Chapter 12

Cultural Ecology

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A well-dressed extension agent, trained in a US land grant university somewhere in the Midwest, enters a dusty Indian village as part of a state service to introduce high-yielding varieties of wheat and maize, which together with industrial fertilizers and pesticides might increase local crop yields by more than 50 percent. After many group meetings with community members and groups, he becomes frustrated. While a handful of local farmers are interested in fertilizers, they are less enthusiastic about the seeds. Others are interested in maize but not in wheat. Many are reticent to implement any of the proposed changes, and they shake their heads at the fellow and return to their millets and legumes, thinking only of the back-breaking work of the day still ahead of them. The agent, employed by the state only to improve the lot of the local poor, is dumbfounded. He departs the village convinced that it is the *culture* of peasants like these, inherently conservative, frightened of change, and distrustful of progress, that keeps India poor, underdeveloped, and primitive in the face of rapid modernization throughout the developed world.

Had the man greater inclination or time to stop and listen to these farmers, he might have learned a great many things about the logic of local culture. The stalks of the high yielding wheat plants, designed to be short and therefore less wasteful of inputs into biotic production, provide far too little field stubble after harvesting to feed livestock, thus eliminating a key part of local subsistence. The water demands of the crop would require capital expenditures for well digging that would put most households in a precarious position of debt. The chemical fertilizer inputs that such crops require would create annual cash demands that are out of synchronization with household cash availability, which follows harvest. Moreover, the traditional fertilizer, goat and sheep dung, is known throughout the area to sustain yields over multiple cropping seasons far better than industrial urea. These stories of local production, however, go unattended by the agent.

Yet there is a long history of listening to such stories and asking the questions that inevitably follow. It is the project of Cultural Ecology – a field of Geographic and Anthropological research – to interpret and understand the logics, choices, and imperatives of daily environmental practice in a way that is sensible, practical, and

universal. Cultural Ecology begins from the assumption that human ecological choices and practices are comprehensible and often optimal under the social and environmental conditions that prevail in place. As such, work in the field for the last century has consistently crossed the globe for explanations to the basic puzzles of life. Why would people choose lower risk over higher yields? Why do nomads move? Why do forest people cut forests? Why raise large families?

The answers to questions like these are more imperative than ever in a world searching for sustainable human systems and Cultural Ecology, despite shortcomings, thrives in many forms, quietly informing the work of local development organizations and even vast bureaucracies like the World Bank. Overshadowed in recent years by some other forms of cultural inquiry, Cultural Ecology can arguably said to have triumphed in many practical spheres, making the dismissive behaviors of the hypothetical extension agent described above increasingly unlikely in real life. For this reason alone, Cultural Ecology is worth exploring. So too, its highly empirical and synthetic efforts to analytically link environmental systems with the logics of the human world can inform geographical studies as few other approaches have yet proven to do (Netting 1986; Turner 1989). Finally, the field might yet provide a remedy for a range of pernicious, if persistent, ways of thinking about people and nature, including geographical determinism and apocalyptic Malthusianism, a pair of untenable arguments that seem never to go away.

Some Arguments Never Die

In the past, many crude arguments concerning the relationship between people and the landscapes in which they live often dominated accounts of human–environment interaction. Many of these arguments sought to explain cultural, political, and social systems by way of environmental limits. Others pointed to the ultimate limits the environment places on human society, especially constraints on growing populations. In the former case, the rise and success of European culture has been spuriously attributed to climate (Landes 1998), soils (Jones 1981), and a combination of landforms and rainfall (Hall 1985) (see Blaut 2000 for a full discussion). In the latter case, the limits of the earth's carrying capacity have consistently been used to predict demographic disaster and to justify the lifeboat ethics of denying aid to the poor and disenfranchised (Malthus 1992; Robbins 1998).

Curiously, these arguments have never fully disappeared, and reemerge from time to time. Despite the remarkable absence of any evidence in support of either geographical determinism or Malthusian apocalypse, the arguments endure. Parleying his training in evolutionary physiology to the study of global history in the recent book *Guns, Germs, and Steel* (Diamond 1997), Jared Diamond has argued for example that the rise of the "West" in world history resulted from the East–West orientation of the Eurasian continental axis, which allowed domestication, innovation, and diffusion. Echoing determinists of past eras, Diamond invokes "ultimate factors" in his explanation of history, insisting on the simple geographical determination of society by environment.

So too, authors like Paul Ehrlich (1968), who endlessly warn of overpopulation continue to sell copies of their prophecies in the millions. These arguments also survive constant revision as predicted disasters fail to arise (Ehrlich & Ehrlich 1991).

In light of these uncritically accepted views, rigorous investigation of human–environment interaction has never been more urgent. To truly evaluate and understand nature–society relations, however, requires exacting work on daily production, human adaptation, and the complex interworkings of resource use and production. Such work is too rarely performed because it is difficult, time consuming, and filled with complexity that makes simple reductionist arguments difficult to defend. Yet that is the very work of Cultural Ecology, the investigation into human production of, and adaptation to, environment.

In the following chapter, I will define the field of Cultural Ecology and trace some of the historic threads in its diverse research trajectory. In the process, I hope to introduce some of the *dramatis personae* that have inhabited this eclectic field over the last century with no pretense to the comprehensiveness of the account; the players, thinkers, and fieldworkers are too many and diverse. Even so, I intend to describe the field's diversity and highlight its most captivating areas of research, finally arguing that despite its flaws, Cultural Ecology is a crucial tool for exploring the combined questions of contemporary development, global poverty, and worldwide environmental change, issues as pertinent now as they were more than a century ago.

Auspicious Beginnings – In the Field with a Russian Anarchist

In 1865, in preparing for an expedition to a largely unmapped region of northern Siberia, Geographer Peter Kropotkin utilized for navigation a map prepared by a Tungus hunter, drawn with knifepoint on tree bark. The map, he said "so struck me by its seeming truth to nature that I fully trusted to it" (Woodcock & Avakumovic 1990: 72). That expedition, like several before it, demonstrated to the young Russian noble – who would later come to espouse a progressive policy of social anarchism – "the constructive work of the unknown masses, which so seldom finds any mention in books, and the importance of that constructive work in the growth of forms of society" (Woodcock & Avakumovic 1990: 59–60). Performed on horseback and foot, ongoing expeditions brought Kropotkin into contact with farmers, herders, plants, animals, and landscapes, that were to form the empirical basis for his best known argument, that evolution rests upon collective intraspecies mutual aid, cooperation, and collective organization (Kropotkin 1888).

More fundamentally, Kropotkin's fieldwork, his respect for local knowledge, his interest in the relationship between production and society, all reflect the auspicious beginnings of human/environment research and the hallmark traits of Cultural Ecology (Turner 1989). First, Kropotkin's work focused on *production* as a key site of social-environmental process. By investigating how people make a living from the land, he reasoned, we might better understand nature/society interactions. "The means of production being the collective work of humanity" (Kropotkin 1990: 14), he insisted, they provide the most direct window into the mechanisms of evolution.

Second, Kropotkin's work was marked by rigorous *archival and field-based* empirical research. His book *Mutual Aid* is filled with detailed observations of plant and animal life in Siberia and Manchuria, but also with careful accounts of the organization of society in places ranging from Rome to early Russia, all reconstructed from historical and archaeological accounts (Kropotkin 1888).

Third, Kropotkin held an explicit concern for *marginalized and disenfranchised* communities. In these communities, he saw the survival and innovation of "institutions, habits, and customs" that despite persistent exploitation by landlords and the state, locals preferred to maintain rather than adopt problematic solutions "offered to them under the title of science, but [that] are no science at all" (Kropotkin 1888: 260–1).

Fourth, Kropotkin had a strong interest in the position and power of *traditional environmental knowledges*. Though a strong supporter of innovation and modernization, he believed the elements of progress lay in the existing knowledge and ingenuity of local communities (Kropotkin 1985).

Finally, like many Cultural Ecologists to follow, Kropotkin held a keen interest in landscape as a central focus of explanation. Indeed, his earliest and most comprehensive contributions to theoretical Geography involved exploring for evidence of long-term desiccation and topographic change (Woodcock & Avakumovic 1990).

Though this picture of research comes from across a gulf of more than a century, it provides a sketch of the fundamental questions that remain on the minds of Cultural Ecologists. Why do people do things the way they do? What accounts for the vast diversity of economies and human ecologies around the globe? How does development work? Why does it fail? What are the links and feedbacks between vast civilizations and the soils, plants, and nutrient systems to which they are connected? Turning vast questions into an empirical project, Kropotkin was among the earliest geographers to explore the nature/society relationship in a grounded way. These efforts would soon be followed by others.

Theories of Culture and Change – Steward and Sauer

In 1955, the anthropologist Julian Steward offered a similarly comprehensive theory to account for the development and change of cultures, one that took seriously the environmental systems in which people are embedded without deterministic models of cause and effect. Coining the term "cultural ecology," he explained that the culture core – that "constellation of features which are most closely related to the subsistence activities and economic arrangements" – marked the starting point for investigations into human behavior and group practice (Steward 1972: 37). Why are certain hunting community groups arranged into bands? Is it related to the demands of subsistence? Where this is not the case, what other ecological and cultural factors impinge? Cultural Ecological research was therefore centered on human adaptation ***to*** the environment.

In a parallel but somewhat inverse fashion, Carl O. Sauer wrote in 1925, that "this contact of man with his changeful home, as expressed through the cultural landscape, is our field of work" (Sauer 1965: 349). Eschewing the various forms of environmental determinism that had swept through Geography in previous decades, he sought to create a field-based method to understand the way humans carve their histories into the land. How do the landscapes of cultivation function ecologically and how have they been formed to suit the demands of producers? How might that change with the advent of new cultivars or a change in markets? In complementary distinction to Steward, Sauer's Cultural Ecology was centered on adaptation ***of*** the

environment. These two concerns and approaches would continue to define the field, both in philosophy as well as in terms of the mundane objects of study.

As later observers noted, this kind of work concerned culture at its most mundane and basic, and so perhaps its most universal (Murphy 1981). Explaining landscapes from human practice and human practice in an environmental context, it set the tone for much of what would follow. Cultural Ecologists would be interested in how people make a living in nature, how they adapt the landscape, and how their technology, labor, and knowledges link to complex environmental systems around them.

Adaptation – Exploring Human Capacity

The natural extension of this sort of thinking is to perform rigorous research into how people adapt to the environment, to spend time in communities undergoing change, and to explore the historical and archaeological records of past cultures searching for emerging adaptations. The resulting work on *adaptation* in Cultural Ecology seeks to explain how complex traditions and practices function ecologically. By explaining the ecological logic of a cultural event, like a festival, food system, or house type, adaptation research shows the endless variability and creativity of human life in nature.

In this way, otherwise mysterious or difficult to understand ways of doing things can be explained by virtue of their complex ecosystem functions, especially in cases where people are forced to make a living using simple tools in difficult environments. Agriculture on raised mounds can be shown to be an adaptation to soil moisture and temperature regimes in the tropics (Waddell 1972). Nomadic adaptations can be viewed as a highly functional way to spread risk and lower ecological impact, contrary to colonial and government efforts that sought to settle nomads (Johnson 1969; Sanford 1983). Large herd sizes and the culture of the "cattle complex," rather than being seen as irrational, can be viewed as effective adaptation to variability and herd mortality patters in semi-arid lands (Dahl & Hjort 1976).

The classic study in this area was Roy Rappaport's (1968) analysis of the livelihoods of the Maring people of New Guinea. Specifically, Rappaport sought to explain the complex, intermittently repeated, ritual behaviors of subsistence producers. He concluded that both periodic ritual warfare and pig sacrifice were the product of population cycles of both pigs and people, and that they interacted in complex metabolism to achieve equilibrium.

Another model study, Bennett's *Northern Plainsmen* (1969) is instructive both for its insights and its application to areas outside the traditional realm of underdeveloped contexts. Focusing his attention on farmers, ranchers, and indigenous people in Alberta, Canada, Bennett shows that each livelihood is an adaptation to a separate sphere or niche in a complex ecosystem – where ranchers adopt individuated practices, Hutterite farmers and land-poor Native Americans adapt cooperatively.

Moreover, such research suggests that adaptation is not simply a response to a single and isolated environment, since the spread and diffusion of adaptations is a hallmark of human practices. Diffusion research and variations in adaptation over space as well as time, became important strands of research showing the remark-

able adaptively not only of people, but of the species they used, transported, and established far from the sites of their original domestication (Sauer 1952).

Excesses in Functionalist Thinking and the Teleology of Adaptation

For all of its strengths, this adaptation approach overextended itself seriously, and suffered from a fundamental teleological flaw: if people do it, it must be adaptive. Indeed, the logic of adaptation is arguably that those cultural features evident in populations, including and especially those "unusual" ones, that differ from more generic practices must be environmentally functional. This line of thinking was exhausted most thoroughly by anthropologist Marvin Harris, whose global examples and catchy titles (*Cows, Pigs, Wars, and Witches* in 1974 and *Cannibals and Kings* in 1977 most notably) made him an influential thinker in the area of environmental anthropology (Harris 1974). He argued, for example, that the cow became sacred in India since it made sense for the provision of milk proteins and traction power for agricultural production (Harris 1966). With little of the hallmark methodological practices of Cultural Ecology, especially long-term fieldwork and archival investigation, this field of "cultural materialism," as it became known, promulgated dozens of similar hypotheses, explaining the vast complexities of diet, conflict, and marriage with reference to simple adaptive principles.

Such functional adaptation usually did not survive empirical evaluation. Exacting fieldwork on India's sacred cattle, for example, revealed a far more complex picture of the adaptive and maladaptive features of animal keeping. Questions of cause and effect in cattle protection became prominent in careful investigation (Simoons 1979; Freed & Freed 1981): do adaptive uses lead to taboos creating surpluses or does the surplus of animals lead to adaptive uses?

Even where rich exploration of adaptation was the rule, however, fundamental and troubling problems remained. As Roy Ellen simply explained, "showing how things work is explaining neither why they came about nor why they persist. It does not provide a causal explanation" (Ellen 1982: 193). Adaptation researcher Alexander Alland (1975: 69) similarly warned that the role of adaptation "should not be exaggerated or we run the risk of substituting 'just so stories' for scientific explanations."

And the reductionism of this form of functional explanation did indeed lead to bizarre and untenable conclusions. Vastly complex Aztec human sacrifice traditions, for example, were explained to have resulted from protein deficiencies for which human flesh was a crucial supplement. Even ignoring the fact that the maize–legume combinations of domesticates in the region during this period could easily have met protein demands of people, the dismissive reduction of such a complex political, economic, and cultural system to a matter of protein needs, was concluded to be unsatisfying by even the most ardent supporters of the approach (Winkelman 1998).

More fundamentally, exploring adaptation of varying communities does little to illuminate why certain forms of human ecology prevail, especially when the broader forces acting within and between communities is ignored. In the obvious case of Bennett's *Northern Plainsmen*, a troubling silence prevails as to why native peoples in the region are land-poor and low on capital *in the first place*. Are they simply seeking out an "ecological niche" of poverty? Or are more profound historical

power imbalances, land thefts, and conflicts part of the explanation? The obvious answer to these questions (yes), is made difficult in an approach centered on adaptation since even where people obviously respond to environmental signals, complex interactions at other scales (international, state, and community) condition and drive those responses (Trimbur & Watts 1976).

Even so, echoes of adaptation can be heard in strands of effective and illuminating research emerging in recent years. With increased concern on how people manage to thrive under ecologically and economically marginal and variable conditions in Africa (Mortimore 1989; Batterbury 2001), Latin America (Bebbington 2001; Rocheleau et al. 2001), and Asia (Robbins 1998), adaptation as a general line of inquiry continues to make sense (Batterbury & Forsyth 1999). While it remains short on explanatory power, by crediting the efficacy of environmental practices of local people, adaptation research helps to makes sense of the world.

Energetics and Systems Research – Putting a Number on Making a Living

Simultaneous to the emergence of interest in adaptive dynamics, more formalized and quantitative techniques of ecological assessment also began to thrive, and systems research in Cultural Ecology entered the computer age. Mirroring research in the science of Ecology, Cultural Ecologists sought a common metric through which they could track the metabolism of complex systems, which might include many species: humans, animals, and plants. A universal unit, they concluded, might include energy and nutrients. Using such common metrics, human social systems could therefore be compared in terms of productivity and efficiency.

In one prominent example, Bayliss-Smith compared the flow of energy between historical and contemporary farms in New Guinea, Polynesia, South India, England, and Soviet Russia in painstaking detail. He concluded that the highest output systems, the Soviet collective farm and contemporary English intensive practice, are far from the most efficient, a conclusion linked to the ecological price of fossil-fuel dependence.

The implications for this kind of work are especially evident for research into swidden (slash and burn) agricultural systems, where producers clear forest patches, burn the fallen biomass, and plant garden plots until the forest regrows into prohibitively thick secondary growth. Historically, colonial and development authorities described such systems as ineffective, destructive, and unsustainable.

Cultural Ecologists would reach rather different conclusions. As early as the 1950s, there was increasing recognition of the ecological similarities between swidden fields and the natural ecology of tropical forests (Conklin 1954). This work was followed by detailed and comparative case studies that showed that the biodiverse structure and physical canopy architecture of swidden cultivation sites made them miniaturized tropical forests (Geertz 1963). More formally, and working again among the Tsembaga of New Guinea, Rappaport documented the flow of solar and human energy in swidden cultivation. Measuring inputs in clearing, weeding, planting, and harvesting crops, as well as the biomass of crop yields, he concluded that swidden is far more efficient and ecologically stable than systems that depend upon high yielding varieties of cultivars and higher inputs (Rappaport 1975). Later

research amended many of the misunderstandings found in this early work – the structure and sustainability of swidden systems is by no means identical to that of the standing forest it replaces – but continued to explore the practice in ecosystemic terms (Dove 1983). Research further demonstrated that swidden systems, though frequently maligned as practices of isolated peoples, are often well-integrated into market economies (Pelzer 1978).

Again, however, despite the power of systems approaches and quantitative energetics, questions arise about explanation. To have described the flow of energy in a system is by no means the same as explaining why the system looks the way it does or why it might change. As a result, much of the enthusiasm for this approach has waned in the last 20 years.

But even as Cultural Ecologists have abandoned energetics, engineers have begun to champion the approach, with specific attention to the thermodynamic cost efficiencies of many practices (Bakshi 2002). In so doing, they seek to perhaps allow a final answer to compelling practical mysteries like: "paper or plastic?" Systems approaches in Cultural Ecology have poor explanatory power ("why do people do things the way they do?") but continue to represent a powerful tool for exploring processes ("how do varying ways of doing things differ ecologically?").

Agrarian Landscapes – The Geography of Practical Reason

Beyond the internal characteristics of such human ecosystems, a central concern for Cultural Ecologists, and one that is truly geographic in emphasis and execution, is the study of agrarian landscapes. This interest has led to sustained research on the way internal logics and practical constraints of making a living on the land give rise to recognizable signatures and patterns. Whether exploring the distribution of agrarian systems across the hills and plains of New Guinea (Brookfield 1962), following Swiss peasants on the tasks of their daily work through their carefully produced patchwork landscapes of field, pasture, and garden (Netting 1981, 1986), or examining the vastly complex human-made ecosystems of sugarcane, silkworm, and mulberry in China (Zhong 1982), all this work emphasizes the remaking of the landscape to solve the practical problems of production. Landscapes are shown to be fitted to meeting household goals and making possible complex livelihoods that balance demands of both the environment and the market.

Because few variables for explaining such landscape change can easily be tracked or measured, however, especially over long histories, Cultural Ecologists tend to rely on population to explain much of this change. The theory and methods of this approach to landscape research, therefore, reflect "demand driven" concerns. When population rises, Cultural Ecologists suggest that there is pressure for innovation and increased yields resulting in landscape modification and land clearing. When populations fall, the reverse occurs and land is left for fallow and regrowth into native vegetation. This focus on population follows directly from revelations drawn from Esther Boserup's *Conditions of Agricultural Growth* (1965), a universally read and discussed volume in the field. This thesis, and its carefully assembled reasoning, shows the capacity of humans to expand the production of food by modifying the conditions under which it is produced, thus drawing into question long-held assumptions about absolute limits for populations.

However attractive and well-worn as such models may be, there are many forces and variables acting on farm households that remain unconsidered. Beyond population, commodity prices, political institutions, and a wide range of ideologies and traditions impinge on the way people make a living, few of which figure prominently in Cultural Ecological research. The reduction of explanation to demography therefore bedevils much otherwise excellent research into the production of landscape. But this approach nevertheless allows the formulation of many key questions and hypotheses for the study of agrarian change. Research has followed to explore the conditions under which intensification occurs, and the logic behind the acceptance and rejection of green revolutionary technologies including high yielding varieties of cultivars and important inputs like fertilizer and other agricultural chemicals (Turner & Brush 1987).

Exploration in this vein also continues to thrive in research on past environments, breaking new and important ground in both Geography and Archaeology. In particular, research shows the vast and complex alterations of the landscape made by pre-Columbian peoples (Butzer 1992; Doolittle 2000; Denevan 2001). Such research not only demonstrates the profound influence of Native American peoples on the landscape, underlining the adaptivity and creativity of these traditions, it further serves to dispel the myth of a "pristine" and Edenic pre-Columbian landscape, a misconception with no small ongoing influence in the popular, scientific, and political imagination of the Americas (Sluyter 1999).

Beyond Land and Water – The Limits of Cultural Ecology

But these many branches of research began to reach their limit in the last few decades of the century, as the landscapes of both research and subsistence began to change dramatically. In 1971, Barney Nietschmann set off for the Miskito coast of Nicaragua, a place where he had worked for several years prior, living with the Miskito Indians of Tasbapauni village to unlock the mysteries of adaptation using the techniques of energetics and ecosystem analysis. Paddling a dugout canoe back to his field base, however, he found a culture in flux, with scarcities of crucial foods, especially sea turtle, accompanied by an increasing pattern of commodification of land, labor, and crops.

Wishing to explain the changes he witnessed, Nietschmann was forced to transcend the traditional mode of explanation in Cultural Ecology. The explanation for change lay outside the Miskito village, and it was tied closely not only to increasing articulation with global markets, but also to the relative lack of power the Miskito held in regional and national Nicaraguan politics. Convincing explanation, as summarized in his classic account *Between Land and Water* (1973), would require a *political* as well as a cultural ecology. Moreover, the urgency of the problems facing the Miskito would lead Nietschmann in the following years to join the people of Tasbapauni in the struggle for rights to the land, water, plants, and animals that they had husbanded for centuries by establishing protected areas for productive use by the community.

Throughout Cultural Ecology, similar questions are being raised concerning the limits of the approach, and the larger questions that demand interrogation. Why, for example, should the household be the "natural" unit for analysis, when

within the household, significant differences in knowledge and power between men and women directly cause and respond to social and environmental change (Rocheleau 1991)? Why should explanations of intensification remain fixed in local and regional patterns of demography when falling commodity prices and contractualization of peasant labor have driven intensification in agriculture for decades (Pred & Watts 1992)? Why should all cultural meanings and systems of knowledge serve ecological functions when disparate knowledges drive political schism both between and within subsistence groups (Robbins 2000)? Where the goals of local people exceed the opportunities of their locality, might explanations for ecological change lie in transnational processes of migration and remittance (Jokisch 1997)?

Perhaps more profoundly, however, Cultural Ecology faces the more general problems posed by postcolonial politics. What does it mean to have wealthy North Americans, Europeans, and Australians dwelling in villages of the Global South, seeking essential truths amongst "simple" people? Much has been said about this last problem, with accusations that the Cultural Ecological project is an extension of the grim, colonial, and racist projects of the previous century, which though usually benevolent in intent, were essential in the domination of what is now the underdeveloped world (Grove 1990; Bonneuil 2000). This charge has some resonance, especially in examining the most essentialist and reductionist work and its service to more global economic and political forces (Hyndman 2001).

Even so, few defenders of the rights, knowledge, and dignity of local peoples are more outspoken or knowledgeable than Cultural Ecologists. Indeed, many like Nietschmann, were so thoroughly transformed in their political consciousness by their time and work with local producers, that they apprenticed themselves to local political organizations, seeking to aid in the protection of local resources against the aggressive advances of "first world" economies and political forces.

As a result, a new and growing field of interrogation – Political Ecology – has emerged alongside Cultural Ecology, to more carefully examine the institutional, economic and power-laden contexts within which people make environmental decisions. The acorn, however, does not fall too far from the tree; political ecologists continue to be trained in Cultural Ecological theory and methodology and the efforts of researchers in both fields continue to shine light into shadowed questions that have been long neglected.

Forgetting the Lessons of Cultural Ecology: Diamond's Determinism and Ehrlich's Fatalism

The field of Cultural Ecology, despite its limits, therefore provides an empirical tapestry from which to evaluate a boundless range of important questions. By casting culture and nature together in an integrated way, Cultural Ecologists continue to direct attention both towards human adaptation ***to*** the environment and human adaptation ***of*** the environment.

First among the important sets of questions such an approach informs, are those raised by broad-brush ecohistorians and demographers like Jared Diamond and Paul Ehrlich, who have captured the public imagination by postulating that development is determined by the axis of continents and delimited by the growth of populations.

However compelling the simple logics of claims like these, rigorous work in Cultural Ecology demands their rejection.

Claims by Diamond, which rest on the limits produced by topography and climate, insisting for example that latitude and semi-aridity in the New World provided a barrier to the diffusion of agriculture northwards and therefore retarded Amerindian development, evaporate in the face of research. The diversity of pre-Columbian cropping systems across the Americas shows the staggering number of environments in which agriculture can emerge and thrive and across which it has diffused (Whitmore & Turner 1992).

So too, the dependency of "dominant" economies on the environmental knowledges and practices of other "failed cultures" undermines any such determinist argument. As evidence from research on rice cultivation by slaves in colonial America by Judith Carney (2001) shows, West African production knowledges and cultivars were brought to the New World by enslaved people. It is their ecological understandings of flooded and dryland rice production systems that was fundamental to the establishment of the rice economy, the major export crop of the antebellum Civil War period upon which future "cultural dominance" was leveraged. By showing the global scale of interactions prerequisite to domination, this kind of work undermines any hope of identifying a "western" agrarian history isolated from the incorporation of other knowledge systems around the world. Adaptation to the environment is a universal fact of global history, and the dominance of the west, to the degree that such a thing is true, is a product of global adaptations and coercions, not regional limits.

Claims of Ehrlich and others, on the other hand, that the natural limits of ecological systems fix and limit global populations, are rendered equally problematic by Cultural Ecological investigation. The vast boom and bust cycles of population expansion and contraction from prehistory to the present (Butzer 1990; Turner 1990), when investigated in careful detail, show complex relationships with the resource base, but continue to demonstrate the incredible capacity of humans to exist and thrive through adaptation of their environments. This is not to argue that Cultural Ecologists do not acknowledge varying carrying capacities under certain circumstances (Bernard et al. 1989), but the limits to growth are seen as the product of complex mutual adaptations between social and ecological systems, not simple – and easily known – limits. Again, determinism and fatalism are subverted by careful examination of adaptation, environmental knowledge, strategic behavior, and the inextricable linkages between social and ecological systems.

As a result, Cultural Ecology is poised to address the most far-reaching and important questions facing people today. How does articulation with globalizing markets influence environmental decision making and production of natural environments (Barham & Coomes 1996; Godoy et al. 2000; Godoy et al. 2000)? How are individual production decisions influenced and how do they, in turn, effect global land cover transformations (Klepis & Turner 2001; Turner et al. 2001)? These questions drive the next generation of Cultural Ecological research.

In the broadest sense then, Cultural Ecology teaches critical conceptual lessons that determinists and neo-Malthusians alike have failed to learn: Geography is a *process* not a preexisting, *a priori*, "natural" *condition*. Geography is *created* through the interaction of human and non-human agents, each mutually adapting

and interacting over varying spatial and temporal scales. Geographies are *produced*, and are neither destinies nor prisons. In an era of underdevelopment and uneven distribution of basic needs, where many people face the daily prospect of misery even while resources are abundant and food is plentiful, such a lesson is all the more pressing. Thus Cultural Ecology is as timely as ever, providing a research platform for examining the myriad ways people produce and are produced by non-human actors in a complex world.

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