

Introduction

As the subtitle suggests, this book is an attempt to write environmental history on a global scale. The book's aim is to identify, describe, and reflect on the processes by which human beings intervened in the natural environment during the early modern period. From the late fifteenth century to the early nineteenth, the pace and magnitude of change increased in human societies in every part of the world. There were, moreover, shared processes of change of unprecedented intensity seen around the world.¹ Change in the early modern world forecast the direction of even greater changes to come during the nineteenth and twentieth centuries. Most dramatically, the total number of human beings nearly doubled, from 400 to 500 million in 1500 to 850 to 950 million in 1800.²

In this same period, human societies developed the largest, most complex, most efficient state and private organizations known since classical antiquity. The technology and organization of warfare became more effective and more devastating—especially with the use of firearms. During the early modern centuries, humans established new links—primarily by sea—around the entire world. In large measure because of maritime improvements, a new, truly global economy coalesced. Capital investment moved readily from one world region to another. Prices for commodities quoted in the urban centers of the new world economy sent signals to producers around the world. New commodities in increasing quantities and variety flowed to world markets. Monetary systems based on metallic forms of money—copper, gold, and silver—expanded and interlinked in new ways.

1. John F. Richards, "Early Modern India and World History," *Journal of World History* 8 (1997).

2. *Ibid.*, 201.

Creation of a global system of transport and communication, begun in the early modern period, meant that human beings traveled long distances more readily than at any time in human history. Early modern land routes and connections became more passable. However, steady improvement in the safety, price, and capacity of sea travel was the primary accelerant to human mobility. A well-equipped and provisioned seagoing vessel manned by an experienced captain and crew could set out from virtually any port in the world and sail to any other port in the world, no matter how distant. Cultural mixing began the slow process of melding a genuine world culture (still in process at the turn of the second millennium). Aggressive trade, war, and settlement challenged and shocked isolated and insular local cultures and societies. A hesitantly emerging global consciousness was one of the most profound consequences of the speeded-up early modern circulation of peoples.

Verbal and written information passed between the world's regions and within regions at new levels of accuracy and quantity—aided by the rapid spread of printing. In addition to replication of prose, printing permitted replication of complex images in a boost to cartography and the natural sciences. Humans constructed a systematic, far more precise understanding of the shape, size, and complexity of the earth's surface and portrayed this understanding in ever more precise and widely read maps.³ Identifying, naming, and classifying of the world's landforms, climates, minerals, human groups, animals, and plants proceeded at a dizzying pace. The natural sciences of today originated in the taxonomic impulses of enthusiastic observers who communicated their discoveries with great enthusiasm.

Societies in the early modern period still relied on human, animal, wind, and water power. Nevertheless, humans significantly altered the natural world before the industrial revolution. To be sure, the early modern period saw a number of important technological changes, but this was well before the widespread use of the steam engine as a new prime mover driven by fossil fuels. That invention, coupled with the scientific and technical revolutions that accompanied it, gave humans a previously undreamed-of capacity to manipulate the material world.⁴ The industrial revolution marked a massive discontinuity in human history in ways that we are just now beginning to understand.

As the term *early modern* suggests, however, shared historical processes and long-term trends that accelerated in this period deeply influenced massive and growing human-induced environmental change during the nineteenth and twentieth centuries. There are profound continuities that link the environmental history of the early modern and modern worlds.

3. Jerry Brotton, *Trading Territories: Mapping the Early Modern World* (Ithaca, N.Y.: Cornell University Press, 1998).

4. Vaclav Smil, *Energy in World History* (Boulder, Colo.: Westview Press, 1994).

By means of illustrative case studies, this book offers a pan-global view of human impacts on the natural world—not the reverse. With the exception of the discussion of climatic change, each chapter describes anthropogenic change, or the effects of collective human action on the world's ecosystems. Using the relatively new approach called environmental history, the case studies measure material change to the extent that it can be determined. Every new historical approach creates its own sources simply by asking new questions of familiar documents. Practitioners in the new field also discover new sources ignored by more conventional historians in well-established fields. Therefore, for example, many travelers' accounts from this period offer up significant, but previously ignored, observations on environmental changes.

New insights also derive from modern scientific studies in biology, ecology, and environmental studies. These offer the environmental historian assistance in better defining the ecological implications of past human actions. Where possible, the book relies on detailed reconstruction of past environments done by historical geographers and historically minded ecologists. Where, unfortunately, these do not exist, discussion of environmental impacts becomes less precise and satisfactory. It is not easy to describe and assess environmental changes of the present, let alone those of the past.

Each chapter is a synthesis of scholarly and scientific materials written in or translated into English or French. In the best of all worlds, the author would be proficient in a half dozen more languages, but he is not. For better or for worse, English is today the most widely used language in global scholarly communication. Moreover, there exists an extensive historical literature in English for every world region in the early modern period. This literature usually includes English translations of important source materials.

Today, in a world with an increasingly shared world identity and world culture, it is important to begin writing world history. The results will be necessarily uneven and imperfect, skewed by those linguistic and cultural limitations invariably imposed on any single scholar. As in any other historical field, however, when multiple works appear, interpretations can be compared and critically assessed—and will be.

World history is not one grand narrative but rather must be written from multiple thematic, global perspectives that collectively illuminate humankind's common history. Environmental history is more than the sum of national environmental narratives. Instead, we must connect the issues and themes of environmental history with those of world history. If successful, this book will have made a contribution to world history as a genre as well as to environmental history. The long-term effects of human action are best seen in detail at the local level, but best understood in a holistic global perspective.

The book is made up of detailed case studies taken from nearly all parts

of the world. These studies allow us to examine important shared processes of social and environmental change over the long term of three or more centuries. However, for some readers, the case studies examined in the book's chapters may take on a kaleidoscopic character. Each has juxtaposed details, colors, and shapes that form in unpredictable patterns. Each chapter relates a self-contained narrative with little direct connection or transition to the next. The criteria for inclusion, for choice of case study, may seem arbitrary, almost random. Interesting though the chapters may be, with insights and information not easily obtained, they are difficult to fit into a meaningful interpretation of environmental history and world history.

What, then, are the larger patterns and issues addressed in the book? What sorts of environmental impacts are we talking about? What is the global pattern? What shared historical processes do these case studies demonstrate? These historical processes are four in number: intensified human land use along settlement frontiers, biological invasions, intensified commercial hunting or the "world hunt," and energy and resource scarcities in core areas.

First and most important is the intensified human land use in every world region. Rising human numbers put increasing pressure on the land. Human settlement and sedentary cultivation expanded at the expense of forests, woodlands, wetlands, and savannas. Almost invariably such expansion caused a reduction in the quantity and diversity of vegetation or, to put it in other terms, a reduction in biomass and biodiversity. That is, sedentary cultivation depended on selection of one or a few favored plant species cultivated in plowed fields in place of a variety of grass, shrubs, and trees that had formerly occupied a newly cleared field. Agriculture was and continues to be the single most important means by which humans change the world's lands and its ecosystems.

The greater portion of new cultivation occurred in the ubiquitous frontiers of settlement.⁵ In nearly every world region, technologically superior pioneer settlers invaded remote lands lightly occupied by shifting cultivators, hunter-gatherers, and pastoralists. Encouraged, directed, and subsidized by expansive states, surplus populations moved readily and easily to new areas promising employment or fertile land. In Africa, Eurasia, and the New World, they expelled, killed, or enslaved indigenous peoples enfeebled by low numbers, particularistic ethnicities and loyalties, susceptibility to new disease, and backward technology.

Expansive early modern states imposed new types of territoriality on frontier regions. Settlers and colonial regimes refused to recognize any existing

5. John F. Richards, "Only a World Perspective Is Significant: Settlement Frontiers and Property Rights in Early Modern World History," in *The Humanities and the Environment*, edited by Jill Conway, Kenneth Keniston, and Leo Marx (Cambridge: MIT Press, 1998).

property rights among indigenous peoples (or if they did so initially, these were soon abrogated). Instead, they viewed these lands as empty, to be claimed by the encroaching state. In turn, the colonizing state conferred property rights on its frontier settlers. These consisted of the usual bundle of rights common to settled societies in Eurasia: the rights to occupy, alienate, mortgage, and bequeath lands so owned. Often settlers were required to improve their lands by clearing and cultivation in order to retain them. Once property rights were guaranteed by state power, land markets emerged.⁶ Cadastral surveying and mapping added new precision to notions of land ownership and aided nascent land markets.

As settlement frontiers advanced, human land use intensified and productivity per square kilometer rose. Simultaneously, biomass and biodiversity usually declined. Pioneers replaced forests, wetlands, grasslands, and other habitats with intensively cultivated fields and settlements. Rising market demand and declining transportation costs provided an outlet for timber and forest products such as potash, pitch and tar, meat and hides, medicinal plants, and waterfowl and other wild game that could either be hunted or grown by the new settlers. Rural industries such as iron smelting also made heavy use of abundant natural resources in newly opened regions of settlement.

Frontiers of settlement mark a significant change in the way humans use land and consume natural resources. In the Americas, in Africa, and in Eurasia, aggressive pioneers intruded on what they considered to be empty or waste lands so that they might occupy, settle, and cultivate the land by means of sedentary agriculture or commercial pastoralism. Numerous ethnic groups who practiced shifting cultivation, pastoralism, and hunting-gathering lost possession and ownership of their lands to new settlers. Many of these pioneers were Europeans sharing in the emerging maritime skills, military force, and state initiative that propelled European expansion around the world.

The terms *frontiersmen* and *pioneers* convey an image of lonely, intrepid, hardy venturers who fearlessly press deep into wildlands. These pioneers then tame the landscape and subdue its savage peoples. To a certain extent, this image, like all stereotypes, is accurate. Pioneer settlers were usually brave, often isolated, and often self-sufficient for lengthy periods. Frontier virtues such as self-reliance, independence, and resilience were manifest—so too were the frontier vices of cruelty, wastefulness, and ignorance.

Pioneer settlers changed the ecology of those regions they settled. Usually this took the form of obliterating older forms of cultivation and hunting and gathering in favor of more productive modes of sedentary agriculture and

6. Robert David Sack, *Human Territoriality: Its Theory and History* (Cambridge: Cambridge University Press, 1986).

livestock raising. In region after region, pioneers cleared land, drained wetlands, irrigated dry lands, killed off wildlife, and expelled indigenous peoples in order to reduce biodiversity and biomass and thereby expand output.

Not generally recognized is the extent to which pioneer settlers on every frontier had to adapt to the specific ecological circumstances in which they found themselves. In every locality, there were peculiarities of moisture, soils, seasonality, temperature, flora, fauna, water tables, and dozens of other variables to be learned. Some information came from the ecological knowledge of surviving indigenous peoples—but usually not enough. Often trial and error produced solutions to problems of productivity and adaptation, but frequently these came only after difficulties and scarcities in the early years of settlement.

Stereotypes of settler frontiers are also misleading and distorted by the mythmaking propensities of collective memory. Every settler frontier in the early modern centuries depended heavily on linkages to a wider world. Every settler frontier required the active political, military, and fiscal engagement and support of an aggrandizing state. Every settler frontier rested on human energy and tools mobilized by means of capital investment and by market demand for frontier products. In the early modern world, virtually all pioneer settlers funneled commodities obtained from cultivation, proto-industrial processing, hunting, and gathering to metropolitan markets. All settlers were acutely aware of the larger forces that determined their success or failure.

Settler frontiers are transient episodes that leave evidence of their occurrence. Physical changes such as the introduction, planned or accidental, of new species of plants, animals, insects, bacteria, and viruses can be recorded and mapped. Land cover and land use changes have direction and spatial extent. The readily charted extension of new forms of human settlement can serve as a proxy indicator for manifold processes of change. Occurrences of cultural conflict and adjustment across the permeable membrane of the frontier can be recorded and mapped as well. Settlers learned from indigenous peoples and from new ecosystems—often slowly and painfully. Indigenous peoples rapidly learned more devastating lessons from encroaching settlers.

Determining just what constitutes frontier completion or maturity is often difficult; frontiers of settlement signify a change from one form of human exploitation of the natural world to another. Rarely do we find in the early modern period settlers moving into terrain wholly uninhabited by human beings. Whether the earlier or the replacement form of land use was more exploitative or more sustainable is a vexed question. The Taino (Arawak) peoples of Hispaniola did not live in a pristine environment before 1492. Their cumulative effect on the island ecosystems of the West Indies was considerable. What is generally true, however, is that backward link-

age of the frontier settler to the metropolis and the state was new. Insistent cultural signals and resource demands from a much larger society—an emergent world economy—got transmitted to the pioneer settlers and to those who survived among indigenous peoples.

Settler cultivation occasionally took the form of highly intensive industrial agriculture. Colonists cleared the rain forest landscapes of the West Indies, Atlantic Brazil, and the Canary Islands to grow and process cane sugar. Colonial planters imported African slaves to create a captive workforce. Plantation-grown cane sugar became one of the most valuable export products of the early modern world economy. Although limited in area, plantations obliterated complex ecosystems to create industrial platforms for the production of an export commodity.

Also associated with expanding cultivation was water control. Across Eurasia and the New World, early modern societies reclaimed tens of thousands of hectares of land either by draining wetlands or by bringing irrigation water to areas with scanty or unreliable rainfall. Successful wetlands drainage permitted new settlement of previously lightly inhabited lands, such as the fenlands of Britain's east coast. In China, state and local elites were continually engaged in water projects aimed at improving productivity of wet rice cultivation. Although significant, water control was not as important in large-scale environmental change as it later was to become, after introduction of the vast dams and perennial irrigation of the nineteenth and twentieth centuries.

The second major impact discussed is that of biological invasions tied to accelerating human mobility. During the early modern centuries, humans moved in greater numbers over longer distances and with greater frequency than ever before in human history. In various world regions, improved political conditions stimulated heavier overland traffic—especially on critically important routes such as the great highway to Edo in Tokugawa Japan—and modest improvements in bridges and road surfaces added speed and efficiency. However, the most significant leaps came in water transport. In Europe, China, Japan, Russia, and India, riverine transport grew to unprecedented volumes, sometimes aided by the growing number of artificial canals. In these same regions, coastal shipping rose exponentially as costs dropped and reliability and efficiency increased. The most spectacular advance lay in deepwater shipping, which by the end of the eighteenth century reliably tied human society in every inhabited world region with every other human society.

Human mobility encouraged world trade on a new scale and intensity. Traders moved commodities of all types faster, cheaper, and more reliably over longer distances than had occurred in the medieval centuries. Traders and merchants responding to market signals sought out, bought, packaged, and shipped both extracted natural resources and agricultural and industrial

products from around the world. Even relatively low-priced, bulk commodities such as salt and timber could turn a profit in the growing world economy. As a result, humans gained access to and exploited natural resources—forests, marine mammals, fish, wildlife, and above all, fertile soils in favorable climates—that had been only lightly touched by human use, if at all.

When people traveled and migrated, so too did their associated animals, plants, insects, and viruses and other microorganisms. Intrusions into new ecosystems and landscapes by alien invaders became more common. Each human migrant or traveler carried with him or her a collection of associated animals, plants, and microbes in what Alfred W. Crosby has termed a “biological portmanteau.”⁷ The most notable effects resulted from the maritime link between the Americas and Eurasia and Africa. New animals and plants invaded the New World along with European and African human migrants, and many flourished in the absence of predators or other ecological checks to their reproduction. New World cultivars radically changed the diet and pharmacopoeia of the Old World. For example, as the chapter on early modern China points out, the adoption of maize in East Asia made it possible for pioneer settlers to better exploit marginal hill regions in East Asia. New World human populations previously unexposed to deadly microbes faced horrific pandemics. Returning migrants brought different diseases back to the Old World.

More than in any previous era, humans diffused exotic species of bacteria, insects, animals, and plants from their native habitats to new ecosystems scattered throughout the earth’s land and waters. Some of these transfers and introductions were planned; far more were accidental. In its rising velocity of biological exchange, the early modern world forecast the bewildering speed of biological invasions recorded on a near-daily basis today.

During the early modern centuries, the numbers and range of Eurasian varieties of horses, cattle, sheep, goats, and pigs grew dramatically—especially in the New World. Colonial settlers seized upon the favorable ecological conditions for livestock raising that they found in the great grassland and savanna areas of mainland and island North and South America. By introducing domesticated ungulates, they intensified human use of ecosystems that were generally drier and less favorable to sedentary cultivation.

Ranchers (commercial pastoralists) built up herds of livestock and exported meat and hides to world markets. European colonists imported cattle, sheep, goats, and horses and dispersed them to graze and breed on grasslands and savannas previously inhabited only by wild animals. Commercial pastoralism became a worldwide industry that linked producing areas and markets on a global scale. Markets and prices for meat and hides were gen-

7. Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (Cambridge: Cambridge University Press, 1986).

erally buoyant throughout the early modern period to 1800 and beyond. When new areas opened up for settlement, colonists adopted ranching as a satisfying and profitable way of life.

A third human-induced environmental impact was widespread depletion of larger animals, birds, and marine mammals. Early modern societies began the process of extirpation that was to culminate in the typical landscapes of the twenty-first century, from which virtually all large wild animals have vanished. Throughout the early modern world, for example, large predators that posed any conceivable threat to humans or their livestock died in unprecedented numbers. They lost habitat and prey to cultivated fields. Wolves, bears, tigers and other large cats, and other carnivores became the target of systematic hunting by pioneer settlers, who classed them as vermin to be killed in any way possible. Herbivores lost grazing areas to domesticated ungulates. Waterfowl lost habitat as marshes were drained. Other animals and birds whose fur, flesh, teeth, or feathers could be used by humans became prey for commercial hunters.

Increased human mobility encouraged the rapid growth of the “world hunt.” In even the most remote regions on land and sea, hunters killed for the world market. Commercial hunters and gatherers killed off communities and species of wild fish, mammals, and birds, as well as trees and bushes, whose carcasses possessed value in the early modern world economy. Humans voraciously and systematically located, extracted, processed, packaged, shipped, priced, sold, and consumed wild animals in ever greater quantities over ever greater distances. Humans stripped wildlife from hitherto unexploited areas—a kind of windfall effect.

The rapidly growing world economy put traders in direct contact with indigenous peoples around the world who could cheaply extract timber, furs, and medicinal plants for commodity markets. Obsessive, market-driven modes of hunting and trapping were a new form of concentrated human intervention into complex ecosystems. Whereas previously humans in their hunting-and-gathering groups were but one of a number of predator species, commercial stimuli instilled in human hunters a new ruthlessness and ferocity. The most obvious effect of the world hunt was to extirpate target species of animals or birds from one region after another. However, the longer-term ecological consequences of market hunting for the world economy were complicated and probably more significant than we can reconstruct today. The effects on indigenous societies were also profound. Market hunting—when combined with political and military conquest—caused grave cultural, social, and ecological distortions that enfeebled those peoples caught in the new world economy.

The world hunt extended to the oceans. The world’s northern oceans became hunting grounds exploited at a new scale and intensity. Early modern European seafaring proficiency and shipping provided access to greatly ex-

panded ocean resources. For the first time, mariners outside the Mediterranean ventured beyond their coastal waters and voyaged long distances to hunt the fish, whales, seals, walruses, and other marine mammals of the world's oceans. The numbers of vessels and men employed, the capital invested, and the profits all rose steadily. In another resource windfall, fish and marine mammals became commodities in a steadily growing industry that brought cheap protein, oil, and other goods to landlocked consumers.

Building on experience, the sea hunters steadily accumulated greater knowledge and skill in their pursuit. Decade after decade, they deployed more cost-effective, more seaworthy vessels equipped with improved harpoons, nets, and processing tools. Distances traversed to reach good fishing grounds lengthened. When fish and mammal stocks were depleted in one region, hunters moved on to another, usually more remote, region. If one species was entirely depleted, hunters attacked another, less desirable species.

Other important concerns for environmental historians, such as the history of industrial pollution and urban environmental history, receive little attention in this book. Certainly, case studies of early modern industrial concentrations and their pollution and resource consumption could have been included, but are not. Similarly, comparative cases that illustrate sanitation, water supply, air pollution, and other environmental problems of early modern cities have been omitted. These processes, while manifestly important, are not as significant for world environmental history in this period as in the nineteenth and twentieth centuries. Most early modern cities had far smaller populations and areas with less extensive ecological footprints than modern cities have. Similarly, early modern industry was smaller in scale and had less impact on the environment than that seen today. Some industrial pollution associated with mining, as in the case of mercury used in the processing of New World silver mines, was significant and is discussed in this book.

In each chapter, there is a narrative of significant human impact on natural ecosystems. Around the early modern world, human populations consumed greater amounts of natural resources than ever before and often drastically changed natural habitats. They killed off some species of animals and birds and brought invading species to relatively undisturbed areas. They killed off, drove away, or enslaved weaker, less populous indigenous societies. Without question, this is a tragic story replete with brutality and waste. Ecologically rich regions suffered impoverishment and drastic change in a process that certainly can be termed degradation.

It is possible to tell this story simply as a tragedy that continues into the present day—a familiar story to all who hold deep concerns about the state of the world's natural environment. Many environmentalists and environmental historians view forest clearing as unfortunate and mourn the loss of wide expanses of forest cover. They deplore the killing off of large carnivores

and other wildlife. They see sedentary cultivation and grazing as fundamentally negative activities that invariably lead to eroded soils and depauperate landscapes. Often they assume that catastrophic soil erosion must have followed the introduction of plow cultivation and large domesticated hooved livestock. For these environmentalists and historians, each case simply adds more proof of human callousness and greed and the dismaying ecological costs of these tendencies.

Such an approach, however resonant with our present-day fears and concerns, is distorting. It does not fully address the complexity of human interaction with the natural world in these centuries. Human action described in these chapters was usually purposeful in economic terms. For example, settlers who cleared forests did not do so for pleasure but aimed at supporting themselves by producing food and industrial crops for which there was a market demand. Hunters of whales did not embark on difficult and arduous voyages for sport. Instead, they hoped to bring scarce fats and a valuable industrial material (whalebone) to markets where these products were much in demand. Graziers and ranchers did not kill wolves or lions solely for pleasure. They were acting to defend their stock beset by a myriad of threats.

Our fourth and final theme reflects an early modern world of scarcity and uncertainty. From the relative comfort of the twenty-first century, we often ignore the deep-seated fears, insecurities, privations, and discomforts suffered by even the wealthiest and most powerful people in early modern societies. Food supplies were always precarious. Successive harvest failures meant malnutrition for many, even outright starvation amid the horrors of famines. Often war and the breakdown of public order made the effects of food scarcities more severe. Shipping surplus foods to regions stricken by dearth was not easy and often not even attempted.

Both individually and collectively, the drive to increase food production took on desperate urgency. Growing populations put intensifying demands on scarce natural resources—especially food and energy. By the eighteenth century, some societies in Eurasia clearly experienced growing scarcity and deprivation as they used up their resource endowments.

Two of the book's case studies examine the environmental impact of swelling populations in Japan and the British Isles—two of the most densely populated and productive core areas of Eurasia. The spiraling consumption of energy, food, and materials in these core regions began to collide with limited local and regional resources. Early modern cities and towns, stimulated by increased trade flows, added to their populations and converted neighboring rural tracts into urban settings. In the countryside, farmers cleared and plowed former grazing lands and other surplus areas. Often these were village lands managed by the village as a corporate entity under common property rules. As land became scarcer, villages felt pressure to privatize the commons.

Rising demands for energy put an enormous strain on local wood, peat, and other supplies of fuel. By the late eighteenth century, there were distinct signs of increasing materials and fuel scarcities. Both Japan and the British Isles suffered an energy crisis in common with other long-settled areas in Eurasia. Rising demand increased the scarcity of other natural resources too, such as wild game, freshwater fish, and wild plants. Diminished access to these virtually cost-free natural products hurt the living standards of peasants and other groups of rural inhabitants. Early modern Japan and Britain adopted very different methods to cope with energy and resource scarcity. Japan turned inward, toward conservation; Britain turned outward to seek new resources.

On the frontier, settlers found an unheard-of abundance of freshwater, nutritious pasture, fertile soil, forests and woods for the cutting, vast herds and flocks of edible wildlife that were easily hunted, and, frequently enough, valuable minerals. For the pioneer, natural gifts were to be had for the taking—along with natural hazards in the ill-understood new habitats. Nonetheless, the trope or theme of abundance resonated with the inhabitants of more densely settled regions, where resources were becoming scarce and expensive.

Moreover, when pioneer settlers brought new land under sedentary cultivation, they made landscapes more productive in economic terms. Each hectare of land put into row crops annually produced more food for more people than that same hectare had produced under the shifting cultivation of forest peoples. Each hectare of land used for livestock grazing generated more food for human use than it had provided before.

All depended on consistent, intelligent land managers.⁸ Over several generations of farming and grazing, new settlers could by trial and error fine-tune their crops, fertilizers, methods, tools, and agricultural calendars to get acceptable yields year after year. With reasonably secure property rights, they could invest the energy and acquire the skill needed to reduce erosion and build up the quality of soils on their holdings. They could build terraces, drain wet areas, sustain woodlots, and carry out the hundreds of minute improvements that constitute good farming practice. They could continue to obtain part of their subsistence and their market products from hunting and gathering in remaining adjacent forests, jungles, savannas, or wetlands. The result was often a new, highly attractive, mixed countryside with great aesthetic appeal. Under appropriate, time-tested management, mixed landscapes can develop great resilience that permits them to continue to be productive and aesthetically appealing for centuries.

8. See Piers M. Blaikie and H. C. Brookfield, *Land Degradation and Society* (London: Methuen, 1987), 1–26.

It is easy to sympathize with the plight of those many indigenous peoples in the early modern world who suffered grievous losses. It is undeniable that, when these societies shattered, much that had been of great cultural and ecological value was lost. These are the peoples, quietly engaged in shifting cultivation with hoe and fire stick supplemented by hunting and gathering, who were expelled or killed by more powerful and technically advanced outsiders. It is clear that the resource needs of these indigenous peoples were less demanding of forests, jungles, savannas, and other ecosystems than those of the sedentary cultivators who succeeded them. It is reasonable to assume that these peoples lived in greater harmony with their natural environment and displayed greater sensitivity toward and knowledge of its vegetation and fauna.

Whether these many societies and cultures had developed sustainable practices that permitted continuing use of the land on a long-term basis is uncertain. We too-readily romanticize the relationship between such peoples and nature. Whether their demands on their habitats were really sustainable over centuries is a question that only painstaking research by archaeologists and linguists can find answers to. This book does not pretend to examine this question. Instead, several of its case studies describe and reflect on the responses of indigenous peoples to settler pressures and the stimuli of a new market demand for wildlife.

To summarize, fully nuanced environmental history should not present human-induced environmental change as an unrelieved tragedy of remorseless ecological degradation and accelerating damage. It is far too easy to see irreversible decline—to underestimate the resilience of ecosystems and to overestimate human-induced impacts as opposed to natural processes (e.g., in soil erosion). For example, conservationists and environmentalists have tended to regard the savannas of the Mediterranean world as forests degraded by overgrazing and tree cutting. In so doing they have extolled the virtues of the past undisturbed landscapes and mourned the depauperate state of Mediterranean “treed grasslands.”⁹ In their recent ecological history of Mediterranean Europe, A. T. Grove and Oliver Rackham take the opposite view:

Conservationists are obsessed with what are (often wrongly) regarded as “undisturbed” ecosystems, and neglect the merits of cultural ecosystems. Savanna—whether natural or cultural—forms some of Europe’s most beautiful landscapes, and supports many human activities. . . . Particularly important are savannas that have old grassland or ancient trees. The juxtaposition of abundant insect food, nectar from flowers, and nesting cavities in tree-holes

9. A. T. Grove and Oliver Rackham, *The Nature of Mediterranean Europe: An Ecological History* (New Haven: Yale University Press, 2001), 213.

sustains complex food chains. On the scale of conservation values savanna should come at least as high as forest.¹⁰

Browsing and grazing by livestock is crucial to the maintenance of savannas. If livestock are absent, Mediterranean savannas, depending on the mixture of soil and plants, infill with trees or with dense thickets of “tall, aggressive, very combustible grasses and undershrubs.”¹¹

Humans are part of nature, and they must act in order to survive. The benefits to human productivity and well-being that accrue from intervention in the natural environment and active management of the land and resources should also be assessed. Landscapes and ecosystems heavily affected by human action are not necessarily barren, unstable, or degraded. Over generations in many societies, land managers have devised ways to sustain productivity and retain desirable resources and aesthetic features on the land. Environmental history must be attentive to the dilemmas, the concerns, the motives, and the contexts of all historical actors, whether individuals or collectivities.

10. *Ibid.*, 214.

11. *Ibid.*, 215.