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# INTRODUCTION

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One senses a generalized discord in the life sciences and the social sciences as the twenty-first century draws near. This discord, like Thomas Kuhn's "essential tension" (1977), may actually represent a necessary impetus toward new ways of thinking about humankind and global environments, ways that may offer better and more humane solutions to some of the critical problems that humans as a species face in the biosphere today. Yet to some degree, the immediate economic and political needs of regional and global systems have taken precedence over science in the search for comprehension of human-ecological conditions, partly because the social and life sciences have lacked a common metalanguage and framework for mutual debate. There is a way out of this impasse by developing an interdisciplinary language that will help connect what Carole Crumley, citing C. P. Snow, refers to in her foreword as the "two cultures."

Historical ecology supplies that metalanguage. Even though it is still nascent, a conceptual centrality focused on the terms *landscape*, *biosphere*, *human/environmental dialectics*, and *region* is becoming apparent; such terms occur often in the present book. The concept of *landscape*, above all, seems paramount in historical ecology. These terms and their usages, when comprehended technically, facilitate a more holistic (and therefore more accurate and empirically sound) analysis of human ecology.

A revolution in thinking about humans and the environment is taking place in the life and social sciences simultaneously. The new thinking may bridge disciplines and help reengage the debate between biological and cultural determinism. The models of biological and cultural determinism, by their philosophical opposition, provided the milieu in which much scientific debate was carried on in many fields for more than a hundred years. Now those working models have been largely abandoned by the fields in which they originated, and their demise has left the academy, as a whole, in disarray. The disarray—some call it a crisis—in higher education today is not just related to the information revolution that seems to make much university classroom teaching obsolete, and to the dwindling of funds available for both research and teaching about humans and the environment as traditionally practiced. Rather, it is fundamentally tied to the intellectual void that has followed the

evanescence of the two models, however dogmatic, that guided most research in the life and social sciences during this century.

The new framework that can fill that void incorporates the knowledge accumulated by nonstate peoples (i.e., “nonscientists”) who are closely related to their local biotic and geophysical resources, knowledge that has been “captured” (Gunn 1994) over the long term, as one guide in understanding the formation and development of *landscapes* (Posey, chapter 5; Rival, chapter 11), while at the same time it maintains scientific standards of method and evidence. This new framework, which has the most promise for reinvigorating research in human ecology, is called historical ecology. It is already beginning to fill the void, especially with the publication of the first treatise on the subject, as I define it below, by Carole Crumley and her colleagues (Crumley, ed., 1994).

I did not invent the term *historical ecology* (see Crumley in the foreword to this book for a useful history of the term), and I am not alone in considering it to be the most important current intellectual advance in the study of human and environmental relationships. A rapidly growing number of scholars from diverse fields also perceive historical ecology as representing a new, powerful, and holistic framework for research and debate on one of the most fundamental problems of our time: the diverse and complex relationships between humans and their environments.

### What Is Historical Ecology?

The reader of this book merits a brief overview of the conceptual apparatus that underlies historical ecology and that links the chapters together into an entity, centering on the notion of the *landscape*. At the outset I would mention that not all contributors to this volume agree with me on all specific aspects of my conception of historical ecology. Yet I think we understand each other. I consider that Part I represents a contribution to a healthy debate as to the meaning of historical ecology and its relationship to other—both earlier and contemporary—approaches to human/environmental interaction. Part II consists of substantive findings on the development of past and present landscapes, which are biocultural phenomena, in diverse settings.

Historical ecology is connected to but different from several schools of materialism that were concerned with the relationship between humans and nature, including historical (dialectical) materialism, cultural ecology, cultural materialism, and evolutionary ecology (Balée 1996). With regard to historical materialism, historical ecology picks up where Marx left off. Marx argued that “he [humankind] opposes himself to Nature . . . in order to appropriate Nature’s productions in a form adapted to his own wants. By thus acting on the external world and changing it, he at the same time changes his own nature” (1867:177; see Balée, chapter 1). Historical ecologists tend to agree with the premise of the mutual influence of people (“man”) and biosphere (“nature”) on one another over time as a dialectical phenomenon (Crumley 1996; cf. Whitehead, chapter 2). But Marx did not carry that premise fur-

ther—he investigated relationships between people, and relationships between people and economic resources in state societies of his time. Historical ecology actually involves the empirical investigation of relationships between humans and the biosphere in specific temporal, regional, cultural, and biotic contexts, regardless of their relationship to (or their incorporation into) nation-states. Historical ecology owes a debt to the pioneers of cultural ecology, especially Julian Steward, insofar as cultural ecology involved a strong emphasis on empirical research into human/environmental relationships (Whitehead, chapter 2; Bettinger, chapter 8). It differs from cultural ecology, however, in at least two important ways. First, cultural ecology focused on how “natural” environments—replete with given geophysical and biotic conditions—affected localized societies and their cultural development over time. In a real sense, cultural ecology effected a separation of nature and culture (cf. Bettinger, chapter 8); by contrast, historical ecology conceives of relationships between nature and culture as a dialogue, not a dichotomy (Ingerson 1994). Second, cultural ecology had a tendency toward environmental determinism (see Zent, chapter 12). Although some disagreement exists on this matter (see Balée, chapter 1; Bettinger, chapter 8), cultural ecology seemingly was never successful in advancing falsifiable theories about the relationships between state societies and their environments; in other words, it was limited in its explanatory framework to egalitarian societies (Balée 1996). Historical ecology, in contrast, is concerned not only with mutual relationships between egalitarian societies and their local environments and regions, but also with all other kinds of human/environmental, human/regional, and human/biosphere relationships over time—since at least the time of *Homo erectus* in the Pleistocene, with its innovations in use of fire, if not since the beginnings of the genus *Homo* before that (Bettinger, chapter 8; Kidder, chapter 7; Pyne, chapter 4; Roosevelt, chapter 9).

Historical ecology is indebted to cultural materialism, and therefore especially to Marvin Harris (1968, 1979), because cultural materialism endeavors to encompass all sociopolitical systems in their relationships with nonhuman environments. Further, both cultural materialism and historical ecology subscribe to the scientific method (I disagree with Neil Whitehead [chapter 2] here, incidentally, because in my view historical ecology itself is not a method, except *sensu lato*, but rather a way of understanding phenomena). The two fields diverge, however, in two important ways. First, cultural materialism holds that developments in the relationship between societies and local environments over time are *evolutionary* rather than historical and ecological (Bettinger, chapter 8; Ferguson, chapter 13), and it also subscribes essentially to neo-Darwinian theory as concerns the biological evolution of species—yet these evolutionary mechanisms are fundamentally unlike analytically. In other words, cultural materialists (like evolutionary ecologists) tend to use the term *evolution* in a polysemous rather than a metalinguistic (more precise) way, with the result that the meaning of cultural evolution is not often clear in specific analyses. The concept of evolution in cultural materialism, moreover, is not applied to reversals in the intensity of land use by specific societies in given regions (Balée, chapter 1; Rival, chapter 11); historical ecologists tend to view such changes as

historical or developmental, rather than evolutionary, without denying the mechanisms of evolution (natural selection, genetic drift, and so on) with respect to organisms (Graham, chapter 6). Second, historical ecology differs from cultural materialism, as it does from cultural ecology, insofar as the relationship between humans and the environment in a given regional context is conceived of dialectically: cultural materialism specifically rejects such a synthetic, holistic viewpoint, emphasizing the primacy of infrastructure (modes of production and reproduction taken together) in all cultural developments, regardless of changes in the nonhuman environment. The holistic and dialectical perspective of historical ecology is not antiscientific: it represents objective science, but not an exclusively reductionist science, in the final analysis. In a very specific way, historical ecology is even more dialectical than historical materialism, for it begins with the dialectic of an inalienable link between nature and culture, however defined.

Historical ecology is also related to evolutionary ecology, a point stressed by Winterhalder (1994) and Bettinger (chapter 8). In fact, evolutionary ecology, specifically as concerns humans, is probably a direct descendant of cultural ecology (Bettinger, chapter 8). The difference between historical ecology and evolutionary ecology concerns the ends and means of human/environmental relationships. Evolutionary ecology tends to hold that differing human behavior with regard to habitat and biota results in differences in reproductive fitness of the human actors themselves: some individual human behaviors are selected for, and others are selected against, in the process of differential reproductive fitness. The central problem, however, is whether human behavior as concerns habitat and biota can actually be predicted according to a model based on natural selection (a point wisely raised by Eric Alden Smith, an evolutionary ecologist himself, in the conclusion to *Inujjamiut Foraging Strategies* [1991]). Such analyses have likewise tended to be restricted to nonstate societies, a limitation also of the earlier cultural ecology. In addition, evolutionary ecology is nondialectical and does not take as axiomatic the dialogue between humans and the nonhuman environment (Ingerson 1994; Balée, chapter 1).

A current debate in historical ecology specifically concerns the problem of how to differentiate history from evolution in understanding the development of relationships between humans and the biosphere—or, at a more finely grained level of analysis, between humans and *landscapes* (Winterhalder 1994; Bettinger, chapter 8; Ferguson, chapter 13; Gragson, chapter 10; Graham, chapter 6; Whitehead, chapter 2). Ted Gragson, in his treatment in chapter 10 of South American foragers of savanna habitats, indicates that the landscape is a dialectical phenomenon. He implies that *landscape ecology* is a synonym for *historical ecology* (although landscape ecologists from the life sciences have tended to exclude the dialectical inter-relatedness of people and the landscape, which by their definition is the result of essentially orderly process in nature). Another appropriate synonym would be *dialectical ecology* (Balée, chapter 1).

The debate in anthropology between evolutionism and historicism is not unlike that in paleontology between those who explain changes in the fossil record by reference to the gradual effects of natural selection and those who subscribe to much

more rapid, unpredictable changes by reference to punctuated equilibrium, in which extrabiospheric (accidental) phenomena affect the course of evolution of life itself. The sudden disappearance of dinosaurs from the fossil record because of an asteroid impact is empirically analogous to the historical accident of the conquest of the New World by voyagers seeking the Orient who incidentally brought with them diseases from Europe that were unknown in the New World, and to which much of the native population succumbed (Balée 1995). The process of sorting through the similarities and differences between history and evolution (with its attempt to approach both metalinguistically) is one of the most significant contributions to interdisciplinary debate and understanding that this book offers.

A question remains as to whether historical ecology, as a label, embraces unique principles that would pertain to a paradigm in the Kuhnian sense, or to a research strategy in a looser one. Some might argue that historical ecology is a field of inquiry, a theory from another paradigm, or a method of another, already established field of inquiry, such as historical anthropology (Whitehead, chapter 2). This tension in the definition of historical ecology is manifested in the present volume (especially in the chapters by Bettinger, Sponsel, and Whitehead). This book therefore represents an emerging, scientific viewpoint insofar as its chapters' stimulating debate and new insights revolve around key concepts and relationships in human/environmental relationships. I remain content to help in encouraging debate on the status of historical ecology (and Carole Crumley seems to agree with such an aim in her foreword), given that the participants in that debate seem to understand one another partly through their use of key terms and concepts, such as that of the landscape.

### **Evolutionism vs. Historicism in Historical Ecology: Landscape as the Bridge Between Them**

In chapter 2, Neil Whitehead poses the question most forcefully as to whether humans are essentially historical or ecological entities. If historical, then historical ecology must adopt a more rigorous theory of history, rather than merely mapping a simplified temporal dimension (or just a chronology of events) onto an essentially processual, environmental explanation of changes in landscapes over time. A similar *problématique* is clearly present in other chapters. In chapter 13, R. Brian Ferguson argues that "making sense of history requires a sense of evolution" in his documentation of changes in Yanomami tool use and settlement patterns. Likewise, Robert Bettinger (chapter 8), in his insightful analysis of prehistoric settlement patterns in the Great Basin, suggests that "culture and environment interact in complex ways that benefit from an evolutionary analysis in which history is important."

Neil Whitehead, by way of contrast, indicates that history is for him the underlying mechanism of historical ecology. He argues, in incisive discussion of the tension between evolutionism and historicism in modern anthropology, that if persons are essentially historical, then historical ecology can be subsumed under a wider rubric that he calls historical anthropology. Elizabeth Graham (chapter 6) deals

with the problem of “history” and “ecology” in anthropology in a more synthetic way. She suggests that neither is related to the disciplinary objectives of anthropology; rather, history, as understood in historical ecology, can now apply to both ecology and anthropology.

On the other hand, Whitehead (chapter 2) contends that we have not yet found a means to bridge the differences between evolutionism and historicism in anthropology, just as the dichotomy between scientism and humanism remains to be eliminated. One can infer from Whitehead’s chapter that, in order to comprehend human/environmental relationships, you must be either an evolutionist or a historicist: you cannot be both at the same time. He further implies that historical ecology represents a method, rather than a paradigm. His penetrating questions and critique of ideas in historical ecology are extremely important for debate and cannot go unanswered, if historical ecology is to advance. Many of the chapters do address and try to answer these problems in historical ecology (Balée, chapter 1; Bettinger, chapter 8; Ferguson, chapter 13; and Graham, chapter 6). Tristram Kidder and I treat them in a wider interdisciplinary context in the epilogue.

Regardless of whether humans are to be viewed either as historical or as ecological (evolutionary) entities, Whitehead utilizes the concept of *landscape* in its historical-ecological (holistic) sense. He refers to “human praxis in the landscape,” implicitly understood as a biocultural phenomenon. More specifically, in his analysis of anthropogenic black-earth soils in the Amazon, he emphasizes the “synergy” of environment and culture. In other words, he stresses the mutual influence of people and nonhuman nature: the process is really not *either* biological *or* cultural; rather, it is *both*. Whitehead argues that human decision-making in the landscape is the key to understanding the development of the latter over time, as does Graham.

Elizabeth Graham (chapter 6) is also concerned with anthropogenic soils—in this case, of the Maya area in Belize—and notes that soils, both those resulting from ancient geomorphological processes and those affected by human interactions with the *landscape*, are “solid-phase products of the continuous functioning of the biosphere.” If termites and leaf-cutter ants can change the composition of soils (Graham, chapter 6; Sponsel, chapter 17), if elephants can create light gaps that increase biodiversity in African tropical forests (Campbell 1991), and if beavers can “build environments” (Sponsel, chapter 17), so can humans—but potentially on a different scale, with a different consciousness, and with a different history (cf. Ingold 1988).

Humans, who are both biological and cultural, are the key mechanism in historical ecology. This is partly how historical ecology bridges the gap between disciplines (specifically between the so-called life sciences and social sciences). As Graham points out in chapter 6, landscapes have a history, rather than merely an evolution behind them. In alluding to Eric Wolf’s *Europe and the People Without History* (1982), she notes that earlier scholars without a historical-ecological point of view perceived not only “people without history, but landscapes as well!”

In other words, the mechanistic aspect of historical ecology is simultaneously historical and ecological. In this light, Linda Newson in chapter 3 discusses how chronic and acute infectious diseases affect the historical development of different societies and sociopolitical systems of different kinds in unlike ways. The origins

and spread of infectious diseases are both historical and ecological in her analysis. Bacterial and viral pathogens themselves have histories. Infectious disease constitutes a part of the landscape that, depending on historical developments, interacts with people, biota, and regions in distinctive ways.

Anthropogenic soils and infectious diseases represent factors in the landscape. Stephen Pyne in chapter 4 persuasively argues that fire is another such factor, perhaps the most important one. He astutely notes that “fire is a creation of life” (and hence, it is critical to the concept of biosphere in historical ecology—see Balée, chapter 1). Pyne shows how historical-ecological analysis is not limited to egalitarian societies, but rather can be applied to the genus *Homo* (which has a monopoly on fire-making) since the time of *Homo erectus* as a whole—and that includes archaic and modern state societies. He argues convincingly that firefighting in modern Western society has ironically led to more wildfires, whereas low-intensity burning, as practiced by prehistoric and historic native peoples, prevented a buildup of fuels for wildfires. Large, destructive wildfires are artifacts of complex state-level societies, whereas traditional anthropogenic fires (or controlled burning, as with broadcast fires), such as those used in native swidden gardening and in stimulating new growth in the Americas, Africa, Australia, and elsewhere, created landscapes of higher biodiversity (Sponsel, chapter 17).<sup>1</sup>

Sometimes the establishment of national parks and the like in complex societies ironically leads to environmental degradation and biotic impoverishment (Pyne, chapter 4). Carol Henderson (chapter 16) shows how the establishment of a large reserve in the Thar Desert of Rajasthan, India, greatly decreased the availability of scattered, habitable landscapes traditionally used by the agropastoralists of that region—with the result that the utilization of the remaining landscapes was intensified to the point where erosion and decreasing arability, which had not been observed before, became apparent. In chapter 17, Leslie Sponsel also argues convincingly that state conservation efforts are minimal in effectiveness when compared to the long-term degradation of the environment and the decrease in species diversity that, in the specific case of Thailand, they have tended to cause. As Sponsel shows in a detailed historical-ecological analysis, traditional and modern uses of fire in Thailand are strikingly different in their effects on specific landscapes.

Different kinds of fires are associated with different kinds of landscapes and their unlike degrees of biodiversity (Balée, chapter 1; Kidder, chapter 7). Both Stephen Pyne (chapter 4) and Anna Roosevelt (chapter 9) argue for the long-term use of fire involved in the formation of Amazonian landscapes. Pyne points out that the rain forest of the Amazon is an artifact of the Holocene and includes “a biota that has coexisted with humans and thereby with anthropogenic fire.” Roosevelt indicates that the antiquity of fire-using hominids in Amazonian tropical forests, which is only now coming to light in her and her colleagues’ research, dates back more than 10,000 years.

In addition to fire, anthropogenic soils, and infectious diseases, other factors pertinent to the historical-ecological analysis of landscapes unfold in this volume. Tristram Kidder (chapter 7), Elinor Melville (chapter 15), and Janet Chernela (chapter 14) assess the introduction of alien animals and plants into landscapes

where these had not been present before (also see Whitehead, chapter 2, on the history of this type of analysis). Kidder argues that the introduction of South American nutria into southern Louisiana in the 1940s contributed to a profound alteration of landscapes of the Mississippi Delta region. The tendency of nutria to create larger gaps (crevays) in swamp vegetation by outeating and outcompeting the native muskrat has caused some of the increasing erosion and loss of well-drained land noted in the Mississippi Delta. The nutria (which accidentally escaped from the place of introduction on Avery Island to spread throughout southern Louisiana) were introduced by humans associated with complex society. Elinor Melville (chapter 15) argues that the Spaniards' introduction of sheep-grazing to the Otomí people of north-central Mexico, which replaced traditional land use (based mainly on maize) in most areas, has led to a deterioration of the catchment area. The traditional Otomí dictum "do as the land bids" was undermined by the incorporation of their economy into that of the Spanish Empire and of the neocolonialism that followed it. Janet Chernela (chapter 14) likewise points out how the introduction of intensive sugarcane cultivation by the Portuguese, combined with coerced native labor, led to deforestation and the impoverishment of soils in the Upper Rio Negro region of the Amazon—in contrast to traditional land-use patterns of the same native peoples. In Chernela's words, "landscape and individual were simultaneously 'converted' and 'domesticated'" by the historical accident of the Portuguese conquest.

Finally, landscapes can be formed in other ways. For Kidder (chapter 7) the genus *Homo*, from its very beginnings, is noteworthy for being "untidy." With or without fire, he argues, people have altered formerly natural environments and interacted with these over time in the formation of landscapes (also see Graham, chapter 6). Specifically, Kidder suggests (as do Marquardt [1994] and others) that native peoples of the Mississippi Delta built well-drained environments by the accumulation of *Rangia* clam shells in what were otherwise poorly drained or completely inundated environments. It is remarkable that Kidder's shell-midden sites contrast with well-drained sites formed by natural levees and meanderings of the Lower Mississippi, in terms of species and species diversity: the anthropogenic shell middens exhibit higher species diversity and higher numbers of useful plant species than do the control sites, which are evidently unaffected (at least directly) by human activity. My chapter shows how landscapes (in this case, fallows rather than shell middens) in extreme eastern Amazonia also differ in species composition and are richer in species diversity than control sites (high forests) where there is little or no evidence of past horticulture. Laura Rival (chapter 11) shows how the Huaorani of Amazonian Ecuador distinguish landscapes, replete with many useful species (especially the peach palm), from essentially unaltered forests. Landscapes, which are by definition anthropogenic (or biocultural), have implications for biodiversity, often depending partly on the historical development of society.

It remains to be seen whether nation-states (such as our own) and emergent transnational polities can maintain biodiversity or improve the biosphere more generally for us and other life forms. Much of the research in this volume suggests that traditional, nonstate entities have been more effective in promoting biodiversity

(with the possible exception of diversity among bacteria, fungi, parasites, and viruses) and in increasing the arability and habitability of certain world regions, regardless of whether such effects were intended or not. On the other hand, Sponsel (chapter 17) indicates that the environmental ethics of Buddhism in Thailand and elsewhere (a religion associated with state-level society), which encourage the existence of sacred groves and sacred trees—as does Hinduism in Rajasthan and elsewhere in India (Henderson, chapter 16), and as did the Maya religions of Mesoamerica—may have provided a counterweight to otherwise environmentally degrading practices in archaic state-level societies of the past. In historical ecology, the question is *not* whether states or nonstates are inherently better or worse in regard to the sustainability of landscapes; nor does human nature, however understood, have anything to do with it. In each instance, empirical investigation is required in order for people to understand the regional and biospheric contexts of landscapes. The chapters in *Advances in Historical Ecology* suggest possible avenues for crossing disciplinary boundaries and for applying the findings of historical ecology to the modern world by focusing on the central concept of the *landscape*.

## Conclusion

The present volume constitutes an effort to effect a more meaningful debate about relationships between humans and the biosphere in specific landscapes and regions. It carries a general message about the dialectical entity conjoined by humans and their landscapes. It may adduce a new literary and scientific span in the bridge of understanding currently being built between the life and social sciences for the mutual benefit of their diverse practitioners. May it fortify that span.

## Note

1. I refer to biodiversity in the plant and animal kingdoms. It seems an open question whether sedentary and urban societies may have been associated with higher diversity of bacterial, fungal, parasitic, and viral pathogens (Newson, chapter 3).

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## PART ONE

### Human and Material Factors in Historical Ecology