livelihood but also nourishes and frames individual and group identity.

As Dunn points out, Malaysia's "greatest natural wealth lies in her unimaginably diverse forest resources for these are riches that can renew and replenish themselves forever" (1975, 58). The dipterocarp-dominated lowland and hill forests are especially rich in plant and animal species, and many of them, as I explain below, have been utilized by the Orang Asli since time immemorial. As might be expected, however, it is precisely the lowland forests in dryland areas that have borne the brunt of human activities (Aiken and Leigh 1992). The Peninsula also possesses nonbiotic resources that have long been of subsistence and commercial value to its inhabitants, including minerals, notably tin, and the forest land itself, whether temporarily cleared for shifting cultivation or permanently assigned to plantation crops or some other land use. But unlike forests, tin is a nonrenewable resource, and agriculture largely depends on enriching the region's soils, the majority of which are poor and strongly leached, either through the traditional method of releasing stored nutrients in the vegetation by burning the forest or through regular use of fertilizers.

Forest Resources

The Orang Asli have long utilized a vast array of nontimber forest products, especially plants, for food, materials, trade goods, medicines, ritual uses, and other purposes (Burkill 1935). A few brief examples focusing only on food, material culture, and trade will serve to underscore the point (see Rambo 1988, 278–82). Many plant parts, especially leaves, seeds, tubers, and fruits, have been exploited for food. The Batek and other Semang, for example, rely heavily on various species of wild yams and seasonal fruits, particularly durian, as their main source of carbohydrates. Fruit trees are widely prized. They include domesticated species, others that are "cultivated" (in the sense that they are promoted by removing competing vegetation), and yet others that are exclusively wild. Many Aboriginal Malays engage in extensive arboriculture, creating what are essentially anthropogenic forests. Numerous species of wild animals are also valued as a source of food. Rambo observes that virtually "any

species of mammal, bird, reptile, amphibian or fish, some insects, and other invertebrates such as molluscs, may be consumed by Orang Asli" (1988, 282).

The Orang Asli utilize a virtually endless list of plant species for material purposes. Special importance is attached to bamboo, which is used as a building material and for making blowpipes, dart quivers, cooking vessels, water containers—and the list goes on and on. Leaves of pandanus are woven into mats, bags, pouches, and other items, and the leaf of the bertam palm is the main source of *atap* (thatch) for houses. Resin (*damar*) is collected from dipterocarps, and poisons are obtained from the ipoh tree, the roots of lianas, as well as other plant species.

External trade in forest products is an ancient practice. Prior to the nineteenth century, the collectors and primary traders were exclusively or primarily Orang Asli. Well adapted to life in and possessing remarkably detailed knowledge of the forests, they were intimately familiar with the distribution, properties, and spatiotemporal occurrence of literally hundreds of forest products. Studies show that the export of these products to China, India, and the Arab world extends back to the early centuries AD, the prized items including beeswax, gaharu wood (a resinous wood used as incense), camphor, damar, lac, ivory, rattan, honey, and rhino horn (Wang 1958; Wheatley 1959). Various Orang Asli groups also engaged in trade with neighboring Malay communities, exchanging rattan, bamboo, and other forest products for salt, knives, metal axe-heads, and other wares.

Dunn argues that a "seemingly inescapable consequence of great ecological diversity and the astounding range of information that must be absorbed by tropical forest dwellers is that they become 'locked into' the subsistence zone that they have lived in and studied from childhood" (1975, 64–65). A more telling point is that others are effectively "locked out" of the forest. Lacking the detailed, comprehensive, and systematized knowledge of the Orang Asli, the Malays and other more recent immigrants have tended to view the forest as an alien world, a world they are able to penetrate only by converting or destroying it (Rambo 1980, 86).

Clearly, the Peninsula's forests are a veritable storehouse of useful products. In recent decades, however, a single forest product, namely timber, has supplanted all others in commercial importance. This departure represents a major break in the centuries-long history of forest-product exploitation in the region. Many Orang Asli have suffered rather than benefited from this departure because, among other things, several decades of unsustainable timber harvesting have depleted the forest resources that numerous communities depend upon for their livelihood.

Valuing Land

Safeguarding land rights and maintaining access to lands, forests, and other natural resources are common concerns of indigenous peoples around the world, and the Orang Asli are no exception. Land, here broadly construed to mean all the resources of a particular area, is the lifeblood of the Orang Asli.

It is the immediate source of most basic necessities, including food, medicines, fuel, and raw materials for household use, and it provides forest products for trade. It is much more than that, however, because land also carries spiritual, cultural, social, and intergenerational value and meaning. Normally imbued with love and reverence, land is the place of belonging: it nourishes and frames individual and group identity, and it is pivotal to a sense of well-being. Conversely, Orang Asli who are dispossessed of their lands often suffer acutely from emotional distress, loss of authentic identity, and deprivation of life itself, potentially resulting in death.

Private ownership of property is the bedrock on which modern economies are constructed. Like most other indigenous peoples, however, the Orang Asli do not regard themselves as "owners" of the lands they occupy. Endicott notes that Semang (Negritos) and Temiar Senoi view their possession of natural resources to extend only to certain fruit trees (the durian being especially prized), to ipoh trees, and to the collected or harvested products of the land (1979, 171–77). Rights to land and other resources are therefore basically customary usufructuary rights. Note, however, that Orang Asli concepts of land and resource rights "have no force in Malaysian law except for limited recognition of individual ownership of fruit trees" (Endicott 2003, 151). Among the increasing number of Orang Asli who are involved in market exchange, however, the trend is for land to take on "the same character of private property as found in non-Orang Asli communities" (Williams-Hunt 1995, 37).

Whereas the Orang Asli have long relied on a vast array of forest (and sea)[5] products for subsistence and trade, colonial and postcolonial development policies have concentrated on the exploitation of a rather narrow range of natural resources, namely, tin, land for mainly commercial agriculture, and forests primarily for timber production. Although the region's forests provide a wealth of products, perform numerous essential ecosystem services, carry many noneconomic values, and are of vital importance to the region's indigenous peoples, they have, especially in recent decades, been extensively cleared or variously degraded.

Colonial Economic Development, Natural Resources, and the Orang Asli

Britain acquired the three entrepôts of Penang, Singapore, and Malacca[6] in 1786, 1819, and 1824, respectively. Subsequently formed into a single administrative unit called the Straits Settlements, their major purpose was to foster the China trade. Because trade, not territory, was of paramount concern, the British initially showed little interest in the still heavily forested and thinly settled interior of the Peninsula. Britain's presence in the region, however, acted as an economic magnet to a swelling tide of mainly Chinese migrants, many of whom eventually flocked to parts of the western and southern lowlands, where they engaged in tin mining and a resource-depleting form of shifting plantation agriculture. Peoples of Malay stock from Java,

Sumatra, Sulawesi, and elsewhere in the Archipelago had been moving into the Peninsula since about 1500, and the number of new arrivals increased substantially during the nineteenth century.

Britain adopted the so-called "forward movement" in the mid-1870s, and by 1914 colonial rule had been extended over the entire Peninsula. One of the motives behind this new departure was a growing demand at home for industrial raw materials. As a result, after about 1880, the colonial government began to establish the framework for a profitable export economy based on tin and plantation crops. Policies that were adopted included maintaining law and order, establishing an efficient legal and administrative apparatus, creating a modern system of communications, making cheap labor available to planters and miners, and adopting a new system of land tenure. In short, in the two or three decades following the extension of British rule in the Peninsula, the colonial government successfully erected an economic edifice in which private enterprise began to flourish.

The many consequences of Britain's involvement in the land and life of the Peninsula during the colonial period (1786–1957) included substantial population growth; a growing demand for industrial raw materials, including certain forest products, tin, and plantation crops; an increase in the pace and scale of anthropogenic forest change, much of it resulting from the widespread adoption of rubber cultivation after about 1905; and a marked diminution in the socioeconomic status of the Orang Asli, partly because international demand for forest products declined and partly because their ancestral lands and forests were increasingly appropriated for commercial purposes. One result of the quickening pace of population growth and settlement in the Peninsula was increasing conflict with Orang Asli over access to and control over land. As Couillard observes, some of the settlers from the Archipelago "imposed themselves violently, others opted for alliances, especially matrimonial, legitimising in the process their moving into Orang Asli territories" (1984, 99); and Andaya comments that some immigrants from neighboring islands were responsible for killing Aboriginal Malays "in order to seize their lands" (2002, 38). As the Malay population increased, and as settlers advanced inland along the major rivers, many Orang Asli were displaced from their ancestral lands in the lowlands. Some groups were also subjected to intense slave raiding, with the result that they fled into the mountains to escape predation. Many Semai, for example, were displaced from their coastal settlements in Perak, and those who were captured were enslaved. Endicott notes that slave raiding would have served a double purpose: "the Semai who were captured could be enslaved, and those who escaped would be driven out of the area, thus allowing their land to be appropriated" (1983, 232).[7]

Competition for Forest Resources

Singapore's free port attracted Chinese traders in search of forest and marine products such as camphor, beeswax, resins, and seaweed *(agar-agar)*, sea

slugs *(tripang)*, and tortoise shell, and initially the increasing number of junks arriving in Singapore stimulated trade in these products. As Andaya and Andaya point out, however, "despite the impressive growth of the China trade, the percentage of overall trade was slowly shifting in favour of Europe" (1982, 134). Behind this departure was the birth of the industrial age and the triumph of industrial technology, which in turn hastened changes in banking, finance, transportation (especially in ocean shipping), and communications (notably the telegraph). The westernization of trade meant that many forest products declined in importance, although a number of others took on new significance.

Industrialization and rising living standards in Britain stimulated demand and created new uses for certain industrial forest products, including jelutong (*Dyera costulata*, a wild rubber), gutta percha (*Palaquium gutta*, a rubber-like latex used, among other things, for insulating submarine cables), illipe nuts (*Shorea* spp., a source of vegetable oil), cutch (a tanning agent from the bark of mangrove trees), rattan (*Calamus* spp., mainly for furniture), and various gums and resins. Mounting external demand for industrial raw materials and enhanced local prospects of quick profits combined to rapidly deplete the available supplies of certain forest products, especially gutta percha.

Noting that Malays used gutta for making riding-whips, Europeans soon found a variety of commercial uses for a substance that could be molded into any shape by heating and that would harden on cooling. During the 1840s, when there was a rapid rise in the gutta percha market, Malay traders and village headmen scoured the interior of Singapore and southern Johor for gutta trees and recruited an increasing number of Orang Asli as collectors. Though it is possible to tap a gutta tree without permanently damaging it, this was a slow process and it became standard practice to cut the tree down and to bleed the trunk by ringing. Even with this method, however, it required 10 full-grown trees to produce one *picul* (about 60 kilograms) of gutta. Turnbull calculated that between January 1845 and mid-1847 "about seventy thousand trees [on Singapore island] must have been felled to produce the 6,918 piculs of gutta exported from Singapore" (1972, 277–78). By the late 1840s, gutta trees had virtually disappeared from Singapore island and southern Johor.

Several factors conspired to erode the socioeconomic status of the Orang Asli during the nineteenth century. First, they were no longer, as they had been for many centuries, the sole collectors of forest resources; instead, they increasingly faced competition from Malays and Chinese who, in the course of timber cutting or the opening up of new land for agriculture, began to collect and market forest resources. Second, the decline in international demand for many forest products meant the loss of an important source of revenue. As Andaya and Andaya explain, because the collection of forest products "remained largely in indigenous hands and continued to function along traditional lines it was not an attractive field for investment . . . . In the opinion of Straits business interests, the only really potentially rewarding

areas for investment, able to service both the China trade and the growing markets in Europe, were commercial agriculture and tin mining" (1982, 135). And third, deforestation and land alienation associated with those very same commercial ventures increasingly threatened to dispossess the Orang Asli of their ancestral lands and forests.

Land Tenure

Whereas the Orang Asli regarded land as a communal asset whose possession ensured survival and cultural vitality, colonial authorities viewed land as an economic good or commodity that could be bought and sold on the market, a conception that was largely incomprehensible to the indigenes. Since communal systems of land tenure were generally considered inimical to economic development, one of "the first acts of the colonial government was to repudiate Malay [and Orang Asli] customary land rules" (Andaya and Andaya 1982, 208). Capitalist production demanded access to and control over land, and attracting an infusion of capital into the export economy required an ability on the part of the colonial government to provide investors with clear, secure, and uncontested rights to land. Measures that were taken to achieve these ends included declaring state sovereignty over land and adopting the Torrens system of land tenure, which provided for undisputed title to land.[8] Under this system, "all land is deemed to be vested in the crown, and private rights are alienated on the basis of fixed-term leases. . . . In the case of the Malay States, the Malay ruler was deemed to be the crown" (Means 1985/1986, 639; cf. Wong 1975, 16).

Recognizing that the new land tenure arrangements threatened the customary rights of the Malays, the colonial government passed the *Malay Reservation Enactment* of 1913 (revised 1933), thereby providing for the creation of Malay Reservations in which only Malays could lease or own land (Kratoska 1983). But no such protection was extended to the Orang Asli. Instead, as Means explains, "aboriginal lands were deemed to be the crown lands of the Malay rulers, and were treated as if they were unoccupied. . . . [T]he aborigines, who were deemed to be without land title . . . were permitted to live on 'unoccupied lands' by sufferance, as dependents of the Malay rulers" (1985/1986, 640). Also referred to as "waste land" or "vacant land," what appeared to colonial officials as "unoccupied areas" were often used by groups of Orang Asli (as well as Malays) for hunting, collecting forest products, and shifting cultivation. As in other parts of colonial Southeast Asia, however, government authorities in the Peninsula, especially foresters, were adamantly opposed to shifting cultivation, which they invariably considered a major cause of timber depletion and soil erosion. They therefore attempted to put an end to it, although with rather little success among the relatively isolated Senoi living in the interior (Kratoska 1985, 18–20; Harper 1997).[9] A more serious threat to the Orang Asli came from the widespread and continuing appropriation of land in the western lowlands for tin mining, plantation agriculture, smallholder cultivation,

infrastructural development, and other purposes because, as Couillard notes, these developments deprived the aborigines "of free access to land and pushed them into the least fertile regions" (1984, 102).

Restricting Access to Resources

Colonial forest policy also had generally negative consequences for the Orang Asli. Following the establishment of a joint forest department for the Straits Settlements and the Federated Malay States in 1901, a program of forest reservation for mainly sustained timber production and environmental protection got underway, and legislation was introduced to lend support to the department's duties and responsibilities. Forest reservation continued apace during the interwar period, with the result that some 27,110 square kilometers of forest land (or about 20 percent of the Peninsula's total land area) had been reserved for production and protection purposes by 1937 (Aiken and Leigh 1992, 55–57).

As the reservation program proceeded, many Orang Asli in the interior found themselves living within forest reserves, where they were generally permitted to remain, subject to certain restrictions. In any case, forestry laws were virtually impossible to enforce in the more inaccessible reserves occupied by the indigenes, although as noted above, the government made attempts to contain what it regarded as the predations of shifting cultivators. In brief, the effect of colonial forest policy "was to transfer rights to the forest from local communities to the state" (Cleary and Eaton 1996, 105).

The setting aside of parks and wildlife reserves had the same effect. Usually established in remote or inaccessible parts of the country that were deemed to have little or no commercial value, conservation areas were often located in Orang Asli homelands. King George V National Park (later renamed Taman Negara) is a case in point. Established in 1938–39 in a then remote part of the Peninsula, it embraced a broad swath of Batek Semang territory. The Batek were permitted to live in the park, but not to collect forest products for sale.

Paternalism, Security, and Control

Prior to about 1950, colonial officials treated the Orang Asli with benign neglect, usually intervening in their daily affairs only when they contravened certain game or forest laws. Only a few missionaries, philanthropists, gentlemen explorers, and early anthropologists showed much interest in their distinctive ways of life,[10] and most Europeans appear to have regarded them as Rousseauistic "noble savages" or "children of nature" leading idyllic lives in the primeval forest. In the eyes of certain officials, the indigenes were literally like helpless children. The British Resident of Selangor, for example, commented in 1895 that "they must be provisionally treated as children and protected accordingly, until they are capable of taking care of themselves" (quoted in Harper 1997, 8). As Nicholas observes, "the task of

government was to protect and preserve them from the ravages of modern life" (1996, 160).[11]

It was not until the late 1940s, when they were suddenly thrust into strategic importance during the anti-Communist Emergency (1948–60), that the colonial government assumed any real responsibility for promoting the welfare of the Orang Asli. In an early attempt to deny their support to the insurgents, several thousand aborigines were herded into hastily built resettlement camps, where several hundred of them died of disease and psychological upheaval. A different approach called for the establishment of "jungle forts" in Orang Asli areas with high concentrations of guerrillas, their purpose being to provide visible evidence of government authority and to protect the Orang Asli from Communist intimidation (Jones 1968, 298). Eventually a total of 10 forts garrisoned by police were constructed, but "most Orang Asli did not live near forts, and the guerrillas came and went freely whenever the police were not around" (Denton et al. 1997, 64). Recognizing that a greater degree of kindness rather than coercion was required to win over the Orang Asli to the government side, a Department of Aborigines was set up in 1950—it was later greatly expanded and renamed the Department of Orang Asli Affairs or Jabatan Hal Ehwal Orang Asli (JHEOA)—and basic health facilities, rudimentary education, and goods such as salt and tobacco were made available at the forts.

Motivated largely by security concerns, in 1954 the colonial government enacted a law that was to have far-reaching consequences for the Orang Asli. This was the *Aboriginal Peoples Act*.[12] Still in force today, the Act defines the legal status of the Orang Asli and makes the JHEOA responsible for policy and administrative matters pertaining to all aborigines in the Peninsula (Hooker 1991, 55–57). Paternalistic in tone and containing no provision to allow the Orang Asli any role in shaping their own affairs, the Act enables the government minister in charge of aborigines "to exercise total and exclusive power to protect, control and in all ways to determine their life, status and future" (Rachagan 1990, 110).

Under the *Aboriginal Peoples Act*, state governments can—but are not obliged to—set aside "aboriginal areas" or "aboriginal reserves" (Hooker 1991, 62–64).[13] Even in these designated places, however, the Orang Asli have few rights and virtually no security because, first, they cannot obtain individual titles to land, and second, the enabling legislation also provides for the revocation of any such area or reserve without consultation with the aborigines. In short, the Orang Asli cannot obtain any greater title to the land that has been allocated to them than that of "tenant at will" (Hooker 1976, 180). What this means, in essence, is that no tenancy for life is possible. Since all land not owned by title deeds belongs to the individual states, and since very few of the indigenes possess individual titles to the lands they have long occupied, the vast majority of the Orang Asli are legally "squatters" on state land. Thus, as Endicott points out, "State governments can use the land in any way without even consulting the Orang Asli living on it; the states

are only required to pay minimal compensation for fruit trees destroyed by development" (2003, 151).

To sum up: during the British colonial period, Malay settlement, slave raiding, and land alienation for commercial development combined to displace many Orang Asli from their ancestral homelands in parts of the lowlands and major river valleys. As the economic importance of forest products declined in the colonial economy, so too did the socioeconomic status of the indigenes. No longer considered indispensable collectors and traders of forest products, and regarded as lacking "civilization" because they were not Muslims, Malays generally came to view the "backward" ways of the Orang Asli with contempt. The setting aside of extensive forest reserves and a number of conservation areas also worked against the interests of the Orang Asli because it restricted their access to forest products. Following the enactment of the *Aboriginal Peoples Act*, the JHEOA acquired virtually total control over the lives of the Orang Asli.

The Orang Asli and the Malaysian State

The Federation of Malaya became an independent country in 1957.[14] For about a quarter of a century thereafter, economic development remained heavily dependent on primary production of mainly tin, rubber, oil palm, and timber. Two results were a great increase in the pace and scale of deforestation, most of it resulting from government-sponsored land development schemes, and widespread degradation of the remaining lowland and hill forest cover by unsustainable logging (Aiken and Leigh 1992). In addition to the main focus on lowland economic development, hitherto largely inaccessible areas in the mountainous interior of the Peninsula, home to many Orang Asli, were increasingly penetrated by new highways, and some of these same areas were targeted for construction of power-generating dams. Since the 1980s, export-oriented manufacturing of mainly textiles, electronics, and electrical goods has emerged as the main driver of the Peninsula's economy. In that it is almost entirely urban-based, however, manufacturing has brought few benefits to the still predominantly rural-dwelling Orang Asli.

Development, Assimilation, and Dispossession

The government seeks to integrate Orang Asli lands and other resources into the national economy; to modernize what it regards as the "backward," "traditional," and "wandering" ways of life of the indigenes; and to enhance nation building by incorporating the minority Orang Asli into the "mainstream" of society, which should be understood to mean the dominant Muslim Malay society. A 1961 policy document called for the eventual integration of the Orang Asli into the Malay community, adding that their land rights would be recognized and that they would not be resettled without their full consent. The document is a dead letter: integration has become assimilation, and the land and settlement rights of the aborigines have been

consistently ignored (Dentan et al. 1997, 79–83). Unlike Malays, the great majority of Orang Asli are not Muslims. Assimilation therefore requires conversion to Islam, and since about 1980, Muslim missionaries have been active in many Orang Asli villages. Karim claims that conversion to Islam is often "accompanied by apathy and disdain rather than motivation and spiritual enlightenment" (1995, 28).

Lacking legal title to their lands and possessing no power to influence development policies, many indigenous communities have been forced to endure destruction or depletion of prized forest resources, displacement from traditional homelands, unwanted resettlement, and loss of local autonomy. Long-occupied lands have been appropriated, usually without compensation, for various kinds of development projects, including government-sponsored rural land development schemes, logging, and dams for flood control and generation of electricity. Roads invariably accompany all such schemes, resulting in further loss of land and destruction of resources.[15]

Land development schemes and mining projects have displaced many Orang Asli from their traditional homelands. At Cawang, near Trolak in Perak, for example, some 2,000 hectares of forest lands occupied by Semai were cleared by the state agricultural development corporation and turned into a huge oil-palm estate, leaving only about 40 hectares of forest occupied by 5 families (Williams-Hunt 1995, 42–43). In another case, tin mining and agricultural development on Semai lands near Bidor in Perak destroyed fruit trees and polluted streams in the area. Nicholas notes that "the Orang Asli were not assured of any kind of compensation" and that, to make matters worse, "they were asked by the JHEOA to move to another area further inland" (1996, 170).

Logging, together with the roads, tracks, skid-paths, heavy machinery, and workers that invariably accompany the process, have extensively encroached on Orang Asli lands in both lowland and upland areas. A notoriously destructive activity, logging depletes wildlife, destroys fruit trees, increases rates of soil erosion and stream sedimentation, thereby affecting aquatic life, and may, among other things, desecrate ancestral graves and other sacred sites. Logging companies rarely provide compensation for damage to or destruction of fruit trees. Dentan et al. note that "loggers who cleared the area around Mncak, a Semai settlement near Kampar [Perak], never paid the headman the fee promised. . . . Though the logging took place years ago, erosion caused by logging roads continues to damage crops. Complaints to the JHEOA bring no response" (1997, 99).

Other pressures on Orang Asli lands and livelihood have come, for example, from new roads, dams, and airport development. Dentan and Ong observe that highways "have destroyed an inestimable number of Semai plantations" and that "they often run to golf courses which, because they cater to tourists from Japan, are often located in the highlands which were once safe havens for Semai" (1995, 76). Several dams have also been located in highland areas where many Orang Asli live. Construction of the Temenggor Dam in Perak led to many Temiar being moved to new locations outside the

reservoir area (Endicott 1979, 198–99), and the Linggiu Dam in Johor flooded some 5,000 hectares of Jakun land, while another "14,600 hectares became catchment areas on which Jakun are not supposed to farm or build" (Dentan et al. 1997, 107). In Selangor, where some 76 percent of Orang Asli reserves were degazetted between 1990 and 1999, Temuan in Sepang were forced to give up their traditional lands for the development of the new Kuala Lumpur International Airport (Nicholas 2000, 36, 117).

Many Orang Asli have been settled in so-called regroupment schemes. Whereas "resettlement" was the order of the day during the Emergency, the subsequent adoption of the term "regroupment" refers to development schemes within, or close to, traditional Orang Asli homelands. The schemes aim to prevent Communist control of Orang Asli, to provide settled groups with permanent housing, schools, hospitals, and other facilities, and to convert foragers and shifting cultivators into commercial producers of mainly rubber and oil palm—that is, to integrate them into the national economy. It is clear, however, that the schemes also serve to displace Orang Asli from lands and forests that are wanted for development purposes. Regrouped Orang Asli face numerous problems: living conditions are often much worse in regroupment schemes than they were in the deep forest; intergroup conflicts over rights to exploit natural resources tend to erupt between recently settled groups and other Orang Asli long resident in surrounding areas; and higher population densities in the schemes place increased pressure on local resources, resulting in their depletion (Dentan et al. 1997, 117–41). Finally, it must be noted that even regrouped Orang Asli enjoy no security of tenure, because they "cannot get freehold title from the State land office for land in the regroupment schemes" (Hooker 2001, 199).

Although, as noted above, the *Aboriginal Peoples Act* provides for the creation of "aboriginal areas" or "aboriginal reserves," state governments have been very reluctant to set aside land for the Orang Asli. As of 1996, only some 18,500 hectares of Orang Asli lands had been officially gazetted as reserves, representing barely 15 percent of the more than 770 villages where the Orang Asli live; and in ca. 1997, a grand total of 19 individuals had managed to obtain secure title to their land, according to Nicholas (2000, 33, 38). Together with forest and most other natural resources, land is an important source of revenue for most states, and this circumstance probably accounts for their reluctance to devote land on a permanent basis to the Orang Asli. As for the federal government, it has long been unwilling, probably mainly for political reasons, to invoke certain of its constitutional powers in order to acquire state land for the Orang Asli (Rachagan 1990, 103–4; Hooker 1991, 67–68).

In brief, the generally negative effects of development on the Orang Asli include widespread displacement from customary lands; encroachment on and depletion of forest resources, resulting in loss of plant and animal foods, raw materials, and sources of cash income; regroupment, generally leading to greater poverty, insecurity, and growing dependence on the government for survival; and severe marginalization. That many Orang Asli can

no longer make a decent living is not a result of their alleged "backwardness" but rather a direct consequence of government policies aimed at incorporating them into the modern and "progressive" Malaysian state. Deprived of productive assets, ill-equipped to find alternative jobs, and with only their labor to sell, many Orang Asli have been pressed into the swelling ranks of the rural proletariat. At best, as Endicott notes, "government-sponsored programs are designed only to turn indigenes into rural cash-croppers, one of the poorest segments of the national population" (2003, 160).

Orang Asli Responses

The Orang Asli have long resorted to various forms of nonviolent resistance to unwanted incursions into their homelands and disruptions to their ways of life. For example, many Semang and Semai responded to slave raiding by fleeing into the interior uplands, where they sought the protection of isolation; the preference among Temiar for living in longhouses may, originally, "have been partly for defensive reasons" (Endicott 1983, 230); some Orang Asli have resisted Islamization by converting instead to Christianity or the Bahai faith; and in what, admittedly, was a rare act of defiance, Semai in 1982 responded to logging of their forests on Bukit Seruk, Pahang, by blockading the logging roads.

Many Orang Asli have also displayed remarkable adaptability and resilience in the face of numerous pressures to change. Here are two brief examples: first, Lye and Endicott observe that Batek Semang foragers "take a little here and there, using whatever tools and opportunities present themselves, in order to further the long-term project of maintaining cherished ways of life" (2002, 2); and second, Dentan and Ong underscore the extraordinary resilience of Semai horticulturists, many of whom are increasingly involved in the market economy: "Time and again," they write, "outsiders have seized or destroyed trees which Semai tended and grew. Time and again, Semai have cut their losses and retreated to another area to begin again" (1995, 85). In short, it would be a mistake to regard the Orang Asli as passive "victims of development."

There is growing awareness among many Orang Asli that they share a "common heritage and a common plight" (Howell 1995, 286). As a result, they are increasingly mobilizing to protest against integrationist government policies that threaten to erode their distinctive identities and to resist further appropriation of their lands and forests. The trend in recent decades has been for older forms of resistance to be supplemented or replaced by more overt expressions of grievance and disaffection. Thus, for example, Orang Asli efforts to redress the wrongs they have suffered now include asserting their rights through the legal system, publicizing their plight in the media, and appealing for assistance from sympathetic nongovernmental organizations and government agencies. They have also formed advocacy groups to promote their interests.

Dissatisfaction with the JHEOA led to the formation of the Orang Asli Association of Peninsular Malaysia (Persatuan Orang Asli Semenanjung Malaysia, or POASM), in 1977. Now boasting some 20,000 members, POASM is "increasingly active in spreading information about the general situation of the Orang Asli as well as reporting transgressions committed against them" (Howell 1995, 286), and it (unsuccessfully) contested a seat in the 1999 federal election. In 1989, a multiethnic group of volunteers, including some Orang Asli, founded the Centre for Orang Asli Concerns (Pusat Prihatinan Orang Asli, or COAC), which serves, in part, as a documentation and research center on matters concerning the indigenes. Generally reflecting the views of educated Orang Asli, COAC "encourages and facilitates the development of independent community and regional Orang Asli organizations" (Dentan et al. 1997, 154). Other organizations that promote Orang Asli interests include the Orang Asli Assistance Fund and the Temiar Fund, both of which are supported by overseas academics.

It would appear, however, that the ability of these various organizations to effect changes in official attitudes and policies has been rather limited: most Orang Asli remain poor and marginalized, development schemes continue to encroach on their ancestral homelands, and very few individuals enjoy secure titles to their land. Small in number, lacking political influence, and widely regarded as "backward" peoples, the Orang Asli clearly face an uphill battle for survival as distinct and respected peoples within the modern Malaysian state.

Envoi

The Orang Asli, like most other indigenous peoples, want secure legal rights to their ancestral homelands and natural resources, freedom of religious and cultural expression, the right to speak their own languages, and a certain degree of political autonomy, including some latitude to shape decisions that affect their lives. They also want a fair share of the benefits that normally come with economic development and modernization, such as provision of roads, electricity, piped water, and good housing, as well as access to better education and health care. In short, the Orang Asli welcome the benefits of development, provided that they are not required "to give up their cultures and ethnic identities to get them" (Endicott 2003, 155). What they increasingly oppose are the negative effects of the so-called development initiatives that have been foisted upon them.

There is considerable irony in the fact that the government's attempts to "modernize" the Orang Asli and to assimilate them into the Malay population have served instead to produce an emerging sense of collective identity and political unity among the Peninsula's indigenous peoples. Flying as it does in the face of official objectives, this unintended outcome owes much to the ongoing struggle of the Orang Asli to assert their rights to the wealth of nature.

Notes

1. A modern Malay term, Orang Asli means "original people." Prior to the 1960s, when the government introduced the term "Orang Asli," the aborigines were known in Malay by the pejorative term "Sakai" (Couillard 1984). There is a substantial literature on the Orang Asli; see especially Lye (2001).
2. Reliable, up-to-date demographic information about the Orang Asli is difficult to come by because they were lumped together with Malays in recent population census returns, thereby denying their existence as separate peoples. According to Nicholas (2002, 1), there were about 116,000 Orang Asli in 1999.
3. There are peoples living outside Peninsular Malaysia who are ethnically, linguistically, or geographically related to the Orang Asli. They are "the seagoing (but increasingly land-based) peoples of the Riau Islands, Singapore, Straits of Malacca, and Andaman Sea and the so-called Negrito (or Sakai) peoples of southern Thailand" (Lye 2001, xxvii).
4. In 1993, there were 2,972 Semang (3.2 percent), 49,440 Senoi (53.4 percent), and 40,117 Aboriginal Malays (43.4 percent), making up a total population of 92,529 (Nicholas 2000, 11); see note 2 above.
5. Apart from a brief mention below, sea products are not discussed. The major collectors and traders were the Orang Laut ("strand and sea people") of the southern coasts and offshore islands (Andaya and Andaya 1982, 12–13).
6. The British assumed control of Malacca (Melaka) in 1795, and it continued under British rule from that time, except for a brief interlude of Dutch rule during 1818–24.
7. Between 1883 and 1920, the British abolished slavery in all states of the Peninsula. Apparently, as Endicott notes rather disturbingly, "the Orang Asli were viewed as a natural resource, an especially valuable forest product that could be collected for domestic use or converted to cash" (1983, 222).
8. Introduced into the Malay states in the 1890s, the Torrens system "employs title by registration rather than title by deed [and] is based on land registers maintained by the government. All alienated land is entered in the registers, and these entries are the land titles; to be legally binding, mortgages, leases, and transmissions of title must also be entered in the register" (Kratoska 1985, 25).
9. Although unsustainable logging has been the major cause of timber depletion in the postcolonial period, criticism of Orang Asli shifting cultivators' impact on forest resources has persisted. Such criticism, Lye observes, "has been adopted as an ideology by government officials today, regardless of evidence to the contrary" (2001, xxi).
10. Skeat and Blagden's monumental two-volume study of the Peninsula's indigenes appeared in 1906. It remains indispensable.
11. Nicholas goes on to note that H. D. "Pat" Noone, field ethnographer and sometime curator of Perak's Taiping Museum, was instrumental in perpetuating "the view of the British colonialists that the Orang Asli should remain in isolation from the rest of the Malayan population, and be given protection" (160).
12. The revised law of this name came into effect in 1974 and is the successor of the original Aboriginal Peoples Ordinance of 1954. There is a detailed critique of the Act in Hooker (1991, 58–70); see also Rachagan (1990, 105–10).
13. The intended distinction is between an "area" for temporary occupation and a "reserve" for permanent occupation (Hooker 1991, 62–63).

14. In 1963 the Federation of Malaya (now Peninsular Malaysia) joined with North Borneo (now Sabah), Sarawak, and Singapore to form the Federation of Malaysia. Singapore became an independent republic in 1965.
15. Zawawi (1996) presents several case studies of what he calls the "dispossession crisis" from the perspective of the Orang Asli themselves.

BIBLIOGRAPHY

Aiken, S. Robert and Colin H. Leigh. *Vanishing Rain Forests: The Ecological Transition in Malaysia*. Oxford: Clarendon Press, 1992.

Andaya, Barbara Watson and Leonard Y. Andaya. *A History of Malaysia*. London: Macmillan, 1982.

Andaya, Leonard Y. "Orang Asli and the Melayu in the History of the Malay Peninsula." *Journal of the Malaysian Branch of the Royal Asiatic Society* 75, Part 1 (2002): 23–48.

Brookfield, Harold. "Preface." In *Transformation with Industrialization in Peninsular Malaysia*, edited by Harold Brookfield, v–viii. Kuala Lumpur: Oxford University Press, 1994.

Burkill, I. H. *A Dictionary of the Economic Products of the Malay Peninsula*. 2 vols. London: Crown Agents for the Colonies, 1935.

Carey, Iskandar. *Orang Asli: The Aboriginal Tribes of Peninsular Malaysia*. Kuala Lumpur: Oxford University Press, 1976.

Cleary Mark and Peter Eaton. *Tradition and Reform: Land Tenure and Rural Development in South-East Asia*. Kuala Lumpur: Oxford University Press, 1996.

Couillard, Marie-Andrée. "The Malays and the 'Sakai': Some Comments on Their Social Relations in the Malay Peninsula." *Kajian Malaysia* 2, 1 (1984): 81–108.

Dentan, Robert Knox and Ong Hean Chooi. "Stewards of the Green and Beautiful World: A Preliminary Report on Semai Arboriculture and Its Policy Implications." In *Dimensions of Tradition and Development in Malaysia*, edited by Rokiah Talib and Tan Chee-Beng, 53–124. Petaling Jaya, Malaysia: Pelanduk Publications, 1995.

Dentan, Robert Knox, Kirk Endicott, Alberto G. Gomes, and M. B. Hooker. *Malaysia and the Original People: A Case Study of the Impact of Development on Indigenous Peoples*. Boston: Allyn and Bacon, 1997.

Dunn, F. L. *Rain-Forest Collectors and Traders: A Study of Resource Utilization in Modern and Ancient Malaya*. Monographs of the Malaysian Branch of the Royal Asiatic Society, No. 5. Kuala Lumpur: Council of the Malaysian Branch of the Royal Asiatic Society, 1975.

Endicott, Kirk. "The Impact of Economic Modernisation on the *Orang Asli* (Aborigines) of Northern Peninsular Malaysia." In *Issues in Malaysian Development*, edited by James C. Jackson and Martin Rudner, 167–204. Singapore: Heinemann, 1979.

———. "The Effects of Slave Raiding on the Aborigines of the Malay Peninsula." In *Slavery, Bondage and Dependency in Southeast Asia*, edited by Anthony Reid, 216–45. St. Lucia: University of Queensland Press, 1983.

———. "Indigenous Rights Issues in Malaysia." In *At the Risk of Being Heard: Identity, Indigenous Rights, and Postcolonial States*, edited by Bartholomew Dean and Jerome M. Levi, 142–64. Ann Arbor, MI: University of Michigan Press, 2003.

Harper, T. N. "The Politics of the Forest in Colonial Malaya." *Modern Asian Studies* 31, 1 (1997): 1–29.

Hooker, M. B. *The Personal Laws of Malaysia*. Kuala Lumpur: Oxford University Press, 1976.

———. "The Orang Asli and the Laws of Malaysia with Special Reference to Land." *Ilmu Masyarakat* 18 (1991): 51–79.

———. "'Native Title' in Malaysia: *Adong's Case*." *Australian Journal of Asian Law* 3, 2 (2001): 198–212.

Howell, Signe. "The Indigenous People of Peninsular Malaysia: It's Now or Too Late." In *Indigenous Peoples of Asia*, edited by R. H. Barnes, Andrew Gray, and Benedict Kingsbury, 273–87, Monograph and Occasional Paper Series No. 48. Ann Arbor, MI: The Association for Asian Studies, 1995.

Jones, Alun. "The Orang Asli: An Outline of Their Progress in Modern Malaya." *Journal of Southeast Asian History* 9, 2 (1968): 286–305.

Karim, Wazir Jahan. "Malaysia's Indigenous Minorities: Discrepancies between Nation-Building and Ethnic Consciousness." In *Indigenous Minorities of Peninsular Malaysia: Selected Issues and Ethnographies*, edited by Razha Rashid, 18–35. Kuala Lumpur: Intersocietal and Scientific Sdn. Bhd (INAS), 1995.

Kratoska, Paul H. "'Ends That We Cannot Foresee': Malay Reservations in British Malaya." *Journal of Southeast Asian Studies* 14, 1 (1983): 149–68.

———. "The Peripatetic Peasant and Land Tenure in British Malaya." *Journal of Southeast Asian Studies* 16, 1 (1985): 16–45.

Lye Tuck-Po, ed. *Orang Asli of Peninsular Malaysia: A Comprehensive and Annotated Bibliography*. CSEAS Research Report Series No. 88. Kyoto: Center for Southeast Asian Studies, Kyoto University, 2001.

Lye Tuck-Po and Kirk Endicott. "Hunter, Gatherer, Trader, Citizen: Changes in the Batek Way of Life." Paper Presented at the Ninth International Conference on Hunting and Gathering Societies, Heriot-Watt University, Edinburgh, Scotland, 9–13 September 2002.

Malaysia, Government of Malaysia. *Eighth Malaysia Plan 2001–2005*. Kuala Lumpur: Economic Planning Unit, Prime Minister's Department, 2001.

Means, Gordon P. "The Orang Asli: Aboriginal Policies in Malaysia." *Pacific Affairs* 58, 4 (1985/1986): 637–52.

Nicholas, Colin. "The Orang Asli of Peninsular Malaysia." In *Indigenous Peoples of Asia: Many People, One Struggle*, edited by Colin Nicholas and Raajen Singh, 157–76. Bangkok: Asia Indigenous Peoples Pact, 1996.

———. *The Orang Asli and the Contest for Resources: Indigenous Politics, Development and Identity in Peninsular Malaysia*. IWGIA Document No. 95. Copenhagen: International Work Group for Indigenous Affairs, 2000.

———. "Indigenous Politics, Development and Identity in Peninsular Malaysia: The Orang Asli and the Contest for Resources." Paper Presented at Indigenous Rights in the Commonwealth Project, South and South East Asia Regional Expert Meeting, New Delhi, India, 11–13 March 2002.

Rachagan, S. Sothi. "Constitutional and Statutory Provisions Governing the Orang Asli." In *Tribal Peoples and Development in Southeast Asia*, edited by Lim Teck Ghee and Alberto G. Gomes, 101–11. Kuala Lumpur: Department of Anthropology and Sociology, Universiti Malaya, 1990.

Rambo, A. Terry. "Of Stones and Stars: Malaysian Orang Asli Environmental Knowledge in Relation to Their Adaptation to the Tropical Rain Forest Ecosystem." *Federation Museums Journal* New Series 25 (1980): 77–88.

———. "People of the Forest." In *Malaysia*, edited by Earl of Cranbrook, 273–88. Oxford: Pergamon Press, 1988.

Skeat, Walter William and Charles Otto Blagden. *Pagan Races of the Malay Peninsula*. 2 vols. London: Macmillan and Co., 1906.

Turnbull, C. M. *The Straits Settlements 1826–67*. London: The Athlone Press, 1972.

Wang Gungwu. "The Nanhai Trade: A Study of the Early History of Chinese Trade in the South China Sea." *Journal of the Malayan Branch of the Royal Asiatic Society* 31, Part 2 (1958): 1–135.

Wheatley, Paul. "Geographical Notes on Some Commodities Involved in Sung Maritime Trade." *Journal of the Malayan Branch of the Royal Asiatic Society* 32, Part 2 (1959): 1–140.

Williams-Hunt, Anthony. "Land Conflicts: Orang Asli Ancestral Laws and State Policies." In *Indigenous Minorities of Peninsular Malaysia: Selected Issues and Ethnographies*, edited by Razha Rashid, 36–47. Kuala Lumpur: Intersocietal and Scientific Sdn. Bhd. (INAS), 1995.

Wong, David S. Y. *Tenure and Land Dealings in the Malay States*. Singapore: Singapore University Press, 1975.

Zawawi Ibrahim. *Regional Development in Rural Malaysia and the "Tribal Question."* Occasional Paper No. 28. Hull: Centre for South-East Asian Studies, The University of Hull, 1995.

———. "The Making of a Subaltern Discourse in the Malaysian Nation-State: New Subjectivities and the Poetics of Orang Asli Dispossession and Identity." *Southeast Asian Studies* [Kyoto] 34, 3 (1996): 568–600.

Part 3

Environments and Livelihoods

9

From Riches to Rags?

Rice Production and Trade in Asia, Particularly Indonesia, 1500-1950

Peter Boomgaard

Rice and the Region

If there is one thing that all major Southeast Asian countries have in common, it is surely the importance of rice. Political, economic, social, and cultural life in many areas of the region is, in fact, dominated by the production of rice. Rice cultivation has a large share in the economy and also in the diet of the populations. Rice prices and income and the production of rice-growing peasant cultivators are closely monitored by national governments, and subsidies and tariffs regarding rice production and trade are important items in their economic policy toolkits. Under the surface of the region's majority religions, rice goddesses and similar beings are found lurking in myths of origin and other ancient stories. In many areas the beginning of the rice planting or sowing season and the start of the rice harvest are both occasions for festivities and feasts. Clearly, Southeast Asia is not alone in this respect, it shares the characteristics of a "rice economy" or "rice society" with India, Bangladesh, China, Taiwan, Korea, and Japan. In this chapter, I am concerned mainly with Southeast Asia, though I refer occasionally to the other "rice" areas.

In many areas of Southeast Asia rice production was more predominant in the past than it is now, as most economies have now become diversified. However, regionally, the growing of rice is now found in places where it was rare or absent before; a process sometimes called "rizification." On balance, economic life of the region as a whole is now much less dependant on the rice harvest than it was around 1950, while at that date the economy was in turn more diversified than it had been ca. 1850, implying an even greater dependence on rice at the earlier date.

During the twentieth century, the share of Southeast Asia in world rice production was remarkably stable at around 20 percent. However, its share in

the world rice trade dropped from almost 90 percent at the beginning of the century to 20 percent in the early 1970s, after which it recovered slightly, reaching the 40 percent mark prior to 1990 (Van der Eng 1992, 3). These shifts no doubt reflect high rates of population growth in the period 1950–75, and the effects of the Green Revolution combined with family planning measures after 1975.

Rice was undoubtedly important during the period after 1850. Quantitative data on the share of rice cultivation and trade are far rarer prior to 1850, but on the basis of qualitative evidence one can easily establish that rice was already playing a pivotal role by 1500, and in many areas at even earlier dates.

It can be argued, therefore, that rice was one of the resources to have shaped Southeast Asian history at least during the past five centuries.

RICE: A BLESSING OR A CURSE?

Rice and fertility were often mentioned in one breath, as can be seen from the earliest European reports on the region. The Portuguese traveler Tomé Pires, writing around 1515, waxed lyrical when describing the abundant rice harvests and exports of Pegu (Burma), Siam (Thailand) and Java ("Infinite quantities of rice of four or five kinds, and very white, better than anywhere else"), which he linked to the fertility of these areas. His compatriot, Duarte Barbosa, writing in 1518 about the abundance of rice to be found in Java, states that "this island of Java is famed to be the most fruitful island in the world." The Dutch sailor Jan Huygen van Linschoten, writing in the 1580s, calls Bengal a very fertile country, particularly in producing large quantities of rice, of which there is more than in the entire Orient. The British trader William Dampier wrote in broadly similar terms about northern Vietnam in 1688.[1]

Looking at these and similar descriptions dating from the sixteenth and seventeenth centuries, one gains the following general impression. There are many areas in and around Southeast Asia with extensive and fertile plains and densely populated deltas that are covered with wet rice as far as the eye can see. These areas export large quantities of rice at reasonable prices, and, generally speaking, prices of victuals (fish, meat, vegetables, fruit, cooking oil) are low.[2] Often, they also export (cheap) textiles and slaves.

The "countries" mentioned in the sixteenth century as being important rice producers are virtually the same ones that are still important rice producers in the nineteenth and sometimes even in the twentieth century, although they often no longer export the product. The list includes the Coromandel Coast and Bengal in what is now India and Bangladesh; Arakan and Pegu, now in Burma; Pattani (now a Thai part of the Malay Peninsula); Siam; Cambodia (including the Mekong delta, now part of Vietnam); Tonkin (Vietnam); and Kwangtung (Guangdong, Southern China). Places often mentioned in the Indonesian Archipelago are Macassar (Sulawesi), Java, and the smaller islands of Bali, Lombok, Sumbawa (all three Lesser Sundas), and

Nias (off Sumatra's west coast). The deficit areas were also often the same ones around both 1500 and at much later dates (in the nineteenth century), for instance Ceylon (Sri Lanka), Malacca, and the Moluccas. Kwangtung, a rice-exporter around 1500, had become a rice-importer in the eighteenth century.[3]

Interestingly enough, only few reports dating from the sixteenth to the eighteenth centuries pay attention to the downside of the high population densities of these fertile rice plains—poverty. Examples are Pulicat/Coromandel in 1650 and 1688, Tonkin in 1688 and the Kerinci valley (Sumatra) around 1800.[4]

One of the main themes of this chapter is whether wet rice cultivation, so often described in strikingly positive terms, leads inexorably to high population densities and hence to poverty, as seems to have been the case, for instance, in the classical rice plains of Java and in the main river valleys and deltas of Mainland Southeast Asia—those of the Irrawaddy, the Chao Phraya, the Mekong, and the Red River. Looking at these areas in the 1930s, admittedly a period of economic depression, the conclusion seems to be inescapable that wet rice and poverty go hand in hand.

A question we should at least pose is whether wet rice as a crop has inherent properties that predispose its cultivators to poverty. Why has it always been a crop that, at least in Southeast Asia, is almost exclusively grown by indigenous peasants on a relatively small scale, and not a crop produced by plantations established and run by Western capital and management?[5] Does the questionable social and economic reputation of rice as a commercial crop have anything to do with the fact that it is both a subsistence and a commercial crop? We also discuss the relationship between rice-growing and big cities. In addition, this chapter deals with government policies regarding rice cultivation and trade.

However, given the fact that all these observations appear to apply to "wet" rice rather than "dry" rice, the first question to be answered is why people bothered to grow wet rice at all.

From Wet to Dry and Back Again

Around 1980 some 75 percent of Southeast Asia's rice production was rainfed (50 percent) or irrigated (25 percent) lowland rice. Another 15 percent was (dry) upland rice, and 10 percent was deep water (floating) rice.[6] Until some 30 or 40 years ago, most scholars believed that dry rice, cultivated as part of a system of swidden agriculture (slash-and-burn, shifting cultivation), was the most ancient form of rice cultivation, which had originated in India. However, the current orthodoxy is that rice came from China and/or the northern part of Vietnam, and that it was a plant growing naturally in wet habitats such as swamps.

Wet rice, therefore, is older than dry rice. Strangely enough, the shift in paradigm from dry to wet rice as the original crop does not appear to have led to a major rethinking of the why and how of "artificial" wet rice cultivation.

It is plausible, however, that expanding populations with a shortage of natural habitats for wet rice (either floating rice in deep water or rice grown under floodwater retention conditions) made the switch to rice cultivated on artificially bunded fields that could retain water during the growing season of the plant. I will use the Indonesian term *sawah* for these fields, which were either rainfed or artificially irrigated.

Swidden agriculturalists living in heavily forested upland environments adapted the existing rice cultivars to their needs, thus inventing dry rice cultivation. Here, rice would be grown on recently cleared fields of which (much of) the vegetation had been burned down. In Indonesia the term *ladang* is usually applied to this type of cultivation. Swidden agriculturalists usually appear to have intercropped other annual plants with the rice. After one or two harvests, the ladang was either abandoned or was planted with perennials.

These shifts from one type of rice cultivation to another are badly documented, as the processes described here must have taken place largely during prehistoric times. In historic times (by definition the period of written sources) most evidence suggests a shift from dry rice under swidden to wet rice on sawahs.[7]

WHY WET RICE?

The question of why semisedentary swidden agriculturalists turned into sedentary sawah cultivators has long puzzled most observers. During the colonial period and the epoch of the large European merchant companies (East India Company [EIC], Vereenigde Oostindische Compagnie [VOC] [The Dutch East India Company]), many writers thought that laziness was the reason why so many indigenous cultivators did *not* switch from ladang to sawah.[8] It was quite clear to them that ladangs were much less labor-intensive than sawahs, in other words, that swiddeners produced the same amount of rice (and, some would add, often of a better quality) with far fewer hours of labor input than smallholders with sawahs. This is confirmed by modern research. In a comparison between slash-and-burn agriculturalists in Kalimantan (Borneo) and Javanese sawah cultivators published some 20 years ago, returns to labor for the first system were found to be between 88 and 276 percent larger than in the latter one (Dove 1985). The obvious question is why people would be willing to work much harder with little to show for it.

Two answers are often found in the literature, the first one being that the state forced people to do so, and the second one that they did so under pressure of population growth and therefore increasing land scarcity. Neither of these two answers is convincing. If we may assume that the shift to wet rice agriculture on bunded fields was already under way long before 1500, an assumption that can be safely made for Java and various other "core" areas in Southeast Asia, it must be concluded that states did not have the means to force entire populations to lay out sawahs, while population densities were not sufficiently high to result in scarcity of land for swidden cultivation.

I will go into these matters elsewhere in much more detail; for the present purpose I briefly deal with the six factors that I believe may have played a decisive role in this process between, say, the years 1000 and 1500.

The first factor to be mentioned is the role of the indigenous (early) state. Although scholars working on Southeast Asia are no longer convinced (or perhaps never have been convinced) that there was something like a hydraulic-despotic state (the Wittfogel hypothesis) responsible for the creation of irrigation works and wet rice fields, it cannot be denied that the state, or rather the ruler, played a role in this matter.[9] Already at an early stage—for example, in tenth-century Java—rulers encouraged the laying out of irrigation works and bunded fields by giving tax exemptions (*sima*) to religious (Hindu and/or Buddhist) institutions, provided they would take it upon themselves to convert wasteland or swiddens to sawahs (Christie 1992). Rulers were interested in the creation of densely settled wet-rice areas, as its people were easier to tax and to conscript for corvée and war.

The second closely related factor is that the religious establishments may have been a more formidable economic factor than they have been given credit for. They amassed fortunes because rulers, aristocrats, rich people, and also rather ordinary peasants donated valuables, money, land, livestock, and slaves to these institutions, thus making the "church" the largest landowner of the realm. They had the required manpower—slaves—for the laying out of wet rice fields, and put them to good use.

The third factor to be mentioned—again closely related to the last one—is the presence of bonded labor. The literature frequently mentions unfree people (debt-bondage, serfdom, or slavery), but usually fails to spell out the economic consequences of this type of labor force. As already mentioned, temples used bonded people for agricultural purposes, but kings and aristocrats had slaves too. Whereas it would have been impossible to coerce the entire population into converting dry lands to wet rice fields, a gradual process whereby slaves were used for this purpose would be more likely.

The fourth factor hinges on the supposition that the amount of labor invested in the acquisition and upkeep of livestock, mainly water buffalo and cattle, was a major issue in the choice between slash-and-burn and irrigated permanent-field agriculture. The difference in rice yields per hour worked between these two systems may have been small or even negligible if hours spent by livestock are not counted. We also know that during this period (and in some areas up to the present) many people in Southeast Asia kept large numbers of livestock (cattle, water buffalo) for sacrificial purposes. If, therefore, the construction of sawahs seemed attractive for whatever reasons, the plough animals needed for the preparation of these fields would have been already available.

The fifth point is that a switch to wet rice may have been stimulated by a combination of (export) trade, markets, and (moderate) taxation, particularly in regions that were easily accessible to (long-distance) shipping. Although in many cases rice was a subsistence crop pure and simple, we also know that there was a considerable interregional trade in rice in areas such as the

Red River Delta in Vietnam and the Brantas Delta in Java. This meant that in a number of regions producers were always assured of a ready market for their goods and of a supply of status and prestige enhancing commodities in return—a positive labor-consumer balance so to speak.

Finally, there is evidence that people tended to flock together in uncertain times, which would make slash-and-burn a less attractive option because, after a few years, when the fields close to the settlement had to be fallowed, people would have to walk quite a distance to their ladangs. Under those circumstances the construction of irrigation works and the laying out of bunded fields would have been a logical step.

Many European travelogues bear testimony to the fact that around 1500 wet rice fields had come to dominate many well-watered and well-drained upland and lowland valleys.

Rice and Cities

Is there a connection between wet rice agriculture and the growth of towns and cities? It is generally assumed that on a global scale urbanization and population growth are related, in the sense that in the past high population growth rates usually led to high rates of urbanization. Can we, therefore, expect that cities will spring up in wet rice growing areas, or is it the other way around, and is the presence of towns and cities conducive to "sawahization?"

Limiting ourselves for the moment to the "Malay" world, we are confronted with several riddles in this respect. Going back to the period of Srivijaya, an early state in southeast Sumatra from the late-seventh century onward, one is struck by the fact that this "empire," of which the core city is supposed to have been located (most of the time) at the place of modern Palembang, apparently could feed its population without wet rice fields in the surroundings of the capital. It is now assumed that the capital was victualled from the (wet?) rice fields of central Java and the upland plateaus to be found in the Bukit Barisan, the mountain range spanning the entire length of western Sumatra, thus leaving its "ecological footprint" far away from its own environs.

On the other hand, Java, the most densely populated area of that size in Southeast Asia during this period, and covered by wet rice fields, which formed the backbone of the economy in many of its central and eastern regions way before 1500, did not have any cities to speak of prior to the fourteenth century (Pigeaud 1960/3, IV, 494; Christie 1991). Around 1500 and 1600 there were more cities, although most of them were fairly small. However, the link between rice and cities was far from unambiguous. Examples from central and eastern Java—Jepara, Tuban, Gresik-Joratan, Surabaya—suggest that trade-flows, religious connections, political links, and the presence of a good natural harbor are all factors that appear to have been more important than the presence or absence of a rice-rich immediate hinterland (Meilink-Roelofsz 1962, 107–11, 150–51, 269–86).

If we look at the places that struck visitors as being the largest of Southeast Asia in the sixteenth and seventeenth centuries, we come up with Malacca in present-day Malaysia, Acheh in northern Sumatra, and Banten in western Java. Malacca was almost entirely devoid of rice fields and had to import all of its rice from Pegu, Siam, and Java. Around 1600, Acheh had to import much of its rice, but it seems that during the seventeenth century the rulers switched from pepper to rice production, the latter product being almost entirely cultivated by slaves on the plain around the city. Banten was estimated to be able to feed only one quarter of the city's population from its own hinterland; the remainder of the rice was imported from Sumatra, Macassar, and Sumbawa. Banten was also known for its many slaves, who may have been involved in rice cultivation, while the Chinese who lived there were certainly involved in it.[10] Obviously, therefore, the situation of these three harbor cities had been determined, not by their proximity to wet rice growing areas, but by their favorable location for the maritime trade. If the presence of any product had influenced the size and location of at least two (Acheh, Banten) of these three cities, it was pepper, and not rice.

In the same two cases, rice cultivation appears to have been started or expanded because the ports-of-trade in question were thriving, and as supply by indigenous cultivators seems to have been rather inelastic, foreign labor (slaves, Chinese) had to be brought in to get the job done. In the case of Acheh, around 1600 the Sultan had explicitly forbidden the cultivation of pepper in the proximity of the city, one supposes in order to secure its food supply. One can easily imagine that a city depending entirely upon rice in exchange for gold and pepper, Acheh's two main export commodities, would be in big trouble if, for whatever reason, the required quantities of rice failed to arrive—a phenomenon that was far from rare in those days.

The corollary of big cities without rice producing hinterlands is the existence of rice bowls without large cities. This applied, as we have seen, to Java prior to 1400; but even much later, in the seventeenth and the eighteenth centuries, there were few cities in the rice plains of central Java. In fact there was only one, the residence of the monarch of Mataram, which kept moving around in typical Malay fashion (and therefore never became really big). This state of affairs was also to be encountered in the rice bowls of the Bukit Barisan: Kerinci, Besemah, and the Minangkabau and Batak Uplands.[11]

Rice cultivation in the hinterlands of the cities mentioned here (and those dealt with below) was clearly largely a commercial undertaking. We are so used to thinking of rice as a subsistence crop—at least prior to the rice export boom of the 1850s—that we tend to forget that rice could also be grown with the purpose of marketing it.

There is some Indonesian evidence that rice cultivation was not restricted to the hinterlands of ports-of-trade. For instance, we know that the island of Nias was growing rice and exporting it, although the population fed itself on roots and tubers. It is already mentioned as a rice producer in 1515, and around 1800 it was exporting large quantities of rice, although the population ate sweet potatoes. Similar information is available on the subdistrict Sahu of

Halmahera (Moluccas), where the population in the early nineteenth century paid their tribute in rice to the Sultan of Ternate, although themselves eating sago. During the same period the Tongsawang in the Minahasa (Sulawesi) too ate mainly sago and exported their irrigated wet rice crop almost entirely. From around 1600, the Macassar nobility started to develop a rice surplus for export in the Maros plain, north of Macassar. From ca. 1710, the Sula Islands, in the Moluccas, also developed rice cultivation for export. Finally, we encounter rice exports from southern Borneo in the early seventeenth century; this was predominantly rice harvested from dry fields by Dayaks, and one wonders whether this was not cultivated explicitly for export.[12]

It is likely that rice explicitly grown as an export crop prior to 1850 was a more widespread phenomenon than we have been aware of. It might change the way we have always looked at rice-producing peasants. It has often been argued that peasants in dire straits had to sell more of their rice crop than they ideally should have. However, it might equally have been the case that they were eating more of it themselves than they ought to have; something they could not have done if their product had been indigo or rubber.

RICE AND "EUROPEAN" CITIES

Returning for the moment to the main features of the developments encountered in Acheh and Banten, it seems to me that we have stumbled here upon a mechanism (a model if one wants) that could be found later at other places in the Archipelago (and I suppose earlier and elsewhere too)—growing ports-of-trade, located in surroundings favorable for trade but poor in rice, trying to grow their own rice or trying to expand the rice production of their hinterlands with imported labor. To my knowledge, the best example of such a place is Batavia (western Java; now called Jakarta), headquarters of the VOC since 1619, and later the capital of the Netherlands Indies. When the Dutch founded Batavia on the ruins of the indigenous town they had just conquered, it was surrounded by forests and swamps, and only gradually—particularly after ca. 1650, when the attacks of its indigenous neighbors had more or less stopped, and even more so after 1682, when Banten came under VOC suzerainty—were the environs of Batavia cleared for agriculture, mainly by Chinese immigrants. During the first decades, however, the emphasis was on sugar, fruit, and vegetables, not on rice. Around 1660 most rice here came from sawahs, but some was certainly being grown on dry fields (in shifting cultivation) not so far from the city. By 1750, slash-and-burn in Batavia's hinterland had been forbidden, in order to protect the forests, and most rice transported from there to Batavia appears to have been grown on sawahs. Around the same time the rice production of this area seems to have been sufficient to feed the city itself, and although much of it was probably grown by the local peasantry, it is likely that in the area closest to the city, the so-called Environs of Batavia, Chinese farmers and slaves were involved too. The VOC imported buffaloes from Java's northeast coast in order to stimulate the laying out and use of sawahs.[13]

From around 1750 technological innovation began to play a role in the provisioning of rice for Batavia, as from that time onward buffalo-drawn rice mills were introduced by Chinese entrepreneurs. This made transport from the hinterland areas cheaper, and therefore stimulated the demand and supply of rice from that area. Around 1780, European rice millers appeared on the scene, with larger and stronger, water-powered rice mills. Finally, after 1811, the price controls on rice were relaxed, which led to higher prices and therefore a greater supply.[14]

It remains unclear in how far the story of Batavia can serve as an example for other Southeast Asian cities with a large European presence, or even run by Europeans.[15] My impression is that some of the features mentioned here foreshadowed many developments to come, particularly the use of milling technology, foreign capital, and the relaxing of price controls. But regarding the main feature of the "model"—growing ports-of-trade starting or expanding rice cultivation in their immediate hinterland, often with alien labor—we will have to suspend judgment for the time being.

Rice and Risk

If we look at the available data on harvest failures and famines for Indonesia during the period under consideration, it becomes quite clear that most areas were hit by harvest problems with sad regularity.[16] Such problems were often caused by what we now call ENSO events, from El Niño-Southern Oscillation. ENSO events are not always equally serious, but perhaps as frequently as once every 15 years or so they create huge problems. These problems are mainly caused by the reversal of the monsoons, often two years in a row. Inevitably such reversals led to harvest failures in the past and, at least locally, to famines. It would seem that prolonged drought—a typical feature of ENSO events—did much more damage to the rice crop than years with unusually high precipitation. This is not the place for a detailed treatment of famines and other disasters in Asia, so I will limit myself to just a few general observations.

In the first place, it would appear that weather anomalies, and therefore harvest failures, seldom came alone. They were all too often accompanied by epidemics, epizootics, and wars. Some diseases, of course, are clearly caused or at least aggravated by the lack of clean water and bad nutrition owing to drought and harvest failures. Regarding wars, their effects were evidently aggravated by bad weather, hunger, and epidemics, but I am even prepared to argue that such conditions were sometimes at the root of wars. In a "contest state" or "weak state," or whatever you would like to call the typical Southeast Asian state of this epoch, a monarch might have to go to war when his income dropped owing to a failed rice crop in order to satisfy his client-aristocracy. He might even launch a preemptive strike if he saw that his neighbor had been hit by a climatic anomaly. It is also clear that epidemics and other diseases were the usual "camp followers" of wars. Most authors on early modern Southeast Asia agree that there was a relatively high level of

conflict that, in combination with epidemics and harvest failures, must have led to high levels of uncertainty.

The situation in India and Bangladesh does not seem to have been very different from the picture I have painted here. In fact, the older literature on famines in the Indonesian Archipelago often stated that the situation in India was much worse, and if one reads about the disasters that occurred during the seventeenth century one is inclined to agree, although it has to be kept in mind that "India" was of course much bigger than "Indonesia."

A second point is that the wet rice areas seem to have been harder hit than the upland swidden regions. In a recent publication on the environmental history of Southeast Borneo (now Kalimantan), a typical swidden cultivation region—covering the period 1600–1880—the author states that he rarely came across the term "famine" in the sources. There are certainly (ENSO-related) droughts and harvest failures, but they do not appear to have led to famines (Knapen 2001). This is not difficult to understand. One of the problems of wet rice areas was (and is) their high degree of specialization (in rice of course). Sometimes farmers plant second crops during the off-season, but during a drought year those crops might very well fail too. Swidden cultivators have a large array of grown and collected (wild) foodstuffs at their disposal; an observation that hardly applies to the inhabitants of the rice bowls. This may have been one of the reasons that India, with its large rice-growing areas, was doing so badly. It is often stressed that the people of the drought-stricken rice plains had no alternative than to sell themselves or their children into slavery.

The third point is that Java seems to be doing better in the nineteenth century than it did in the seventeenth century. Anthony Reid (1993, 285–98) has suggested that the very bad years in the seventeenth century might have been linked to the so-called Little Ice Age, a phenomenon well known in European historiography and also postulated to have been experienced in India and China. I have my doubts about this explanation. A cursory inspection of weather anomalies as reflected by tree ring measurements (for Java) indicates there is little difference between the seventeenth, the eighteenth, and the nineteenth centuries.

I believe two other factors explain the differences better. The first factor is the gradual spread of "Columbian" nonrice food crops over Java and many other parts of Asia, particularly maize, sweet potatoes, and cassava (Boomgaard 1999; 2003a). These are crops with different requirements from rice that could be grown as complementary crops, often with high yields per acre. This must have led to a much higher degree of diversification and therefore to a better distribution of risk, which would result in fewer chances that a harvest failure would turn into a famine.

The second factor is that in the nineteenth century Java's road network was improved considerably, while the Netherlands Indies government was more concerned about the living conditions of the indigenous population than the VOC had been. Thus, the government had started a monitoring system on the development of the rice crop, and they would—as a rule, but with

notable exceptions—send food to the stricken areas when harvest failures were reported.

As the spread of "Columbian" crops had also taken place in many other Asian areas, one might expect similar developments there.

Rice Demography

There is ample evidence that areas with rice surpluses were exporting slaves during periods of famine. This is particularly well attested for Bengal and the coast of Coromandel. However, other regular rice-exporting areas seem to have been habitual slave exporters during times of good rice harvests as well—Arakan, Nias, Bali, Lombok are examples of this. Perhaps this difference is linked to the absence of slavery as an important institution during normal times in Bengal and Coromandel (owing to the fact that high population densities had rendered slave labor superfluous?), while it was a normal institution in Bali, Lombok, and Nias, and perhaps in Arakan. Southeast China, a net-rice importer after 1700, was not exporting slaves, but large numbers of migrants left the area.

Be that as it may, all these cases suggest a Malthusian problem, with the growth of populations outstripping the means of subsistence. In the case of Java, rice exports seem to have been stable from around 1500 to 1800, while its population was in all likelihood growing, albeit at a low rate. However, Java was, as we have seen, increasingly growing new food crops, in addition to new (or at least more) commercial crops, such as coffee, all of which suggests that its GDP per capita may have been more or less stable (but a slight drop is not entirely out of the question either).

Java did not export slaves, as the institution of slavery was rare among the Javanese (even though some sort of serfdom may have persisted locally, and debt-bondage was probably rather widespread), perhaps again linked to fairly high levels of population density. Slavery did occur in the coastal cities, but these were slaves imported from elsewhere.

A more general point is that there are reasons to assume that wet rice cultivation per se leads to higher population growth rates than swidden cultivation. The reasoning behind this hypothesis is that wet rice farming people require more labor per household than swiddeners, because sawah cultivation is more labor-intensive than slash-and-burn per unit of product. As it is now becoming increasingly clear that Southeast Asian populations (and of course women in particular) were able to control their fertility prior to the onset of modern birth control measures, demand for labor could have been translated into a larger number of children born (and surviving) per female.[17] Anthony Reid (1988, 16) has suggested that in some areas—notably Indonesia and the Philippines—the conversion from local beliefs to Islam or Christianity may have played a pronatalist role as well.

It seems to be a general rule that rice plains that had been exporting rice for a long time (Bengal, Red River delta, much of Java, Kwangtung) after a few centuries were no longer able to do that anymore. By 1900, their own

populations were consuming all the rice they produced although, in addition, rice had to be imported. Although other factors were no doubt involved too (in Java and Kwangtung, peasants spent more time than previously on commercial crops; see also Bray in this book), high rates of population growth must have had something to do with this.

Around 1850, the more recently populated areas (the Irrawaddy delta in Burma, Chao Phraya delta in Thailand, and Mekong delta in Cochin China [Vietnam]), with therefore much lower population densities, had taken over the function of rice exporters. One could even argue that the demand for rice in "old" rice areas led to the annexation of potential "new" rice regions by the former. The annexation of Lower Burma to British India could be viewed in this light, as well as the colonization of Korea and Taiwan by Japan.[18]

RICE AND RULERS

However, factors such as "sawahization," the presence or absence of urban centers, climate, hazards, and population growth cannot explain all the changes in the rice bowls mentioned above. Rice policies of indigenous and colonial rulers must have played a part as well. The following features of government policy seem to be relevant in this respect.

There is overwhelming evidence that indigenous rulers throughout (Southeast) Asia not only stimulated their people to lay out sawahs and to grow rice but that they also taxed the produce and controlled the rice trade to a high degree. Taxes often could be paid in kind or cash (the latter in Java already in the tenth century), but when payment was in kind, the ruler was more or less forced to be a trader himself. Occasionally, the monarch appears to have held a rice trade monopoly, but this may perhaps not have been general practice over all periods and places prior to European rule.

The VOC certainly worked hard in Java to corner as much of the rice trade as it could, partly in order to provision Batavia, plus various "outposts" such as Malacca, Ceylon, and the Moluccas, partly to set the price, and no doubt also to make a profit. From the late eighteenth century, the local VOC functionaries ("Residents") kept careful track of the whole process of rice cultivation, from the preparation of the fields, the reparation of the irrigation canals and the dikes, the plowing and harrowing of the rice fields, the laying out of the seed beds, the transplanting, to the weeding, the draining of the fields and the harvesting of the crop. It even looks as if the peasantry was under the obligation to plant rice (instead of other crops), although I have never been able to locate evidence of any formal decision by VOC headquarters to that effect.

Perhaps it should be assumed that similar systems of supervision were also in operation elsewhere, under the native rulers. We do know that rulers everywhere took an active interest in the various stages of rice cultivation, going on court outings to the countryside when irrigation channels were dug or when the rice harvest was coming in. Cultivating rice may have been considered everywhere in the wet rice bowls as an obligation.

Both the indigenous rulers of (Southeast) Asia and the VOC were strongly inclined to aim at self-sufficiency in rice production. In periods of drought or other weather anomalies that threatened the crops, they would simply forbid the export of rice. The VOC would hold up all rice exports until it had received the amount owed to it for the price that had been agreed upon. As we have seen, it tried to get the hinterland of Batavia to grow more rice for the provisioning of the city, something it also attempted—but with less success—in Ceylon. It manipulated the rice market of Batavia in order to keep prices (and therefore wages and similar expenses) low, and to prevent unrest and starvation among the less wealthy sections of the urban population.

The opinion of most scholars who have looked at these matters is that the rice policies of the indigenous rulers and the VOC (and one assumes the EIC as well) exerted a downward pressure on rice prices. In Java, price controls on rice were abandoned, at least in principle, after 1811, while this was done in the three main rice exporting areas of mainland Southeast Asia—the Irrawaddy, Chao Phraya, and Mekong deltas—only after around 1850, when they came under stronger European influence. The relaxing of price regulations seems to have led to a considerable increase in rice production in Southeast Asia, even prior to increased demand from Europe, which did not make itself felt until ca. 1870 (with the Suez Canal and more steamships).[19]

Rulers were, as we have seen, often rice traders. This certainly applied to both the VOC and the EIC. It seems likely that the European companies, with their large fleets and their ships with larger tonnages than indigenous vessels, were conducive to the growth of the rice trade in Asia (e.g., Arasaratnam 1988, 548).

Taken together, these policies would imply that between about 1650 and 1850 rice cultivation may have been expanding, even though it was almost certainly not a very profitable undertaking for the wet rice growers involved. It may be assumed that European involvement in the rice trade also led to increased monetization that, in theory, could have been an autonomous factor in stimulating production. However, as an increase in the amount of money may also have led to more and higher advances, increased production would have been accompanied by growing indebtedness and a downward pressure on the farm gate prices.

Capital and Technology

After 1850, rice production in mainland Southeast Asia really began to increase. There are various—related—factors that facilitated this development, such as the relaxation of price controls, the use of modern technology for irrigation, drainage, and transportation, and the appearance of modern rice mills; most of which was made possible by the influx of capital from outside. However, rice never became a real plantation crop, as happened with sugar and coffee when capital and modern technology were brought to bear on those crops. Francesca Bray has linked this phenomenon to the fact that

there are no economies of scale in rice cultivation. Growing rice on the scale of a plantation, therefore, would not yield more benefits than the same acreage being split up among so many smallholders. This is not to say that there were no large landholdings, but just that they were not exploited as large-scale rice plantations.[20]

What we do see, therefore, is that the application of outside capital and technology did not lead to structural changes in the size of the units of production. What did seem to change though is that the incidence of tenancy increased, owing to indebtedness and land hunger among smallholders, which meant that rice growers got a lower proportion of the crop than they would have done as smallholders working their own holdings.

It is reasonable to assume that tenancy arrangements (and customs regarding land tenure) played a role in the impoverishment of rice growers prior to ca. 1850 as well, but this is a badly researched topic.

TRAPPED IN THE RICE BOWLS?

By the beginning of the twentieth century, the rice surplus areas were generally the less densely settled regions. This relationship holds both within regions (e.g., Java) and between them. Some of the densely settled areas had structural rice shortages, and others were barely producing enough to feed themselves. These were the classical rice bowls the European visitors of the seventeenth century had been so positive about. As we have seen, these rice bowls had always been rather vulnerable to weather anomalies and other natural and man-made hazards. This was already the case in the sixteenth and seventeenth centuries, and it was still true after 1900.

In the meantime the population had increased, first rather slowly, but after the late nineteenth century much faster. Part of the population increase prior to 1850 may have been caused by the shift from ladang to sawah. An increase in the sawah acreage could not prevent a gradual drop of the sawah acreage per capita as the rate of population growth outstripped the rate of construction of irrigation works (at least partly due to partible inheritance and partly to the existence of communal tenure arrangements). High population growth also eventually led to a lower production and consumption of rice per capita, a drop that had to be compensated for by the production of other food crops (maize, cassava, sweet potatoes), of crops for the international market, and by people going to work outside the agricultural sector.

As urbanization had been limited, the opportunity to work outside agriculture was slight in many of the rice bowls until about 1850. Sometimes the only option to eliminate a surplus population appears to have been by selling it into slavery. After 1850, labor migration would take the place of slavery as an outlet for population surpluses.

One of the factors causing urbanization to lag behind may have been the fact that rice prices were low because indigenous and European rulers prior to 1850 had more or less monopolized the rice trade, which enabled them to keep prices at a low level. Nevertheless, demand generated by the European

companies (and the "European" cities) appears to have led to an increased supply, and to more people switching to wet rice cultivation.

The whole story looks like a positive feedback loop: increased demand leads to more sawahs, while the switch to sawahs leads to higher population growth rates. When more sawahs were created the region increasingly became a monocrop rice plain, with very limited resilience because of the lack of alternative crops and jobs. As the growth of the population seems to have outstripped the growth of arable lands, acreage per capita was dropping while indebtedness may have increased (which may also have been because of increased monetization). Slavery was a safety valve in this system, but was replaced later by permanent or temporary migration. This situation, of course, reminds us forcefully of Clifford Geertz's "Agricultural Involution."

Two developments seem to have saved the day: the Columbian exchange and the increased interregional trade in rice. Thus the European newcomers appear to have given with one hand what they took away with the other.

It was well known that Asian wet rice production, particularly Southeast Asian rice production for export, developed strongly after 1850. Summing up the findings of this discussion, it can be said that rice production prior to 1850 also responded to international market forces, and that it is misleading to regard rice cultivation in this period as purely a subsistence activity. Even in the most remote and unlikely places, such as Nias and the Sula Islands in Indonesia, demand for rice created by interregional and international trade led to a supply response.

An example of this phenomenon is that many mercantile cities "created" wet-rice cultivating, immediate hinterlands; but the ecological footprints of rice-demanding cities could also be found much further afield. Thus, monotonous rice bowls were created. As rice prices were kept down until the early- or mid-nineteenth century, and as the rice trade was often monopolized by the monarch, a European merchant company (VOC, EIC) or Chinese merchants, the rice-cultivating peasantry did not profit as much as they could have. As population growth started to outstrip land clearing, the fertile rice bowls became increasingly populated by impoverished wet-rice growers, with growing proportions of landless laborers. After 1950, the landless laborers would fuel the industrialization of these areas as temporary or permanent migrants. Thus, the rice bowls no longer exported a rice surplus but a surplus of people.

Notes

1. Van Linschoten (1910–39, I, 65); Dames (1918, I, 191); Dampier (1931, 21–24); Cortesão (1967, 97–8, 107, 180).
2. On low prices, see, for example, Van Linschoten (1910–39, I, 65); Keuning (1940–42, II, 40); Foreest and De Booy (1980–81, 228).
3. On rice exports and imports in Southern China, see Elvin (1973, 210); Viraphol (1977, 70–74); Marks (1998, 110–12, 130–32, 252).

4. Merklein (1930, 54–55); Dampier (1931, 32–33); Kathirithamby-Wells (1986, 67).
5. Francesca Bray (1986) has dealt with the same question from another perspective.
6. Uhlig (1983, 270–71); in his text, the author states that these figures refer to "Hinterindien" (Southeast Asia), but his Figure 1 suggests that these are figures for world rice cultivation.
7. Historically, another type of rice cultivation appears to have been less important—the cultivation of dry rice on permanent fields. Due to lack of space, this topic is not dealt with here.
8. I am referring to the (English) East India Company and the (Dutch) Verenigde Oostindische Compagnie (United East India Company).
9. Recently, however, some scholars (Fletcher, Pottier) have returned to viewing "the great royal reservoirs" of Angkor as centers of irrigation systems (cf. Lieberman 2003, 228).
10. Lockyer (1711, 54); Temple (1905, 279, 289–93, 294); Rouffaer and IJzerman (1915–29, I, 118); Dampier (1931, 88–91); Foster (1940, 136); Foster (1943, 136); Cortesão (1967, 98, 107, 185).
11. Elsewhere, I have presented various explanations for the lack of urbanization in the Indonesian Archipelago prior to 1900 (Boomgaard 1989; 1993).
12. Generale Missiven (1960–2004, VI, 758; VII, 8); Raffles (1830, 487–91); Marsden (1966, 83); Cortesão (1967, 162); Reid (1988, 24–25); Knapen (2001, 217); Henley (2004).
13. Mossel (1752); Radermacher and van Hogendorp (1779, 21); De Jonge and Van Deventer 1862–95, V, 90, 133; VI, 75, 82, 101, 136; VIII, 11, 32; X, 69–70, 194, 208); De Haan (1910–12, I, 368–70); Merklein (1930, 19).
14. National Archives, The Hague, Collection Schneither 72, 3: Report of the Commissioner, Native Affairs, July 1795; Hooijman (1781, 323–26); De Haan (1910–12, I, 369; IV, 452); Boomgaard (2000, 3–4).
15. Sutherland (1983, 268) has suggested that slaves played a role in rice cultivation in the seventeenth century near the city of Macassar too.
16. For more detailed information on harvest failures, famines, and other man-made and natural disasters in Indonesia between 1600 and 1940, see Boomgaard and van Zanden (1990, 45–47, 142); Boomgaard (2001); Boomgaard (2002).
17. On fertility changes and birth control in Indonesia in the past see Boomgaard (1989b, 194–95); Knapen (2001, 119–37); Boomgaard (2003b); Henley (2005, 208–10).
18. Van Gelderen (1922, 18–22); Gourou (1965, 144–46); Owen (1971); Hanks (1972); Adas (1974); Van Schendel (1987); Van der Eng (1992); Coclanis (1993).
19. De Haan (1910–12, I, 370–71); Owen (1971, 83); Van der Eng (1992, 3); Coclanis (1993); Remmelink (1994, 132). Trade liberalization may have also played a role in increased rice exports from the Central Manila plain, Philippines, to China from ca. 1820 (cf. Reid 1997, 75).
20. Rice plantations were found elsewhere (Australia, USA) due to different factor proportions.

BIBLIOGRAPHY

Adas, Michael. *The Burma Delta: Economic Development and Social Change on an Asian Rice Frontier, 1852–1941*. Madison: The University of Wisconsin Press, 1974.

Arasaratnam, S. "The Rice Trade in Eastern India 1650–1740." *Modern Asian Studies* 22, 3 (1988): 531–49.

Boomgaard, Peter. "The Javanese Rice Economy, 800–1800." In *Economic and Demographic Development in Rice Producing Societies: Some Aspects of East Asian Economic History, 1500–1900*, edited by Akira Hayami and Yoshihiro Tsubouchi, 317–44. Tokyo: Keio University, 1989a.

———. *Children of the Colonial State; Population Growth and Economic Development in Java, 1795–1880.* Amsterdam: Free University Press, 1989b.

———. "Economic Growth in Indonesia, 500–1990." In *Explaining Economic Growth: Essays in Honour of Angus Maddison*, edited by A. Szirmai, B. van Ark and D. Pilat, 195–216. Amsterdam: North-Holland Publishing Company, 1993.

———. "Maize and Tobacco in Upland Indonesia, 1600–1940." In *Transforming the Indonesian Uplands: Marginality, Power and Production*, edited by Tania Murray Li, 45–78. Amsterdam: Harwood Academic Publishers, 1999.

———. "The Windmills of the Mind: Dutch Introductions of Pre-modern European Technology in Asia, 1600–1800." Paper prepared for ATMA-KITLV Colloquium, Kuala Lumpur, Malaysia, 2000.

———. "Crisis Mortality in Seventeenth-Century Indonesia." In *Asian Population History*, edited by Ts'ui-Jung Liu, James Lee, David Sven Reher, Osamu Saito, and Wang Feng, 191–220. Oxford: Oxford University Press, 2001.

———. "From Subsistence Crises to Business Cycle Depressions, Indonesia 1800–1940." *Itinerario* 27, 3–4 (2002): 35–50.

———. "In the Shadow of Rice; Roots and Tubers in Indonesian History, 1500–1950." *Agricultural History* 77, 4 (2003a): 582–610.

———. "Bridewealth and Birth Control: Low Fertility in the Indonesian Archipelago." *Population and Development Review* 29, 2 (2003b): 197–214.

Boomgaard, Peter and Jan Luiten van Zanden. *Changing Economy in Indonesia, vol. 10, Food Crops and Arable Lands, Java 1815–1942.* Amsterdam: Royal Tropical Institute, 1990.

Bray, Francesca. *The Rice Economies: Technology and Development in Asian Societies.* Oxford: Basil Blackwell, 1986.

Christie, Jan Wisseman. "States without Cities: Demographic Trends in Early Java." *Indonesia* 52 (1991): 23–40.

———. "Water from the Ancestors; Irrigation in Early Java and Bali." In *The Gift of Water; Water Management, Cosmology and the State in South East Asia*, edited by Jonathan Rigg, 7–25. London: SOAS, 1992.

Coclanis, Peter A. "Southeast Asia's Incorporation into the World Rice Market: A Revisionist View." *Journal of Southeast Asian Studies* 24, 2 (1993): 251–67.

Cortesão, Armando, ed. *The Summa Oriental of Tomé Pires: An Account of the East, from the Red Sea to Japan, Written in Malacca and India in 1512–1515.* 1944. London: Hakluyt Society, 1967.

Dames, Mansel Longworth, ed. *The Book of Duarte Barbosa. An Account of the Countries Bordering on the Indian Ocean and Their Inhabitants.* 2 vols. London: Hakluyt Society, 1918–21.

Dampier, William. *Voyages and Discoveries.* Introduction by Clennell Wilkinson. London: The Argonaut Press, 1931.

Dove, Michael R. "The Agroecological Mythology of the Javanese and the Political Economy of Indonesia." *Indonesia* 39 (1985): 1–36.

Elvin, Mark. *The Pattern of the Chinese Past.* London: Eyre Methuen, 1973.

Eng, Pierre van der. "Production and Trade of Rice in Southeast Asia, 1850–1990." Paper Presented at the Conference Island Southeast Asia and the World Economy, 1790s–1990s, ANU, Canberra, Australia, 1992.

Foreest, Jhr. H. A. van and A. De Booy, eds. *De Vierde Schipvaart der Nederlanders naar Oost-Indië onder Jacob Wilkens en Jacob van Neck*. 2 vols. 's-Gravenhage: Nijhoff, 1980–81.

Foster, William, ed. *The Voyages of Sir James Lancaster to Brazil and the East Indies, 1591–1603*. London: Hakluyt Society, 1940.

———. *The Voyage of Sir Henry Middleton to the Moluccas, 1604–1606*. London: Hakluyt Society, 1943.

Gelderen, J. van. *Bevolkingsdichtheid en landbouw op Java*. Batavia: Statistisch Kantoor, 1922.

Generale Missiven van Gouverneurs-General en Raden aan Heren XVII der Verenigde Oostindische Compagnie, edited by W. P. Coolhaas, J. van Goor, and J. E. Schooneveld-Oosterling. 11 Vols. 's-Gravenhage: Nijhoff, 1960–2004.

Gourou, Pierre. *Les Paysans du Delta Tonkinois; Étude de Géographie Humaine*. Paris/La Haye: Mouton, 1965.

Haan, F. de. *Priangan: De Preanger-Regentschappen onder het Nederlandsche Bestuur tot 1811*. 4 vols. Batavia: Kolff, 1910–12.

Hanks, Lucien M. *Rice and Man: Agricultural Ecology in Southeast Asia*. Arlington Heights: AHM Publishing Corporation, 1972.

Henley, David, "Rizification Revisited; Re-examining the Rise of Rice in Indonesia, with Special Reference to Sulawesi." In *Smallholders and Stockbreeders: Histories of Foodcrop and Livestock Farming in Southeast Asia*, edited by Peter Boomgaard and David Henley, 107–38. Leiden: KITLV Press, 2004.

———. *Food, Fertility, and Fever; Population, Economy and Environment in North and Central Sulawesi c. 1600–1930*. Leiden: KITLV Press, 2005.

Hooijman, J. "Vervolg der verhandelingen over den tegenwoordigen staat van den landbouw in de Ommelanden van Batavia." *Verhandelingen Bataviaasch Genootschap* 3 (1781): 81–113, 297–335.

Jonge, J. K. J. de and M. L. van Deventer. *De opkomst van het Nederlandsch gezag in Oost-Indië Verzameling van onuitgegeven stukken uit het oud-koloniaal archief (1595–1814)*. 17 vols. 's-Gravenhage: Nijhoff, 1862–95.

Kathirithamby-Wells, J. ed. *Thomas Barnes' Expedition to Kerinci in 1818*. Occasional Paper, 7. Canterbury: University of Kent, 1986.

Keuning, J. ed. *De Tweede Schipvaart der Nederlanders naar Oost-Indië onder Jacob Cornelisz. van Neck en Wijbrandt Warwijck 1598–1600*. 3 vols. 's-Gravenhage: Nijhoff, 1940–42.

Knapen, Han. *Forests of Fortune? The Environmental History of Southeast Borneo 1600–1880*. Leiden: KITLV Press, 2001.

Lieberman, Victor. *Strange Parallels; Southeast Asia in Global Context, c. 800–1830*. Cambridge: Cambridge University Press, 2003.

Linschoten, Jan Huygen van. *Itinerario: voyage ofte schipvaert van—near Oost ofte Portugaels Indien, 1579–1592*. 5 vols. 's-Gravenhage: Nijhoff, 1910–39.

Lockyer, C. *An Account of the Trade in India* . . . . London: Crouch, 1711.

Marks, Robert B. *Tigers, Rice, Silk, and Silt: Environment and Economy in Late Imperial South China*. Cambridge: Cambridge University Press, 1998.

Marsden, William. *The History of Sumatra*. Kuala Lumpur: Oxford University Press. Reprint of 3rd ed. 1811, 1966.

Meilink-Roelofsz, Marie Antoinette Petronella. *Asian Trade and European Influence in the Indonesian Archipelago between 1500 and about 1630.* 's-Gravenhage: Nijhoff, 1962.

Merklein, J. J. *Reise nach Java, Vorder- und Hinter-Indien, China und Japan, 1644–1653.* 1672. Den Haag: Nijhoff, 1930.

Mossel, Jacob. *Aanmerkingen over de landen in het koningryk Jacatra, nevens de aangrensende en mede onder de Nederlandse Comp. sorteerdende Preanger landen.* Batavia: n. p., 1752.

Owen, Norman G. "The Rice Industry of Mainland Southeast Asia, 1850–1914." *Journal of the Siam Society* 59, 2 (1971): 75–143.

Pigeaud, T. G. T. *Java in the 14th Century; A Study in Cultural History.* 5 vols. The Hague: Nijhoff, 1960–63.

Radermacher, J. C. M. and W. van Hogendorp. "Korte Schets van de Bezittingen der Nederlandsche Oost-Indische Maatschappij, benevens eene Beschrijving van het Koninkrijk Jaccatra en der Stad Batavia." *Verhandelingen Bataviaasch Genootschap* 1 (1779): 1–70.

Raffles, Sophie, ed. *Memoir of the Life and Public Services of Sir Thomas Stamford Raffles.* London: Murray, 1830.

Reid, Anthony. *Southeast Asia in the Age of Commerce. I; The Lands below the Winds.* New Haven, CT: Yale University Press, 1988.

———. *Southeast Asia in the Age of Commerce. II: Expansion and Crisis.* New Haven, CT: Yale University Press, 1993.

———. "A New Phase of Commercial Expansion in Southeast Asia, 1760–1840." In *The Last Stand of Asian Autonomies; Responses to Modernity in the Diverse States of Southeast Asia and Korea, 1750–1900*, edited by Anthony Reid, 57–82. Houndmills: MacMillan; New York: St. Martin's, 1997.

Remmelink, Willem G. J. *The Chinese War and the Collapse of the Javanese State, 1725–1743.* Leiden: KITLV Press, 1994.

Rouffaer, G. P. and J. W. IJzerman, eds. *De Eerste Schipvaart der Nederlanders naar Oost-Indië onder Cornelis de Houtman, 1595–1597.* 3 vols.'s-Gravenhage: Nijhoff, 1915–29.

Schendel, Willem van. "Origins of the Burma Rice Boom, 1850–1880." *Journal of Contemporary Asia* 17, 4 (1987): 456–72.

Sutherland, Heather. "Slavery and the Slave Trade in South Sulawesi, 1660s–1800s." In *Slavery, Bondage and Dependency in Southeast Asia*, edited by Anthony Reid, 263–85. St. Lucia: University of Queensland Press, 1983.

Temple, Richard Carnac, ed. *A Geographical Account of Countries Round the Bay of Bengal, 1669 to 1679, by Thomas Bowrey.* Cambridge: Hakluyt Society, 1905.

Uhlig, Harald. "Reisbausysteme und –ökotope in Südostasien; Geowissenschaftliche Methoden in der Reisbauforschung und die Ökosysteme des Überschwemmungsreisbaues." *Erdkunde: Archiv für wissenschaftliche Geographie* 37 (1983): 269–82.

Viraphol, Sarasin. *Tribute and Profit: Sino-Siamese Trade 1652–1853.* Cambridge, MA and London: Harvard University Press, 1977.

10

Instructive and Nourishing Landscapes

Natural Resources, People, and the State in Late Imperial China

Francesca Bray

Throughout the imperial era the Chinese state took an active role in promoting the livelihood of farmers. Here I focus on the diffusion of an iconic wet-rice landscape (figure 10.1) to ask how the fundamental values of governance characteristic of the Chinese state, in conjunction with administrative techniques, relations with commerce, and the geographical scale of the territories under state control, affected the growth of rural economies and the exploitation of key natural resources. I shall concentrate mainly on the period between 1500 and 1800 when China's economy and population were in more or less steady expansion, thus increasing the pressure on environment and natural resources.

China presents an interesting contrast to the Southeast Asian states that are the main focus in this book, not least where the long-term potential of rice farming is concerned. Peter Boomgaard's chapter documents the emergence and spread of "monotonous rice bowls" in Southeast Asia, initially supplying food to the great coastal trading cities and later growing rice for world markets. Most striking, perhaps, is the lack of diversity that Boomgaard shows came to characterize these specialized rural economies. But in late imperial China intensified rice farming supported local rural economies remarkable not for their monotony but for their diversity and dynamism.

Late imperial China differed from the Southeast Asian states in its sheer size, in its mode of production or political economy, and in its relations with other states and regions. One important difference is that no colonial companies or governments gained a foothold in China until the Opium War of 1840, and even after the territorial concessions of the following decades the only truly colonial transformations of rural production occurred

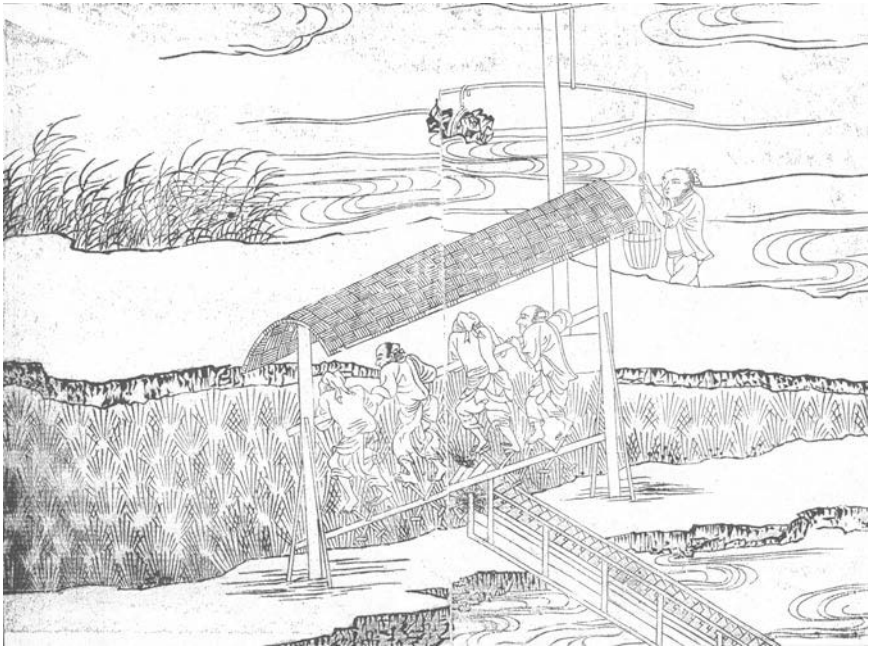

Figure 10.1 Irrigating the Fields; *Gengzhi tu*, Early Sixteenth-Century Woodblock Version; Franke 1913, Figure I, 13.

in the regions annexed by Japan: Taiwan after 1895, and Manchuria in the 1930s. Another key difference with the Southeast Asian polities was the sheer size of the state: the long-term vitality of China's rice-based rural economies was tied to the geographical scale within which government policies and regulations were applied, markets operated, and peasants migrated.

THUMBNAIL SKETCH OF AN EVOLVING AGRARIAN EMPIRE

Through the vicissitudes of over two millennia, from the first unification of China by the Qin dynasty in 221 BCE until the fall of the Qing dynasty and the establishment of a republic in 1912, China evolved as an essentially agrarian empire. Except for intermittent periods of political fragmentation, the territories united under imperial government were vast, spanning several climatic zones and a corresponding range of natural resources. The population too was enormous by comparison with most other polities. Wars, epidemics, and gains or losses of territory had it fluctuating between about 100 million and 300 million between 100 BCE and 1600 CE, reaching 400 million at the end of the eighteenth century after 150 years of continuous peace and prosperity. Although the proportions of the different

groups shifted, throughout imperial times the population consisted essentially of a huge majority of farming households, increasingly engaged in commodity production from about 1100 CE; a small national elite of governing officials; and locally based elites of landowners. Professional artisans were a small and largely urban minority. Merchants grew in number and influence through late imperial times. They played a crucial role in stimulating peasant production, and thanks to the sophisticated networks they set up, from 1500 on the hinterlands of China were steadily incorporated into marketing networks that were not only regional but national or international in scope.

Unlike many of its Asian neighbors that participated in early modern world markets, late imperial China exported manufactured goods, importing raw materials and silver bullion. Some of the goods that China imported, for example rare timbers and spices from Southeast Asia, were expensive. Some of its manufactured exports, such as the iron nails and cooking pots that went to the East Indies, or the sturdy cottons destined for farmers in Korea or Japan, did not bring particularly high prices—but they were exported in large quantities. The luxury manufactures that went into the circuits of long-distance trade with Europe and the Americas—notably fine silks and porcelains, and later tea—commanded very high prices, and apart from a few coveted curiosities such as clocks and pistols the only valuable commodity that the Chinese would take in exchange was bullion. As a result, between about 1500 and 1800 China absorbed almost all the silver being mined in Japan and the New World (Flynn 1995).

Despite the officially recognized importance of trade in generating prosperity and in keeping the empire running smoothly, late imperial Chinese rulers did not form any of the alliances with or dependence upon merchants that were typical of the mercantilist states of early modern Europe, and even in the nineteenth century China's foreign trade represented just a tiny fraction of its huge internal commerce. The late imperial state did tax foreign trade, though its primary goal in doing so was to control it rather than to expand it as a source of income. Chinese merchants overseas were offered no special protection or privileges, nor were they expected to expand the realm of Chinese influence and control. However merchants operating within China, though granted no special legal or institutional privileges, benefited from the fact that after the end of the Song dynasty (1279) the taxes on most forms of internal trade were minor or nonexistent. The Chinese state viewed trade as a secondary but necessary activity that brought essential goods to farmers and helped them sell their surpluses. In the classical formulation of statecraft, "*nong ben*, farming is the foundation." The late imperial state was able to spare merchants from taxation in part because the fiscal mechanisms it had devised tapped agricultural revenues extremely effectively (Wong 1997, 133).

The core of the Chinese fiscal system throughout the imperial era was the land-tax. Over time the ways in which tax dues from peasant farmers and landowners were calculated varied, as did the rates of taxation.[1] However,

except in certain times of extreme crisis, rates were usually kept low; equivalent to around one-tenth of the harvest.

> Government taxation rates were set by officials who believed that light taxation allowed the people to prosper, and since a prosperous people was held to be crucial for the maintenance of a powerful state, tax rates were low. Some officials, at least, no doubt realized that attempting to raise tax rates would have the unhappy consequences of promoting resistance and even rebellion. (Wong 1997, 90)

Despite relatively modest rates of taxation, the Chinese state was normally able to generate sufficient revenues to pay its officials, maintain its armies, engage in public works, and administer its territories, not to mention supporting the imperial family in the style to which it was accustomed, running local schools and the national university, arranging for uplifting moral lectures to be given in the villages, and supplying famine relief. In considering the burden on Chinese farmers, however, we must remember that many were paying rent to landlords as well as the land-tax.

During the early dynasties the men in farming families were expected to pay about one-tenth of their main cereal crop in taxes, while the women of the household paid equivalent amounts of cloth. Later the substitution of money for goods was allowed in some cases. In the late sixteenth century the transition to cash payment of all taxes was completed. This shift was facilitated by, and also encouraged, the increasing engagement of rural households in commodity production, the progressive integration of national markets by merchant networks, and a generalized rise in the consumption of purchased goods—and also most probably in standards of living.

Although a few industries in late imperial China operated on a large scale—most notably the imperial and commercial porcelain manufactures at Jingdezhen in Jiangxi, the imperial silk manufactures in the great cities of the lower Yangzi, the salt factories of Sichuan and of the southern coasts, and the paper manufactures up in the mountains of Fujian—most manufactured goods were produced in small workshops or rural homes. Commodities that were plantation crops under the colonial powers, such as cotton, tea, or sugar, in China were grown on small peasant farms and processed domestically or in small local factories (Gardella 1994; Mazumdar 1998). Urban factories employing specialized workers produced some of the very finest textiles, but the bulk of the vast amounts of cloth sold and consumed was spun and woven in peasant households (Chao 1977; Bray 1997).

It has been argued that this system of intensive farming combined with small-scale commodity production reached a point of stagnation or diminishing returns in about 1400 or 1500, leading to devastation of the environment and hopeless overpopulation and impoverishment. In the mid-1980s, Philip Huang began to elaborate on Chayanov's theories of peasant self-exploitation and on Mark Elvin's influential analysis of what he called

China's "high-level equilibrium trap" to interpret these long-term trends as "involution" or "growth without development" (Elvin 1973; Huang 1990).

More recently a revisionist trend has come to prominence, stimulated by scholarship that has reconsidered the roots, nature, and trajectories of the Industrial Revolution in the West, in particular Jan de Vries' suggestion that its dynamics were in fact better described as an "industrious revolution" (de Vries 1994).[2] De Vries argues that between roughly 1550 and 1850 households in northwestern Europe worked more hours and allocated more of their labor to specialized production for the market. They made the time for this work by purchasing some goods that they had previously made for themselves. The profits they made by their sales allowed them to purchase more consumer goods, thus raising their living standards, albeit sacrificing some leisure in return. Observing similar patterns in China and tying them to data on early modern world trade, historians and social theorists including André Gunder Frank (1998), R. Bin Wong (1997, 2002), and Ken Pomeranz (2000, 2002) have argued that at least until 1800 China, as the most prosperous and productive nation in the world, was not moribund but a key actor in generating the economic configurations of world trade that catalyzed the rise of the modern West. Life expectancy and living standards of rural households around 1800, these scholars argue, compared favorably with those in Western Europe at the time. Hamilton and Chang (2003) go so far as to claim that as early as the sixteenth century China should be thought of as a mass-consumption society.

The debate continues to rage, and given the patchy nature of the data both for Europe and for China, it is likely to continue to simmer for some time. For myself, I basically side with the second camp (e.g., Bray 1986). But as a historian of technology who has studied China's premodern farming systems from the mud up, so to speak, rather than from the court down or the merchant's office out, I tend to look more closely than many of my colleagues at how the nitty-gritty of farming techniques and the production and dissemination of technical knowledge translated into political or economic trends. I am especially interested in the ideologies embodied in or expressed through technical systems of production. Here I shall discuss how the technical dynamics of irrigated rice farming meshed with the political goals and the social and economic institutions of late imperial China.

Instructive and Nourishing Landscapes

The ideological goals of Chinese statecraft were to preserve and extend the political and moral order throughout its territories. A primary concern was the welfare of the people: the task of the ruling class was to guarantee peace and prosperity to their subjects, partly by ensuring them a stable livelihood, and partly by instilling them with ethical values. Floods or famines were signs that a ruler had failed to fulfill the mandate of heaven and justified a rebellion to overthrow him; a local magistrate was responsible for fighting poverty as well as collecting taxes; and officials who brought dramatic improvements to

the people under their charge, for instance, by constructing a dyke to keep flood tides at bay, would be rewarded by having hundreds of peasant babies named after them. To this moral responsibility of the ruler was joined the more pragmatic concern that strong states depended upon a healthy economy. A well-nourished peasantry and full state granaries were needed to support the expenses of government; to maintain large and well-equipped armies to defend the frontiers and extend the empire's territories; and to carry out public works.

The Chinese ideology of empire envisaged a social contract based on reciprocity between the emperor and his millions of peasant subjects. The emperor, through his officials, offered protection and benefits to farming households, who in return worked diligently to pay the taxes without which the empire would founder. This basic social contract made rural production the lifeblood of empire. Peasant men and women were acknowledged as direct participants in the reproduction of the state, and throughout imperial times the state repeatedly intervened to reduce the power of any group (feudal aristocrats, local strongmen, Buddhist monasteries, or wealthy landlords) who threatened to siphon off excessive amounts of produce or land, take peasant families out of the direct tax system, or accumulate sufficient assets to resist or conceal all or part of their tax dues. The aim was to maintain a direct fiscal relation between peasant producers and the state, to keep the number of those peasant producers as high as possible, and to raise levels of peasant production of the basic commodities of grain and textiles wherever feasible.

The goals of empire shaped the techniques of government and the historical evolution of the relations between production, consumption, and government, as R. Bin Wong argues in his discussion of the specificities of what he calls the Chinese "political economy" (Wong 2002), or what we might alternatively refer to as a "mode of production." If it was both the moral responsibility, and the most effective method of government, to bring benefits to the people (*limin*) by educating and nourishing (*jiaoyang*) them, then clearly government had to play an active role not only in protecting the peasantry from other groups anxious to extract resources from them, but also in providing the resources and knowledge that would enable them to prosper.

Imperial China was from its inception an agrarian state in the strong sense of the term. The promotion of agriculture, *quannong*, was at the core of the philosophy and techniques of government. Even before the first unification of the empire in 221 BCE., Chinese states were actively involved in producing and circulating farming knowledge, building infrastructure, and managing distribution. This interventionist approach continued throughout the imperial period, and involved every level of government, from the emperor and his senior ministers down to local magistrates.

Best known to Western readers, no doubt, are the coordinated policies for offering economic aid and technical support to farmers during the Song dynasty (968–1279), famously described by Mark Elvin (1973) as the equivalent of a Green Revolution. Many state-sponsored improvements in

farming took place in the Northern Song, but the Southern Song policies, developed in response to the loss of half of China's territories to the Khitan in 1126, were particularly spectacular in their effects. They generated sufficient increases in farm production in the rice regions of the south to feed a huge influx of refugees, to wage long wars against a series of enemies in the north, and to build a brilliant new capital, Hangzhou, admired by Marco Polo as the finest city in the world. Hangzhou, near the mouth of the Yangzi, was in the heart of the deltaic region known as Jiangnan, "south of the river," a region that contained some of the most fertile rice lands in China, and was to remain in the forefront of economic and intellectual development throughout the late imperial period.

Many further milestones in the official promotion of agriculture were to follow. Here I shall mention just a couple of official contributions to written agricultural knowledge and its dissemination.

In 1313, the middle-level official Wang Zhen completed an *Agricultural Treatise* (*Nongshu*) designed for use by fellow officials to reanimate farming in the many regions of China devastated by the wars that had preceded reunification under the Mongol Yuan dynasty (1279–1368). The treatise not only provided detailed instructions for all the steps of crop production, animal husbandry, and textile work, it also contained a superb innovation: a comprehensive illustrated register of all the tools and equipment used for farming and textile production. Illustrations were paired with textual descriptions in such a way as to provide a blueprint, so that a literate official could work with a carpenter or smith to reproduce the device in an area where it was hitherto unknown but could be useful. The work was printed in the Yuan imperial printing-house for circulation to officials, and was frequently reissued thereafter, usually under official sponsorship (Bray 2007).

In the last years of the Ming dynasty (1368–1644), officials from around the Jiangnan region exchanged their experience in various aspects of water control and published their discussions. Among the participants was the great statesman Xu Guangqi, a close associate of the Jesuits and a trusted adviser of the emperor. Although subsequently best known for his conversion to Christianity and his work on European science and astronomy (Jami 2001), Xu himself believed that his greatest contribution to knowledge was his monumental work *The Complete Treatise on Agricultural Administration (Nongzheng quanshu)* (Bray and Métailié 2001). The work is full of Xu's critical insights and innovations, including Xu's personal researches on fertilization, irrigation techniques, and new crops such as sweet potato, which he introduced into the lower Yangzi as a famine crop. The *Nongzheng quanshu* was published posthumously, in 1639, by a group of young officials who believed, like Xu, that *quannong*, promoting agriculture, lay at the core of successful statecraft and was just as essential as military improvements for saving the crumbling dynasty.

Other official efforts to promote agriculture included not only the production and circulation of texts, as in the two examples just given, but also

tangible material interventions, notably the remodelling of landscapes. This included hydraulic works on various scales, closely linked to a set of what one could call *ideal* or *iconic* landscapes of intensive wet-rice farming. Figure 10.1, which shows farmers irrigating their rice fields, is a thirteenth-century version of Lou Chou's work *Gengzhi tu* (*Farming and Weaving Illustrated*). Lou was a native of Jiangnan. In the course of his life he had appointments all over China, but in the early 1130s he was magistrate of Yuqian County, in the heart of the Jiangnan region where rice farming techniques were very advanced. It was in Yuqian, in 1132–34, that Lou Chou completed the *Gengzhi tu*, a set of 45 paintings showing the main tasks of rice farming and sericulture, each inscribed with a poem of the author's own composition. The *Gengzhi tu* was presented in 1153 or 1154 to the emperor, who immediately added poems of his own and ordered the work to be engraved onto stone so that rubbings could be made and distributed (Watabe 1986, 4–5; Wang 1995, 33). Over the next seven centuries it was copied as paintings on yamen walls, as woodblock printed books circulated to magistrates, as paintings by court artists (often inscribed by the emperor and/or the empress with their own poems), and as stone carvings. The pictures, often with vernacular poems or on their own, were included in farming treatises and household encyclopedias, and quickly became part of the popular visual vocabulary, providing motifs for wallpaper, porcelains, and lacquer screens (Bray 2007).

The *Gengzhi tu* depicted the most advanced rice farming techniques of Jiangnan at the time. To that extent it served as a document for technical improvement in less developed regions. Figure 10.1 shows four farmers using a chain-pump, while just to the right a man can be seen raising water with a bucket attached to a weighted pole. The poem praises the speed and efficiency of the chain-pump, which was beginning to spread through southern China, compared to the exhausting labor involved in raising the water the old-fashioned way with bucket and sweep.

The *Gengzhi tu* was the first work to celebrate the indispensable role of the irrigated Jiangnan landscape in supporting the imperial order, and to show the skills, hard work, and technical sophistication that made this contribution possible. Together Lou Chou's pictures and poems insist upon the daily toil that went into making the land yield such riches; they movingly portray the sweat, dedication, and sacrifice that went into producing the rice and silk with which the peasants paid their taxes. At the same time, however, the poems typically dwell more on ambience than on technical details. By contrast, Wang Zhen's apparently more schematic illustrations in his *Nongshu* (1313) of tools, equipment, buildings, and field-types were paired with detailed textual descriptions. Text and pictures together offered quite accurate blueprints. In the drawing of a polder, *wei tian* (figure 10.2), the rice fields are seen from above, with the main water channels, the main dykes and the low divisions between fields within a sector clearly shown. The text gives further details about the construction, pumping, water control, and maintenance of polders. In the same section Wang Zhen also describes rain-fed, tank-fed, stream-fed and terraced rice fields.

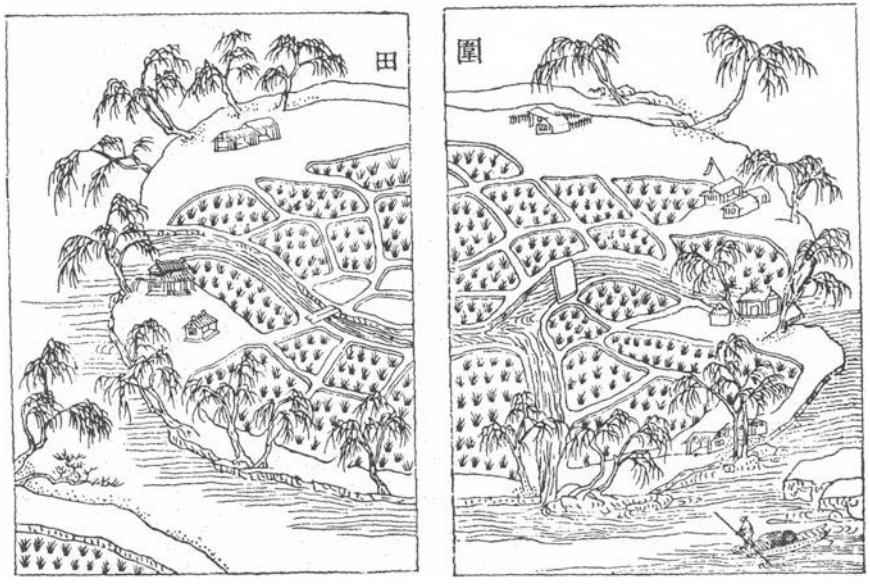

Figure 10.2 Poldered Fields, *Nongshu*, 1530 Version. Wang Zhen 1981, 137.

Wang Zhen wrote in secular terms about how to foster the productivity of a given landscape, whereas Lou Chou's document was almost a rhapsody on the rural roots of empire—the two forms were complementary and inseparable components of an imperial agenda. The landscapes that they depicted were both nourishing and instructive. Magistrates familiarized themselves with the latest best practice in order to teach the local people how to improve their farming methods and thus their livelihoods. They also organized lectures and rituals to remind the farmers of their dependence upon the state and their obligations to support the empire. If Wang Zhen's landscapes represent a tradition of technical models, then Lou Chou's represent one of moral ideals, both of which contributed equally to the project of *zheng nong*, "correct agriculture" (Will 1994). The technical and moral dimensions of agricultural improvement were inseparable in the minds of Chinese officials—though perhaps not in the minds of farmers or landlords, for whom the term *li* (as in *limin*, see before) was as likely to mean "economic profit" as "benefit" in the more general sense (Bray and Métailié 2001).

A key dimension of this ideal landscape was its gendered nature. Men's work fed the family and the empire, women's work clothed them; both were equally indispensable to the economy, and to the political-cosmic order. The *Gengzhi tu* gives equal attention to men's work—producing grain—and to women's work—producing textiles; Wang Zhen's *Nongshu* is typical of late imperial agricultural treatises in devoting half the work to field crops and

the other half to textile fibers and equipment. It was official policy to spread the ideal rice landscape wherever in the empire it could be built, and also to encourage local women to engage in the production of yarn or cloth. When taxes were still paid in kind the majority of families produced textiles for fiscal reasons, whether or not the region was suited to silk, hemp, or cotton. Once all taxes were converted to cash in the 1580s, many regions simply abandoned textiles for products where they had some comparative advantage. But there were numerous official attempts in the late Ming and Qing to introduce or to revive textile production in regions where women were perceived as being "idle" (Mann 1992; Will 1994). Although in many such cases the women were actually busy with handicrafts or other income-generating activities, in official eyes they were idle because only spinning and weaving constituted truly productive "womanly work" (*nügong* or *nühong*)—and this was because textile production, like staple grain production, was seen not just as a material but also as a social and moral activity (Bray 1997, Chapter 6).

Figure 10.3 comes from an eighteenth-century version of the *Gengzhi tu*. It shows two women working at a drawloom, producing sophisticated figured silks; a young mother with her baby, and her bent mother-in-law comforting her little grandson, stroll past the weaving-room in the foreground of the picture. The industry of figured silk-weaving had moved from rural homes, where women wove, to urban workshops, where men replaced them at the loom, as early as the sixteenth century, but the ideal of women as weavers persisted in official representations, and continued to direct state policy (ibid., Chapter 5).

How did the ideal landscape of womanly productivity mesh with the ideal landscape of male productivity? Some rice landscapes were integrated with sericulture: mulberries were planted along the bunds (figure 10.2), their leaves fed silkworms and the silkworms' excrement was used as fertilizer. In other sericultural areas most of the land on the farm would be planted with mulberries and an area of less than one-fifteenth of a hectare would be planted to rice to support the family (*Bu nongshu*, 101). Cotton also competed with staple grains for land, and in areas where farmers began to abandon rice to gain the maximum profits from cotton, local magistrates would often attempt to dissuade or prevent them. On the other hand, in areas where fiber crops were not well developed, officials encouraged their introduction. Figure 10.4, which shows women and children picking the cotton bolls, comes from a late-eighteenth century illustrated treatise on cotton cultivation written by the Governor of Zhili (the province that contained the capital, Beijing) to encourage the production of both raw cotton and homespun cloth. It contains detailed technical instructions suitable for the northern climate (Kuhn 1988, 196, 198).

Over the centuries following the Song, ideal landscapes of these kinds were reproduced in a steady wave rippling out from the heartlands of Jiangnan across the Chinese Empire. Meanwhile in Jiangnan itself the methods and technologies of rice, silk, and cotton production were intensified and improved (Li 1998 a, 1998b; Shiba 1998), and this new knowledge also

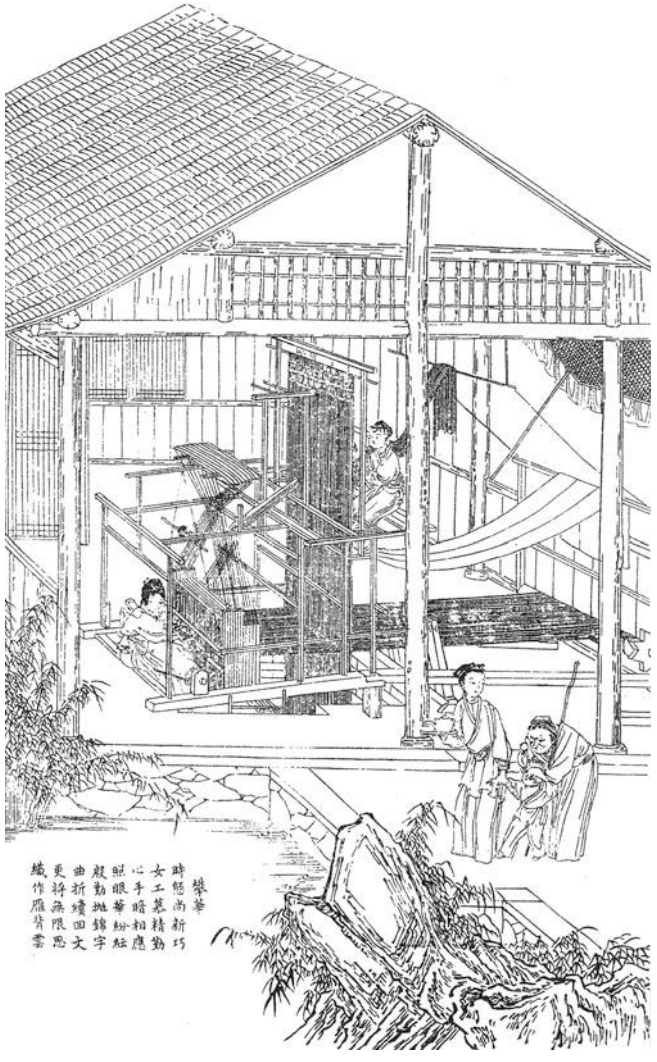

Figure 10.3 Weaving Silk Cloth on a Drawloom, *Gengzhi tu*, 1742 Version. Franke 1913, Figure II, 21.

tended to radiate outward, supplemented by information about technical innovations or improvements from other regions. Official instruction and support (including the construction of irrigation schemes, distribution of seeds, loans and tax breaks, propagation of information about new fertilizers and fertilizing techniques, etc.) played an important role in this process of the diffusion of ideal landscapes; so too did migrating peasants or improving landlords. I stress the term "ideal" because it is important to remember that these landscapes were considered symbolically as well as materially effective.

Figure 10.4 Harvesting Cotton, *Mianhua tu*: 1/14b.

Several scholars have noted that official attempts to introduce Han Chinese methods of farming and of textile production were part of a "civilizing mission," regarded as a highly effective means of sinifying barbarians and inculcating proper moral and political values. Owen Lattimore specifically points to the symbolic dimensions of official policies to establish Chinese farming landscapes along the frontiers.[3]

The rice landscape is not only highly productive but also extremely versatile, and here technical and economic advances could generate tensions between official and farmer goals. Faced with the loss of the north, Southern Song officials taught and encouraged Jiangnan rice farmers to grow a second crop, of wheat, in the winter months. Many northern refugees preferred wheat to rice so there was a good market for the crop, yet initially many farmers were reluctant, fearing that the practice would exhaust the soil's fertility and render their fields barren. But officials were able to provide information about recently perfected methods of fertilizing the fields, along with techniques for alternating between wet and dry cropping that improved the quality of the soil structure and cut down on pests. The government also wisely decided not to tax the wheat crop. In consequence, the Jiangnan rice farmers were soon converted to double-cropping (Golas 1980).

Many combinations of subsistence and commercial farming were possible in the rice regions. Depending on terrain, climatic conditions, and prevailing markets, from the same rice field a farmer could sell the surplus of a single or double crop of rice, or grow catch-crops of vegetables, ginger, or indigo. He could devote only the best land to rice for food, and use the rest for cotton or mulberries, oranges or sugarcane (Bray 1986, 124–34). These levels of involvement with the market were seldom criticized by officials, nor was the sale of surplus cloth or yarn. But by the late sixteenth century trade networks were so well developed that farmers in some areas were tempted to abandon any involvement in subsistence farming to concentrate all their resources on products for which they had a competitive advantage. Farming households around the prime silk region of Suzhou in Jiangnan, for example, preferred to turn over all their land to mulberries and to buy rice on the market (*Bu nongshu*); in the Shanghai area they turned their farmland over to cotton (*Nongzheng quanshu*, Chapter 35). The rice upon which they depended was produced upstream, in the middle Yangzi provinces of Hunan and Hubei, which had now advanced technically to the point where they were producing rice surpluses.[4]

In late imperial China, the lifeblood sustaining not only the state but also an increasingly intensive rural engagement in market production was the surplus of grain, and principally the surplus of rice. Some of this surplus circulated through local markets, some was transported across the country, whether in state barges moving tax grain north to the capital along the Grand Canal, or in merchant ships linking the fields of the latest grain-basket hinterland with the great cities of the Lower Yangzi. Twelve thousand official barges moved tax grain along the Grand Canal during the Ming dynasty. The standard load increased from 25 to 45 tons in the course of the dynasty (Brook 1998, 45–49). Commercial shipping moved huge quantities of other commodities. For example, the northeastern provinces were excellent for growing cotton, but the climate was too dry for successful spinning. Cotton dealers therefore transported raw cotton from the northeast down the canal to the Yangzi delta. There it was processed and made into cloth, which was then taken north and sold by the same dealers (Bray 1997, 212–15).

Although the inevitability of peasant involvement in trade was recognized in the great tax reforms of the 1580s, where all state labor obligations and taxes in kind were changed permanently to a single tax in cash, the growing dependence of farmers on trade made late-Ming officials very nervous. They feared the risk of mass starvation in the Yangzi delta should the harvest fail in Hunan; they also faced ever-increasing needs for rice for official use, as enemies massed on the frontiers. But there was no turning back the tide. By the seventeenth century the Jiangnan region had become a manufacturing powerhouse, propelled by household production. In Fujian, slightly to the south, some regions specialized in making paper or growing tea, and many other Fujian peasants grew sugar, which was processed in small local factories using some specialized technology such as roller-mills. Essentially, however, the main equipment needed for peasant sugar production was part of the

same "technological kit" as that used for rice farming, and it could also be adapted without significant capital investment for other rural manufactures such as oil or soy products (Daniels 1996). Merchants took these products, including sugar, around China and often abroad too; indeed, until the rise of the Caribbean factories displaced all competition, certain types of Chinese sugar were produced exclusively for European markets (Sabban 1994).

Hamilton and Chang (2003) argue that this type of low-capital and highly flexible household involvement in commodity production allowed for extremely effective specialization and rationalization of production, with a mass consumer market emerging as early as the sixteenth century. The development through the late Ming of highly effective long-distance merchant networks was crucial in developing what Hamilton and Chang identify as a "distribution-driven" rather than "production-driven" market. Although acknowledging that in this system of trade-integrated handicraft production expansion often involved the simplification of technology and the increased involvement of younger family members, scholars such as Hamilton and Chang, and Pomeranz, reject interpretations of this trend as involutionary. Whereas Elvin (1973) and Huang (1990) have stressed the resistance to technical and managerial transformation and the potential for immiseration of a system of production that offered diminishing returns to an hour of labor, with peasants struggling to meet fixed consumption targets from shrinking farms, Pomeranz, Li and Wong put a positive spin on the flexibility of this mechanically low-tech and labor-intensive system,[5] arguing that late imperial China is a case of Hayami and de Vries' "industrious revolution." Perkins (1970) had already argued that despite the population increases of the late seventeenth and eighteenth centuries, per capita supplies of basic foods did not start to drop in China until 1800 at the earliest. Pomeranz (2002) goes further, arguing that until the end of the eighteenth century much of rural China had high standards of living (measured by consumption of cloth, tobacco, sugar, tea, and furniture as well as staple grains and fuel) that compared favorably to the most advanced areas of Europe at the time. He argues that one reason was that women's earnings more closely approximated men's than in Europe, and also notes that in China's rice-growing regions "known techniques could still raise yields without exhausting the soil," while the preservation of natural resources such as forests also compared well to countries such as France, at least until the end of the eighteenth century (Pomeranz 2002, paras 24–28).

The ripple effect of economic intensification, population growth, and raised consumption levels continued throughout late imperial times, filling up China's peripheries. The diversified economies of the core regions could support high densities of population and at first attracted migrants, but eventually a limit was reached and people migrated to less developed areas, which in their turn would see production intensify and population levels rise.[6] The Pearl River delta began to rival the Yangzi delta as a manufacturing core, importing raw materials and exporting processed goods. The Shanghai region remained the chief exporter of cotton goods, and to meet its needs for

raw materials it expanded its cotton fields while continuing to import raw cotton from the North. By the mid-nineteenth century the Canton region was importing raw cotton from India to feed its looms; it also sold sugar to the north in exchange for raw cotton. Starting in the eighteenth century, large quantities of rice were imported from Siam by various manufacturing regions of China (Viraphol 1997). Chinese merchant networks provided the empire with an extraterritorial "shadow acreage" that allowed it to compete successfully even in the late nineteenth and early twentieth centuries with many industrial products that Western nations had hoped to import into China, notably cotton goods (Hamilton and Chang 2003, 199).

Glass Half Full, Glass Half Empty

Let me finally turn to the effects of this agronomic imperialism on natural resources. Clearly the long-term growth of population, coupled with rising levels of consumption and exports, translated into a steady increase of pressure on natural resources. To what extent were the rice and textile landscapes, and the sociotechnical systems associated with them, able to accommodate these processes of economic growth without environmental degradation? Here again there are strong disagreements over the interpretation of the same data. Elvin (2004), for example, tends to present levels of deforestation in 1800 as proof that from early times population growth and path-driven technologies had trapped China into a situation where it was probably more environmentally degraded than northwest Europe at the same time. Pomeranz (2002) interprets the same data as a long-term triumph of the Chinese political economy and its sustainable resource use. Again, my own view of the historical potential of rice economies in general, and of the rice-based late imperial Chinese economy in particular, is closer to that of Pomeranz.

What were the environmental effects of extending the farming area and intensifying cropping? This depended on the terrain and the crop. The construction of new rice paddies had very different effects from clearing patches of hillside for maize.

Wet-rice offers a comparatively stable basis for expansion and intensification. The shift to irrigated fields, transplanting, fertilizing, and other intensive techniques not only increases output but builds a highly resilient ecosystem underpinned by the enduring natural fertility and low erosion of established irrigated rice fields (Grist 1975, 20–38). The long-term potential for intensification and diversification of crop production is very high. In 1178, the Song official Zhou Qufei wrote disapprovingly that the rice farmers of Qinzhou (southern Guangdong) were very careless in their methods, simply breaking up the soil into clods rather than working it till it was smooth, dibbling the seed into the field directly rather than transplanting, and neglecting to weed or irrigate—"they simply leave Nature to take care of the crop" (Bray 1984, 510). By the late seventeenth century Qu Dajun described how the farmers of the same region coaxed a continual sequence of

rice, indigo, melons, oilseed, or cotton from the soil, providing not only for their own subsistence but also for large volumes of food and raw materials exported downriver to Canton. "The people are all extremely industrious and devote themselves so diligently to their farming that truly no patch of land is wasted and no hands are ever idle" (ibid., 509).

Once the fields and watercourses had been built, wet-rice landscapes tended to be ecologically quite stable (Osborne 1998, 208). When rice farmers in the middle-Yangzi provinces of Hunan and Hubei began to export grain downriver to the Jiangnan cities, the intensification of rice production transformed the local landscapes but did not destabilize them. Rice yields could be raised by improved skills, increases in labor, and cheap improvements in technique without exhaustion of the soil. Even poor farmers could afford the small purchases of soybean waste or oilcake that improved yields significantly if properly applied, and fertilizers were a trade that grew significantly through late imperial times (Bray 1984, 289–98). Cotton, on the other hand, was known to be a gross feeder by comparison with rice, and officials continually nagged cotton-growers not to neglect fertilizing the soil. By the mid-Qing the lower Yangzi provinces were importing huge quantities of soybeans from Manchuria not to eat but to keep their cotton fields in good heart (Pomeranz 2002, note 44). In general, the rice lands and surrounding croplands in the economically advanced regions did not deteriorate under pressure and remained highly productive throughout the imperial era (Shiba 1998).[7]

Not all Chinese crop systems were equally resilient, however, nor were all nonarable lands in the rice-growing regions necessarily well cared for. By the late eighteenth century, population increases and the consequent migration of many peasant families to more marginal and fragile lands in the central provinces and along the borders was starting to have devastating effects. Landless peasants moved up into mountainous regions, chopping down forests to plant crops that would provide immediate returns on newly cleared hill fields. The New World imports of maize and sweet potato were especially popular choices for poor peasants, whereas landlords invested in upland farms of tea or indigo. In both cases the effects of deforestation and erosion, and the implications for China's river systems, were immediately clear to Chinese officials. Though they had no hesitation in legislating to curb landlord enterprises, control over remote areas was difficult to maintain. And in the case of the landless, compassionate magistrates were torn between allowing poor peasants to gain a livelihood, and protecting the waterways and fertile plains of China's most productive regions.[8] Until the mid-nineteenth century, officials in many of China's border regions also maintained "remarkably effective government limitation of access to non-Han areas," thus protecting many fragile environments of grassland and mountains (Vermeer 1998, 278). Elsewhere, however, by the nineteenth century "it seemed as if humans had set out to reduce their original natural environment to only two types of land: carefully maintained, productive, private farmland and ruthlessly exploited, unproductive, common wasteland" (ibid. 235).

Until the nineteenth-century crisis, official support for agriculture, in combination with the specific organization of Chinese trade networks, generally reduced the risks to farming families as well as local pressures on resources, while increasing production and consumption. "Moving resources through greater spaces gave the Chinese state certain opportunities that European states lacked" (Wong 1997, 132). Wong remarks that this often translated into lower taxation than might otherwise have been the case. It also allowed the government to dampen the effects of shortage and surplus in basic grains across its territories. In the course of the eighteenth century the effect of climatic disasters on grain prices was only a fraction in South China of what it was in England, and grain prices rose much more slowly, thanks to a constellation of intensive cropping patterns, an integrated national grain market, and state institutions to prevent hardship. The details of the latter were devised on the basis of a constant monitoring of food supplies where "local officials routinely reported grain harvest estimates, rainfall amounts and grain prices to the central government" (Marks 1998b, 422; Will and Wong 1991).

Relations between state and merchants evolved through late imperial times. Wong notes that by the eighteenth century, although there were some official disagreements (animated by subsistence anxieties) over long-distance versus local commerce, or grain versus cash crops, generally the beneficial and important role of commerce was acknowledged. This he notes is a change from the sixteenth century, when the dramatically rapid expansion of commerce and perceptions of the loss of values and stability in pursuit of profit still generated widespread anxiety among the elite. But "Chinese officials and thinkers came up with ways to tame commerce and create for it socially acceptable functions." The state retained control over the bulk of the grain produced in China, though Chinese merchant networks imported additional supplies from Southeast Asia, and almost all other goods in daily use (apart from salt, which remained a state monopoly) were traded freely, with at most nominal tax (Wong 1997, 136–37). As mentioned earlier, the trade networks allowed for local specialization and efficient divisions of labor in producing commodities (for example. northern China and Jiangnan exchanging raw and woven cotton), thus also reducing the pressures on local resources, and providing cash to farmers, some of which went into fertilizers or improved varieties or other inputs that improved productivity and kept the land in heart.

At the same time, as already mentioned, the ripple effect did not always work to support rational regional divisions of labor. In the eighteenth century, when the middle- Yangzi provinces turned to cotton instead of putting all their energies into rice, the surplus available for Jiangnan farmers dwindled and they were obliged to increase their own rice production—which in fact they did rather successfully (Li 1998b). Nor did the state's interventions to ensure stability, however well intentioned, always succeed. Elvin (2004) provides illuminating examples of several long-term large-scale hydraulic projects that demonstrate that it is not only in modern societies that ambitious technological solutions generate new technical problems almost ad infinitum.

Elvin concludes that the huge hydraulic systems he discusses locked economic and institutional structures into place, preventing any qualitative change (Elvin 2004, 162), and he argues that large-scale state policies and local initiatives interacted in late imperial China to generate pressures on environmental, social, and economic resources that grew inexorably until irreparable damage was done—a view with which Smil (1993) concurs. Economic historians such as Pomeranz, Wong, and Hamilton tend to emphasize the dynamic nature of the interplay between government, commercial networks, and local economies, and they argue that state infrastructural support played a key role in improving factor productivity. Elvin alludes to "a thoroughness of environmental exploitation that was distinctive in the premodern world" (ibid., xxiii–xxiv). The revisionists (including me) would agree entirely with Elvin's formulation, while putting a very different spin on it. The data are plentiful, if patchy, and new insights are offered every year. Given China's historical longevity, its geographical size and diversity, it is unlikely that any resolution of the debate is imminent.

NOTES

1. For example, Huang (1974); Wong (1997, 131–40); Mazumdar (1998, 211–17, 288–94 ff).
2. De Vries was inspired by the Japanese economic historian Hayami Akira, who proposed a contrast between an "industrial revolution" in England and an "industrious revolution" in Tokugawa Japan (Hayami 1967, 1992).
3. Lattimore (1962), Mann (1992), Will (1994), and Elvin (2004). Hostetler (2001) discusses the symbolic efficacity attributed to drawing maps of non-Chinese territories.
4. Rawski (1972) is the classic study of this ripple dynamic, whereby regions that initially produced surpluses of cereals shifted to a more diversified economy of cropping and of manufacturing, while agriculture in hinterland regions that had been little involved in markets was developed to generate rice surpluses for export to the more advanced economic regions. See also Marks (1998a) and Pomeranz (2002).
5. However, they place far less importance on skill as a substitute for capital or mechanical complexity than do I or Li Bozhong (Bray [1986], Li [1998 a, b]).
6. The population of core regions like Jiangnan remained stable through the Qing, while that of newly developing regions grew rapidly. "The Yangzi Delta alone probably held 16 to 21 percent of China's population in 1750, but less than 9 percent by 1850 and under 7 percent by 1950" (Pomeranz 2002: para 42).
7. In the twentieth century the introduction of chemical fertilizers brought a quantum leap in productivity.
8. See Osborne (1998, 222–29.) and Vermeer (1998, 273–75) for contrary examples.

BIBLIOGRAPHY

Arrighi, Giovanni, Takeshi Hamashita, and Mark Selden, eds. *The Resurgence of East Asia: 500, 150 and 50 Year Perspectives.* London and New York: Routledge, 2003 [hereafter referred to as Arrighi et al.].

Bray, Francesca. *Science and Civilisation in China* vol. VI Part 2, *Agriculture*. Cambridge: Cambridge University Press, 1984.

———. *The Rice Economies: Technology and Development in Asian Societies*. Oxford: Basil Blackwell. 1986, reprinted Berkeley, CA: University of California Press, 1994.

———. *Technology and Gender: Fabrics of Power in Late Imperial China*. Berkeley, CA: University of California Press, 1997.

———. "Agricultural Illustrations: Blueprint or Icon?" In *Graphics and Text in the Production of Technical Knowledge in China: The Warp and the Weft*, edited by Francesca Bray, Georges Metailie, and Vera Dorofeeva-Lichtmann, 526–74. Leiden: Brill, 2007.

Bray, Francesca and Georges Métailié. "Who Was the Author of the *Nongzheng quanshu*?" In *Statecraft and Intellectual Renewal in Late Ming China: The Cross-Cultural Synthesis of Xu Guangqi (1562–1633)*, edited by C Jami, P Engelfriet, and G Blue, 322–59, Leiden: Brill, 2001.

Brook, Timothy. *The Confusions of Pleasure: Commerce and Culture in Ming China*. Berkeley, CA: University of California Press, 1998.

Chao Kang. *The Development of Cotton Textile Production in China*. Cambridge, MA.: Harvard University Press, 1977.

Daniels, Christian. *Science and Civilisation in China* vol. VI Part 3, *Biology and Biological Technology, Agro-industries: Sugarcane Technology*. Cambridge: Cambridge University Press, 1996.

De Vries, Jan. "The Industrial Revolution and the Industrious Revolution." *Journal of Economic History* 54, 2, (1994): 249–70.

Elvin, Mark. *The Pattern of the Chinese Past*. Stanford: Stanford University Press, 1973.

———. *The Retreat of the Elephants: An Environmental History of China*. New Haven, CT: Yale University Press, 2004.

Elvin, Mark and Liu Ts'ui-jung, eds. *Sediments of Time: Environment and Society in Chinese History*. Cambridge: Cambridge University Press, 1998 [hereafter referred to as Elvin and Liu].

Fang, Guancheng. *Mianhua tu* [Illustrations of Cotton Planting and Manufacture] ca. 1765. Facsimile reproduced in *Zhongguo gudai banhua congkan*, vol. 4. Beijing: Zhonghua Press, 1960.

Flynn, Dennis. "Arbitrage, China and World Trade in the Early Modern Period." *Journal of the Economic and Social History of the Orient* 38, 4 (1995): 429–48.

Frank, André Gunder. *ReOrient: Global Economy in the Asian Age*. Berkeley, CA: University of California Press, 1998.

Franke, Otto. *Keng Tschi T'u: Ackerbau und Seidengewinnung in China*. Hamburg: L. Friederichsen & Co., 1913.

Gardella, Robert. *Harvesting Mountains: Fujian and the China Tea Trade, 1757–1937*. Berkeley, CA: University of California Press, 1994.

Golas, Peter J. "Rural China in the Song." *Journal of Asian Studies* 39, 2 (1980): 291–325.

Grist, D. H. *Rice*. 5th ed. London: Longman, 1975.

Hamilton, Gary G. and Wei-An Chang. "The Importance of Commerce in the Organization of China's Late Imperial Economy." In Arrighi et al., 173–213.

Hayami Akira. "Keizai shakai no seiritsu to sono tokushitsu [The Emergence of Economic Society and Its Characteristics]." In *Atarashii Edo Jidaizo o Motomete* [In Search of a New Image of the Edo Period], edited by Shakai Keizaishi Gakkai, 173–213. Tokyo: Toyo Keizai Shinposha, 1967.

Hayami Akira. "The Industrious Revolution." *Look Japan* 38 (1992): 8–10.
Hostetler, Laura. *Qing Colonial Enterprise: Ethnography and Cartography in Early Modern China*. Chicago, IL: University of Chicago Press, 2001.
Huang, Philip C. C. *The Peasant Family and Rural Development in the Yangzi Delta, 1350–1988*. Stanford, CA: Stanford University Press, 1990.
Huang, Ray. *Taxation and Government Finance in 16th Century Ming China*. Cambridge: Cambridge University Press, 1974.
Jami, Catherine, Peter Engelfriet, and Gregory Blue, eds. *Statecraft and Intellectual Renewal in Late Ming China: The Cross-Cultural Synthesis of Xu Guangqi (1562–1633)*. Leiden: Brill, 2001.
Kuhn, Dieter. *Science and Civilisation in China* vol. V Part 9, *Textile Technology Spinning and Reeling*. Cambridge: Cambridge University Press, 1988.
Lattimore, Owen. *Studies in Frontier History*. London and New York: Oxford University Press, 1962.
Li Bozhong. "Changes in Climate, Land, and Human Efforts: The Production of Wet-Field Rice in Jiangnan during the Ming and Qing Dynasties." In Elvin and Liu, 447–86, 1998a.
———. *Agricultural Development in Jiangnan, 1620–1850*, New York: St Martin's Press, 1998b.
Lou Chou. *Gengzhi tu* [Farming and Weaving Illustrated]. c. 1134.
Mann, Susan. "Household Handicrafts and State Policy in Qing Times." In *To Achieve Security and Wealth: The Qing Imperial State and the Economy 1644–1911*, edited by Jane Kate Leonard and John R. Watt, 75–95. Ithaca, NY: Cornell University East Asia Program, 1992.
Marks, Robert B. *Tigers, Rice, Silk and Silt: Environment and Economy in Late Imperial South China*. Cambridge: Cambridge University Press, 1998a.
———. "'It Never Used to Snow': Climatic Variability and Harvest Yields in Late-Imperial South China, 1650–1850." In Elvin and Liu, 411–46, 1998b.
Mazumdar, Sucheta. *Sugar and Society in China: Peasants, Technology, and the World Market*. Cambridge, MA: Harvard University Asia Center, 1998.
Osborne, Anne. "Highlands and Lowlands: Economic and Ecological Interactions in the Lower Yangzi Region under the Qing." In Elvin and Liu, 203–34, 1998.
Perdue, Peter C. *Exhausting the Earth: State and Peasant in Hunan, 1500–1850*. Cambridge, MA: Harvard University Press, 1987.
Perkins, Dwight H. *Agricultural Development in China, 1368–1968*. Chicago, IL: Aldine, 1970.
Pomeranz, Kenneth. *The Great Divergence: China, Europe, and the Making of the Modern World Economy*. Princeton, NJ: Princeton University Press, 2000.
———. "Political Economy and Ecology on the Eve of Industrialization: Europe, China, and the Global Conjuncture." *The American Historical Review* 107, 2, (2002): 425–46; consulted online at http://www.historycooperative.org/journals/ahr/107.2/ah0202000425.html last accessed 14 June, 2003.
Raswki, Evelyn S. *Agricultural Change and the Peasant Economy of South China*. Cambridge, MA: Harvard University Press, 1972.
Sabban, Françoise. L'industrie sucrière, le moulin à sucre et les relations sino-portugaises aux XIVe–XVIIIe siècles. *Annales Histoires, Sciences Sociales* 49, 4 (1994): 817–62.
Shiba Yoshinobu. "Environment versus Water Control: The Case of the Southern Hangzhou Bay Area from the Mid-Tang through the Qing." In Elvin and Liu, 135–64, 1998.

Smil, Vaclav. *China's Environmental Crisis: An Inquiry into the Limits of National Development*. Armonk, NY: M. E. Sharpe, 1993.

Vermeer, Eduard B. Population and Ecology along the Frontier in Qing China. In Elvin and Liu, 235–79, 1998.

Viraphol, Sarasin. *Tribute and Profit: Sino-Siamese Trade, 1652–1853*. Cambridge, MA.: Harvard University Press, 1997.

Wang Chaosheng, ed. *Zhongguo gudai gengzhi tu* [Farming and Weaving Pictures in Ancient China]. Beijing: China Agriculture Press, 1995.

Wang Zhen. *Nong shu* [Agricultural treatise]. 1313. Modern Edition: Wang Yuhu, Beijing: Nongye Press, 1981.

Watabe Takeshi. "Chūgoku nōsho *Kōshikido* no ryūden to sono eikyō ni tsuite" [Studies about the Spread and Influences of "Pictures of Tilling and Weaving."] *Bulletin of the Faculty of Letters, Tokai University*, 46 (1986): 1–37.

Will, Pierre-Étienne. Développement quantitatif et développement qualitatif en Chine à la fin de l'époque impériale. *Annales Histoire, Sciences Sociales* 49, 4 (1994): 863–902.

———. La réglementation administrative et le code pénal mis en tableaux. *Études chinoises* XXII (2003): 93–157.

Will, Pierre-Etienne and R. Bin Wong. *Nourish the People: The State Civilian Granary System in China, 1650–1850*. Ann Arbor, MI: University of Michigan Press, 1991.

Wong, R. Bin. *China Transformed: Historical Change and the Limits of European Experience*. Ithaca, NY: Cornell University Press, 1997.

———. "The Search for European Differences and Domination in the Early Modern World: A View from Asia." *The American Historical Review* 107, 2 (2002): 447–69; consulted online at http://www.historycooperative.org/journals/ahr/107.2/ah0202000447.html last accessed 14 June 2003.

Xu Guangqi. *Nongzheng quanshu* [Complete treatise on agricultural administration]. 1639, Modern Edition: Shi Shenghan, 3 vols, Shanghai: Guji Press, 1979.

Zhang Lüxiang. *Bu nongshu* [Supplemented Treatise on Agriculture]. Ca. 1658, Modern Edition: Chen Huanli and Wang Dacan, *Bu nongshu jiaoshi*. Beijing: Nongye Press, 1983.

11

Demographic Growth, Agricultural Expansion, and Livestock in the Lower Chindwin in the Eighteenth and Nineteenth Centuries

Michael Charney[1]

Introduction

In one way or another, an ecological approach to premodern Burmese history is not new. Indeed, the two main American historians of premodern Burma, Victor B. Lieberman and Michael A. Aung-Thwin, have made ecology central to their arguments of dynastic rise and collapse. Aung-Thwin, for example, has argued that the fall of the Kingdom of Pagan (ca. 1300) was due to imbalances between royal and monastic reserves of human and agricultural resources in a society that had reached the limits of possible agricultural expansion. Lieberman likewise demonstrated that the fall of the First Taung-ngu Dynasty (sixteenth century) and the subsequent political hegemony of Ava were due to the agricultural and demographic superiority of Upper Burma over its more ecologically challenged neighbor. Numerous other scholars working on premodern Burma have found ecological change impossible to ignore as a major factor in Burma's political fate. Riggs, for example, has identified the loss of agricultural resources as a key factor in the slow death of Burma's last dynasty.[2] Certainly, there can be no suggestion that ecological factors have been ignored in assessing causality for premodern historical change in Burma.

Identifying the nuances of the impact of ecological factors regarding local or subregional history, however, has been neglected due to the general macroscopic approach of the prevailing literature regarding Burma's history. Until fairly recently, the fact that relatively few scholars worked on premodern Burma presented an obstacle to paying attention to the kinds of local history upon which the historiography of other regions, such as Europe, have been built. As these numbers have increased and the available body of literature has expanded, a local approach to Burma's ecological history has

become both possible and necessary. As a result, such an approach has enormous possibilities for identifying particular relationships between the environment and historical change that a less circumspect approach might miss. The present chapter seeks to understand how the interplay of human, animal, and agricultural resources helped to shape the history of one area of Burma, the Lower Chindwin, in the precolonial period, particularly in the eighteenth and nineteenth centuries. The Lower Chindwin area was and is Burma's hottest and driest zone and, for much of the premodern era, most of the river was on the edge of the Burmese state and was thus open to hill-tribe raids. Even when Burmese rule was extended over the southern half of the river from the eleventh century, the Lower Chindwin remained on the periphery. Yet, by the end of the precolonial period, it was the second-largest population center and was the chief center in contributions to the royal pool of servicemen. This change had an important impact on local agriculture, animals, and religion and, in turn, these developments affected the course of the development of the Burmese state. Ultimately, forest-dwelling monasticism increasingly gave way to town- and village-dwelling monasticism, and thus contributed to the spread of popular Buddhism, although a dwindling number of orthodox-minded monks used the royal court to assert state protection over forest reserves and erect sanctuaries for animals.

The Frontier Problem

Archaeologists have determined that the Lower Chindwin was the site of a sizeable and growing population over the course of the Neolithic to Bronze ages. Population growth was likely due to the ability to grow corn and to make use of the rich volcanic soils of the area deposited by a series of Holocene volcanoes across the Chindwin River, including the Monywa area. Elizabeth Moore also observes that volcanic activity narrowed the river and slowed the flow of water, thus making the Chindwin more attractive for human settlement, as well as making the area "extremely rich in terms of natural resources," including volcanic stone and copper useful for better agricultural tools. Indeed, most raw materials found along the Irrawaddy River, Burma's main river valley, could also be found along the Chindwin.[3]

Natural limits on the extension of cultivation in the Lower Chindwin were not due to the paucity of arable lands, but rather to the threefold problems of manpower availability: manpower scarcity per se, mobility, and manpower raids. The first problem was endemic to Southeast Asia generally during much of the premodern period and after; there was a great disparity in the ratio of land to people in the region as a whole. The second problem, mobility, was chronic, to different degrees in different states, and was due to the limited ability of the state, throughout much of the early modern period, to force populations to stay in one place. The success of attempts by the state to resolve both problems, through the capture of new populations for forcible resettlement, depended upon the overall strength of a state at any

given time. Although a strong state could maintain, through warfare, sizeable, and periodic inputs of new labor, political fluctuations or longer-term decline meant that a neighbor could just as easily raid and carry off people as well.

Despite early and sizeable human settlement and agricultural potential, during much of the early historical period until the mid-eighteenth century Burmese states found it difficult to maintain a satisfactory (for the court) sedentary population. Logically, the emergence of large-scale Burmese states in the Irrawaddy River Valley and neighboring areas, all with an interest in increasing manpower and agricultural reserves, would seem to have encouraged more population growth in the area. Indeed, the early (Srikshetra and Pagan) and many of the later (Panya, Myinsaing, Sagaing, and Ava) capitals of lowland Burmese states were all in proximity to the Lower reaches of the Chindwin and would have otherwise promised tight control by the Burmese state. The parallel rise of rival states in the neighboring hill areas and along the upper reaches of the Chindwin meant that the Lower Chindwin was a site of state contest and thus witnessed a continual drain on local manpower reserves. From the midsection of the river to the north, hostile states such as Manipur and Assam, as well as Chin and Kachin tribesmen, presented a constant threat to local settlements. The transition from the small-scale settlements and polities of the prehistoric period to the hegemonic ones of the classical and early modern periods (eighth–eighteenth centuries) to the north and the south made the Lower Chindwin a hostile frontier. Even control of the Lower Chindwin was occasionally shaken because of dynastic upsets and the political instability that would ensue.[4] From the eleventh century, as Pagan's political reach expanded, areas brought under new settlement were referred to as *taik*, the Lower Chindwin being divided into two such *taik*. Although the use of *taik* ceased for many other areas of Upper Burma by the eighteenth century, the Lower Chindwin remained divided into *taik*, specifically the Pangyi and Twinthin *taiks*, likely indicating the degree to which this area continued to be perceived as a frontier relative to the Burmese state.

Frontier raiding, for captives and property, and the disruption of settler communities did not encourage population growth. Burmese attempts to keep the area populated depended mainly upon the relatively frequent deportation of war captives to the area and many of these settlements were still recognizable until the nineteenth century as communities descended from war captives. Although local land registers are not available to the degree found elsewhere in premodern Burma, the significance and frequency of war captive inputs would suggest that maintaining an agricultural population here was a continual problem. Burmese kings of the sixteenth and seventeenth centuries attempted to strengthen the local population base and increase the area under cultivation by planting colonies of war captives drawn from defeated Shan/Tai states, Mon rebels from southern Burma, and Thais from Ayudhya. Other land was given to several hundred Muslims from western Burma who had migrated into Burma and to Portuguese and Indian captives taken at Syriam in 1613.[5] Even in the 1740–57 war between Upper

and Lower Burma, the Burmese king Alaunghpaya (r. 1752–60) had to bring the Lower Chindwin under his control by force because locally resettled communities of Mon deportees from the south supported southern rebels over the northern champion.

Lieberman has made a good case for population dislocation in southern and central Burma from the 1740s. In his view, refugees from the traditionally populous districts of Meiktila, Yamethin, and Myingyan eventually resettled in the Chindwin and Mu valleys from 1752. A number of indicators support this observation, including contemporary travel accounts as well as royal appointment lists from 1745 and 1752 that demonstrate the concentration of important military commanders in northwestern Burma. These men were intended to raise significant numbers of troops, so their concentration suggests that this area was now better populated than other areas under Ava's control.[6]

By itself, this demographic shift probably would not have had long-term significance without a stabilization of the frontier. In other words, unless new strategies were pursued by the court, the sudden repopulation of the Lower Chindwin was easily reversible once Burma went through one of its many lapses in military strength and administrative order. The expansion of the post-1752 Burmese frontier had a definite impact on the population base of the Lower Chindwin. As the Burmese state matured over the course of succeeding dynastic cycles of rise and decline, the problem of population raiding in the Lower Chindwin, our focus here, was resolved for a considerable period of time. Burmese rulers in the last half of the eighteenth century pushed the limits of more or less direct rule further out than any previous dynasty, just as their contemporaries on the Southeast Asian mainland, in Vietnam and Siam (Thailand), did in their respective sections of the region.

The Burmese court's solution to the frontier problem was threefold. First, they brought Manipur and Assam under Burmese control, beginning with a campaign against Manipur in 1758–59. In this and later conquests, the Burmese deported a very large number of Manipuris and Assamese to other parts of Burma, reducing the threat of population raids stemming from the north. Second, from 1758, the royal Burmese military presence in the Lower Chindwin Valley was significantly enlarged. Since these men became local landholders, the Burmese court had in effect increased the number of agriculturalists and secured the area politically with loyalists.[7] Third, and most importantly, the dynastic founder, Alaunghpaya, divided large sections of the Lower Chindwin among two of his sons, who ruled these areas as appanages, keeping the area under close royal scrutiny. Further, in the 1780s, Manipur and Assam were brought under even tighter Burmese control and, further west, Arakan was annexed to the empire. Even when these last three areas were lost to the British from 1825, the threat of manpower raids from the north was severely curtailed.

The securing of the northern reaches of the Chindwin River had a significant impact on demographic resources in the lower half of the river. Over the course of the last four decades of the eighteenth century, the population of

the Lower Chindwin grew rapidly, certainly in absolute numbers, but especially relative to other areas of the royal domains. As one account recorded of this area in 1797, "The [Chindwin] is . . . I am informed, a considerable river, and flows from Cossay through a very fertile country. The country on both banks is populous and well cultivated."[8] From the 1780s and well into the 1820s, the Lower Chindwin Valley shouldered the heaviest burden in providing royal servicemen to the royal court. Only the royal capital rivaled the Lower Chindwin governorships of Alon (Badon) and Tabayin in numbers of settled royal servicemen and Alon was the single largest population center in the kingdom (including the royal capital). The Lower Chindwin, with Alon at its center, thus amounted to a special royal bastion in the Konbaung state. Certainly, this is indicated in part by the growing economic prosperity of the area, as Toe Hla has demonstrated using data on royally sponsored annual festivals. The two main locations of these festivals were the Alon governorship (nineteen) and the Pangyi *taik* (eleven) in the Lower Chindwin, each hosting far more than most other locations (usually one or two per year). Since these fairs reflected local trading activity, they suggest that Alon was the kingdom's busiest trading center outside of the royal capital.[9]

The establishment of the standing army regiments in the area also aided the opening up of agricultural land in the Lower Chindwin area physically and financially. The Burmese ruler Bodawhpaya (r. 1782–1819) made the Lower Chindwin the home of the 12 royal guard units, as well as miscellaneous other palace forces, including many of his cavalry units. Even after his death, these regiments remained in place. Certainly, the manpower input was significant, for although on-duty guardsmen were stationed in the capital, 90 percent remained at home working the fields or loaning land and seeds to tenants. Only 10 percent of the total servicemen assigned to a military regiment were on duty in the capital at any one time, on varying tours of duty lasting several years. Elite servicemen not on active duty received land grants as a condition of service, lower revenue demands than the *athi* (free) population, and were expected to maintain their martial skills. Members of the elite units also received larger grants of land and were relatively free from *corvee* labor responsibilities, permitting them to direct their labor to their own personal estates.[10]

There was a serious ecological impact of the dramatic increase in human resources in the late eighteenth century Lower Chindwin and this was partly because the Lower Chindwin, like much of lowland Upper Burma, was dependent upon agriculture. A glance first at the soils available in early areas of settlement, along the river, is necessary. The Lower Chindwin region is roughly divided in terms of soil into four main zones. To the east of the Chindwin-Mu river watershed lie infertile stony soils. To the west lies a more diverse mixture of soils, including richer black and red soils. The north is dominated by less fertile sandy red soil. The fourth area consists of the alluvial soils of the lower reaches of the Chindwin and annually inundated soils along this river. The Burmese divided the soils in the area into cool (*aye-deh*), moisture-retaining

soils, and hot soils (*pu-deh*), soils that did not retain moisture, depending on their ability to absorb, retain, and percolate water. Among the cool soils, the most desirable was alluvial soil, known later by the misnomer of "black cotton soil," which was deposited along the riverbanks during annual flooding. This soil could be used to grow wet crops such as rice.[11] This thin strip of alluvial soils south of Monywa and along the banks of the Chindwin River, and such activities as fishing and boatbuilding, probably provided sufficient opportunities for subsistence while the local population remained small, but were insufficient when the population grew.

The demographic expansion discussed above pushed cultivation out of these riverine soils into the less watered, and loam, soils of the interior. Here, life was more challenging. Low rainfall (only about 35 inches per year), for example, made the hinterland of the Lower Chindwin Valley one of Burma's driest zones. Most Burmese probably would have preferred to work the better-watered lands of the Lower Delta, or the lands fed by sophisticated and royally sponsored irrigation systems constructed over centuries in lands along the Irrawaddy River. The Lower Chindwin area lacked similarly extensive irrigation systems and thus it was probably the driest of the dry-zone lands. Although the Chindwin River and several streams provide water in several areas, the bulk of the district, classified as part of Burma's dry zone, depended upon well water—and even these dried up on an annual basis, forcing cultivators to seek drinking water for people and animals up to four miles away. One partial solution for the lack of water was to allow one-third of cultivated land to lay fallow each year.[12]

Animals, Millet, Horse Manure

In the context of the Lower Chindwin hinterland, animal husbandry depended mostly on cattle, horses, and, to a lesser extent, pigs. The application of water buffalo was limited to the riverbanks and well-irrigated areas because the animal performs poorly in heat and depends on the protection of mud baths in hot weather, such baths being generally unavailable elsewhere in the region.[13]

The size of cattle stocks, about 99,589 head of cattle in 1890–91 (the earliest count available), amounting to a little less than one head for every two people at the time, was limited by raiding, poor grazing opportunities, and rinderpest (until the introduction of cattle inoculation in the early twentieth century). The sale of cattle during bad harvests also limited the size of local stocks. Cattle were essential for the drought-prone Lower Chindwin area because they could be sold off when harvests failed and help subsidize survival. The Monywa area, for example, would sell its cattle during such times in Lower Burma. Although we know that cattle were sold across the Arakan Yoma in the 1820s, figures are generally unavailable until the colonial period.[14]

As for horses, the importation of new supplies from Manipur and elsewhere contributed to a diversification of horse breeds and increased settlement of

horse stocks in the Lower Chindwin and other dry zone areas. The Burmese court continued to depend upon mountain ponies provided as tribute from the Shan states, because they were vital for campaigns across the mountains against Siam. Nevertheless, from the late eighteenth century, the court pursued faster and lighter mounts that were more useful for maintaining domestic control over the greater geographical sweep of the enlarged Burmese state. Literati from the Lower Chindwin were also considered at the royal capital to be experts on ponies. One palace guardsman's son, for example, asked the Hermit of Gado, living north of Budalin, to compile a text on ponies. This work, entitled the *Myin Gyan*, soon became widely regarded as the authoritative text on the subject.[15]

The Lower Chindwin produced crops well suited to horses and cattle. Rice, of course, was preferred for human consumption and would be grown wherever and whenever possible. Limited rainfall in much of the area, however, placed a natural limit on its cultivation.[16] The Burmese fed their horses with special care. As one British officer commented in the 1880s, "Our cavalry and transport drivers might well take lessons from the Burmans in the care of their . . . ponies, for indeed a thin animal, the property of a Burman, is rarely, if ever, seen."[17] However, local climate and vegetation went far in making this situation possible. The wet, tropical climate of coastal Southeast Asia, where rainfall is heaviest, did not favor horse health or longevity. Furthermore, wetland grass was identified as a major source of equine diseases. Indeed, the deaths of nearly half the number of the 2,000 horses brought into Burma by the British in 1886–87 was blamed on local green fodder.[18]

Dry zone crops such as millet provided the best fodder for equines and bullocks. The cultivation of such crops was concentrated in the same areas where Burmese cavalry were stationed, including the Lower Chindwin. Not surprisingly, the most significant crop in the Lower Chindwin was millet although later on other dry crops such as sesamum, groundnut, and various beans became important as well. Millet could be grown in the difficult climate of the area; it was chopped and served as the main cattle and horse feed, and was frequently "put down as a fodder crop pure and simple." During the harvest, cattle would be stall-fed with millet and after the harvest, they were sent out to the fields to eat what remained of the stalks. Cattle could also feed on jungle waste, but, as cultivation expanded, cattle in more densely populated areas were fed on scrub jungle ever further out.[19]

The suitability of cattle and horses to the Lower Chindwin, however, does not explain why they would have become important factors in encouraging demographic growth or agricultural expansion. As one might expect, draft animals were necessary for agricultural expansion for tilling and harvesting. However, there were more important considerations. Even for primary cultivators, for example, animal husbandry provided some economic security against bad harvests. In the difficult agricultural areas outside of the wet-soils near the river, animals may initially have provided the possibilities for a life not limited to agricultural produce. The presence of the standing regiments

and their demand for local horses and accoutrements also encouraged the emergence of horse-breeding and related industries. There were two main centers for saddle-making, at least by the end of the nineteenth century, and both were found south of Monywa. The first was Monywe. The second was the village of Kye-mon, which emerged as a center for embroidered saddle-making and other appurtenances to horse riding. The village spun cotton to make the stuffing for reins and webbing for straps. Brass cowbells were made both here and at Indaing, to the northeast of Monywa.[20]

Another explanation for the relationship between increasing quadruped stocks, demographic growth, and agricultural expansion involves the kinds of soils increasingly encountered in the Lower Chindwin as growth occurred. The red soils of the district, for example, ranged in composition from pure sand, to loam and sand, and to hard loam. Sand, or loam mixed with sand, was preferred by cultivators because it could absorb rainwater, although hard loam could not. Thus, in an area where the time between rains could be excessive, the hard loam was unsuitable for intensive cultivation without significant sources away from the major rivers and the same kind of extensive irrigation systems developed in other areas of Burma over the course of long-term settlement; the hard loam presented an obstacle to agricultural expansion.[21] A solution to these problematic soils was the addition of moisture-absorbing manure, from cattle as well as from horses. As the numbers of both increased, the advantages of applying manure over the long-term probably made the difference between starvation and survival as cultivators were pushed onto poorer soils.

The importance of manure to agricultural cultivation outside of the river areas of the Lower Chindwin may also be indicated in part by the growing wealth and prominence of cavalry officers in the area. Toe Hla's study of eighteenth and nineteenth century contractual records and previously unused local land inquests has drawn attention to several families of cavalry commanders-turned-guardsmen in Le-zin village in the Lower Chindwin. Le-zin village was located in the lower part of the Alon township and was one of ten In-daing cavalry villages. Three families of cavalry officers dominated the local village economy based on their ownership of significant acreage of arable land. Through their elite status as hereditary officers, intermarriage with other elite families in the region, loans to village cultivators, and the leasing out of their own lands to tenants, these families appear more as landed aristocracy than as royal servicemen.[22] They continued to provide money for the extension of agricultural cultivation, especially after service lands were converted to private land and military pay was made in cash in the last decades of indigenous rule. Others fell into debt. After the coup of 1878 and then in the Restoration of 1879, the court witnessed an upsurge in debt contracts among royal servicemen. Such contracts can also be read, conversely, as the demonstration of money-lending by elite families.[23] One likely explanation for the wealth of these cavalry elites and their local prominence is that they possessed a vital agricultural input, both in terms of the animals they owned and the important manure these animals produced.

Buddhist Monasticism and Mobilization against Beef-Eating

As we have seen, the Lower Chindwin was changing in the eighteenth century in many ways. A growing population, the expansion of cultivation, and the increase and introduction of old and new animal stocks were altering the ecology of the region, as well as its economy and administration. In this section, attention will be paid to two interconnected factors. First, the rapid eighteenth century development of the region presented a serious challenge to the prevailing forest-dwelling (*aranyavasi*) monasticism of the area. As a result, forest-dwelling monks were forced to demonstrate that their interpretation of the monastic code (the *Vinaya*) was the purest, and thus they needed to be supported by the state at a time when town-dwelling (*gamavasi*) monks were receiving greater popular support. Second, one particular influence among forest-dwelling monks in the area was Hindu revivalism, along with admonitions against eating fish and beef, emanating from Manipur and moving down the Lower Chindwin. This had serious potential ramifications in a region where stocks of cattle, and the mouths they would feed, were rapidly increasing. Ultimately, the intersection of these two influences, missionizing zeal and the push to end the consumption of beef, contributed to the famous beef boycott of the Leidi *hsayadaw* at the beginning of British rule.

According to local traditions, the relatively low level of settlement in the Lower Chindwin made it home to numerous forest monasteries. Fewer people with limited resources would have been able to support fewer town- or village-dwelling monks, who would have depended upon lay patronage for survival. Recruitment of novices would also have been more difficult. However, sparse human settlement and substantial forestland had provided an ideal environment for forest-dwelling monks and their ascetic orientation. In the ideal, forest-dwelling monks sought to isolate themselves far from human society, in the forests, to concentrate on cultivating meditative practices without fear of corrupting influences.[24]

Local traditions hold that a new wave of monks came to the Lower Chindwin during the 1740–57 war because this area was relatively peaceful compared to the ongoing warfare everywhere else in the kingdom.[25] The growth of the Lower Chindwin population from the 1740s seems to have encroached upon forest monasteries, forcing them to move further away. As towns and villages expanded, the number of forest monasteries declined; many, including the Maungdaung *hsayadaw*'s forest monastery, converting to a village monastery. Perhaps the forest-dwelling monks were also wary of an increase among their town-dwelling rivals and their increasing popularity with the local population. Forest- and town-dwelling monks despised each other and went to considerable lengths to blame each other for "false teachings." They were competitors, to different degrees, for royal resources. Each also had particular political advantages—the forest-dwelling monks being more influential with the court while the town-dwelling monks exerted more

influence among the general population. In the latter case, a close relationship with townspeople and villagers, especially amongst the latter, for whom the town or village monastery may have been the only ever-present institution, drew town-dwelling monks into a range of nonreligious activities beyond education. This gave forest-dwelling monks the excuse necessary to tarnish the image of town-dwelling monks.

The combined threat posed to forest-dwelling monasticism by expanding (geographically) human settlement and the rise in town-dwelling monasticism due to demographic growth (more people meant more lay support for town-dwelling monks) resulted in growing tensions between forest- and town-dwelling monks. This situation was ripe for missionary zeal and purification drives as both groups intensified efforts to guarantee their source of sponsorship and stake their claim for religious authority. For forest-dwelling monks, this meant emphasizing their claim to strict adherence to textual orthodoxy in order to maintain royal support. For the town-dwelling monks, this meant winning greater lay support. Both, in their own ways, had an important impact on the region's animal life. In the eighteenth century, forest-dwelling monks from the Lower Chindwin area initiated a series of attacks on impure texts and town-dwelling monks along with them. After securing a strong place in the court with the accession of King Bodawhpaya (whose preregnal appanage had been in the Lower Chindwin) to the throne in 1782, forest-dwelling monks from the Lower Chindwin, citing their authority over both Pali and Sanskrit texts, used their connections with the king to attempt to assert control over religious and lay knowledge in the kingdom as a whole.

New attitudes toward animals were also spreading into and out from Manipur with the growth of Hindu influence during the reign of Gharib Newaz. In the 1710s, Newaz was the object of Hindu missionizing and, after converting, in 1722, Newaz forbade the consumption of meat and the keeping of pigs and poultry in the royal capital. Another religious man, Shantidas, arrived in Manipur in 1724, teaching the Manipuris not to eat meat or fish and Newaz accepted him as his guru. Newaz then set about to eradicate preexisting religious beliefs, punishing Manipuris who were still reluctant to practice Hinduism and banishing many Brahmins and commoners alike from Manipur.[26] Newaz evidently brought his guru and his ideas to Burma during several raids and in 1744, when Shantidas arrived in the Burmese court, he informed the Burmese king that he intended to win him over to his way of thinking.[27] The Hindu teacher, however, died of an illness about a month later.[28]

Although specific details remain unclear, the Hindu prohibition of beef consumption being emphasized in mid-eighteenth century Manipur appears to have influenced Buddhist monks further down the river. Manipuri influence was especially influential among such Lower Chindwin monks as Shin Nyana, who worked extensively with a range of Sanskrit and Bengali secular and religious texts that they frequently translated into Burmese. The intersection of Hindu and Buddhist prohibitions on certain kinds of meats

worked together to influence a drive among Lower Chindwin monks to establish animal sanctuaries throughout the region. Although such attempts began in the 1780s, the best-documented cases come from the 1830s and 1850s. At that time, Shin Nyeyya, a Lower Chindwin monk, who became the kingdom's *thathana-baing* (chief ecclesiastical officer), used his position in the court to establish animal sanctuaries in the Lower Chindwin.

Due to Buddhism's admonition against the taking of life, many donors constructed ponds as fish and turtle sanctuaries at Buddhist monasteries. The general Kòn-baung laity, however, did not strictly adhere to the admonition against beef-eating. As a result, monks periodically attempted to persuade the court to declare towns and villages as sanctuaries for animals. As *thathana-baing*, Nyeyya had more influence than most. In the late 1830s, he succeeded in gaining a royal declaration that four villages—two villages in the Pagan-gyi and Taloub townships and in the two Lower Chindwin villages of Ywa-tha and Budalin—would henceforth be animal sanctuaries. Nyeyya repeated this feat in 1854, again on behalf of Lower Chindwin monks, when he persuaded another Burmese king, Mindon, to establish yet another animal sanctuary in Maungdaung village.[29]

After the demise of the royal court (one of the key sources of support for forest-dwelling monasteries) in 1885, another forest-dwelling monk, the Leidi *hsayadaw* (d. 1923) sought to make Buddhism more understandable to the lay community and thus popularize it and his base of support.[30] Although this monk was educated elsewhere in Upper Burma, he established his first monastery in Monywa (the colonial successor to precolonial Alon, ten kilometers to the north), by then the most populous town of the Lower Chindwin. One of his earliest efforts that drew for him regional, as well as national, prominence was his 1885/86 call for a beef boycott. Although sometimes misunderstood as nationalist activity, recent scholarship by Guy Lubeigt indicates that the beef boycott's roots were economic and, indeed, were related to the fragile ecosystem that had evolved over the course of the eighteenth and nineteenth centuries in the area.[31]

Although educated in monasteries elsewhere in Upper Burma, the Leidi *hsayadaw* did not begin to gain prominence until he moved to a monastery in the Monywa area, known as "Leidi," in 1890. Although details are not available, it could be conjectured that general agricultural conditions were not so different between his home area and the one into which he now moved. This might explain how the monk was later able not only to win over members of the local lay community, but also to develop an approach to preaching and teaching the *Dharma* that won him increasing fame across Upper Burma. Although technically a forest-dwelling monk, the Leidi *hsayadaw*'s approach was to make Buddhism understandable to the general lay audience, through poems and stories and the presentation of Buddhism in less than traditional ways, although simultaneously producing scholarly work on Buddhism that would appeal to more orthodox-minded monastic colleagues.[32] In this way, the Leidi *hsayadaw* presented a middle ground between the two extreme approaches reportedly represented by the older generations of forest- and

town-dwelling monks in the area, especially during the eighteenth and early nineteenth centuries. In any event, over the course of the next few years, he gathered a growing lay following during a period in which the traditional authorities in monastic affairs, the court and the chief patriarch, were either gone (the former) or their influence severely curtailed (the latter).

Although the Leidi *hsayadaw* wrote and preached on many topics, the one that is most relevant here is his admonition of the consumption of beef, which came to be seen, mistakenly, by later nationalist writers as intended as a national outcry. Beginning with a poetical letter, the *Nwa-meitta-sa*, which he composed and circulated in 1885, the Leidi *hsayadaw* argued that it was a sin for the Burmese to kill cattle and eat beef.[33] This should not be surprising, given the emphasis of forest-dwelling monks in the area for the past century on admonitions against the taking of life and the sanctuaries they helped establish in the Lower Chindwin area. However, the Leidi *hsayadaw* mixed his argument, suggesting that the taking of animal life was a sin, but also appealing to the economic interests of local farmers by framing his admonition along ecological lines. Burmese cultivators, he argued, had depended upon the labor of cattle and buffalo over the course of many previous generations for their livelihood.[34] As he further suggested, with considerable but not complete exaggeration, the marketing of beef for human consumption was threatening the extinction of buffalo and cattle. Money being paid by consumers was enticing cattle thieves to search for and deliver the beasts. Since cultivators depended upon the animals for ploughing the tough earth and for transporting the produce, the loss of these beasts of burden was ruining the personal economies of cultivator families. As he observed, such families were being forced into starvation and "stood downcast without knowing what to do." Some he argued had even turned to banditry themselves, just to survive.[35]

As mentioned, the Leidi *hsayadaw*'s arguments have been viewed as an expression of protonationalism.[36] However, a careful reading of the document, as Lubeigt has suggested, indicates that his appeal was economic. Moreover, as I suggest here, the document can better be understood in the context of the close relationship that had emerged in the Lower Chindwin between agriculture, demography, and animal livestock. In other words, the Leidi *hsayadaw*'s appeal was informed by an awareness of the fragile ecology of the local landscape and reveals, however much he overestimated its impact during his own time, an understanding of the consequences of a failure to protect a valuable resource.[37]

The Leidi *hsayadaw*'s success in promoting the beef boycott elsewhere in Burma does not concern us here, but it should be noted that beef eating is not absent in Burmese culture and the killing of cattle and buffalo for feasts, including those dedicating Buddhist temples, was quite common in precolonial Burma.[38] One way around the problem of taking life is to consume an animal after it has already died a natural death. As Michael Symes reported in 1795,

> It was privately intimated to me, that there would be no crime if a servant of mine should shoot a fat bullock when he met one; that it would be ascribed to

> accident, and I might make reparation to the owner, who would think himself amply recompensed for his loss by two tackals, about six shillings; and the beast being dead, there could be no sin in eating it; but that a public sanction could not previously be given to slaughter one. I declined supplying our table by this evasive logic, and preferred the want of beef to the risk of giving offence, and wounding the feelings of people who omitted no opportunity to manifest towards us hospitality and kindness.[39]

Horace A. Browne similarly observed in 1859 that beef could be, and was, sold in markets in the royal capital, so long as the beast was not felled by a butcher, and Ivan Minayeff found beef for sale here at cheap prices in 1885, the same year the Leidi *hsayadaw* composed his admonition against beef-eating.[40] The Leidi *hsayadaw* successfully developed an approach that may have been religious in theory and intent, but was appealing because its argument was more than religious; it was also economic and ecological, appealing to the economic interests of local cultivators for the preservation of cattle and buffalo as vital natural resources essential for their survival in the region.

The Leidi *hsayadaw*'s appeals seem to have produced results. There was a dramatic increase in the number of cattle in the Lower Chindwin in the 1890s, from 99,589 head in 1890–91 to 228,066 head in 1900–1901. In a district with a population that changed from just over 230,000 people to about 275,000 people in the same period, the ratio of cattle to people grew at an astounding rate.[41] British settlement officers attributed this increase to "the greater security of property which was engendered" with the extension of British rule, but also cited suppression of cattle theft and the reduction of cattle disease as additional factors. A decline in cattle deaths due to better precautions against the spread of rinderpest and foot and mouth disease must have been partly responsible.[42] The number of cattle continued to grow, to 258,257 head in 1906–7 and 273, 848 head in 1929–30, with certain fluctuations in-between.[43] According to indigenous sources, it was actually the Leidi *hsayadaw*'s letter, and its "moral" message, that brought this change, not only by its circulation, but also by his adherents who memorized and regurgitated the contents of the note among other Burmese.[44]

Viewed another way, as I have suggested here, it could be asserted that rather than simply being interpreted as a moral condemnation of beef-eating, it was the ecological appeal of the Leidi *hsayadaw*'s message that found a receptive home among Lower Chindwin cultivators and encouraged a kind of proto-environmentalism. The Leidi *hsayadaw*'s attempt to win popular support, by bringing Buddhism to the people,[45] was a pioneering move. He initiated this effort by manufacturing (since it was certainly exaggerated) an economic or, again, an ecological crisis to gain moral leadership at the popular level. This suggests that at least part of the local population was aware of, and concerned about, the fragility of their life on this changing landscape.

CONCLUSION

This chapter has attempted to explain how the interplay of different natural resources, human, agricultural, and animal, shaped the history of one region (or subregion) of Upper Burma. The Lower Chindwin emerged from a periphery conditioned by geo-political factors to an important part of the Burmese state because of these mutually interdependent resources. Without animals, the Lower Chindwin would have reached a natural limit to agricultural expansion and thus a limit to demographic growth. Without the dry zone crops produced in the area, the application of animals in large numbers would have been difficult, if not impossible. Indeed, one argument for the dearth of horses in the Lower Delta is its domination by wetlands.

A changing ecosystem, unleashed in force in the eighteenth century, also had its religious consequences and, although outside of the scope of this chapter and more fully discussed elsewhere, its political and social consequences. In the case of religious change, a growing human population and expansion of cultivation encouraged the growth of town-dwelling monasticism and presented a challenge to forest-dwelling monks, who took the lead throughout the nineteenth century in emphasizing religious admonitions against the taking of animal life. At the very end of the century, the Leidi *hsayadaw* developed the most sophisticated argument yet, which echoed, at least in part, concerns about the threat to local ecology.

NOTES

1. The author would like to express his gratitude to several scholars. The ideas presented concerning manpower control and migration were shaped partly during lengthy discussions with colleague and fellow Chiangrai resident Jon Fernquest during the author's research residence in the area in October–December 2004. Atsuko Naono and Greg Bankoff provided useful critiques of the initial draft of this chapter. William Clarence Smith, Toe Hla, and Victor Lieberman were also important sources of information on diverse topics, from equines to the Chindwin and Mu river valleys.
2. Aung-Thwin (1985), Lieberman (1984), Riggs (1966).
3. Moore (2005, 208, 215, 216, 220).
4. Grant Brown (n. d., 2–3, 8, 10–11); Aung-Thwin (1985, 101–3 [particularly the map on 102]).
5. Williamson (1929, 70–73).
6. Lieberman (1984, 231); Dalrymple (1808, 1.130).
7. Lieberman (1984, 265–66); Singh (1992, 176, 177); Tin (1968, 1.292–93, 295); RCM (1995, 24, 50); Kabui (1991, 1.267); Symes (1800, 275, 288, 318–19, 360); Crawfurd (1829, 126, 283); Hardiman (1912, 20–21); Williamson (1929, 24).
8. Cox (1821, 46).
9. Koenig (1990, 241, 245); Toe Hla (1987, 91); Charney (2006, 69).
10. Lieberman (1984, 100–103); Koenig (1990, 109–11).
11. Hughes (n. d., 2, 21, 22).
12. Hughes (n. d., 4, 7, 19).

13. Hughes (n. d., 35).
14. Hughes (n. d., 37); Hardiman (1912, 95); Hughes (n. d., 36); Pemberton (1966, 173). One representative case may be the 1921–22 failed harvest, as a result of which cattle were exported and the number of cattle, oxen, and buffaloes in the district dropped by over 40,000 (Hughes n. d., 35).
15. Tun Nyein (1899, 17); Langham-Carter (1940, 338).
16. Hughes (n. d., 20, 24).
17. Heyland (2004, 31).
18. Clarence-Smith (2003, 6); Heyland (2004, 31, 38); Charney (2004, 171).
19. Cartwright and Breakspeare (1910, 199, 201); Heyland (2004, 31, 38); Hughes (n. d., 19, 22, 36, 37).
20. Hardiman (1912, 122–23); GUBSS (2.2, 511).
21. Hughes (n. d., 7, 22).
22. Toe Hla (1987, 156–60); Saito (1997, 171); Thant Myint-U (2001, 39).
23. Saito (1997, 158); Toe Hla (1987, 78).
24. Than Tun (1988, 85).
25. Local informants interviewed in Monywa in April 2003.
26. Lieberman (1984, 209); HNY (1955, 3.375, 377); RCM (1995, 27–33, 35–38, 50); Kabui (1991, 1.252–53, 255, 257, 259, 267, 281); Singh (1992, 160, 163–64, 168, 179, 193, 206).
27. HNY (1955, 3.381); RCM (1995, 42).
28. HNY (1955, 3.381); RCM (1995, 43).
29. DMY (1919, 371); ROB (24 June 1854, 9.380).
30. Stewart (1949, 13).
31. Lubeigt (2005).
32. Lubeigt (2005, 387–88); Houtman (1999, 203–4).
33. Leidi (1995, 6); Lubeigt (2005, 392).
34. Leidi (1995, 5).
35. Leidi (1995, 8).
36. For a discussion of the Leidi *hsayadaw*'s concerns about the fate of Buddhism under British rule, see Houtman (1999, 203).
37. As Lubeigt suggests, the case made that cattle were on the verge of extinction could not be made for the post-1885 period. Lubeigt (2005, 400–401).
38. Lubeigt (2005, 402–3); Beef was also certainly served to visitors to the palace in the late eighteenth century. Cox (1821, 96).
39. Symes (1800, 246).
40. Browne (1907, 26); Minayeff (1959, 139).
41. Hughes (n. d., 35).
42. RAB (1899, 40). My thanks to Atsuko Naono for this information and citation.
43. Hughes (n. d., 35).
44. Leidi 1995, 14, publisher's note (within brackets). Apparently, this is the same publisher's note found by Lubeigt in the 1911 volume of the Leidi hsayadaw's works, which was unavailable to the author. See Lubeigt (2005, 400). Thus, it was a fairly contemporaneous observation.
45. Stewart (1949).

Bibliography

Aung-Thwin, Michael. *Pagan: The Origins of Modern Burma*. Honolulu: University of Hawaii Press, 1985.

Browne, Horace A. *Reminiscences of the Court of Mandalay: Extracts from the Diary of General Horace A. Browne, 1859–1879*. Woking: The Oriental Institute, 1907.

Cartwright, H. A. and O. Breakspeare. *Twentieth Century Impressions of Burma: Its History, People, Commerce, Industries, and Resources*. London: Lloyd's Greater Britain Publishing Company, 1910.

Charney, Michael W. *Southeast Asian Warfare, 1300–1900*. Leiden: Brill, 2004.

———. *Powerful Learning: Buddhist Literati and the Throne in Burma's Last Dynasty, 1752–1885*. Ann Arbor, MI: University of Michigan Center for South and Southeast Asian Studies, 2006.

Clarence Smith, William Gervaise. 2003. "Animals of War in Pre-colonial Southeast Asia." Paper Presented at the International Workshop on Precolonial Warfare in Monsoon Asia, January, 16.

Cox, Hiram. *Journal of a Residence in the Burmhan Empire, and More Particularly of the Court of Amarapoorah*. London: John Warren & G. & W. B. Whittaker, 1821.

Crawfurd, John. *Journal of an Embassy from the Governor-General of India to the Court of Ava in the Year 1827*. With an Appendix by Professor Buckland and Mr. Clift. London: Henry Colburn, 1829.

Cushman, Richard D., trans. *The Royal Chronicles of Ayutthaya*, edited by David K. Wyatt. Bangkok: Siam Society, 2000.

Dalrymple, Alexander. *Oriental Repertory*. 2 vols. London: William Ballintine, 1808.

DMY. *Dutiya-maha-ya-zawin-daw-gyì*. Mandalay: n. p., 1919.

Grant Brown, G. E. R., comp. *Burma Gazetteer: Upper Chindwin District*. Volume A. Rangoon: Superintendent, Government Printing and Stationery, n. d.

———. *Burma As I Saw It 1889–1917 with a Chapter on Recent Events*. London: Methuen & Co, 1926.

GUBSS. Scott, J. G. and J. R. Hardiman. *Gazetteer of Upper Burma and the Shan States*. Parts 1 and 2. Rangoon: Superintendent, Government Printing, 1900–1901.

Hardiman, J. P., comp. *Burma Gazetteer: Lower Chindwin District*. Vol. A. Rangoon: Superintendent, Government Printing and Stationery, 1912.

Heyland, Col. "Notes on Cavalry Employed in Upper Burma from October 1886 to October 1887." *SOAS Bulletin of Burma Research* 2, 1 (Spring 2004): 29–38.

Hla Baing. *Leidi Gandawin-kyaw-myà-thamaìng*. Mandalay: n. p., 1967.

HNY. *Hman-nàn maha-ya-zawin-daw-gyì*. Vol. III. Mandalay: Ko Hla Maung, 1955.

Houtman, Gustaaf. *Mental Culture in Burmese Crisis Politics: Aung San Suu Kyi and the National League for Democracy*. Tokyo: Tokyo University of Foreign Studies, Institute for the Study of Languages and Cultures of Asia and Africa, 1999.

Hughes, T. L. *Report on the First Revision Settlement Operations of the Lower Chindwin District Season 1928–31*. Rangoon: Superintendent, Government Printing and Stationery, n. d.

Kabui, Gangmumei. *History of Manipur*. 2 vols. New Delhi: National Publishing House, 1991.

Koenig, William J. *The Burmese Polity, 1752–1819: Politics, Administration, and Social Organization in the Early Konbaung Period*. Ann Arbor, MI: University of Michigan Center for South and Southeast Asian Studies, 1990.

Langham-Carter, R. R. "Four Notables of the Lower Chindwin." *Journal of the Burma Research Society* 30, 1 (1940): 336–42.

Leidi *hsayadaw*. *Nwà-meitta-sa hnín Thei-yi-thei-yek-meitta-sa*. Yangon: Myanmya-pyi Sa-oub-daik, 1995.

Lieberman, Victor, B. *Burmese Administrative Cycles: Anarchy and Conquest, c. 1580–1760*. Princeton, NJ: Princeton University Press, 1984.

———. *Strange Parallels: Southeast Asia in Global context, c. 800–1830*. Vol. 1. *Integration on the Mainland*. Cambridge: Cambridge University Press, 2003.

Lubeigt, Guy. "Introduction of Western Culture in Myanmar in the 19th Century: From Civilian Acceptance to Religious Resistance." In *Essays in Commemoration of the Golden Jubilee of the Myanmar Historical Commission*, 380–409. Yangon: Ministry of Education, Union of Myanmar, 2005.

Mendelson, E. Michael. *Sangha and State in Burma: A Study of Monastic Sectarianism and Leadership*, edited by John P. Ferguson. Ithaca, NY: Cornell University Press, 1975.

Minayeff, Ivan Pavlovich. *Travels in and Diaries of India and Burma*, translated by Hirendranath Sanyal. Calcutta: Eastern Trading Company, 1959.

Moore, Elizabeth. "Stone Tools and Rings: Neolithic and Bronze Age Change." In *Essays in Commemoration of the Golden Jubilee of the Myanmar Historical Commission*, 203–26. Yangon: Ministry of Education, Union of Myanmar, 2005.

Pemberton, R. Boileau. *Report on the Eastern Frontier of British India*. Gauhati, India: Department of Historical and Antiquarian Studies in Assam, 1966.

RAB. *Report on the Administration of Burma during 1898–99*. Rangoon: Superintendent, Government Printing, Burma, 1899.

RCM. [*Royal Chronicle of Manipur*] *The Lost Kingdom*, compiled and edited by L. Joychandra Singh. Imphal: Prajatantra Publishing House, 1995.

Riggs, Frederick W. *Thailand: The Modernization of a Bureaucratic Polity*. Honolulu: East-West Center Press, 1966.

RMAS. "Rakhine Mìn-ra-za-grì Areì-daw sa-dàn." [Palm-leaf manuscript, number 1632] AMs, 1784 [1775]. National Library, Ministry of Culture, Yangon, Union of Myanmar.

ROB. Than Tun, ed. *The Royal Orders of Burma, A. D. 1598–1885*. 10 vols. Kyoto: Center for Southeast Asian Studies, Kyoto University, 1984–90.

Saito, Teruko. "Rural Monetization and Land-Mortgage Thet-kayits in Kon-baung Burma." In *The Last Stand of Asian Autonomies: Responses to Modernity in the Diverse States of Southeast Asia and Korea 1750–1792*, edited by Anthony Reid, 153–184. London: Houndmills, 1997.

Sangermano, Father Vincenzo. *The Burmese Empire a Hundred Years Ago*. With an introduction and notes by John Jardine. London: n. p., 1893.

Singh, R. K. Jhalajit. *A Short History of Manipur*. 2nd revised ed. Imphal: n. p., 1992.

Stewart, John Alexander. *Buddhism in Burma*. London: University of London, 1949.

Symes, Michael. *Account of an Embassy to Ava*. London: Bulmer & Co., 1800.

Than Tun. *Essays on the History and Buddhism of Burma by Professor Than Tun*, edited by Paul Strachan. Whiting Bay, Scotland: Kiscadale Publications, 1988.

Thant-Myint U. *The Making of Modern Burma*. Cambridge: Cambridge University Press, 2001.

Tin, Ù. *Myan-ma-mìn Ok-chok-pon sa-dàn*. 5 vols. Rangoon: Superintendent, Government Printing and Stationery, 1931–33.

———. *Kòn-baung-zet maha-ya-zawin-daw-gyì*. 3 vols. Rangoon: Leidi Makkaing, 1968.

Toe Hla. "Money-Lending and Contractual 'Thet-kayits': A Socio-economic Pattern of the Later Kon-baung Period, 1819–1885." Unpublished Ph. D. dissertation: Northern Illinois University, 1987.

Toe Hla. *Kyìndwìn-myit-tha Mù-eiya*. Monywa, 1995 n. p.
Tun Nyein, ed. and trans. *Inscriptions of Pagan, Pinya, and Ava: Translations, With Notes*. Rangoon: Superintendent, Government Press, 1899.
Williamson, A. *Burma Gazetteer: Shwebo District*. Vol. A. Rangoon: Superintendent, Government Printing and Stationery, 1929.
Williamson, G. and W. J. A. Payne. *An Introduction to Animal Husbandry in the Tropics*. London: Longmans, Green & Co, 1959.

12

"Stealing From the Gods"

Fisheries and Local Use of Natural Resources in Vietnam 1800–2000

John Kleinen[1]

Environment and Resources

Two centuries of colonial intervention, warfare, and economic recovery have transformed Vietnam from an area of generally low population density and sufficient natural resources into a country where the present population pressure takes its toll on environmental and natural resources. These resources are influenced by climate change and heavy utilization of soils. Landscapes have changed dramatically due to agricultural activities, deforestation, and urbanization. This is not exceptional for a country like Vietnam, but a general development for most of the countries of Southeast Asia (Bankoff 2004). The degradation of the natural environment goes hand in hand with the commodifition of land and surface waters. Different entitlements offer different sets of incentives for resource exploitation and production. Rights regimes have an impact upon social processes in terms of either social differentiation or equality. They either may create subsequent conditions for accumulation and resource concentration, or for equal distribution. The rights regimes are important in terms of defining the relative positions of men and women within communities and households. They also provide necessary frameworks for resource management and environmental protection. In cases where maintenance of land resources is dependent on extensive common infrastructure, such as dykes and irrigation systems, changes in the rights regimes may also have an impact on the long-term sustainability of cultivation, conflict resolution, and the capacity for coping with floods and extreme weather. On the other hand, the degradation of the environment, and the risks of adverse distributional effects of privatization of the coastal zone for aquaculture development are considerable (Kleinen 2006; Van Zwieten 2002). The planned development also represents big potential

conflicts over the resources in the coastal zone, and is thus a challenge for the local and regional governance structures.

Against the backdrop of the effects of global climatic change and large infrastructure works in upstream parts of Vietnam, the vulnerability of local populations facing hazards and disasters associated with natural resources is part of this investigation. Taking some case studies from a single area, this chapter tries to extrapolate some thematic patterns for Vietnam as a whole. The province of Nam Dinh in northern Vietnam has some harbors and fishing villages, which are modest compared to those found in other parts of the country. Here, however, I will concentrate on three main topics. First of all I will discuss the coastal and marine environment in general. Second I will concentrate on the history of fisheries and its main actors, the fisher folk themselves, especially those who live off inshore fishing and employ traditional techniques to catch the fish along the seashore. A special section is devoted to the coastal districts of the province of Nam Dinh, where the above-mentioned topics can be studied in more detail. I will conclude this chapter with some comments on the vulnerability of various segments of the population in the coastal zone under study.

VIETNAM'S COASTAL AND MARINE ENVIRONMENT

Coastal zones are boundary areas, places of contestation, and cross-fertilization. They are naturally and socially marginal spaces in that they serve as the limit between sea and land. The destruction and pollution of these habitats have resulted in the clearing of mangroves that serve as important nursery areas for demersal fisheries and the expansion of aquaculture. But coastal zones are also sites of first contact between cultures. At the same time, and because of these factors, they recently have become highly desirable places and thus have been subjected to great social and ecological pressures. In the meantime, the discourse on coasts and seas has shifted to Integrated Coastal Zone Management as a result of concerns about climatic change and the rise in sea levels (Vallega 1993; Cicin-Sain and Knecht 2000; Visser 2004).

The maritime tradition is connected with Vietnam's extended coastline, but also with its long historical link with naval technology and marine resources. Fisheries contribute less than 5 percent to the GNP of Vietnam, but fish is extremely important in diet, and accounts for some 80 percent of animal protein intake in the country, much of it in the form of dried, salted, or preserved fish and fish sauces. Historically, freshwater fisheries prevailed over the exploitation of marine resources, due to the limited technologies of fishing in coastal waters and high seas. According to FAO statistics, the marine fishing catch of many Southeast Asian nations expanded since the 1960s and increased dramatically in the 1970s when the level of world output stagnated. Trawling initiated the "the great fish race" and pushed the capacity of the fisheries to its frontiers (Butcher 2004). The independent nation-states increasingly protected their territorial waters and extended their

baselines with 12 nautical miles. Competitive trawling from foreign countries like Japan was fended off, but internal competition among fisher people was encouraged. This led to a renewed tapping of the marine resources until the closing of the frontier by the late 1990s. In the following paragraphs I will describe the fisheries system for Vietnam as a whole.

Fisheries in Vietnam

Vietnam's long coastline of over 2,350 kilometers gives access to a claimed exclusive fishing zone of about 238,000 square kilometers. Divided into three major sea areas, the fishery zone of the Gulf of Bac Bo, Eastern, and Western Nam Bo is the home of marine demersal fisheries and consumable invertebrates such as shrimp, crab, lobster, cuttlefish, and squid. Pelagic fisheries are mainly operated along the continental shelf facing central Vietnam. The three zones are subdivided into a number of important fishing areas. The sea around the Spratley Islands and adjacent areas deserves special mention. Although most of the fishing areas are within the officially established straight baselines that measure the outer limits of the territorial sea and other maritime zones, these islands are not part of it (Farrell 1998, 62–78; Prescott 1996). The total number of marine fish species exceeds 750, belonging to 157 families. The South China Sea contains more than 3,500 species and 280 families (Froese et al. 2000).

Vietnam nowadays counts about 500,000 marine fisher folk who sell their catches on domestic or export markets. Some 3 million people derive their livelihood from the fisheries sector, directly and indirectly. This is reason enough for the government to encourage the expansion of the sector, both offshore and the inland fisheries and aquaculture. Traditionally, many Vietnamese combine fisheries with other activities, such as agriculture or salt-making for a living. The sector is therefore closely integrated with other sectors. In spite of the increase in the fish production in Vietnam, the country utilizes mostly small-scale fisheries and has conducted fishing activities mostly in coastal waters. Around 1993, the number of marine fishing boats was estimated at more than 60,000. In order to reach the target of increasing offshore fishery production, a program of investing in offshore vessels has been implemented since 1997. However, the efficiency of the program is limited due to reasons such as lack of suitable technologies, unidentified fishing grounds, lack of skilled labor forces, and the inadequacy of services for vessels operating in offshore areas. In a broader perspective, increases in population, the poverty of small-scale fishers, and the arrival of nonresident harvesters from nearby China and Hong Kong have taken a huge toll on marine fisheries. In interviews with local fishermen in 2001 and 2002, they cited overfishing, the decline in marine resources, and destructive fishing as problems in several provinces of the north, while existing literature about the centre and the south confirm these trends (Nguyen 1996, 2001). In recent years, the number of fishing boats has increased considerably in Vietnam.[2]

Nowadays, fisheries in Vietnam are still small-scale, multispecies, multigear, using traditional fishing techniques. Fishers have limited ability in terms of capital investment. The average increase in the number of fleets was 8.7 percent per year from 1983 to 1998. The average horsepower per boat also grew from 16.3 hp in 1983 to 26.2 hp in 1998 (Van Zwieten et al. 2002, 27).[3] The fishing operations in Vietnam use different types of fishing gear. However, according to Nguyen (2003), from all the gear in use (trawl, purse seine, coastal gillnet, hook and line, and lift net), the trawl and purse seine fisheries are the most effective ones.

Data on quantities of fish landings are underreported in many cases or are not reported by species, which makes the assessment of aggregate stocks difficult. There is only fragmentary data on how many fish are unintentionally caught and discarded, how many boats are deployed, and how much time is spent fishing, which obscures the full impact of fishing on the ecosystem. The poor monitoring of changes is partly the result of lack of aggregate data on quantities of fish landed by smaller vessels and inadequate monitoring organizations. The available data shows a low amount of marine fish landings during the colonial period, at an average of 32,000 tons a year, although after the First Indochina War (1946–54) this number rose to an average of 600,000 tons a year between 1956 and 2000. The majority of the catch originated in the Republic of Vietnam. In 1974, the catch plummeted due to the closing war effort and the flight of the fishing fleet after 1975. Recovery came in the 1980s (see figure 12.1).

Vietnam's officially reported marine catch of nearly 1.3 million tons in 1999–2000 was composed of fish (82 percent) and other species such as shrimps, squids, cuttlefish, and others (18 percent). An estimated amount of 330,000 metric tons of mollusks and crustaceans (1997) is rapidly increasing (Kleinen 2005). The economic importance of 120 species (6 percent) has

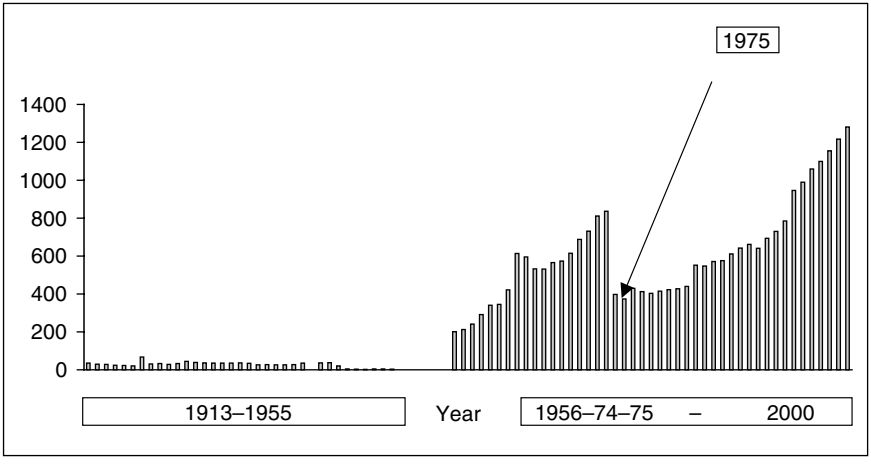

Figure 12.1 Marine Fish Landings 1913–2000.

Sources: La Dépêche coloniale 1925; Annuaire statistique de l'Indochine 1913–50; Directorate of Fisheries (RVN) 1963–69; FAO yearbooks 1960–2000, 2004; Butcher, 2004, Appendix 1.

been established. More sophisticated monitoring of catch estimated that a capture of 4 million tons, corresponding to 40 kilogram per hectare over the Exclusive Economic Zone (200 nautical miles above the territorial zone) is more realistic to expect (Van Zwieten et al. 2002, 19). Commercial fisheries play an important role in supporting the economy, even though compared with other Southeast Asian countries these numbers are modest. Malaysia reportedly had a marine catch of 1 million tons in 1999; Thailand 2.3 million and Indonesia 3.4 million. In Europe, the top 10 coastal countries caught around 12 million tons in 1999, ranging from 2.6 million tons in Norway (1999) to 600,000 tons in the Netherlands (1998). Asia, excluding the Middle East, had an estimated production of 36.5 million metric tons in 2000 (WRI 2000).

The value of exports of fish and fishery products increased from US$20 million in 1981 to US$252 million in 1992 and to an average of US$587 million per year in the period from 1996 to 1998 (WRI, 2000). In 2002, the aquatic exports earned US$988 million (of which 40 percent went to the United States). With a total export value estimated at US$1.8 billion in 2001, fisheries are the third important export sector, after the export of crude oil and rice. In terms of value shrimp (over 40 percent), squid and finfish take the larger part of the export. Japan is the most important market, accounting for a third of the export value, while the remaining exports go to the rest of Asia and the United States. Vietnam was expected to produce 2.5 million tons of aquatic products in 2004, down from the previously forecast of 2.65 million tons.

Asia is by far the most important region for direct human consumption of the produce of capture fisheries and aquaculture owing to the mixture of relatively high per capita consumption levels and large populations. For example, Japan had one of the highest per capita consumption levels in the world at 71 kilograms in 1970–90. China accounted for 27 percent of the total growth in fish consumption in the same period. Europe is the second largest fish- consuming continent. The per capita food supply from fish and fishery products (kilos per person) in Vietnam was estimated at 19 kilograms per year (WRI, 2000).

Historical Background

Historical information of the fisheries of Vietnam is scanty due to a general scarcity of historical documents compared to similar economic activities such as plantation activities, mining, and international trading. Time and data series for French Indochina's fisheries are anecdotal and too general. Scientific knowledge goes back to the 1920s, when demersal fisheries resources were explored off the coasts of Cambodia and Vietnam (Gruvel 1925). A Chinese trading network ensured a supply of dried or salted fish from Saigon (the bulk was the catch from the Tonlé Sap) to Singapore and Hong Kong of nearly 28,000 tons a year. Japanese trawlers entered the Gulf of Tonkin in 1928 and its fleet grew annually. The catch ended up in Japan.

In the 1930s, the French geographer Pierre Gourou (1936, 442–47) estimated that sea fishery in the north was of minor importance: the low quantity of fish (within the territorial waters), competition from Chinese junks on high seas, the inferior technology practiced by Vietnamese fishermen and the lack of natural, protected landing places in the event of storms and other natural disturbances induced this verdict. "On the whole," explained Gourou in 1940, "catches are too small to permit the use of European trawlers, the more so because the local market demands fish at a very low price, and it is not possible to sell fresh fish preserved by refrigeration processes to the native clientele, which is the only one of sufficient importance" (1940, 432–33). Colonial authors blamed the monopoly of Chinese merchants who dominated the sector (Gruvel 1926, 143–45, 155, 188–89). The Chinese lived exclusively on large junks 25–40 metric tons in weight with crews of between 8 and 15 persons, while the Vietnamese settled down in villages practicing fishing on a part-time basis. The French authorities gave Chinese junks the right to navigate as far as Vinh (Nghe Anh) and to leave a territorial zone of 8 kilometers along the coast to Vietnamese craft. "The continental shelf of the South China Sea is Chinese property" concluded Robequain in 1929 (1929, 403). Between January and June they reported to their ports on the mainland and the island of Hai Nan. In the colonial literature the role of Japanese fishers is seldom mentioned. According to several sources, Japanese beam-, otter-, and pair-trawlers fished since the early 1930s between the fifteenth parallel (15°N) and the Gulf of Tonkin. They grew in numbers until 1938 at the outbreak of the Sino-Japanese war, with about 20 otter-trawlers in the Gulf catching an average of 11,000 tons of fish a year (Shindo 1973, 8–9; Butcher 2004, 143). Trawlers of the same type and nationality roamed the waters of the South China Sea and beyond as far as off northwest Australia. Their presence preceded the Great Fish Race after the World War II (Butcher 2004, 168 ff.). In the 1950s and 1960s, Thai and Filipino trawlers expanded also into the South China Sea and close to Vietnamese territorial waters. According to Butcher (2004) this movement coincided with a rapid expansion of the South Vietnamese fishing fleet. Fishers from the major port of Rach Gia in Ha Tien indicated "declines in catch per unit of effort" since 1969, while the coastal fishery resources of southern Vietnam were described as "heavily exploited" (quoted in Butcher 2004, 198). Gear conflicts and the arrest of Thai trawlers went back to the late 60s, until the gravitating war made fishing off the coast even outside the territorial waters a dangerous enterprise. Above 15°N, trawling had already stopped in the 1940s.

The 33,000 Vietnamese fisher folk of northern Vietnam living in 90 hamlets were mainly "peasants-cum-fishers" and more orientated to agriculture than to fishing on the high seas (Gourou 1940, 327; Nguyen 1995). Less than 3 percent (4, 500) were professional fishers, whose contribution to the food staple of the 5.5 million inhabitants was very limited (1936, 445; 1940, 340–41). The long coasts of central and southern Vietnam were the natural habitat of experienced fishers who lived in separate village-communities near

the shore, although the existing fishing techniques differed in technology and economies of scale. The southern part of colonial Vietnam had a larger number of villages, of which many were called *van chai*, a term that indicated that the majority of the inhabitants were professional fishermen—around 35,000 people "Vietnamese and Chinese included" (see Gourou 1940; Robequain 1944).

Gourou's representation of a culture that was "never much interested in matters regarding the sea" (1931, 146) has been repeated by Vietnamese and foreign scholars alike (for example, Nguyen 2002). But these impressions are not warranted when one considers the maritime history of the area. Being part of maritime Asia, the early states of Dai Viet and Champa not only attracted foreign traders from Java, China, India, and the West, they also fought mutual wars (Le 1981, 159–60). These naval battles showed at least that the Vietnamese did not turn their back on the sea. Also, the kingdom of Champa used naval power and piracy to establish its "plunder-based political economy" (Hall 1985, 178–93). During the fifteenth and sixteenth centuries, Vietnamese maritime power proved to be superior to the Chinese in terms of technology and the use of ships (Sun 2006; Yang 1992). With the arrival of Western forces, naval power was used for rivalries, but did not lead to a trade-oriented economy or polity, that is, the establishment of a commercial fleet or the expansion of a fishing fleet (see MacNeil 1982). New research from the southern part of Vietnam, the Inner Region (or Cochinchina), revealed that early attempts to establish a commercial economy remained dominated by the sale of products that catered for war (Cooke et al 2004). Import-export taxes from goods shipped by foreigners and foreign ships turned out to be one of the most profitable income sources of the Nguyen lords in the nineteenth century (Crawfurd 1837 [1967], 480 ff.).

In the first half of the twentieth century, foreign powers did not equip the Vietnamese with navies of their own. The development of a merchant and a fishing fleet remained equally modest. In the colonial period, French Indochina had a merchant fleet of 28 cargo ships. Most of the ship owners were Chinese and French, except the successful river and coastal fleet of a Vietnamese entrepreneur Bach Thai Buoi (1874–1932), who went bankrupt in 1929.[4] In 1949, this fleet came under the direction of the different *Etats associés*, but it is unclear whether the original shipping companies ceded their rights to the State of Vietnam under Bao Dai (de Labrusse 1950). During the first Indochina War, French intelligence was struggling with information about the naval capabilities of the Viet Minh and relied heavily on scientific sources such as Gourou and others.[5] A commemorative publication in 1955 mentions the different naval branches of the republican army and the major transport companies, but not the merchant fleet (Thai 1956). Around the early 1960s, 40,000 junks was reported to sail in about the 40,000 square miles of southern Vietnam between the seventeenth parallel and the Gulf of Thailand. Of these, an unknown number were believed to be "enemy junks," which coincided with the DRV's attempt to create a Ho Chi Minh trail over sea (Goscha 2002). Official statistics mentioned a growth of fisher boats

weighing less than five tons from 53,750 in 1963 to 81,955 in 1969, out of which 39,000 were motorized (Vietnam Bulletin 1971). To understand better the situation of Vietnamese fisheries, let us now turn to an analysis of a local sector by dealing with the situation in one province.

FISHERY AND THE FISHING INDUSTRY IN NAM DINH

The Setting

Coastal Nam Dinh is composed of three adjacent coastal districts. These three coastal administrative districts, located 45 kilometers southeast of the Nam Dinh provincial town and 110 kilometers southeast of Hanoi, are surrounded by a dyke system that protects the land against the sea. The Red River in the north and the Day River in the south border the province and the estuary. A third river, the Ninh Co, separates Nghia Hung from Hai Hau. The total area of the three districts is about 72 square kilometers (72,000 hectares). The total population is almost 0.5 million, with a population density of more than 1,300 per square kilometers, a figure that comes close to the average in the densely populated areas of the Red River delta plain.[6]

The general pattern of the coastal zone along the districts is a combination of small dunes, beaches, mudflats, and wetlands, partly planted with pine trees (*Casuarina* spp.) and naturally growing mangroves. Sea dikes protect the coast against flooding and storms

The estuary is surrounded by more than 80 kilometers of sea dikes with average heights of 7 meters. Sea dike building and management date back to the eleventh century, but in the past two centuries dike-building operations, in response to land accretion that gave the area its present shape, have been carried out. In the 1840s the southeast edge of the delta was protected, stretching to the right bank of the Day, in the adjacent Ninh Binh province. Similar operations took place in Nghia Hung district where, in 1899 and in 1927, dikes were lengthened between the Day and the Ninh Co. Since the end of the nineteenth century, the vulnerable coastal area received its present sea dikes (see Vu et al. 1999). The Red River and its arteries were fixed in the second half of the twentieth century by river and sea dikes, with the result that sediment was discharged over a small number of main branches instead of a large number of small branches. These caused sites of major accretion at the various mouths of the large branches of the Red River delta, such as the Ba Lat, the Day and the Tra Ly (see Government 1995, 13). The district of Nghia Hung, located at the mouth of the Day River, equally has a "depositional" coastline with a fast increase of sand and silt estimated at between 10 and 24 meters annually (for this type see French 1997, 13). Erosion takes place at the same pace (Tran et al. 1997; Wijdeven 2001; Pruszak et al. 2002; Van Maren 2002). The volume of floods combined with spring tides, however, has occurred at an increasing rate. There were very large floods within a 25–30 year period (with disaster years 1945, 1971, and 1996), but the number of large floods increased between 1905 and 1960 compared to earlier periods. That number even doubled between 1960 and 1991

compared to the years before 1960 (Nguyen 1995b; Tran et al. 1997). About 8 or 10 typhoons struck the coast between 1990 and 2000, generating wind forces of a magnitude from between 9 and 10 (72–108 kilometers per hour). This average number of typhoons puts Nam Dinh in number 10 of 29 coastal provinces affected by typhoons (see also Imamura et al. 1997). The variable occurrence from period to period of flood extremes is a direct result of the ENSO phenomenon and climatic change in general (Kelly et al. 2001, 154–61; Kleinen 2006).

History of Fishing in Nam Dinh

There is little data on the history of the fishery activities in Nam Dinh. Neither the coastline nor the different estuaries of the Red River are particularly well known for their fishing activities, like the region north of the province. The Gulf of Bac Bo can be further divided into four ecological zones. The Gulf proper is a shallow sea formed by a wide continental shelf with a depth of 200 meters. The coastline and inshore area comprise a rocky coast northeast of Hai Phong, with the famous Ha Long bay islands fringed with coral reefs. The Red River delta has seven river mouths extending up to Sam Son in Thanh Hoa province and even up to Vinh (Nghe An), where a number of rivers flow into the Eastern Sea (Vu et al. 2001, 6–8). Due to migration policies undertaken by the Nguyen mandarins, settlers in the coastal districts were mainly farmers (see, for example, Poisson 2004). Fishing became a side activity for farmers who cultivated land conquered from the sea.

Fishing communities fully engaged in fishing along the northern coast are few in number. Linguistically none of the villages in Nam Dinh carry the name *van* such as villages elsewhere in Bac Ninh and Quang Ninh, a term that refers to the professional origins of the inhabitants (Vu et al. 1999, iv). Although most of these villages remained small, a few became part of larger population clusters.

Prewar statistics from the 1930s showed that the total number of people involved in coastal fishing in these villages was 1,610 (790 in Giao Thuy, 620 in Hai Hau and 200 in Nghia Hau), accounting for 4–5 percent of the total number of fishermen in Tonkin (Gruvel 1925, 156). The total number of fishermen in the three districts at the end of the colonial period had more than doubled (3,623).[7] Fishing was often a side activity for people working in the salt-fields, who had no land at all and who worked as day laborers for the owners of the salt fields. The French provincial resident, Pierre Lotzer, reported in 1939 that "[S]ea-fishing does not seem to be of great importance. The inhabitants do not take risks on the high seas, because the ichthyologic fauna of the coast is rather rich and satisfies their needs. This activity is only a supplement to the living resources of the coastal population."[8] Trends in fish production during the colonial period are difficult to assess because of unreliable statistics. An average annual catch of 300 to 400 tons was locally produced and consumed. The export of fresh saltwater

fish was very limited in general (less than 1,000 kilograms in 1921). Salted, dried, or smoked fish production did not take place at all, while fish sauce production began only at the end of the 1930s.

The difference between Vietnamese and Chinese fishermen as reported by colonial authors (Gruvel 1925, 143–45; Robequain 1929, 402–3; Gourou 1936: 442–47), became visible in Nam Dinh. From the provincial capital, Chinese fish traders and entrepreneurs also controlled the transportation system by junks, including the salt transports along the coast (Hocquard 1892). Fish production was an estimated 300 tons a year including shrimps and lobsters used for local consumption, provincial trade, and fish sauce production. Transport by motorcar enabled the markets of Nam Dinh town to receive fresh products. An increase was reported in 1939 with 534 tons. In that year, small factories were established to produce fish sauce and shrimp paste (*nuoc mam* and *mam tom*).

Weak social institutions determined the socioeconomic and legislative environment beyond the fisherfolk and their communities. With the shift of the powers of the invalidated Vietnamese empire to the French colonial state, the governance of fisheries did not change tremendously, especially not in the north, where indirect rule was inaugurated as a legal fiction. The French declared all land and coastal waters not privately owned or controlled "national common property," leaving the precolonial traditional community-based fisheries management de facto unaltered (Nguyen 1995; see also Ruddle 1998). The colonial state did not interfere in religious and cultural customs. A few administrative practices exercised by the village authorities or by groups of fishermen provided a degree of local control. French decrees regulated fishing efforts and the use of fishing gear and nets outside a maritime zone of three nautical miles (4,749 meters), but did not seem to enforce these rules strictly (see Gruvel 1925, 189–91). Taxation was levied on the use of boats, not on fishing itself. Taxes ranged from an annual tax of 0.20 French piaster ($) for boats under 2 tons, to 10$ for boats between 10 and 20 tons. Foreign craft had to pay double these amounts. Chinese junks, however, only paid a fee of 0.50$–1$ if identified as "foreign," and they were free to circulate and fish along the coast of Tonkin as authorized by the colonial government (Id 1925, 189).

Fisheries after 1945

The revolutionary state of Vietnam treated the coastal waters in the same way as its predecessors, but it extended the state's powers to the local administrative management of the People's Committees of the communes. Collective control over production also included the fisheries. Production teams and cooperatives undertook fisheries production. Although these organizations did not always represent separate entities from agricultural cooperatives, in many villages along the coasts, special fishing cooperatives were established. These cooperatives owned the assets and the equipment and organized several fishing units, such as the production groups whose members came

from various families. The smaller production teams mainly centered on individual fishing households to form units. Around 1960, Nam Dinh had 3,065 families engaged in fishing activities, encompassing 13,204 people. Of these, only 584 were in production teams, although only 36 families formed production groups. Four hundred and fifty-one families had joined an unknown number of (lower) level cooperatives, probably those who were already organized in teams. Between 1960 and 1967, the province had between 18 and 23 (lower level) fishing cooperatives, employing 4,833 people and using an area of about 23 hectares as fishing fields (*ca rung*). Sea fish catch in those years varied between 3.4 and 4.1 tons, which was 8 percent of the estimated total catch in the 1960s and early 1970s (Statistical Office 1968, 28–29; Vu 2001, 97). The remainder of the more than 13,000 people who were engaged in blue water fishing activities before 1960 were affected by the war, which led after 1964 to a drastic decline in fisheries. In the bombing campaigns between February 1965 and January 1973 on northern Vietnam, coastal areas were an easy targets—facilitated by American and South-Vietnamese ships in the Gulf of Tonkin. Heavy coastal artillery (with 76.2 millimeter and 100 millimeter caliber shells) made the beaches off-limits (Ha Nam Ninh 1978). Although the period of the early 1960s was seen as a "golden period" (*thoi ky vang*), fishing cooperatives rapidly declined during the second half of the 1960s due to the war effort. It is suggested that in seaside villages farmers switched to fishing in order to avoid farming collectives, but in fishing cooperatives collective work was regulated as we have just mentioned (Kerkvliet 2005, 165).

The lower level cooperatives developed into higher-level organizations, with the consequence that in coastal areas, these multipurpose cooperatives took over all the economic activities, including fishing. Unlike the agricultural cooperatives, former members of these "input" cooperatives describe them as "working well" until the late 1980s. They provided cheap gear, engines, even hulls or complete vessels. Low-interest loans were also provided. Statistical overviews of the periods between Land Reform and the Collectivization Period up to 1967 mention "fishing fields" (*ca rung*) of around 22,000 to 23,000 hectares for the whole province. The total production of sea fish in those years was between 3,410 and 4,171 tons. Before coastal zones were defined as areas of strategic defense, open access was denied. Poaching and collecting of marine products continued, due to the weak implementation of cooperative structures (Le 2004, 61–92). Most of these cooperatives collapsed around 1976, "due to corruption," as informants commented.

After the War Ended: 1975–Present

Ruddle's assessment (1998) of a slow development of blue water fisheries in the north, and even of a failure after 1975 in the south, is not supported by data acquired from the province. Pair trawlers with drag, trawl, or purse seine nets, as they are seen today in major villages and towns such as Giao Lam and Thinh Long, date back from the 1960s (Holbrook 2000). Small

lacquer-caulked bamboo boats (*mung*) were introduced between 1974 and 1975, mainly from southern Vietnam. Decennial-long connections between Nam Dinh and southern central Vietnam through early contacts between Catholic parishes and migration of labor for plantations proved to be fruitful in this regard. The equipment, gear, and costs for building the hulls were provided by the cooperatives. Nowadays, the offshore trawlers are organized as shareholders in cooperatives such as the Ninh Co Fishing Enterprise. Taking an example from government policies elsewhere regarding state-owned enterprises (SOEs), district authorities found a way to avoid the collapse of the Ninh Co Enterprise by establishing the unit as a shareholder company (*co phan hoa*) and to allow the value of the unit's assets to be owned by the new company. A management board was established, accountable to the state.

The remainder of the fishing fleet is still organized in 15 cooperatives under the new law on cooperatives (*luat Hop Tac Xa*), which marks a shift over to a service basis for its members. The cooperative deals mainly with state agencies, but in practice operates as a private firm. The all-encompassing role of the cooperative with a huge number of cadres has been abandoned. Small trawlers and *mùng*-boats are all privately owned today. Giao Lam commune has two pairs of pair-trawlers (*tau danh ca bang luoi ra*) manned by a crew of 10 persons, 58 smaller motorized boats (*thuyen huyen may)* with an engine of 45 hp used by 3 or 4 people and 30 mung-boats with a crew of 2.

Ownership varies, especially where the bigger trawlers are concerned. Some have two or even three owners. The harbors of Thinh Long and Van Ly in Hai Hau district receive not only the offshore trawlers, but also the smaller ones. From a total of the 1,600 vessels the province claims for navigating the coastal waters, 52 pair-trawlers belong to district capital of Thinh Long. The number of smaller trawlers and mung-boats is 553. Monitoring of fishing activities nowadays is divided between wharfs or landing jetties (*cang ca*), beach sites (*bai ngang*) and "service points" (*dich vu*), where boats can moor, but there is no central coordination and no clear demarcation between the different stakeholders (UBND 1996). Although the Ministry of Fisheries and its local departments are responsible for gear and vessel registration, there is no effective management system in operation. The powerful Coastguard (*phong bo bien*) deploys a large defense force for coastal protection. The Customs are part of the Navy and both institutions operate within territorial waters. The Customs and the Coastguard become active only when smuggling of consumption goods and territorial rights are at stake. Fishing rights and gear conflicts are mainly settled among the stakeholders, since the responsible authorities never intervene, possibly because they are involved. A natural resource tax is applied to capture fisheries, but the regulation is defective due to an invalid monitoring system of the beach landings. Use of the coastal waters around Nam Dinh has created tension between traditional fishers (the small gill net fishers) and the upcoming trawler fisheries employing modern techniques. Overcapitalization, as in an increased fishing effort due to a growing number of vessels and

fleet horsepower, combined with a decreased catch per unit effort, creates a prisoner's dilemma: common-pool problems are dilemmas in which the participants themselves will use fishing ground in suboptimal way, which can lead to disastrous results. Without proper resource and fishery management, the dilemma will result in the classic tragedy of the commons. The question that remains is whether one of many intervention strategies might be effective in helping to solve particular problems.

Wholesale traders who work with small middle (wo)men organize the purchase and sale of the fish. Fish products, mainly shrimps, are processed in the only fish freezing factory the two districts have. Although in Giao Lam five major dealers share the fish trade with a few others in neighboring Giao Phong, the district of Hai Hau is dominated by only one female fish trader, Ba Vui (49 years), who operates along the 33 kilometer shoreline mainly on her own. She has a special trawler, which follows those of Van Ly and Thinh Long. In 2003, she built a wharf near the Thinh Long harbor. Between 20 and 100 young men and women, depending on the season, run their motorbikes along the beach of Hau Hau and take the catch from every mung-fisher boat with which Ba Vui has a financial agreement, based on loans delivered to the boat owners. Trade with shrimp fishermen is organized through a middle person, Mr. Cuong, who deals with Ba Vui.

Of 100 mung or gillnetters, the majority report to have received investments from Ba Vui, but that amount is small compared to her other investments. Average investments of US$100 per boat are standard practice. An ice factory is located near her house in the centre of Thinh Long and a modern 3.5 ton truck equipped with a cooling and freshwater installation inside guarantees the arrival of fresh fish every other day to Mong Cai near the Chinese border.

At present the estuaries and shallow waters below 30 meters are the main fishing grounds. Nam Dinh produces less than 1 percent of the national production (i.e., less than 18,000 tons) and has increased output since 1980 with 6.5 percent per year (Van Zwieten et al. 2002, 26). The northern waters provide a production of 190,000 tons, of which shrimp and prawns constitute about 30 percent. The Nam Dinh fisheries account for 10 percent of this catch. In general, the majority of the catch is made up of small fish. Commercially important fish families are mackerel, anchovies, and mullet. Their groupings structure is simple, and composed of only four or five age groups (Vu 2001, 84–86).

Vulnerability and Risk in Vietnamese Fisheries

Fisher folk and the coastal population as a whole suffer regularly from natural hazards such as typhoons, flooding, and salinity of soils and water levels. Vulnerability is a widely discussed topic (Cannon 1994; Blaikie 1994, 2001; Bankoff 2001, 2004). Cannon (1994) has hinted at the danger of the tautology that the victims are identified as vulnerable. Vulnerability is a key

variable in determining whether or not a hazard becomes a disaster. Disasters happen when a natural hazard strikes vulnerable people. The central coast of Vietnam is the most hazardous area in terms of the risk of typhoons and flooding. On a regular basis, typhoons land there with serious consequences for the environment and the local population (e.g., Adger et al. 2001; Kleinen 2006). Although, the provinces of central Vietnam are regarded as the most poor, the region as a whole should not be equated with the most vulnerable. Early warning systems and increased mitigation measures have been put in place.

The sea environment is badly affected by oil spills, pollution by wastewater, and overfishing. Vietnam experienced 14 cases of oil spills between 1989 and 1996, forcing the coast to receive around 50,000 tons of oil. Urban areas daily discharge annually nearly 1 million cubic meters of wastewater and some 7,000 tons of solid waste and rubbish. The use of explosives and chemicals and the cutting down of mangrove forests to raise shrimps or produce salt is another contributing factor (see Le 2004). Destructive seafood exploitation is threatening the development of 85 percent of coral reefs in Vietnam. The marginalizing of small fishers has led to the expulsion of old fishing ports to other places, which are quite distant from roads and paths leading to the villages.

If the market is taking its toll, small-scale fishers are displaced by powerful competitors. A solution embedded in the term "Territorial User Rights in Fisheries" (TURF) is a far cry from what happens here: coastal fishing villages are not yet granted management and harvesting rights over the fishing grounds immediately adjacent to their communities. If they had them, they would have the incentive to conserve fish for future years, and, where appropriate, traditional management systems could be revived and given recognition under national fishery management regimes.[9]

A local fisherman explained once the options he had with the expression: "Chung toi an cap cua troi! [I am stealing from the gods!]" He meant that he was forced to take sand from the beach for use in the saltpans to supplement his meager income from fishing. It was not a lame excuse by way of apology for an act that he apparently felt was possibly improper, namely taking sand from the beach for personal use. Like the sand, he and his fellow fishermen see the sea as a common pool resource. He knows that the beach will no longer be a place where his boat can land freely. For more than a decade, small buildings, cafés, and eating-places have been built temporarily along the shore to receive day-trippers from the provincial town and even from the capital Hanoi. A concrete road connected the village with the beach where trees and gray sand gave access to an area that soon developed into a tourist resort with guesthouses and hotels. The expansion of leisure activities at one of the oldest fishing villages in the region was exemplary for many other places along Vietnam's far-reaching seacoast. Fishing, safe landings near the villages, and the use of the beach and the marshlands between the dunes and the sea dikes were no longer open access places for everybody. Fishermen added their meager income to the low earnings from salt gathering.

For them, taking sand from the sea is traditionally part of a usufruct right that belongs to "the commons," but an entitlement that had changed during collectivization when it became collective property.

Summary and Conclusions

Use-rights of fishermen in terms of access and harvest rights came under great pressure as a result of the rapid privatization of the resource. Before 1986, when Vietnam embarked upon a course of economic renovation, the state reallocated all its common natural resources under "central management" and still claims to do so in many sectors such as fisheries and forestry. However, under state management access to natural resources was not open to all. Heavy claims to open access resources were often met by a failing centralized control and regulation. The consequence was that these claims temporarily created open access resources where limited-access common property rights had previously existed (see also Ostrom, 1990; Adger and Luttrell 2000; Allison and Ellis 2001; for a summary of some recent publications, see Taylor 1998).

At first glance the limited-access rights for fishermen to their fishing grounds, the diminishing catch effort per unit resulting in a decline of beach landings, and the developing shrimp cultivation and a presumed "open access" to the sea is exploited by "free riders" who create a social dilemma about the question of who "owns" the common property of the (shallow) sea (Hardin 1968; see also McCay et al. 1987; Jentoft et al. 1998). Free rider behavior results not from a lack of respect for common property, but as a result of opening up market activities in a formerly collectivized economy. Vietnam's economic renovation policies since the mid-1980s have not only created conflicts about land, but have also affected coastal areas and waters that until now were regarded as common property managed by the state. The district and village authorities represent the state. On the one hand they try to prevent privatization of the common-pool resource, but on the other hand they eagerly show a "private" interest of their own. State appropriation of common-pool resources contributes to unsustainable utilization or conversion to other uses. In similar situations, like in China, collective ownership has not been abandoned as a result of the post-Mao rural reforms in the early 1980s, but has resulted in conflicts over the management of collective property (Zhang 2002, 102–21). A closer look at our case, however, reveals that the "commons" never have been an open-access resource.

"Renovation" means liberalization of market forces and privatization of natural resources. The government apparatus at the village and district level has not changed dramatically. The absence of clearly defined individual rights has led to an encroachment of the beaches and mudflats. People's Committees are still the most important representations of state power, but their local autonomy has sometimes been increased with negative consequences. "New winds of change" have forced local authorities to yield to privatization, but will this also benefit the poor sections of the population?

The question remains whether or not the activities of the different actors will also lead to better control of the natural resources and, with it, better control of negative ecological consequences, which have not yet been taken into account.

NOTES

1. The research for this paper was funded by Foundation for the Advancement of Tropical Research (WOTRO) grant under WB 52–837. Also, the Netherlands Science Foundation (NWO) (Netherlands Foundation for Scientific Research) provided the necessary funding to enable me to write this and other articles for the NIAS environmental history project, under grant number 365–53–006/GW. I thank the NIAS in Wassenaar for all the support given in 2004.
2. A measure for overfishing is the "catch per unit effort" (CPUE), that is, the quantity of fish caught (in number or in weight) with one standard unit of fishing effort. From this one can determine whether coastal waters (less than 50 meters depth) are overexploited [Daug et al. 2002]. A declining ratio will eventually lead to biological over fishing, but it is too early to speak of "ecosystem over fishing" (Murawski 2000). In Vietnam, catch and effort data are lacking due to poor monitoring.
3. In official statistics, engine power (Hp) and number are differentiated. Engine power is a better measure of fishing effort (Van Zwieten et al. 2001, 26–27).
4. National Archives Vietnam (NAV), Nam Dinh file 3560.
5. Personal communication by Christopher Goscha.
6. The average population density nationwide is 225 inhabitants per square kilometre.
7. NAV, Superior Resident of Tonkin, RST file no. 73055.
8. NAV, RST file 73052.
9. The TURF's concept was developed in the 1980s in order to revive or establish traditional fishery management systems. See Christy (1982).

BIBLIOGRAPHY

Adger, W. N. and Cecilia Luttrell. "Property Rights and the Utilisation of Wetlands." *Ecological Economics* 35 (2000): 75–89.

Adger, Neil, Mick Kelly, and Nguyen Huu Ninh. *Living with Environmental Change: Social Vulnerability, Adaptation and Resilience in Vietnam.* London and New York: Routledge, 2001.

Allison, E. H and F. Ellis. "The Livelihoods Approach and Management of Small-Scale Fisheries." *Marine Policy*: 25, 5 (2001): 377–88.

Bankoff, G. "Environment, Resources and Hazards." In *The Southeast Asian Handbook*, edited by P. and M. L. Heenan, 179–92. London and Chicago: Fitzroy Dearborn, 2001.

Bankoff, G., G. Frerks, and D. Hilhorst, eds. *Mapping Vulnerability: Disasters, Development and People*. Sterling, VA: Earthscan, 2004.

Blaikie, P. et al., eds. *At Risk: Natural Hazards, People's Vulnerability and Disasters.* London and New York: Routledge, 1994.

Bo chi huy quan sù [Ministry of Defence]. *Ha Nam Ninh. Tien hanh chien tranh nhan dan chong chien tranh pha hoai cua de quoc My (1965–1972) [*Ha Nam Ninh.

To Carry Out the People's Anti-aggresive War against the Sabotage of the American empire]. Nam Dinh: Defence Department, 1978.
Butcher, J. G. *The Closing of the Frontier. A History of the Marine Fisheries of Southeast Asia c. 1850–2000*. Singapore: ISEAS, 2004.
Cannon, T. "Vulnerability Analysis and the Explanation of Natural Disasters." In *Disasters, Development and Environment*, edited by A. Varley, 13–30. Chichester: Wiley, 1994.
Christy, J. F. "Territorial Use Rights in Marine Fisheries: Definitions and Conditions." FAO Fisheries Technical Paper 22, 1982.
Cicin-Sain, B. and Robert W. Knecht. *Integrated Coastal and Ocean Management. Concepts and Practice*, Washington DC: Island Press, 1998.
Cooke, N. and Li Tana. 2004. *Water Frontier: Commerce and the Chinese in the Lower Mekong Region, 1750–1880*. Singapore: Singapore University Press; Lanham, MD: Rowman & Littlefield, 2004.
Crawfurd, J. *Journal of an Embassy to the Courts of Siam and Cochin China* [1837]. *With an introduction by David Wyatt*. Singapore, Oxford, and New York: Oxford University Press, 1967.
Daug, V. T., D. Tran, R. Nielsen, and F. Riget. "Results of Bottom Trawl Surveys Carried Out in Vietnamese Waters (20–200 m) in 1996–1997." *Naga, the ICLARM Quarterly* 25, 1 (2002).
FAO. Food and Agriculture Organization of the United Nations. http://www.fao.org/fi/fcp/en/NLD/profile.htm, 2004 accessed on 20/04/2006.
Farrell, E. C. *The Socialist Republic of Vietnam and the Law of the Sea: An Analysis of Vietnamese Behavior within the Emerging International Oceans Regime*. The Hague and Boston: Nijhoff, 1998.
French, P. W. *Coastal and Estuarine Management*. London and New York: Routledge, 1997.
Froese, R. and D. Pauly, eds. "FishBase 2000: Concepts, Design and Data Sources." ICLARM, Los Baños, Laguna, Philippines, http://www.fishbase.org, (consulted on 6 August 2006).
Goscha, C. "The Maritime Nature of the Wars for Vietnam (1945–75)." Paper for the Fourth Triennial Vietnam Symposium, Texas Tech University, Vietnam Center, 11–13 April 2002.
Gourou, P. *Les Paysans du Delta Tonkinois. Etude de Géographie Humaine*. Paris et Hanoi: Publications de l'EFEO, 1936.
———. *L'utilisation du sol en Indochine française*. Paris: Centre d'Etudes de Politique Etrangère, 1940.
Government (Netherlands and Vietnam). *Pilot Study of Sea Dyke Erosion in Nam Ha Province*. Marine Hydrometeorological Centre (a. o.), 1995.
Gruvel, A. *L'Indochine. Ses richesses Marines et Fluviales. Exploitation actuelle, avenir. Geographiques, Maritimes et Colononiales*. Paris: Ancienne Maison Challamel, 1925.
Hall, K. R. *Maritime Trade and State Development in Early Southeast Asia*. Honolulu: University of Hawaii Press, 1985.
Hardin, G. "Tragedy of the Commons." *Science* 162, 3859 (1968): 1243–48.
Hocquard, D. *Une Campagne au Tonkin. Ouvrage contenant deux cent quarante gravures et deux cartes*. 1892; reprint Paris: Arlea, 1999.
Holbrook, R. D. and Manob Suriya. *Blue Book of Coastal Vessels, Thailand*. 1967; reprint Bangkok: White Lotus, 2000.
Imamura, F. and Dang Van To. "Flood and Typhoon Disasters in Viet Nam in the Half Century since 1950." *Natural Hazards* 15, 1 (1997): 71–87.

Jentoft, S., Bonnie J. McCay, and Douglas C. Wilson. "Social Theory and Fisheries Co-management." *Marine Policy* 22 (1998): 423–36.

Kelly, P. M., M. H. Hoang, and V. L. Tran. "Responding to El Niño and La Niña: Averting Tropical Cyclone Impacts." In *Living with Environmental Change: Social Vulnerability, Adaptation and Resilience in Vietnam*. London and New York: Routledge Environmental Studies 2001.

Kerkvliet, B. J. T. *The Power of Everyday Politics: How Vietnamese Peasants Transformed National Policy*. Ithaca, NY and London: Cornell University Press, 2005.

Kleinen, J. *Facing the Future, Reviving the Past. A Study of Social Change in a Northern Vietnamese Village*. Singapore: ISEAS, 1999.

———. "Access to Natural Resources for Some: A Tale of Aquaculture in Nam Dinh, Vietnam." In *Institutional Dynamics and Stasis: How Crises Alter the Way Common Pool Resources Are Perceived, Used and Governed. Regional Center for Social Science and Sustainable Development (RCSD)*, edited by Louis Lebel, Xu Jianchu, and Antonio Contreras, 133–61. Chiang Mai: Monograph Series, Faculty of Social Sciences, Chiang Mai University, 2006.

Labrusse, de, S. *Economie maritime indochinoise. Politique du cabotage en Indochine*. Saigon: Imprimérie Française d'Outre-Mer, 1950.

Le, Thi Van Hue. *Coastal Resource Use and Management in a Village of Northern Vietnam*. Maastricht: Shaker Publishing, 2004.

MacNeill, W. H. *The Pursuit of Power: Technology, Armed Force, and Society since A. D. 1000*. Chicago, IL: University of Chicago Press, 1982.

Maren, v. D. S. *Hydrodynamic Process and Sediment Fluxes in Ba Lat River Delta System*. Utrecht University, 2002.

McCay, B. and J. Acheson. *The Question of the Commons*. Arizona: The University of Arizona Press, 1987.

Murawski, S. A. "Definitions of Overfishing from an Ecosystem Perspective." *ICES Journal of Marine Science* 57 (2000): 649–58.

Nguyen, Duy Thieu. *Cong Dong Ngu Dan o Viet Nam [Fishers Communities in Vietnam]*. Ha Noi: Khoa Hoc Xa Hoi, 2002.

Nguyen, Long. "A Preliminary Analysis on the Socioeconomic Situation of Coastal Fishing Communities in Vietnam." *World Fish Center* (2001): 657–88, www.worldfishcenter.org/trawl/. accessed on 6 August 2006.

Nguyen, Quang Trung Tien. *Ngu Nghiep Viet Nam nua dau the ky XX [Fisheries in the first half of the 20th Century]*. Hue: NXB Thuan Hoa, 1995.

Nguyen, The Anh. "Traditional Vietnam's Incorporation of External Cultural and Technical Contributions: Ambivalence and Ambiguity." *Tonan Ajia Kenkyo [Southeast Asian Studies]* 40 (2003): 444–58.

Nguyen, Truc Tang. *Thuc trang ve dieu kien tu nhien dai ven bo va so bo nhan dinh ve tac dong cua muc nuoc bien Dong o Vietnam. [Management and Knowledge about Sea Level Rise Impacts in Vietnam]*. Vietnam VA project, 1996.

Nielsen, S. S. et al. *Local Use of Selected Wetland Resources. Cua Day Estuary, Red River Delta, Vietnam*. Zoological Museum Copenhague and Wetlands International, 1998.

Ostrom, E. *Governing the Commons—The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press, 1990.

Poisson, E. *Mandarins et subalternes au nord du Viêt Nam—une bureaucratie à l'épreuve (1820–1918)*. Paris: Maisonneuve et Larose, 2004.

Prescott, D. *The South China Sea: Limit of National Claims*. Kuala Lumpur: Maritime Institute of Malaysia, 1996.

Pruszak, Z., M. Szmytkiewicz, N. M. Hung, P. V. Ninh, "Coastal Process in the Red River Delta Area, Vietnam." *Coastal Engineering Journal* 44, 2 (2002): 97–126.

Robequain, C. *Le Thanh Hoá, Etude géographique d'une province annamite*. Paris et Bruxelles: Publications de l' Ecole française d'Extrême-Orient, 1929.

———. *The Economic Development of French Indo-China*. Oxford: Oxford University press, 1944.

Ruddle. K. "Traditional Community-Based Coastal Marine Fisheries Management in Viet Nam." *Ocean and Coastal Management* 40, 22 (1998): 1–22.

Shindo, S. "General Review of the Trawl Fishery and the Demersal Fish Stocks of the South China Sea." FAO Technical Paper no. 120, 1973.

Statistical Office, N. H. *8 nam xay dung va phat trien kinh te—van Ha Tinh Nam Ha (1960–1967) [8 Years Economic and Social Production and Development in the Province of Nam Ha (1960–1967)]*. Nam Ha: Statistical Office, 1968.

Sun, L. "Chinese Gunpowder Technology and Dai Viet: c. 1390–1497." In *Vietnam: Borderless Histories*, edited by A. Reid and Nguyen Tuyet Tran., 72–122. Madison, WI: University of Wisconsin Press, 2006.

Taylor, M. "Governing natural resources." *Society and Natural Resources* 11, 3 (1998): 251–58.

Thai, Van Kien. *Viet-Nam d'hier et d'aujourd'hui*. Paris, Tanger et Saigon: Commercial Transworld Editions, 1956.

Tran, D. T., Tran Dinh Lan, and Dinh Van Huy. "Natural and Human Impact on the Coastal Development of Red River Delta." Report LOICZ Open Science Meeting, 1997.

UBND, Tinh Nam Ha So Thuy San [People's Commitee of the Province of Nam Ha, Department of Fisheries]. "Du an ton the: phat trien thuy san nam ha thoi ky 1996–2010 [Statistical Draft: Production of Fisheries in Nam Ha for the Period 1996–2000]". Department of Fisheries, 1996.

Vallega, A. "A Conceptual Approach to Integrated Coastal Management." *Ocean and Coastal Management* 21, 1–3 (1993): 149–162.

Vietnam Bulletin. *South Vietnam's Fishing Industry*, no. 8, 22 February 1971.

Visser, L. E. *Challenging Coasts. Transdisciplinary Excursions into Integrated Coastal Zone Development*. Amsterdam: Amsterdam University Press, 2004.

Vu, thi Minh Huong, Nguyen Van Nguyen et Philippe Papin, *Repertoire des toponymes et des archives villageoises du Bac Ky* Hanoi, EFEO, *Bibliothèque Vietnamienne*, VI 1999.

Vu, Trung Tang. *The Eastern Sea: Resources and Environment*. Ha Noi: The Gioi 2001.

Wijdeven, B. "Coastal Erosion on a Densely Populated Delta Coast in Vietnam." MSc dissertation, TUD, 2001.

WRI. "World Resources 2000–2001—People and Ecosystems—The Fraying Web of Life." [The series is a UNDP guide published by the WRI] vol. 2004. Washington, DC: World Resources Institute, 2000.

Zhang, J. "From Village Commons to Shareholding Corporation: collective Property Reforms in a Chinese village." In *Collective Goods, Collective Futures in Asia*, edited by S. Sargeson, 102–22. London and New York: Routledge, 2002.

Zwieten, P. A. M. v., Wim L. T. van Densen, and Dang Van Thi. "Improving the Usage of Fisheries Statistics in Vietnam for Production Planning, Fisheries Management and Nature Conservation." *Marine Policy* 26, 1 (2002): 13–34.

Index