

Appendix: Doing Environmental History

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IN THE OLD DAYS, the discipline of history had an altogether easier task. Everyone knew that the only important subject was politics and the only important terrain was the nation-state. One was supposed to investigate the connivings of presidents and prime ministers, the passing of laws, the struggles between courts and legislatures, and the negotiations of diplomats. That old, self-assured history was actually not so old after all – a mere century or two at most. It emerged with the power and influence of the nation-state, reaching a peak of acceptance in the nineteenth and early twentieth centuries. Often its practitioners were men of intensely nationalistic feelings, who were patriotically moved to trace the rise of their individual countries, the formation of political leadership in them, and their rivalries with other states for wealth and power. They knew what mattered, or thought they did,

But some time back that history as “past politics” began to lose ground, as the world evolved toward a more global point of view and, some would say, toward a more democratic one. Historians lost some of their confidence that the past had been so thoroughly controlled or summed up by a few great men acting in positions of national power. Scholars began uncovering long submerged layers, the lives and thoughts of ordinary people, and tried to reconceive history “from the bottom up.” Down, down we must go, they maintained, down to the hidden layers of class, gender, race, and caste. There we will find what truly has shaped the surface layers of politics. Now enter still another group of reformers, the environmental historians, who insist that we have got to go still deeper yet, down to the earth itself as an agent and presence in history. Here we will discover even more fundamental forces at work over time. And to appreciate those forces we must now and then get out of parliamentary chambers, out of birthing rooms and factories, get out of doors altogether, and ramble into fields, woods, and the open air. It is time we bought a good set of walking shoes, and we cannot avoid getting some mud on them.

So far this extending of the scope of history to include a deeper and broader range of subjects has not challenged the primacy of the nation-state as the proper territory of the historian. Social, economic, and cultural history are all still pursued within the national boundaries. Thus, to an extent that is quite extraordinary among the disciplines of learning, history (at least for the modern period) has tended to remain insular study of the United States, Brazil, France, and the rest. Such a way of organizing the past has the undeniable virtue of preserving some semblance of order in the face of a threatening chaos – some way of synthesizing all the layers and forces. But at the same time it may set up obstacles to new inquires that do not neatly fit within the national borders, environmental history among them. Many of the issues in this new field defy a narrow nationality: the wanderings of Taureg nomads in the African Sahel, for instances, or the great whales through

all the world's oceans. Other environmental themes, to be sure, have developed strictly within the framework of single-nation politics, as a few of the essays in this book illustrate. But not all have done so, and in the history that will be written tomorrow, fewer and fewer will be.

Environmental history is, in sum, part of a revisionist effort to make the discipline far more inclusive in its narratives than it has traditionally been. Above all, it rejects the conventional assumption that human experience has been exempt from natural constraints, that people are a separate and "supernatural" species, that the ecological consequences of their past deeds can be ignored. The old history could hardly deny that we have been living for a long while on this planet, but it assumed by its general disregard of that fact that we have not been and are not truly part of the planet. Environmental historians, on the other hand, realize that we can no longer afford to be so naïve.

The idea of environmental history first appeared in the 1970s, as conferences on the global predicament were taking place and popular environmentalist movements were gathering momentum in several countries. It was launched, in other words, in a time of worldwide cultural reassessment and reform. History was hardly alone in being touched by that rising mood of public concern; scholarship in law, philosophy, economics, sociology, and other areas was similarly responsive. Long after popular interest in environmental issues crested and ebbed, as the issues themselves came to appear more and more complicated, without easy resolution, the scholarly interest continued to expand and take on greater and greater sophistication. Environmental history was, therefore, born out of a moral purpose, with strong political commitments behind it, but also became, as it matured a scholarly enterprise that had neither any simple, nor any single, moral or political agenda to promote. Its principal goal became one of deepening our understanding of how humans have been affected by their natural environment through time and, conversely, how they have affected that environment and with what results.

One of the liveliest centers of the new history has been the United States, a fact that undoubtedly stems from the strength of American leadership in environmental matters. The earliest attempt to define the field was Roderick Nash's essay, "The State of Environmental History."¹ Nash recommended looking at our entire surroundings as a kind of historical document on which Americans had been writing about themselves and their ideals. More recently, a comprehensive effort by Richard White to trace the development of the field credits the pioneering work of Nash and that of the conservation historian Samuel Hays, but also suggests that there were anticipations before them in the frontier and western school of American historiography (among such land-minded figures as Frederick Jackson Turner, Walter Prescott Webb, and James Malin). Those older roots became increasingly recalled as the field moved beyond Hays's politics of conservation and Nash's intellectual history to focus on changes in the environment itself and consider, once more, the environment's roles in the making of American society.

Another center of innovation has been France, particularly the historians associated with the journal *Annales*, who have been drawing attention to the environment for several decades now. That journal was founded in 1929 by two professors at the University of Strasbourg, Marc Bloch and Lucien Febvre. Both of them were interested in the environmental basis of society, Bloch through his studies of French peasant life and Febvre as a social geographer. The latter's protégé, Fernand Braudel, would also make the environment a prominent part of his historical studies, notably in his great work on the Mediterranean. For Braudel, the environment was the shape of the land – mountains, plains, seas – as an almost timeless element shaping human life over the long duration (*la longue durée*). There was, he insisted, more to history than the succession of events in

¹ All authors referred to in this essay are fully cited in the Bibliography.

individual lives; on the grandest scale, there was history seen from the vantage of nature, a history “in which all change is slow, a history of constant repetition, ever-recurring cycles.”

Like the frontier historians in the United States, the *Annalistes* in France found their environmental interests reanimated by the popular movements of the sixties and early seventies. In 1974, the journal devoted a special issue to “Histoire et Environnement.” In a short preface Emmanuel Le Roy Ladurie, himself one of the leading lights in the field, gave this description (my translation) of the field’s program:

Environmental history unites the oldest themes with the newest in contemporary historiography: the evolution of epidemics and climate, those two factors being integral parts of the human ecosystem; the series of natural calamities aggravated by a lack of foresight, or even by an absurd “willingness” on the part of the simpletons of colonization; the destruction of Nature, caused by soaring population and/or by the predators of industrial overconsumption; nuisances of urban and manufacturing origin, which lead to air or water pollution; human congestion or noise levels in urban areas, in a period of galloping urbanization.

Denying that this new history was merely a passing fashion, Le Roy Ladurie insisted that the inquiry had in truth been going on for a long time as part of a movement toward “histoire écologique.”

Much of the material for environmental history has indeed been around for generations, if not for centuries, and is only being reorganized in the light of recent experience. It includes data on tides and winds, on ocean currents, on the position of continents in relation to each other, on the geological and hydrological forces creating our land and water base. It includes the history of climate and weather, as these have made for good or bad harvests, sent prices up or down, ended or promoted epidemics, led to population increase or decline. All these have been powerful influences over the course of history, and continue to be so, as when massive earthquakes destroy cities or starvation follows in the wake of drought or rivers determine the flow of settlement. The fact that such influences continue in the late twentieth century is evidence of how far we are yet from controlling the environment to our complete satisfaction. In a somewhat different category are those living resources of the earth, which the ecologist George Woodwell calls the most important of all: the plants and animals (and one might add the soil as a collective organism) that, in Woodwell’s phrase, “maintain the biosphere as a habitat suitable for life.” These resources have been far more susceptible to human manipulation than the abiotic ones, and at no point more so than today. But pathogens are also a part of that living realm, and they continue, despite the effectiveness of medicine, to be a decisive agency in our fate.

Put in the vernacular then, environmental history is about the role and place of nature in human life. By common understanding we mean by “nature” the nonhuman world, the world we have not in any primary sense created. The “social environment,” the scene of humans interacting only with each other in the absence of nature, is therefore excluded. Likewise is the built or artificial environment, the cluster of things that people have made and which can be so pervasive as to constitute a kind of “second nature” around them. That latter exclusion may seem especially arbitrary, and to an extent it is. Increasingly, as human will makes its imprint on the forest, on gene pools, on the polar ice cap, it may seem that there is no practical difference between “nature” and “artifact.” The distinction, nonetheless, is worth keeping, for it reminds us that there are different forces at work in the world and not all of them emanate from humans; some remain spontaneous

and self-generating. The built environment is wholly expressive of culture; its study is already well advanced in the history of architecture, technology, and the city. But with such phenomena as the forest and the water cycle, we encounter autonomous energies that do not derive from us. Those forces impinge on human life, stimulating some reaction, some defense, some ambition. Thus, when we step beyond the self-reflecting world of humankind to encounter the nonhuman sphere, environmental history finds its main theme of study.

There are three levels on which the new history proceeds, three clusters of issues it addresses, though not necessarily all in the same project, three sets of questions it seeks to answer, each drawing on a range of outside disciplines and employing special methods of analysis. The first deals with understanding nature itself, as organized and functioning in past times; we include both organic and inorganic aspects of nature, and not least the human organism as it has been a link in nature's food chains, now functioning as womb, now belly, now eater, now eaten, now a host for microorganisms, now a kind of parasite. The second level in this history brings in the socioeconomic realm as it interacts with the environment. Here we are concerned with tools and work, with the social relations that grow out of that work, with the various modes people have devised of producing goods from natural resources. A community organized to catch fish at sea may have very different institutions, gender roles, or seasonal rhythms than one raising sheep in high mountain pastures. Power to make decisions, environmental or other, is seldom distributed through a society with perfect equality, so locating the configurations of power is part of this level of analysis. Then, forming a third level for the historian is that more intangible and uniquely human type of encounter – the purely mental or intellectual, in which perceptions, ethics, laws, myths, and other structures of meaning become part of an individual's or group's dialogue with nature. People are constantly engaged in constructing maps of the world around them, in defining what a resource is, in determining which sorts of behavior may be environmentally degrading and ought to be prohibited, and generally in choosing the ends of their lives. Though for the purposes of clarification, we may try to distinguish between these three levels of environmental study, in fact they constitute a single dynamic inquiry in which nature, social and economic organization, thought and desire are treated as one whole. And this whole changes as nature changes, as people change, forming a dialectic that runs through all of the past down to the present.

This in general is the program of the new environmental history. It brings together a wide array of subjects, familiar and unfamiliar, rather than setting up some new, esoteric specialty. From that synthesis, we hope, new questions and answers will come.

Natural Environments of the Past

The environmental historians must learn to speak some new languages as well as ask some new questions. Undoubtedly, the most outlandish language that must be learned is the natural scientist's. So full of numbers, laws, terms, and experiments, it is as foreign to the historian as Chinese was to Marco Polo. Yet, with even a smattering of vocabulary, what treasures are here to be understood and taken back home! Concepts from geology, pushing our notions of history back into the Pleistocene, the Silurian, the Precambrian. Graphs from climatology, on which temperatures and precipitation oscillate up and down through the centuries, with no regard for the security of kings or empires. The chemistry of the soil with its cycles of carbon and nitrogen, its pH balances wavering with the presences of salts and acids, setting the terms of agriculture. Any one of these might add a powerful tool to the study of the rise of civilizations. Together, the natural sciences are indispensable aids for the environmental historian, who must begin by reconstructing

past landscapes, learning what they were and how they functioned before human societies entered and rearranged them.

But above all it is ecology, which examines the interactions among organisms and between them and their physical environments, that offers the environmental historian the greatest help. This is so in part because, ever since Charles Darwin, ecology has been concerned with past as well as present interactions; it has been integral to the study of evolution. Equally significant, ecology is at heart concerned with the origins, dispersal, and organization of all plant life. Plants form by far the major portion of the earth's biomass. All through history people have depended critically on them for food, medicine, building materials, hunting habitat, and a buffer against the rest of nature. Far more often than not, plants have been humans' allies in the struggle to survive and thrive. Therefore, where people and vegetation come together more issues in environmental history cluster than anywhere else. Take away plant ecology and environmental history loses its foundation, its coherence, its first step.

So impressed are they with this fact that some scholars speak of doing, not environmental, but "ecological history" or "historical ecology." They mean to insist on a tighter alliance with the science. Some years back the scientist and conservationist Aldo Leopold projected such an alliance when he spoke of "an ecological interpretation of history." His own illustration of how that might work had to do with the competition among native Indians, French and English traders, and American settlers for the land of Kentucky, pivotal in the westward movement. The canebrakes growing along Kentucky bottomlands were a formidable barrier to any agricultural settlement, but as luck would have it for the Americans, when the cane was burned and grazed and chopped out, bluegrass sprouted in its place. And bluegrass was all that any farmer, looking for a homestead and a pasture for his livestock, could want. American farmers entered Kentucky by the thousands, and the struggle was soon over. "What if," Leopold wondered, "the plant succession inherent in this dark and bloody ground had, under the impact of these forces, given us some worthless sedge, shrub, or weed?" Would Kentucky have become American property as and when it did?

Shortly after Leopold called for that merging of history and ecology, the Kansas historian James Malin brought out a series of essays leading to what he termed "an ecological reexamination of the history of the United States." He specially had in mind examining his native grasslands and the problem in adaptation they had set for Americans, as they had for the Indians before them. From the late nineteenth century on, white settlers, coming out of a more humid, wooded country, had tried to create a stable agriculture on the dry, treeless plains, but with only mixed results. Malin was impressed that they had succeeded in turning the land into prosperous wheat farms, but not before they had had to unlearn many of their old agricultural techniques. Dissatisfied with traditional history, which did not give such matters any prominence, Malin found himself reading ecologists to find the right questions to ask. He read them with a certain freedom, as a source of inspiration rather than a set of rigid models. "The ecological point of view," he believed, "is valuable to the study of history; not under any illusion that history may thus be converted into a science, but merely as a way of looking at the subject matter and processes of history."

Those were alliances sought some thirty or forty years back. Since then, as ecology has developed into a more rigorously mathematical science, with more elaborate models of natural processes, neither Malin's nor Leopold's casual sort of alliance has seemed adequate. Environmental historians have had to learn to read at a more advanced level, though they are still faced with Malin's problem of deciding just how scientific their history needs to be and which ideas in science can or ought to be adopted.

Today's ecology offers a number of angles for understanding organisms in their environment, and they all have their limits as well as uses in history. One might, for example, examine the single organism and its response to external conditions; in other words, study adaptation in individual physiological terms. Or one might track the fluctuations in size of some plant or animal population in an area, its rates of reproduction, its evolutionary success or failure, its economic ramifications. Although both sorts of inquiry may have considerable practical significance for human society, there is a third strategy that holds the most promise for historians needing to understand humans and nature in the composite.

When organisms of many species come together, they form communities, usually highly diverse in makeup, or as they are more commonly called now, ecosystems. An ecosystem is the largest generalization made in the science, encompassing both the organic and inorganic elements of nature bound together in a single place, all in active, reciprocating relationship.² Some ecosystems are fairly small and readily demarcated, like a pond in New England, while others are sprawling and ill-defined, as large as the Amazonian rain forest or the Serengeti plain or even the whole earth. All are commonly described, in language derived heavily from physical mechanics and cybernetics, as self-equilibrating, like a machine that runs on and on automatically, checking itself when it gets too hot, speeding up when it slows and begins to sputter. Outside disturbances may affect that equilibrium, throwing the machine temporarily off its regular rhythm, but always (or almost always) it returns to some steady state condition. The numbers of species constituting an ecosystem fluctuate around some determinable point; the flow of energy through the machine stays constant. The ecologist is interested in how such systems go on functioning in the midst of continual perturbations, and how and why they break down.

But right there occurs a difficult issue on which the science of ecology has reached no clear consensus. How stable are those natural systems and how susceptible to upset? Is it accurate to describe them as balanced and stable until humans arrive? And if so, then at what point does a change in their equilibrium become excessive, damaging or destroying them? Damage to the individual organism is easy enough to define: It is an impairment of health or, ultimately, it is death. Likewise, damage to a population is not very hard to determine, simply, when its numbers decline. But damage to whole ecosystems is a more controversial matter. No one would dispute that the death of all its trees, birds, and insects would mean the death of a rain-forest ecosystem, or that the draining of a pond would spell the end of that system. But most changes are less catastrophic, and the degree of damage has no easy method of measurement.

The difficulty of determining ecosystem damage applies to changes worked by people as well as nonhuman forces. A South American tribe, for instance, may clear a small patch in the forest with their machetes, raise a few crops, and then let the field revert to forest. Such so-called swidden, or slash-and-burn, farming has usually been regarded as harmless to the whole ecosystem; eventually, its natural equilibrium is restored. But at some point, as this farming intensifies, the capacity of the forest to regenerate itself must be permanently impaired and the ecosystem damaged. What is that point? Ecologists are not sure and cannot give precise answers. For that reason the ecological historian more often than not ends up talking about people inducing "change" in the environment – "change" being a neutral and indisputable term – rather than doing "damage," a far more problematical concept.

² "Systems" talk can be rather mystifying and jargonized. The *American Heritage Dictionary* defines a system as "a group of interacting, interrelated, or interdependent elements forming or regarded as forming a collective entity." One may then speak of systems in nature, in technology and economics, or in thought and culture. And all these, in turn, may be described as interacting systemically, until the mind reels before the complexity.

Until recently the ruling authority in ecosystem science has been Eugene Odum, through the various editions of his popular textbook, *Fundamentals of Ecology*. Odum is a system man nonpareil, one who sees the entire realm of nature as hierarchically organized into systems and subsystems, all made up of parts that function harmoniously and homeostatically, the rhythm of each system rather resembling the eighteenth-century's watchlike nature that never missed a tick. That earlier version was supposed to reveal the contriving hand of its divine maker; Odum's, in contrast, is the spontaneous work of nature. But increasingly, ecologists are retreating from his picture of order. Led by paleoecologists, especially paleobotanists, who collect core samples from peat bogs and, through pollen analysis, try to reconstruct ancient environments, they are finding Odum's blueprint a bit static. Looking backward in time to the Ice Age and before, they are discovering plenty of disorder and upheaval in nature. Abstracted from time, the critics say, ecosystems may have a reassuring look of permanence; but out there in the real, the historical, world, they are more perturbed than imperturbable, more changing than not.

This scientific difference of opinion is partly over evidence, partly over perspective, like disputing whether a glass is half empty or half full. Stand back far enough, stand off in outer space as the British scientist James Lovelock has tried imaginatively to do, and the earth still looks like a remarkably stable place, with organisms maintaining conditions highly suitable for life for over a billion years: all the gases in the atmosphere properly adjusted, fresh water and rich soil preserved in abundance, though evolution rages on and on, ice sheets come and go, and continents go drifting off in all directions. That may be how things look to the cosmic eyeball. Seen up close, however, the organic world may have a very different aspect. Stand on any given acre in North America and contemplate its past thousand years or so, even a single decade, and the conclusion ecologists are coming to these days is change, change, change.

There is a further unresolved problem in translating ecology into history. Few scientists have perceived people or human societies as being integral parts of their ecosystems. They leave them out as distractions, imponderables. But people are what the historian mainly studies; consequently, his or her job is to join together what scientists have put asunder.

Human beings participate in ecosystems either as biological organisms akin to other organisms or as culture bearers, though the distinction between the two roles is seldom clear-cut. Suffice it here to say that, as organisms, people have never been able to live in splendid, invulnerable isolation. They breed, of course, like other species, and their offspring must survive or perish by the quality of food, air, and water and by the number of microorganisms that are constantly invading their bodies. In these ways and more, humans have inextricably been part of the earth's ecological order. Therefore, any reconstruction of past environments must include not only forests and deserts, boas and rattlesnakes, but also the human animal and its success or failure in reproducing itself.

Human Modes of Production

Nothing distinguishes people from other creatures more sharply than the fact that it is people who create culture. Precisely what culture really is, however, is anybody's guess. There are literally scores of definitions. For preliminary purposes it can be said that the definitions tend to divide between those including both mental and material activities and those emphasizing mental activities exclusively, and that these distinctions between the mental and material correspond to the second and third levels of analysis in our environmental history. In this section we are concerned with the material culture of a society, its implications for social organization, and its

interplay with the natural environment.

In any particular place nature offers the humans dwelling there a flexible but limited set of possibilities for getting a living. The Eskimos of the northern polar regions, to take an extreme case of limits, cannot expect to become farmers. Instead, they have ingeniously derived a sustenance, not by marshaling seed, plows, and draft animals of other, warmer latitudes, but through hunting. Their food choices have focused on stalking caribou over the tundra and pursuing bowhead whales among floating cakes of ice, on gathering blueberries in season and gaffing fish. Narrow though those possibilities are, they are the gift of technology as much as nature. Technology is the application of skills and knowledge to exploiting the environment. Among the Eskimos technology has traditionally amounted to fish hooks, harpoons, sled runners, and the like. Though constrained by nature, that technology has nonetheless opened up for them a nutritional field otherwise out of reach, as when a sealskin boat allowed them to venture farther out to sea in pursuit of prey. Today's Eskimos, invaded as they are by the instruments of more materially advanced cultures, have still more choices laid before them; they can, if they desire, import a supply of wheat and oranges by cargo plane from California. And they can forget how their old choices were made, surrender their uniqueness, their independence of spirit, their intimacy with the icy world. Much of environmental history involves examining just such changes, voluntary or imposed, in subsistence modes and their ramifications for people and the earth.

As historians address these elemental issues of tools and sustenance, they soon become aware that these have been other discipline of anthropologists, and environmental historians have been reading their work with great interest. They have begun to search for clues from anthropologists to critical pieces of the ecological puzzle: What is the best way to understand the relation of human material cultures to nature? Is technology to be viewed as an integral part of the natural world, akin to the fur coat of the polar bear, the sharp teeth of the tiger, the fleet agility of the gazelle, all adaptive mechanisms functioning within ecosystems? Or should cultures be viewed as setting people apart from and outside of nature? Everything in the ecosystem, we are told by natural scientists, has a role and therefore an influence on the workings of the whole; conversely, everything is shaped by its presence in the ecosystem. Are cultures and the societies that create them also to be seen in that double position, both acting on and being acted on? Or are they better described as forming their own kind of "cultural systems" that mesh with ecosystems only in rare, isolated cases? Or, to make the puzzle more complicated still, do humans create with their technology a series of new, artificial ecosystems – a rice paddy in Indonesia or a carefully managed German forest – that require constant human supervision? There is, of course, no single or consistent set of answers to be given to such questions; but anthropologists, who are among the most wide-ranging and theory-conscious observers of human behavior, can offer some provocative insights.

Anthropological thinking on such questions goes back well into the nineteenth century, but it has been particularly the last three or four decades that have seen the emergence of an ecological school (one with no settled curriculum, bearing such contending labels as cultural ecology, human ecology, ecological anthropology, and cultural materialism). The best guide to this literature is probably John Bennett's *The Ecological Transition*, though there are other useful surveys by Emilio Moran, Roy Ellen, Robert Netting, and others. Bennett defines the ecology school as the study of "how and why humans use Nature, how they incorporate Nature into Society, and what they do to themselves, Nature, and Society in the process." Some of these anthropologists have maintained that culture is an entirely autonomous and superorganic phenomenon, emerging apart from nature and understandable only in its own terms – or at least, as Bennett himself would have

it, modern culture is, to some important degree, expressive of nature and ought not be rigidly set off in its own, self-contained sphere. Both positions are illuminating to the environmental historian, though for the historical era that is the main focus of this book, Bennett's is surely the more plausible one.

No one did more to found the ecological study of culture than Julian Steward, who published in 1955 his influential work, *Theory of Culture Change*, from which comes the idea of "cultural ecology." Steward began by examining the relationship between a people's system of economic production and their physical environment. He asked what resources they chose to exploit and what technology they devised for that work. This set of subsistence activities he called the "cultural core." Then he asked how such a system affected the behavior of people toward one another, that is, how they organized themselves to produce their living. Social relations in turn shaped other aspects of culture. Some of the most interesting case studies for him were the great irrigation empires of the ancient world, in which large-scale control of water in arid environments led again and again to parallels in sociopolitical organization. Such regularities, he hoped, would suggest a general law of human evolution: not the old Victorian scheme that had all cultures moving along a single, fixed line of progress from hunting and gathering to industrial civilization, but rather one that explained the multilineal evolution of cultures, now diverging, now converging, now colliding with one another, with no end point in sight.

Steward's leadership in the new ecological approach inspired, directly or indirectly, a younger generation of field researchers who fanned out to all parts of the globe. John Bennett went to the Canadian prairies, Harold Conklin to the Philippines, Richard Lee to the !Kung Bushmen of Africa, Marshall Sahlins to Polynesia, Robert Netting to Nigeria to observe the hillside farmers there, Betty Meggers was off to the Amazon basin, Clifford Geertz, to Indonesia, and there were still others. But above all, it has been Marvin Harris who has taken Steward's ideas and transformed them into a comprehensive and, some would complain, a highly reductive theory of the relationship between nature and culture. Like Steward, he has identified the "techno-environment" (i.e., the application of technology to environment) as providing the core of any culture, the main influence over how a people live with one another and think about the world. He has been even more rigidly deterministic than Steward was about that core. He has also been more interested in its dynamics. The techno-environmental system is not at all stable, he insists, certainly not forever. There is always the tendency to intensify production. It may come from population increase, climate change, or competition between states. Whatever the cause, the effect is always the same; depletion of the environment, declining efficiency, worsening living standards, pressures to move on – or if there is no new place to go, then pressure to find new tools, techniques, and resources locally, creating thereby another techno-environment. In other words, the degradation of the environment can be tragic, unhappy, or if people rise successfully to the challenge, it can mean the triumphant birth of a new culture. Harris calls this theory "cultural materialism." Clearly, it draws not only on Steward but on recent energy shortages, the present decline of a techno-environment based on the fossil fuels, and the revival of Malthusian anxieties about world resource scarcity, though Harris would argue that a time of scarcity can also be a time of opportunity and revolution.

Marvin Harris has explicitly compared his theory of cultural materialism to that of Karl Marx, who gave the world "dialectical materialism," a view of history impelled forever forward by the struggle of one economic class to dominate another. The contrast between the two theories is emphatic: One sees change coming from the struggle of whole societies to exploit nature, with diminishing returns; the other points to internal conflicts within societies as the prime historical

agency, with nature serving as a passive background. Perhaps, however, the distance between the two men is not hopelessly unbridgeable. One might put a little more Marxism into Harris by arguing that, among the factors leading to depletion and ecological disequilibrium, is competition between classes as well as states. Capitalists devise a social and technological order that makes them rich and elevates them to power. They set up factories for mass production. They drive the earth to the point of breakdown with their technology, their management of the laboring class, and their appetites. Subsistence gets redefined as endless want, endless consumption, endless competing for status. The system eventually self-destructs, and a new one takes its place. Similarly, we might improve Marxism by adding Harris's ecological factors to help explain the rise of classes and class conflict. Neither theory, taken alone, adequately accounts for the past. Together, they might work more effectively, each supplying the other's shortcomings. In so far as the course of history has been shaped by material forces, and hardly anyone would deny that they have indeed been important, we will undoubtedly need something like that merger of the two theories.

The modes of production are an endless parade of strategies, as complex in their taxonomies as the myriad species of insects thriving in the canopy of a rain forest or the brightly colored fish in a coral reef. In broad terms, we may speak of such modes as hunting and gathering, agriculture, and modern industrial capitalism. But that is only the bare outline of any full taxonomy. We must also include, as modes, submodes, or variations on them, the history of cowboys herding cattle across a Montana grassland, of dark-skinned fishermen casting their nets on the Malabar coast, of Laplanders trailing after their reindeer, of Tokyo factory workers buying bags of rice and seaweed in a supermarket. In all these instances and more, the environmental historian wants to know what role nature had in shaping the productive methods and, conversely, what impact those methods had on nature.

This is the age-old dialogue between ecology and economy. Though deriving from the same etymological roots, the two words have come to denote two separate spheres, and for good reason: Not all economic modes are ecologically sustainable. Some last for centuries, even millennia, while others appear only briefly and then fade away, failures in adaptation. And ultimately, over the long stretch of time, no modes have ever been perfectly adapted to their environment, or there would be little history.

Perception, Ideology, and Value

Humans are animals with ideas as well as tools, and one of the largest, most consequential of those ideas bears the name "nature." More accurately, "nature" is not one idea but many ideas, meanings, thoughts, feelings, all piled on top of one another, often in the most unsystematic fashion. Every individual and every culture has created such agglomerations. We may think we know what we are saying when we use the word, but frequently we mean several things at once and listeners may have to work at getting our meaning. We may suppose too that nature refers to something radically separate from ourselves, that it is "out there" someplace, sitting solidly, concretely, unambiguously. In a sense, that is so. Nature is an order and a process that we did not create, and in our absence it will continue to exist; only the most strident solipsist would argue to the contrary. All the same, nature is a creation of our minds too, and no matter how hard we may try to see what it is objectively, in and by and for itself, we are to a considerable extent trapped in the prison of our own consciousness and web of meanings.

Environmental historians have done some of their best work on this level of cultural analysis,

studying the perceptions and values people have held about the nonhuman world. They have, that is, put people thinking about nature under scrutiny. So impressed have they been by the enduring, pervasive power of ideas that sometimes they have blamed present environmental abuse on attitudes that go far back into the recesses of time: as far back as the book of Genesis and the ancient Hebraic ethos of asserting dominion over the earth; or the Greco-Roman determination to master the environment through reason; or the still more archaic drive among patriarchal males to lord it over nature (the “feminine” principle) as well as women. The actual effects of such ideas, in the past or in the present, are extremely difficult to trace empirically, but that has not deterred scholars from making some very large claims here. Nor should it altogether. Perhaps we have too wildly exaggerated a notion of our mental prowess and its impact on the rest of nature. Perhaps we spend too much time talking about our ideas, neglecting to examine our behavior. But however overblown some of these claims may be, it is certainly true that our ideas have been interesting to contemplate, and nothing among them has been more interesting than our reflections on other animals, plants, soils, and the entire biosphere that gave birth to us. So, for good reason, environmental history must include in its program the study of aspects of esthetics and ethics, myth and folklore, literature and landscape gardening, science and religion – must go wherever the human mind has grappled with meaning of nature.

For the historian, the main object must be to discover how a whole culture, rather than exceptional individuals in it, perceived and valued nature. Even the most materially primitive society may have had quite sophisticated, complex views. Complexity, of course, may come from unresolved ambiguities and contradictions as well as from profundity. People in industrial countries especially seem to abound in these contradictions. They may chew up the land wholesale and at a frightful speed through real estate development, mining, and deforestation but then turn around and pass laws to protect a handful of fish swimming in a desert spring. Some of this is simply confusion, some of it may be quite reasonable. Given the protean qualities of nature, the fact that the environment presents real dangers as well as benefits to people, this contradictoriness is inescapable. It has everywhere been true of the human reaction. Yet not a few scholars have fallen into the trap of speaking of “the Buddhist view of nature” or “the Christian view” or “the American Indian view,” as though people in those cultures were all simple-minded, uncomplicated, unanimous, and totally lacking in ambivalence. Every culture, we should assume, has within it a range of perceptions and values, and no culture has ever really wanted to live in total harmony with its surroundings.

But ideas should not be left floating in some ethereal realm, free from the dust and sweat of the material world. They should be studied in their relations with those modes of subsistence discussed in the preceding section. Without reducing all thought and value to some material base, as though the human imagination was a mere rationalization of the belly’s needs, the historian must understand that mental culture does not spring up all on its own. One way to put this relationship is to say that ideas are socially constructed and, therefore, reflect the organization of those societies, their techno-environments and hierarchies of power. Ideas differ from person to person within societies according to gender, class, race, and region. Men and women, set apart almost everywhere into more or less distinctive spheres, have arrived at different ways of regarding nature, sometimes radically so. So too have slaves and their masters, factory owners and workers, agrarian and industrial peoples. They may live together or in close proximity but still see and value the natural world differently. The historian must be alert to these differences and resist easy generalizations about “mind” of a people or of an age.

Sometimes it is maintained that modern science has enabled us to rise above these material

conditions to achieve for the first time in history an impersonal, transcultural, unbiased understanding of how nature works. The scientific method of collecting and verifying facts is supposed to deliver truth pure and impartial. Such confidence is naïve. Few scholars writing the history of science today would accept it uncritically. Science, they would caution, has never been free of its material circumstances. Though it may indeed be a superior way of arriving at the truth, certainly superior in its capacity to deliver power over nature, it has nonetheless been shaped by the techno-environment and social relations of its time. According to historian Thomas Kuhn, science is not simply the accumulating of facts but involves fitting those facts into some kind of “paradigm,” or model of how nature works. Old paradigms lose their appeal, and new ones rise to take their place. Although Kuhn does not himself derive those paradigm shifts from material conditions, other historians have insisted that there is a connection. Scientists, they say, do not work in complete isolation from their societies but reflect, in their models of nature, their societies, their modes of production, their human relations, their culture’s needs and values. Precisely because of this fact, as well as the fact that modern science has had a critical impact on the natural world, the history of science has a part in the new environmental history.

Finally, the historian must confront the formidable challenge of examining ideas as ecological agents. We return to the matter of choices that people make in specific environments. What logic, what passion, what unconscious longings, what empirical understanding go into those choices? And how are choices expressed in rituals, techniques, and legislation? Sometimes choices are made in the halls of national governments. Sometimes they are made in that mysterious realm of the *Zeitgeist* that sweeps across whole eras and continents. But some are also made, even in this day of powerful centralized institutions, by scattered households and farmsteads, by lumberjacks and fishing crews. We have not studied often or well enough the implementation of ideas in those microcosms.

Once again, it is anthropologists who have a lot to offer the historian seeking insight and method. One of the most intriguing pieces of fieldwork that comes from them bears directly on this question of ideas at work in the small setting. It comes but of a mountain valley in New Guinea, where the Tsembaga people subsist on taro, yams, and pigs. Published by Roy Rappaport under the title *Pigs for the Ancestors*, it exemplifies brilliantly how one might conceive of humans and their mental cultures functioning within a single ecosystem.

The Tsembaga appear in Rappaport’s study as a population engaged in material relations with other components of their environment. Unlike their plant and animal congeners, however, they create symbols, values, purposes, and meanings, above all, religious meanings, out of the world around them. And that culture performs, though at points obscurely and indirectly, an important function: It encourages the Tsembaga to restrain their use of the land and avoid its degradation. For long periods of time, up to twenty years, these people busy themselves raising pigs, which they accumulate as payment to their ancestral spirits for help in battles with their neighboring enemies. Then at last, when they feel they have enough pigs to satisfy the spirits, a ritualistic slaughter ensues. Hundreds of the animals die and are consumed on behalf of the ancestors. Now, the debt paid, the Tsembaga are ready to go back to war, confident that they will have divine power on their side again. So their lives go round, year after year, decade after decade, in a ritualistic cycle of pig-raising, pig-slaughtering, dancing, feasting, and warring. The local explanation for this cycle is wholly religious, but the outside observer sees something else going on: an elaborate ecological mechanism at work, keeping the number of pigs under control and the people living in equilibrium with their surroundings.

In this forested valley Rappaport has found an example, assuming the validity of the study, of

how a culture can take shape through addressing the problems of living within a peculiar ecosystem. The harmony between the two realms of nature and culture seems in this case to be nearly perfect. But the historian wants to know whether human populations are always as successfully adaptive as the Tsembaga. Moreover, are the people that the historian is most likely to study – people organized in advanced, complex societies, relating to nature through modern rituals, religions, and other structures of meaning and value - quite so successful? Rappaport ventures to suggest that the “ecological wisdom” embodied unconsciously in the New Guinea ritual cycle is by no means common. It is most likely to be found where the household is the primary unit of production, where people produce for immediate use rather than for sale and profit, and where “signs of environmental degradation are likely to be apparent quickly to those who can do something about them.” Modern industrial societies, on the other hand, he finds culturally maladaptive. In them an economic and technological rationality has replaced the Tsembaga’s ecological rationality. Rappaport’s case is therefore of limited application elsewhere. Nor does it explain why a change in rationality has occurred, why cultures have drifted away from ecosystem harmony, why modern religion fails to restrain our environmental impact. Generally, anthropology bows out as those issues arise, retiring to its remote green valleys and leaving the historian to face the grinding, shrieking disharmonies of modernity alone,

As it tries to redefine the search into the human past, environmental history has, as indicated above, been drawing on a number of other disciplines, ranging from the natural sciences to anthropology to theology. It has resisted any attempt to put strict disciplinary fences around its work, which would force it to devise all its own methods of analysis, or to require all these overlapping disciplines to stay within their own discrete spheres. Each may have its tradition, to be sure, its unique way of approaching questions. But if this is an age of global interdependence, it is surely also the moment for some cross-disciplinary cooperation. Scholars need it, environmental history needs it, and so does the earth.

One discipline not so far explicitly discussed is geography. Environmental historians have leaned on many geographers for insight, on names like Michael Williams and Donald Meinig among presently active scholars, and from the recent past, names like Carl Sauer, H. C. Darby, and Lucien Febvre. Over the last century scholars from the two disciplines have crossed into one another’s territory often and found that they share much in temperament. Geographers, like historians, have tended to be more descriptive than analytical. Taking place rather than time as their focus, they have mapped the distribution of things, just as historians have narrated the sequence of events. Geographers have liked a good landscape just as historians have liked a good story. Both have shown a love of the particular and a resistance to easy generalizing – a quality that may be their common virtue and strength. But they also bear a neighborly resemblance in their weaknesses, above all in their recurring tendency to lose sight of the elemental human-nature connection: historians when they have measured time only by elections and dynasties, geographers when they have tried to reduce the earth and its complexities to the abstract idea of “space.” Nature, the land, climate, ecosystems, these are the entities that have relevance. When and where geographers who have talked about such forces, they have offered much in the way of information to the new history. More, it has preeminently been geographers who have helped us all see that our situation is no longer one of being shaped by environment; rather, it is increasingly we are doing the shaping, and often disastrously so. Now the common responsibility of both disciplines is to discover why modern people have been so determined to escape the restraints of nature and what the ecological effects of that desire have been.

Put so comprehensively, with so many lines of investigation possible, it may seem that

environmental history has no coherence, that it includes virtually all that has been and is to be. It may appear so wide, so complex, so demanding as to be impossible to pursue except in the most restricted of places and times: say, on a small, scarcely populated island well isolated from the rest of the world and then only for a period of six weeks. Historians of every sort will recognize that feeling of being engulfed by one's subject. No matter how inclusive or specialized one's perspective, the past seems these days like a vast buzzing confusion of voices, forces, events, structures, and relationships defying any coherent understanding. The French speak bravely of doing "total history." History is everything, they say, and everything has a history. True and noble that realization may be, but it does not give much ease of mind. Even delimiting some part of the totality as "environment" may seem to leave us with the still unmanageable burden of trying to write the history of "almost everything." Unfortunately, there is no feasible alternative open to us any longer. We did not make nature or the past; otherwise, we might have made them simpler. Now we are challenged to make some sense of them – and in this case, to make sense of their working intricately together.