

Historical Ecology: Premises and Postulates

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Ecological factors never operate in a cultural vacuum nor do the enduring patterns of language, kinship, and cultural values that every individual inherits prevent adaptation to a material environment.

—R. McC. Netting (1986:101)

Preliminary Definitions and Concepts

Historical ecology concerns itself with interrelationships between human beings and the biosphere, that part of the earth suffused with life. Historical ecology clearly requires data drawn from a multitude of disciplines (Crumley 1996), even though it is centered on humans. It is unlike environmental history (*Journal of American History* 1990), ecological anthropology (Balée 1996), cultural geography, and other fields that exhibit contrasting positions and orientations. Historical ecology takes a distinctive perspective on human societies and their interactions with other life forms and the land, just as do cultural ecology,¹ cultural materialism, structuralism, and other theoretical orientations. Historical ecology reflects a materialist viewpoint, but cannot be equated with cultural materialism, which is an explanatory device in both environmental history (Worster 1990) and ecological anthropology (Winterhalder 1994:21–22). Because historical ecology emerges from a dialectical point of view (Crumley 1996), it bears a stronger resemblance to dialectical materialism than to cultural materialism (Crumley 1994b; Ingerson 1994; Patterson 1994). *Dialectical ecology* (Levins and Lewontin 1985) may be an apposite synonym, therefore, for historical ecology.

Unlike environmental determinism, cultural ecology, cultural materialism, and cultural evolutionism, historical ecology begins with the premise that historical, not evolutionary, events are responsible for the principal changes in relationships between human societies and their immediate environments. Historical ecology reveals a dialectical process in the unfolding of these changes. Like the concept of “punctuated equilibrium,” it assumes that historical events may affect biocultural developments. Where environmental disturbance occurs sporadically or even

chaotically over time such that equilibrium never seems to be reached, biological and cultural impoverishment is unusual.

Historical ecology focuses on the interpenetration of culture and the environment, rather than on the adaptation of human beings to the environment. In other words, a relationship between nature and culture is conceived, in principle, as a dialogue, not a dichotomy (Ingerson 1994:65). Beyond that premise, I propose that historical ecology explains human/biosphere interrelationships by a core of interdependent postulates. These postulates may help explicate historical ecology as a viewpoint, rather than as a field or method per se.

The postulates are: (1) Much, if not all, of the nonhuman biosphere has been affected by human activity. (2) Human activity does not necessarily lead to degradation of the nonhuman biosphere and the extinction of species, nor does it necessarily create a more habitable biosphere for humans and other life forms by increasing the abundance and speciosity of these. (3) Different kinds of sociopolitical and economic systems (or political economies) in particular regional contexts tend to result in qualitatively unlike effects on the biosphere, on the abundance and speciosity of nonhuman life forms, and on the historical trajectory of subsequent human sociopolitical and economic systems (or political economies) in the same regions. (4) Human communities and cultures together with the landscapes and regions with which they interact over time can be understood as total phenomena. The remainder of this chapter assesses these postulates in the light of known data.

Postulate 1: Much, if not all, of the nonhuman biosphere has been affected by human activity.

In the most important work on the subject of historical ecology to date, Carole Crumley (1994a:240) stated that “no spot on the earth is unaffected by humans.” That comment is at least intuitively obvious today—taking into consideration chlorofluorocarbons (CFCs) in the atmosphere, ozone depletion, acid rain, tropical deforestation, global warming, and the like. Yet other researchers would claim that it applies to the prehistoric world as well, in regions as widely separated as Australia (Allan and Baker 1990; Hynes and Chase 1983; Gould 1971; Walsh 1990), Africa (Bailey and Headland 1991; Vansina 1990; Wilmsen 1989), North America (Cronon 1983; Denevan 1992; Kidder, chapter 7, this volume; Lewis 1982; Marquardt 1992; Nicholas 1988; Patterson and Sassaman 1988; Pyne 1982; Stewart 1956), and especially South America (Denevan 1966, 1992; Steven 1993), where human influence is mostly noted through anthropogenic fire and agriculture, but which is most often considered to harbor among the most pristine terrestrial conditions on Earth (short of Antarctica).

Whereas historical ecology assumes that wherever humans are or have been present an interrelationship exists between them and their biotic and abiotic regional environs, this postulate sheds no light on the uniqueness of humans as a species. If humans have affected the entire biosphere, including essentially uninhabited parts such as the Southern Ocean and the Antarctic Continent (Campbell 1992), one can still argue that such pervasive influence, generally of a deleterious sort for biodi-

versity, has arisen with the appearance of modern nation-state societies. CFCs, global warming, declines in sperm counts, and so forth seem to be mainly twentieth-century phenomena.

If humans routinely affect the biosphere, this does not necessarily distinguish humanity as a life form. According to the Gaia hypothesis, part of the reason why the surface of Earth is habitable yet the surfaces of its sister planets Venus and Mars (which were also formed nearby from the same giant cloud of gas) are not, is that photosynthetic organisms about 3.5 billion years ago wittlessly began imbuing Earth with a large supply of atmospheric oxygen and a profound reduction in atmospheric carbon dioxide; for every molecule of oxygen released by photosynthesis, a corresponding molecule of carbon became interred as fossil carbon in sediment (Lovelock 1979, 1992; Barghoorn 1992; McElroy 1992). The atmosphere is partly an artifact of the unfolding of life. In this context, one may consent to the view that Earth and its Latin equivalent, Terra, are misnomers: our planet should have been called Vita (Campbell 1992; Campbell and Durkee 1996)—for it is life itself, rather than any single life form or species (even the human one), that distinguishes it from the other planetary bodies of our solar system, at present. Life as a total phenomenon may even have affected plate tectonics and other supposedly inorganic processes (Margulis and Olendzenski 1992), just as elephants have changed structure and perhaps species composition in African tropical forests by creating major light gaps (Campbell 1991).

Elephants, like humans, are gap-producing species in tropical forests. Unlike humans, though, elephants lack extrasomatic tools such as broadcast fires (Pyne, chapter 4). Humans are unique perhaps only in terms of the scale by which they have modified the planet, as well as in the degree of intentional planning (what is “available to the discursive awareness of the actor” [Giddens 1987:63]), based in the higher functions of the cerebral cortex, that preceded their actions. As Tim Ingold (1988:97) has pointed out, “though humans differ but little from other animal species . . . that difference has mighty consequences for the world we inhabit, since it is a world that, to an ever greater extent, we have made for ourselves, and that confronts us as the artificial product of human activity.”

If the human species is somehow unique in its relationship to the biosphere, this may not necessarily be because it has always and everywhere influenced other life forms on Earth. Rather, humans may demonstrate historically a *greater potential* than any other species to affect biodiversity and the biosphere generally. In addition, they have evinced high *adaptability* to a wider range of habitats, as well as *technologies* that are distinctive properties with historical implications. Historical ecological research indicates that the environment (with the possible exception of certain maritime, mountainous, and circumpolar zones of the earth) and society (without exception) are essentially historical constructs, not immutable givens (Gunn 1994). Research in historical ecology has sought neither to deconstruct the role of nature nor to deny the role of evolutionary mechanisms, such as natural selection, in human social life. Rather, it is based on the premise that putatively natural environments that have been subjected to management have progressively

become landscapes (Crumley 1993; Crumley and Marquardt 1990)—that is, culturally and historically determined physical environments. Other life forms that lack domesticates (and here one may distinguish between anthropogenic fire and wild-fire, the former a kind of “domesticate”; see Pyne, chapter 4) and agriculture have not created landscapes, however much they may have affected the surface of the earth in other ways.

This human potential to affect biodiversity and the biosphere in qualitatively different ways from other life forms and also from the sum total of other life forms does not, however, support the assertion that humanity is biologically programmed, or in some other way overdetermined, to reduce biodiversity and make Earth less habitable generally for other life forms. Nor does it support the opposite view, that human beings are biologically programmed, or in some other way overdetermined, to live in harmony with the other life forms of the biosphere, even behaving so as to increase their abundance and diversity.

Some of the recent criteria employed in characterizing human nature have been implicitly related to biodiversity and environmental conservation. With regard to biodiversity, it may be argued that two doctrines concerning human nature seem to be in constant competition within sociocultural anthropology (and, for that matter, within the bioecological sciences): the Ecologically Noble Savage (Redford 1991; Alvard 1993, 1994), on the one hand, and what I call *Homo devastans* (Balée 1996), its opposite, on the other. The Ecologically Noble Savage implies that indigenous (especially foraging) peoples tend not to diminish biodiversity, may in fact deliberately act to increase it (e.g., Anderson and Posey 1989; Hynes and Chase 1983; Orr 1992:32; Posey 1985), and exhibit a wisdom and knowledge of local nature greater than the potential of Western science to know that nature (e.g., Hughes 1983; C. L. Martin 1992; Nelson 1993; Orr 1992; Reichel-Dolmatoff 1976). Those who subscribe (if only implicitly) to *Homo devastans* argue that indigenous peoples, presumably like human beings everywhere, contribute to lowered biodiversity (Alvard 1994, 1995; Diamond 1986, 1992), are naturally destructive or polluting of local environments (Rambo 1985; Redford 1991), and do not manage other life forms or increase environmental diversity (e.g., Parker 1992, 1993).

The Ecologically Noble Savage doctrine holds that it is human nature to be custodial of the environment, the relationship becoming corrupted only after the rise or intrusion of civilization. The doctrine of *Homo devastans*, in contrast, holds humankind itself accountable for the destruction of natural habitats and of other species. These opposed dogmas have been applied to non-state-level societies, from which some researchers have sought to promote or deconstruct specific viewpoints on human nature (see critiques by Sponsel 1992; Nabhan and St. Antoine 1993). Both views require the demonstration of sociocultural universals; either would become a mere shibboleth with proof of a single counterexample. It is clear that both views have converts in the scientific community today. Yet research in historical ecology seems to support neither view, just as sociocultural universals based on the juxtaposition of biology, language, and culture have been continuously proven to be erroneous since the time of Franz Boas (Sussman 1995).

Many modern environmentalists seem most likely to assume the existence of *Homo devastans*. When referring to some “panhistorical, cross-cultural, and ultimately destructive human ‘nature,’” according to Alice Ingerson (1994:52), her environmentalist students really meant the world capitalist system. Many environmentalists, evidently, do not consider the peoples of nonstate, egalitarian societies to make up part of that abstraction formerly called “Man.”

The American conservationist George Perkins Marsh showed the internal contradictions of this view in his famous work *The Earth as Modified by Human Action*, originally published in 1864. That work helped inspire many twentieth-century students of human/environmental relationships (Thomas 1956; Turner et al. 1990). Marsh claimed that “the action of man upon the organic world tends to derange its original balances” (1885:vii; also see Graham 1956:688). In a section entitled “Destructiveness of Man,” Marsh (1885:33, quoted in Graham 1956:688) declared that “Man is everywhere a disturbing agent; wherever he plants his foot, the harmonies of nature are turned to discords.” Further, “Man pursues his [nonhuman living] victims with reckless destructiveness” (Marsh 1885:34). That by “Man” Marsh generally meant the industrializing society of his time seems evident: “Purely untutored humanity, it is true, interferes comparatively little with the arrangements of nature, and the destructive agency of man becomes more and more energetic and unsparing as he advances in civilization” (1885:38–39). Marsh (1885:121) did not exonerate nonstate peoples categorically, however, pointing out that native peoples had extirpated the large flightless land birds, moas, from New Zealand. He seems to have shared in the nineteenth-century evolutionist thought of many of his contemporaries—namely, that the progression to civilization underwrote human history (see Whitehead, chapter 2).

Marsh’s view was counterbalanced by that of another nineteenth-century conservationist, Henry David Thoreau, who contrasted his own, environmentally destructive society with that of the American Indian. The Indians possessed true “wisdom” about nature (Worster 1977:96). Since non-Indians could emulate this wisdom, Thoreau promoted a precursor to Kent Redford’s (1991) “Ecologically Noble Savage” (see Kidder, chapter 7). The superior state of humankind, in Thoreau’s view, was evident in other societies. In this context he wrote (1885:712):

The kings of England formerly had their forests “to hold the king’s game,” for sport or food, sometimes destroying villages to create or extend them; and I think that they were impelled by a true instinct. Why should not we, who have renounced the king’s authority, have our national preserves, where no villages need be destroyed, in which the bear and panther, and some even of the hunter race [i.e., American Indians], may still exist, and not be “civilized off the face of the earth,”—our forests, not to hold the king’s game merely, but to hold and preserve the king himself also, the lord of creation,—not for idle sport or food, but for inspiration and our own true re-creation?

Human nature sought peace with nonhuman nature. The biophilia hypothesis seems to be a more recent incarnation of this view (Kellert 1993).

The environmentally incorrect rival of the Ecologically Noble Savage, *Homo devastans*, gained strength in the twentieth century by its expansion of reference. In addition to modern civilization, it came to include hunters and gatherers of the late Pleistocene, who were blamed for the extinction of hundreds of species and genera of mammals worldwide. Certain nineteenth-century scientists, such as the comparative anatomist Jean Baptiste Lamarck and the zoologist John Fleming, earlier believed that the human species had been involved in Pleistocene extinctions, partly because humans were thought to have coexisted with Pleistocene animals and were simultaneously considered to have been capable of extirpating other species—even though empirical evidence for this was scant (Grayson 1984b:23–24). Once archaeological research in France and England during the 1850s proved that human beings and extinct animals of the Pleistocene had been contemporaneous, the famous geologist Charles Lyell declared that the antiquity of man “throws great light on extermination of animals, and in Denmark, of trees” (quoted in Grayson 1984b:24).

This view gained support in the twentieth century with the Pleistocene overkill hypothesis of paleontologist Paul S. Martin, who found that very few late Pleistocene extinctions of megafauna in the Americas, Australia, and Oceania occurred before the arrival of human beings (Martin 1966, 1967, 1973; see Alvard 1994, 1995, for possible recent applications of this view to Amazonia, and the critique in Alvard 1995 by Janis Alcorn). In other words, Martin’s argument is based on the *timing* of extinctions—specifically, their coincidence with humankind in given regions. In the Americas, the major extinctions of megafauna occurred from about 11,000 B.P. on, or shortly after the presumed time of the arrival of human beings across Beringia. Because human remains were rarely found with extinct animals of the Pleistocene, there being very few kill sites, Martin (1973, 1984) suggested that there was a “blitzkrieg” of the fauna by Paleo-Indians, whose Clovis projectile points and fully modern human anatomy would have had a deadly efficiency in extirpating species and genera of prey. The evidence from Australia, however, is more equivocal; there, major extinctions of megafauna seem to postdate human occupation by many thousands of years (Grayson 1984a). Martin’s model of Pleistocene overkill cannot be falsified because it is a simulation, not an empirically demonstrable hypothesis (Grayson 1984a). The same can be said of the competing dogmas of the Ecologically Noble Savage and *Homo devastans*.

Nevertheless, the concept of Pleistocene overkill gained a number of adherents ready to believe that it was human nature to make other life forms vanish. In light of the evidence for Pleistocene overkill, the Pulitzer Prize winner René Dubos (1974:44) declared that “like the tendency to kill, the tendency to waste and to foul the nest seems to be inscribed in the genetic code of the human species.” On the other hand, whereas human hunters certainly killed individuals of the Pleistocene megafauna, it remains to be proved (and the issue is still quite controversial) whether they alone *caused* the extinction of any or all of the taxonomic groups to which these individuals belonged. In this light, *Homo devastans* seems to be as dogmatic and unempirical as its earlier sociobiological counterparts, the creature of

microeconomics *Homo economicus* and the Hobbesian, territorial *Homo bellicosus* (see Sahlins 1976:53; also Nabhan and St. Antoine 1993).

This counterargument means that it may not be human nature to be destructive of biodiversity and the environment, however defined. But it may also not be human nature to encourage the growth of biodiversity and increase the habitability of Earth for other life forms—which leads to the next postulate of historical ecology, as I see it.

Postulate 2: Human activity does not necessarily lead to degradation of the non-human biosphere and the extinction of species, nor does it necessarily create a more habitable biosphere for humans and other life forms and increase the abundance and speciosity of these.

Some evidence suggests that the creation of certain landscapes by human beings did not result in irreversible damage to regional biodiversity—thus undermining the doctrine of *Homo devastans*. The evidence is principally associated with the origins of domesticated and semidomesticated plants and animals. In some regions of the Neolithic world, the domestication of plant and animal species may have entailed a net increase in the total number of species present, assuming that sometimes the wild progenitors did not become extinct. The New World contributed more than one hundred species of plants to the world’s inventory of domesticated plants (Brücher 1989); in the absence of evidence for local extinctions of ancestral and related species of these plants, this contribution represents an increase in plant biodiversity. Early agrarian societies, and modern ones that have either retained or been forced into an essentially egalitarian political system and reciprocal economy, may have been frequently associated with net regional increases in bioecological diversity.

I would reiterate in this context a definition of resource management: “*the human manipulation of inorganic and organic components of the environment that brings about a net environmental diversity greater than that of so-called pristine conditions, with no human presence*” (Balée 1994:116; emphasis in the original). For Australia and North America, it has been argued (Pyne 1982; Patterson and Sassaman 1988) that the use of broadcast fires by indigenous peoples led to an increase in the abundance of game animals by encouraging new growth of grasses and legumes (also see Cronon 1983; Lewis 1982; Walsh 1990). These fires may have also decreased the risk of large *wildfires*, which tend to be more destructive than constructive with respect to new habitats. In belated recognition of the environmentally enriching effects of certain indigenous activities, the fire-management strategies of Australian Aborigines (as interpreted by government planners) are now being employed by National Park personnel of Australia to control the incidence of wildfires (Allan and Baker 1990). These strategies essentially reduce fuels in the fire environment, and therefore reduce the likelihood of large wildfires (Pyne 1982; and see chapter 4, this volume). In nineteenth-century North America, “light burning” (controlled broadcast fires) was derogatorily referred to as “Paiute forestry.” Yet this practice came to be adopted by the U.S. Forest Service during the early years of the

twentieth century as a land-management and fire-protection strategy in areas of the West that are prone to wildfires. "Paiute forestry" has continued to form part of the program of conflagration control by the National Park Service, in spite of problems with escape fires (Pyne 1982:100–104).

Other alterations of the landscape by Native Americans that did not necessarily lead to species extinctions, and that may even have enhanced habitats for nonhuman life forms, include the islands of shell mounds created by prehistoric hunter-gatherers on the southwest coast of Florida (Marquardt 1992) and coastal Louisiana (Kidder, chapter 7); and the parkland environment of New England, which encouraged plants adapted to fire regimes and much sunlight (including strawberries and other edible fruits) as well as game animals, such as white-tailed deer (Cronon 1983; Patterson and Sassaman 1988; Denevan 1992).

In Africa, it is becoming increasingly clear that many equatorial forests once thought to be pristine are in fact anthropogenic forests (Bailey 1996; Bailey and Headland 1991; Vansina 1990). Robert Bailey (1996:325) makes the significant observation that "biodiversity exists in central Africa today, not despite human habitation but because of it." This observation also applies to a regional analysis of the forests inhabited by the Ka'apor Indians of eastern Amazonia.

Amazonia evinces human-induced landscape changes since prehistory (Balée 1989; Denevan 1992; Posey 1985; Posey and Balée 1989; Moran 1993). These landscapes occur in the Llanos de Mojos of Bolivia, with its prehistoric raised fields and mounds (Denevan 1966, 1992); the *apêtê* (forest islands) of the cerrado country in north-central Brazil (Posey 1985; Anderson and Posey 1985, 1989); the mounds of Marajó Island (Roosevelt 1991); and widely distributed forest types such as liana forests, Brazil nut forests, babaçu and other palm forests, and forests dominated by the dicotyledonous trees bacuri (*Platonia insignis*, in the clusia family), *Jacaratia spinosa* (in the papaya family), hog plum (*Spondias mombin*, in the cashew family), copal (*Hymenaea parvifolia*, in the caesalpinia family), *Gustavia augusta* (in the Brazil nut family), *Trichilia quadrijuga* (in the mahogany family), *Neea* (in the four-o'clock family), *Simaba cedron* (in the simaruba family), and *Theobroma speciosum* (in the cacao family) (Balée 1989, 1993, 1994).

Eugene Parker's (1992, 1993) theory that the *apêtê* (forest islands on the high savanna) of the Kayapó are completely natural, nonanthropogenic phenomena seems unconvincing. As I have noted elsewhere (Balée 1993, 1994), many species found on *apêtê* of the Kayapó (as reported in Anderson and Posey 1985, 1989; and elsewhere) are also found in fallows of the Ka'apor about three hundred miles to the north and east. The fallows of the Ka'apor, called *taper*, are anthropogenic forest formations brought about by indigenous forest-management practices (Balée 1994). Some of the plant species that fallows share with *apêtê* include *Tapirira guianensis* (cashew family), *Himatanthus sucuuba* (dogbane family), *Schefflera* sp. 1 (ginseng family), *Tabebuia serratifolia* (bignonia family), *Tetragastris altissima* (bursera family), *Maytenus* sp. 1 (staff-tree family), *Casearia* spp. (flacourtiaceae family), *Sacoglottis* spp. (humiria family), *Mascagnia* spp. (malpighia family), *Cecropia palmata* (cecropia family), *Neea* spp. (four-o'clock family), *Coccoloba*

paniculata (buckwheat family), *Simaruba amara* (quassia family), and *Vitex flavens* (verbena family). Several of these species occur *only* in areas that have been disturbed by indigenous forest-management practices in the region of the Ka'apor—indirectly suggesting that *apêtê* may be secondary forests in the region of the Gorotire Kayapó.² In other words, the Kayapó term *apêtê* would probably best be glossed in Ka'apor as *taper* ("old fallow") or *taper-ran* ("old fallow-similar"), and vice versa.

The question remains, however, whether indigenous forestry conforms to the definition of resource management given above. William Denevan (1966, 1992) implies that the construction in Bolivia of mounds, raised fields, and other transformations of the lowlands ultimately lowered biodiversity, but no direct evidence supports this claim. Many if not all of the forested landscapes of the Llanos de Mojos may be anthropogenic (Denevan 1966, 1992; Erickson 1995; Erickson et al. 1991; Roosevelt 1992; Stearman 1989)—but that does not mean, a priori, a net loss in biodiversity. Clark Erickson (1995) refers to "landscape accumulation" in the Llanos de Mojos by the building of mounds and raised fields, which in many cases today are covered with forest vegetation that otherwise would be absent in the flooded savanna (Balée 1995; for a North American analogue, see Kidder, chapter 7). Some 1,300 miles to the northeast, Ka'apor native forestry practices may have actually enhanced biodiversity in the region by the creation (via disturbance) of the distinctive landscapes that they refer to as *taper*.

In defining the concept of landscape, Carole Crumley and William Marquardt (1990:73) pointed out that, "in interacting with their physical environment, people project culture onto nature"—often unconsciously. Such a dialectical view of interrelationships between humans and the biosphere (or, for earlier writers, Nature) has a clear forerunner in Karl Marx (1867:177; also see Sahlins 1976:126–129). Historical ecology draws on dialectical materialism, even if it goes far beyond that earlier viewpoint by actually investigating human/biosphere interrelationships empirically. It also shows just how dialectical those interrelationships really are.

The landscapes that I call fallows represent a projection of culture onto nature through time. These are living landscapes, even if they have traditionally (and erroneously) been understood to be primary forests by foresters, ecologists, and phytogeographers alike (Balée 1989). Fallows exhibit many species, including some of those mentioned above in the comparison with *apêtê*, that occur nowhere else in the *terra firme*. They are as biologically rich as the high forests in the same region (Balée 1993, 1994; see figure 1.1), but they harbor many species unique to them, and many more that only gain ecological importance in areas disturbed by indigenous agroforestry. These species may be collectively considered as semidomesticates (also see Posey and Balée 1989).³ Insofar as fallows and their constituent species would not exist without indigenous forestry, it may be concluded that indigenous forestry has actually enhanced the environmental and biological diversity of the region of the Ka'apor, given that there is no evidence for extinctions of plants and animals within that region. Similar findings with respect to the extremely rich habitat of the Huaorani of Amazonian Ecuador have been expressed by Laura Rival

(chapter 11). In other words, traditional Ka'apor agroforestry (and no doubt that of other indigenous peoples in Amazonia) undermines the doctrine of *Homo devastans*, even if it does not provide proof of the Ecologically Noble Savage either. The point is that no evidence exists to show that human beings are biologically programmed, or in some other way overdetermined, to be either stewards or destroyers of the diversity of nonhuman life forms.

Postulate 3: Different kinds of sociopolitical and economic systems (or political economies) in particular regional contexts tend to result in qualitatively unlike effects on the biosphere, on the abundance and speciosity of nonhuman life forms, and on the historical trajectory of subsequent human sociopolitical and economic systems (or political economies) in the same regions.

If some Amazonian peoples have by their activities enhanced environmental diversity and increased regional biodiversity, clearly not all nonindustrial political economies have had similar results. The evidence for altered landscapes in Amazonia has led some researchers to believe that this represents an automatic decline in biodiversity and habitability for other life forms (Alvard 1993, 1994; Redford 1991)—but no long-term empirical evidence supports that.

While these statements derive in part from the doctrine of *Homo devastans*, convincing evidence exists that Polynesia, for its part, did suffer severely lowered biodiversity, partly as a result of human occupation. But this increased poverty of the flora and fauna did not result solely from human nature, for it can be demonstrated that humans have not everywhere been associated with diminished diversity of other life forms (as in the Ka'apor example given above). Rather, Polynesia suffered lowered biodiversity partly because of the peculiarities of island environments (such as high biological endemism), and partly because of human occupation. Individual islands, unlike regions and continents, tend to be high in endemic species over small expanses of land (Balée 1995). In Polynesia, many of these species evolved over millions of years before human arrival within the last 2,500 years; therefore, many species were unusually susceptible to extirpation by perturbations of the environment caused by humans and perhaps other animals (especially introduced animals) (Meilleur 1996). In addition, prehistoric and modern indigenous peoples of Melanesia may have caused extinctions of numerous bird species (Diamond 1984, 1992), and the indigenous Semang people of Malaysia have been seen as "primitive polluters" (Rambo 1985), no different in kind from civilized societies in their supposed propensity (if I may borrow from Dubos) to "foul the nest."

Yet evidence for increased agricultural biodiversity as a result of indigenous agroforestry complexes in South America is not limited to Amazonia. In the Andes, prehistoric peoples developed many new landraces of potatoes, *oxala* tubers, maize, coca, and other domesticated species; however, after the rise of the state, which put an emphasis on surplus food and monoculture for taxation, a decrease in infraspecific crop biodiversity and a reduction of soil fertility seem to have occurred (Zimmerer 1993, cited in Futemma 1994). The rise of the classic Maya in the Copan val-

SPECIES/AREA CURVES FOR FALLOW AND HIGH FOREST in the Gurupi, Turiaçu, and Pindaré basins

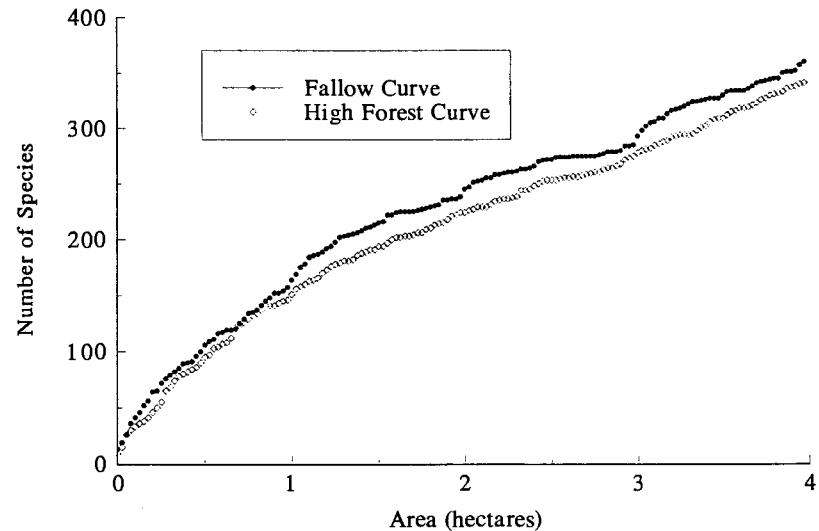


Fig. 1.1 Species/Area Curves from pre-Amazonia. Four hectares of fallow forest (*taper*) and four hectares of high (primary) forest (*ka'a-te*) were inventoried in the region. Mapping the increase in species diversity per unit area of each forest type shows that fallows and primary forests accumulate diversity at a similar rate, and that the total numbers of species found in the two forest types do not differ significantly.

ley has also been associated with deforestation and increased pauperization of the environment (Abrams et al. 1996).

With the exception of certain island societies, therefore, the only solid evidence for a human association in certain regions with reduced biodiversity and decreased habitability for other life forms comes from state societies, old and new. It would be counterproductive to abandon the social and politicoeconomic criteria that have distinguished hunter-gatherers, village horticulturalists, chiefdoms, and states, because differences, even if continuous, exist in terms of their mutually distinctive effects on the biota of landscapes and regions. This hypothesis is, in principle, measurable, and hence falsifiable. Although these politicoeconomic types are not linked in an evolutionary sequence (given the obvious fact that states and nonstates still coexist—although perhaps for not much longer), nor is one type morally superior to the other, the differences are significant. These differences, in terms of their demonstrable effects on the biosphere, show that human nature is ultimately not the culprit in today's massive depletion of nonhuman life forms; rather, the political economies of states and multistate organizations (Capistrano and Kiker 1990, cited in Schmidt 1994:99) only are to blame. L. S. B. Leakey was right when he wrote that "we are too apt to blame man and man alone for some of the things that happened"

(1964:26). Whether states are intrinsically destructive of bioenvironmental diversity, however, is an ethnographic and historical, not a biological, question.

Postulate 4: Human communities and cultures together with the landscapes and regions with which they interact over time can be understood as total phenomena.

In an attempt to view society (or culture) and nature as a single phenomenon, Thomas Patterson (1994:230) defines totality as "a dialectically structured and historically determined unity that exists in and through the diverse interpenetrations, connections, and contradictions that join its constituent parts regardless of whether the components are observable or unobservable." In the context of the proposed postulates discussed above, this definition also encompasses, in principle, the landscapes and regions of given political-economic entities over time (Crumley 1994b:9). It is in the visible manifestation of landscapes, such as fallows or cultivated forests (Rival, chapter 11), that culture and nonhuman life forms can be comprehended as one—that is, as a totality. Just as potsherds and other nonliving artifacts may be considered cultural, so too may certain living infrahuman organisms, such as domesticated and semidomesticated plants and animals. From this perspective, culture can be said to reside in, or be expressed by, certain trees as well as people's minds (cf. Roberts 1964:439).

Culture and the environment—together with their many permutations, such as culture and nature, society and nature, people and the biosphere, and so forth—represent a single phenomenon amenable to regional analysis using the paradigmatic concepts and tools of historical ecology. Although the human species remains central to historical ecology, this approach is perhaps less anthropocentric than some others, for whereas humans have conditioned the biosphere through their activities in regions and on landscapes, these same activities have constrained other potential developments. If it is not human nature to be either the nemesis or the steward of nonhuman life forms, the human species as a whole cannot be considered as wholly independent of those other life forms in given regional contexts. Rather, specific types of social and political-economic systems have historically interacted in finite and comprehensible ways with portions of the biosphere. These interactions constitute different totalities in the human experience of the biosphere, and vice versa.

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Notes

1. Several writers (e.g., Moran 1990; Murphy 1970; Netting 1986) seem to hold *cultural ecology*, as a term, to mean the field of inquiry into the mechanical links between society and

the environment. I prefer the terms *human ecology* and *ecological anthropology* to refer to that field. Cultural ecology, as originally conceived by Julian Steward, was not a field, but a theoretical construct (see discussion in Balée 1996; Butzer 1990).

2. Several of these species, such as *Tabebuia serratifolia* and *Tapirira guianensis*, occur widely in Amazonia, may be physiologically plastic or ecologically insensitive (Bush 1994; Gentry 1988), but do not seem to be species of areas quite recently disturbed.

3. Charles Clement (1995) divides my use here of semidomesticates into three categories based on degree of human selection.

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