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ENVIRONMENTS AND ENVIRONMENTALISMS IN ANTHROPOLOGICAL RESEARCH: Facing a New Millennium

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■ **Abstract** With the concept of environment as its organizing motif, this review focuses on two general fields of anthropological environmental research: ecological anthropology and the anthropology of environmentalism. Analysis of the complementary political and human ecology research programs is structured around four theoretical and methodological areas: transformations in the ecological paradigm, levels of analysis and articulation, the use of history, and the reemergence of space. Ethnographic analyses of the social forces of environmentalism point to civil society as an emerging and important protagonist with regard to environmental issues, and these social forces are reviewed within the categories of environmental movements, rights, territories, and discourses. A final prospective section looks at contemporary urban, viral, virtual, and warfare environments and postulates that the combination of empirical and political approaches can provide for anthropology an expanded role, one that has strong bioethical implications, in environmental debates and issues.

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INTRODUCTION

For the past two decades, anthropological research on environmental issues has been part of a broad public sphere that has witnessed a sharp increase in environmental concerns and activism throughout the world. That has, in turn, been accompanied by significant interrelational changes between humans and their environment, resulting from the use of new communication and biological technologies. Given the breadth and complexity of environmental issues, academic disciplinary boundaries are easily crossed and new sites of transdisciplinary research have emerged that combine natural and social-scientific approaches in unique ways. Anthropology, however, has specific contributions to make to the wider environmental research field.

In common usage, the term environment is often used as a synonym for nature (i.e. the biophysical or nonhuman environment), but this usage creates great conceptual confusion because the environment of a particular human group includes both cultural and biophysical elements (Rappaport 1979). By extension, the organism/environment dynamic, which is relational (Levins & Lewontin 1985) and perspectivist (Viveiros de Castro 1996), is often erroneously fused with the nature/culture dualism, which is essentialist and substantive. The concept of environment as a research tool allows for the delimitation of a wide range of socionatural units of analysis (Smith & Reeves 1989) that transect the nature/culture division orthogonally.

In this context, the term environmentalism refers to an explicit, active concern with the relationship between human groups and their respective environments. Although "environmentalist" usually refers to political activists, the term can reasonably include persons and groups that are directly involved with understanding and/or mediating this relationship. Thus, anthropologists and other social scientists who are involved in environmental research can be considered as representing the environmental wing of their respective disciplines.

Current environmental research in anthropology falls into two major areas that have distinct methodologies and objects of study. The first, called ecological anthropology, uses ecological methodologies to study the interrelations between human groups and their environment. The second, called the anthropology of environmentalism, uses ethnographic methodologies to study environmentalism as a type of human action. These two areas provide the organizing motif for this review. It concludes with a prospective look at new environments and their corresponding new environmentalisms that are gaining importance in the world.

This review is indicative, rather than exhaustive, in that it analyzes representative or insightful works that exemplify significant new trends or areas of interest in anthropological environmental research. Special attention is given to work that concerns the tropical rainforests (particularly the Amazon) because of the importance these biomes have to planetary environmental issues. Publications with important transdisciplinary dialogue and debate by practitioners in particular fields of study are referred to throughout the review.

ECOLOGICAL ANTHROPOLOGY

Political and Human Ecology

Nearly two decades ago, Orlove (1980) provided a critical review of the literature on ecological anthropology in which he noted the advance of "processual ecological anthropology" as a stage that was gradually supplanting neofunctionalist approaches. One influential current within processual ecology is "human systems ecology," initially developed by Bennett (1976), whose long-term work with agricultural systems led him to the notion of "human ecology as human behavior," whereby cultural elements are translated into active behavioral tendencies involving "responses and adaptations made by real people in real-life contexts" (Bennett 1993:45–46).

During the 1980s, actor-based, decision-making models used in processual ecology were combined with political economy approaches used in anthropology (see Roseberry 1988), which led to the emergence and consolidation of a significant research program, newly termed political ecology. An early theoretical outline of political ecology (see Schmink & Wood 1987) was applied to the southern Pará region of the Brazilian Amazon, where a host of "contested frontiers" were uncovered involving disputes between multiple social actors over their definitions of, access to, and control over natural resources (Schmink & Wood 1992). In an ethnographic analysis of the local struggles between farmers and ranchers over land and water in a peasant corporate community in northwestern Mexico, Sheridan (1988) develops a political ecology analysis that places these struggles within the context of intervention by regional economic interests, seasonal water shortages, and the mediation of government bureaucrats at local, regional, and national levels.

One study (Stonich 1993) places the agency of rural peasants at the forefront of environmental destruction in southern Honduras based on their "strategies for survival" and, at the same time, it reveals the larger developmentalist context within which these strategies and degradation occur. In 1994, the *Journal of Political Ecology* was launched at the University of Arizona with the goal of contributing "critically and substantively to an increased understanding of the interaction between political and environmental variables broadly conceived" (Greenberg & Park 1994:8). In just a decade, the political ecology research program in anthropology developed a high level of empirical (DeWalt 1998) and political (Hvalkof & Escobar 1998) sophistication.

Geographers were also developing a research program in political ecology during this time (for an early and influential theoretical statement see Blaikie & Brookfield 1987). Furthermore, geographers elaborated a political ecology, which they termed liberation ecology, that incorporates contemporary poststructural theory on discourse and meaning (see for example Peet & Watts 1996). Bryant & Bailey (1997:192), however, are hesitant to take the "turn to discourse," since it "may result in a turn away from the material issues that, after all, prompted the birth of Third World political ecology in the first place."

In 1988, the University of California at Santa Cruz initiated a new publication that helped consolidate a neo-Marxian perspective to political ecology research. The journal—*Capitalism, Nature, Socialism*—subsequently entered into an international collaboration with three sister journals published in French, Italian, and Spanish. The notion of the "second contradiction of capitalism" (O'Connor 1998:158–77) is that capitalist relations of production and forces of production impair or destroy their own social and material "conditions of production." Consequently, this notion places contemporary environmental crises within the framework of the worldwide expansion of capitalism and offers an alternative reading of the emergence of the environmentalist movement as a potential social barrier to capitalist accumulation. One innovative work (Leff 1995:21) asserts that "the functional structure of ecosystems, insofar as they determine the productivity of natural resources, affects the conditions of production of value and surplus value."

Flourishing human ecology studies coincided with the consolidation of the political ecology research program and have moved in many new and fruitful directions. The interdisciplinary journal, *Human Ecology*, proved to be an important forum for a host of anthropological studies that adopted ecosystem approaches (see also Moran 1990) dealing with the specific cultural and biophysical requirements of foragers, pastoralists, and subsistence and intensive agriculturalists (Bates & Lees 1997). Another key contribution to these studies is the extensive, cross-cultural research on households—understood as both agricultural and social institutions—carried out by Netting (1993). Based on numerous empirical studies, Netting proposes theories regarding issues such as property rights, land use, population growth, food production, and sustainable agriculture. Similarly, a detailed ethnography by Sillitoe (1996) of how the Wola of Papua, New Guinea, manage and shape their wet, steep terrain is insightfully combined with essential scientific information concerning climate, soil types, land resources, and biotic factors.

Within the broader field of ecological anthropology, political and human ecology can be considered as complementary research programs that have different transdisciplinary emphases. Anthropological political ecology has established a dialogue with geography and political economy and has developed a strong critical approach in which concepts such as claims, rights, power, and conflicts predominate. Anthropological human ecology has established a dialogue with the biological sciences and has developed a strong empirical approach in which concepts such as energy flows, knowledge systems, subsistence, and adaptation pre-

dominate. The power of their complementariness lies precisely in the union of the critical with the empirical approach. In addition, the ecological methodology common to both confronts them with similar theoretical and empirical problems, which are addressed in the contexts of (*a*) paradigmatic shifts, (*b*) levels of analysis and articulation, (*c*) the use of history, and (*d*) the reemergence of space.

Transformations in the Ecological Paradigm

The nature/culture dualism has provided the baseline for the greater part of scientific thinking throughout this century and has strong, often unrecognized, methodological and epistemological implications for research, including the separation of the natural from the social sciences, both institutionally and intellectually. New ecological research is engaged in the difficult, challenging process of finding practical ways of bridging this divide, and anthropology, which has always worked on both sides of the nature/culture fence, is strategically situated to contribute to this effort. Unfortunately, the radicalization of the nature/culture dualism during the 1990s has unduly compromised this strategic position by provoking the so-called science wars, which have involved a great deal of conceptual mudslinging and which have even led to formal splits in university anthropology departments. As a result, the development of an ecological theory that incorporates natural and cultural dimensions within a single, broad paradigmatic framework is more urgent than ever. It is, in fact, being hammered out far from the battlefield of the science wars by anthropologists from many countries working with peoples and their environmental problems throughout the world.

One of the primary problems faced by ecological theorists is how to address both natural and social phenomena within a single explanatory framework. Environmental historians have been particularly sensitive to this problem. Dean (1995:9), in his history of the Brazilian Atlantic forest, treats that forest as a "natural subject"; Worster (1993:123–34) undertakes the difficult task of "thinking like a river." In fisheries research, the actions of scallops are explained as a crucial element in determining the outcome of certain research projects (Callon 1986). These works point to the notion of natural agency, in which the actions of the biophysical world must be incorporated into ecological analysis. Serres (1995) maintains that the reincorporation of natural agency is a major challenge facing contemporary philosophy, whereas Gellner (1995:252) argues that the social construction of reality "needs to be complemented by the natural construction of society."

This problem is approached via the symmetry, or equivalence, postulate developed by Barnes & Bloor (1982), which has been most fully implemented in the field of the sociology of knowledge. In a study of technological change, Law (1987:114) argues that "to treat natural and social adversaries in terms of the same analytical vocabulary" allows the researcher "to discover the pattern of forces as these are revealed in the collisions that occur between different types of elements, some social and some otherwise." Vayda & Walters (1999) maintain that ecological research should not make a priori judgments concerning the causes of environmental change but must be willing and able to assess all possible factors, whether

of biological or social origin or, as is usually the case, of the complex and contingent interaction of both. Latour (1993) has applied the notion of symmetry to anthropology as a means of bridging its two great divides, that of nature/culture and that of us/them.

In this context of epistemological symmetry, the following question arises: Which discipline is the most indicated to translate natural agency into concepts for use in analysis? Yearley (1993) explores a series of problems that arise when science is used as a "stand-in for nature." In spite of these difficulties, the natural sciences remain a prime candidate for this task because they have been studying natural agency systematically and in great detail for a long time (Murphy 1994). If one wants to understand the agency of a volcano, questioning a volcanologist is not a bad place to start, although this need not eliminate seeking out folk knowledge, and particularly information from people who live in regions of frequent volcanic activity. Knowledge of nature through artistic expression is also revealing—consider Julio Cortázar's (1964) short story of an existential encounter between a human being and an *axolotl*, or Plumwood's (1996) narration of her episode as prey for a crocodile—and can be useful in understanding natural agency. The select use of different types of knowledge can lead to a postpositivist position that retains empiricist (see Jackson 1989) and realist (see Morris 1997) foundations in which natural scientific knowledge plays a leading, but not exclusive, role in representing natural agency.

Epistemological symmetry must confront the realist condition of ontological asymmetry. The fact that all elements are operating within a single symmetrical field does not mean that they are operating according to the same principles or that the power relations between them are symmetrical. The incorporation of natural agency into ecological analysis does not require that the biophysical world be anthropomorphized. On the contrary, recognizing and incorporating the distinctive type, structure, and power of natural agency is one of the key methodological challenges of ecological analysis. Biological and geological processes cannot be subsumed under discourse theory, just as political and cultural change cannot be subsumed under the concept of natural selection. Furthermore, the multiplicity of social agencies is supplemented by the multiplicity of natural agencies. Every animal species has its own ontology (Ingold 1992) and other natural forces, whether ocean currents, black holes, atoms, or the sun, have their own type and structure of agency.

Within the context of multiple agencies, hybrids of human and natural agents, whether they are cyborgs—described succinctly by Haraway (1992:42) as "compounds of the organic, technical, mythic, textual and political"—or quasi-objects (Latour 1993), must be included in ecological analysis and the respective structure of their agency taken into account. A problem emerges, however, when all agents are understood as hybrid, because their distinctive natural and social agencies are then eliminated as a result of their fusion. Rabinow (1992:241–42), for example, introduces the concept of biosociality, in which "nature will be known and remade through technique and will finally become artificial, just as culture becomes natural." McKibben (1989) notes that large parts of nature have been

modified or invaded by human action, which characterizes the current epoch as heralding the "end of nature." Yet there are many things in the universe either that have no human imprint or that have been touched by humans and yet still retain their distinctive natural agency. One good example of a natural-cultural hybrid could be a solar panel, but the sun, an essential aspect of the hybrid, is clearly a natural agent that has not been modified by humans.

Scientific understanding of the ecological dynamics of natural systems has also undergone changes because the earlier trends in natural ecology that emphasized equilibrium, homeostasis, and stability have, beginning in the 1970s, gradually shifted toward new emphases on disturbance, catastrophe, and non-equilibrium dynamics. Rappaport (1990:45) cautions, however, that "attention to disorder and disturbance does not preclude attention to order and regularity." Regarding the interface of natural and social systems, Holling & Sanderson (1996) postulate a disharmony that is founded in the notions of management and purpose: Management occurs in human societies, particularly in modern ones, where it demonstrates a strong tendency to maximize a narrow range of values, but it is not common in natural systems; and purpose, in which cross-generational social learning operates as an important variable in social systems, is unknown in natural systems. Early on, Bateson (1972) called attention to the dynamics that result from the union of conscious purpose, which tends to be linear, with the circularity of cybernetic and biophysical systems. He found that this interaction produces neither predictability nor randomness but rather stochastic processes within which both random and selective forces are operating (Bateson 1979). Recently, the concepts of autopoiesis, self-organizing systems, and complexity have served as powerful organizing motifs in research on stochastic dynamics (Jantsch 1980, Prigogine & Stengers 1984, Kauffman 1991).

These developments have led to radical questioning of the established notions of adaptation (Singer 1996) in the search for ways to effectively bridge the nature/culture division. Political and economic processes must be incorporated into the biophysical adaptive situation, not only to provide historical specificity to human/environment interaction, but also to identify factors that "perpetuate unequal adaptive potential" (Thomas 1998:64). In such a context, questions of, for example, whether the system of slavery implanted in the Americas was efficient as a mechanism for plantation owners adapting to New World ecosystems, or whether the underclass in contemporary societies adapts to hostile urban environments of violence, drug abuse, and structural unemployment, reveal the serious shortcomings of a strict adaptationist program. The theoretical and substantive evaluation of adaptation is at the core of the efforts of biological and cultural anthropologists toward "building a new biocultural synthesis" (Goodman & Leatherman 1998).

Global, Regional, and Local Levels of Analysis and Articulation

The delimitation and use of multiple levels of analysis, where each level demonstrates a degree of internal articulation, has a unique set of agents, and operates

according to its own dynamic, is providing new insights into the relationship between human groups and their environments. In anthropological ecological research, different kinds of generalizations are obtained from different levels of analysis (Bennett 1976). In biological terms, the distinction has been made between "ecosystem people," whose subsistence is tied to particular local-level ecosystems, and "biosphere people," who draw their support from resources obtained at a planetary level (Dasmann 1988).

When the planet is the environment of analysis, humanity is the population of study for anthropologists. Although such a large and complex environment involves enormous methodological and empirical difficulties, it is often the only adequate level of analysis for such environmental problems as the increase in size of the hole in the ozone layer, global warming, and the biophysical and social impacts of the El Niño ocean current. Human ecology research on global climate change considers the impacts of this change on regional biocultural systems (Gunn 1994) and the human causes of these changes (Stern et al 1992). Research on deforestation and subsequent secondary successional regrowth in Amazonia has benefited from new techniques that combine planetary-level information obtained from satellites with local-level knowledge derived from onsite interviews and observation (Moran & Brondizio 1998). In general, the use of satellites and other remote sensing devices, including geographic information systems technology, provides a host of new possibilities for anthropological ecological research, particularly in the area of land-use patterns and changes (Conant 1990, Guyer & Lambin 1993).

Global-level phenomena have become increasingly important in political ecology research because of the planetary dimension of many environmental problems and issues and the recent intensification (Harvey 1989) of long-term processes of globalization (Wolf 1982). Altvater (1993) undertakes an energetic analysis of the world economic system whereby the pillage by multinational corporations of islands of syntropy—highly ordered geological areas such as oil deposits, coal mines, or gold veins—as a means of increasing their production results in the global export of entropy. Durham (1995) developed a model of the political ecology of deforestation of tropical rainforests in Latin America that includes one positive-feedback loop that corresponds to capital accumulation, which generally occurs at national and global levels, and another that is linked to impoverishment, which primarily is a local and regional phenomenon (see also Rudel & Horowitz 1993, Sponsel et al 1996).

The increasing relevance of global-level phenomena to human groups changes the very meaning of the local. On the one hand, local presence of global phenomena produces a situation described as "glocality" (Robertson 1995). On the other hand, the manner in which social actors behave and conduct local politics changes when global influences are present. In fact, not only is the notion of what is local an issue, the determination of who is best situated to represent local groups also has become an issue, as exemplified in the case of different Amazonian social agents (Ribeiro & Little 1998). O'Connor (1998:299–305) suggests that the slogan "think globally, act locally," which orients both the Greens and the

leftist social movements, should be supplemented with the slogan "think locally, act globally," in order to foster a viable and effective "international red green movement."

The new interest in global-local dynamics should not obscure the crucial role played by intermediate regional and national levels of analysis and articulation in the intricate processes of mediation and linkage of local and global levels. A study of a regional market system in Western Sudan employs four different levels of analysis in order to capture the intricacy of the market places, channels, and strategies that comprise the system (Reeves 1989). Ribeiro (1994) shows how a major hydroelectric dam on the Argentine-Paraguay border fails to promote development as a result of the unequal distribution of power and differing degrees of articulation of transnational, national, regional, and local levels of agency. The conflicts between locally based (often indigenous) nations and the official state over control of and access to natural resources are the source of what Clay (1994) refers to as the twentieth-century "resource wars." These conflicts also highlight the differing cultural and political bases of distinct levels of articulation.

The difficulties in delimiting distinct levels and in identifying the agents and dynamics internal to each are compounded by the need to theorize about the relationship between levels and to make it operational. DeWalt & Pelto (1985) provided a good introduction to these issues when they outlined a methodological framework for linking micro with macro processes in a micro-macro nexus (Bennett 1985). Under the influence of new developments in chaos and complexity theory, recent work is positing the metaphor of "fractalness" as a way of ethnographically detecting the irregular, asymmetrical power connections that unite social actors who operate at different levels of social scale and whose actions often produce unpredictable results (Little 1996). In this regard, Harries-Jones (1998) makes the additional point that cross-level political actions must be combined with the cross-scalar dynamics of natural systems.

Environmental History and Historical Ecology

An explicit concern with the history of ecological interrelations has led to the development of separate fields of environmental history (see Worster 1988b) and historical ecology (see Balée 1998), which roughly correspond to the political/human ecology division outlined above, which have distinct transdisciplinary emphases, and which have their respective journals of debate: *Environmental History Review* and *Historical Ecology*. A third term, ecological history, is also used to describe this area of research (Cronon 1983, Gadgil & Guha 1992, Radding 1997). All these terms describe a type of research that is interested in "deepening our understanding of how humans have been affected by their natural environment through time and, conversely, how they have affected that environment and with what results" (Worster 1988a:290–91).

Key insights derived from historical research in ecological issues have been provided by a reevaluation of the past impact of human beings on landscapes previously considered as pristine or as landscapes only minimally modified by past inhabitants, including specific indigenous peoples or unknown Paleo inhabitants.

Certain environments previously thought of as natural are now known to be artifactual landscapes that were created, in part, by human societies of the past and that include, in the case of Amazonia, agricultural fallows, anthropogenic savannas, babassu palm groves, and sporadic, highly fertile sections of soil (Balée 1992). Not all such impacts, however, have been beneficial to human populations, nor have they necessarily been biophysically innocuous. Pyne (1993) provides a historical review of the widespread use of fire as an environmental management tool in different continents beginning from the Late Pleistocene, with major consequences for subsequent development of the burned ecosystems. Simmons (1993) documents how, in numerous regions of the earth, forest clearance, overhunting, overfishing, introduction of exotic species into ecosystems, and soil erosion from agriculture have all been the result of millenary human activities that have modified the biophysical environment in innumerable ways. Recent archeological and historical debates concerning the role of deforestation in the eclipse of the Late Classic Mayan Copan state (Abrams et al 1996), environmental degradation within the Roman Empire (Hughes 1994), and the deforestation and soil erosion caused by early inhabitants of Easter Island (Bahn & Flenley 1992) represent still other results of this type of research.

Islands provide a biophysical laboratory for historical human ecology and archeological research to the extent that they contain microcosmic histories of natural millennial processes and provide clear geographic and social-scale parameters for understanding these histories (Kirch 1997). With the study of islands of different sizes (see Dewar 1997), new possibilities are emerging for developing long-term models of the changes in biophysical environments and the differential impacts of humans on those environments over thousands of years—models that can contribute to the creation of planetary-level models.

Ecological researchers must confront enormous methodological difficulties if they are to understand the historical conjunction of geological, biological, and cultural temporalities, which have temporal scales that range from billions of years in the first case, to millions in the second, and thousands in the third. For example, the dynamics of frontier expansion in Ecuadorian Amazonia that involve oil development, colonization, deforestation, and conservation activities include at once the geological time frame of the formation of underground oil deposits, the biological time frame of the establishment of world-record levels of plant and animal diversity, and the cultural time frame of developmentalist frontier expansion, and have generated such responses as the depletion of oil deposits, reduction of biological diversity, and social stratification (Little 1992).

The notion of imperialism, whether of the ecological (Crosby 1986) or Green (Grove 1995) variety, has been used to describe the biophysical dimension of European expansion. Based on a detailed chronicle of the biological expansion of Europe throughout the globe over a thousand-year period (AD 900–1900), Crosby (1986) argues that biogeographical factors were crucial to the success of European imperialism, particularly regarding the introduction and ever-expanding use of Old World plants and animals in the Americas and Australia. Grove (1995: 486), in a detailed history of the territorial expansion of European powers

between 1600 and 1860 and the scientific study of the impacts of that expansion on tropical islands, documents how modern environmentalism "emerged as a direct response to the destructive social and ecological conditions of colonial rule."

Territory, Place, and Landscape

The concepts of territory, place, and landscape have served to reintroduce geographical space as a significant factor in ecological research. Work with foragers, fishers, pastoralists, and peripatetics has demonstrated how human territoriality has many motivations and is contingent upon different sets of circumstances (Casimir & Rao 1992). Malkki (1992:24) shows this in her work with refugees and exiles in Burundi and Tanzania and notes that "people are chronically mobile and routinely displaced, and invent homes and homelands in the absence of territorial, national bases." Almeida (1994) refers to a "war of the maps" in drawing a sociopolitical map of the Carajás region of Brazilian Amazonia in which the ethnographic information provided by marginalized populations is incorporated directly into the map, thereby revealing the overlapping and contested claims of all the residents of this region. These and other works on human territoriality move away from past ethological analogies and environmental deterministic approaches by developing ecological analyses that view all peoples, regardless of societal scale or ecosystemic constraints, as having the potential for territorial behavior.

The notion of place has also emerged as a means of situating peoples in contemporary social and environmental conflicts. Dirlik (1998) argues that place consciousness has strong political dimensions not only for the critique of universalist pretensions of development but also as a means of directly confronting the operations of global power. Similarly, Rodman (1992:640) sees place as a "politicized social and cultural construct" and Appadurai (1996) refers to the processes of the "production of locality." Tuan (1996) shifts attention from the psychological and social foundations of local places to the notion of "cosmos" as the cosmopolitan side of culture that offers a potential liberating counterpart to the dangers of provincialism and bigotry often found in the "hearth."

Landscapes—defined by Crumley (1994:6) as "the material manifestation of the relation between humans and the environment"—represent another means of introducing geographical space into anthropological analysis, where it can serve as a "laboratory of past human choice and response in which the effects of environmental change can be palpably understood" (Crumley 1994:7). An ecological understanding of landscapes involves analysis of the knowledge systems, productive practices, and religious rites that local peoples have developed over the course of centuries as a means of interacting with and gaining sustenance from their biophysical environments.

The spiritual relationship of Native American peoples in the United States to sacred centers at specific geographic sites unites religion and spatiality (Deloria 1994). With religious landscapes coming to the fore throughout the world, the new and expanding field of spiritual ecology brings into the ecological realm the

themes of sacredness and spirituality (Kinsley 1995, Gottlieb 1996), themes that are being explored in a new journal, *Worldviews: Environment, Culture, Religion*, founded in 1997. An aesthetic relationship with the landscape is also important and is exemplified by the Temiar peoples of the Malaysian rainforest who inscribe in their songs crucial forms of knowledge of their landscape in a manner that serves to "map and mediate their relationships with the land and each other" (Roseman 1998:111).

Ethnoscientific research has expanded remarkably over the past two decades, and ethnospecialities have developed in botany, zoology, entomology, ichthyology, agronomy, and pharmacology. Perhaps ethnobotanical research has experienced the fastest growth and international organization (see Posey & Overal 1990) and has attained a high degree of sophistication. One example is provided by Balée (1994) in a treatise that combines an extensive botanical description of local plants with a detailed analysis of the complex system of plant use and activity and forest management of the Ka'apor of Brazilian Amazonia. In the area of development, Ploeg (1993) shows how a precise knowledge of specific plots of land is crucial in the cultivation of potatoes for local farmers in the Andean highlands. Redford & Padoch (1992) document how both indigenous and folk knowledge and practices offer models of sustainable resource use in neotropical forests. The use of indigenous and other local knowledge systems has, for academia and development, important dimensions that involve the difficult process of brokering between local and Western scientific knowledge systems as a means of finding innovative, location-specific solutions to new development and environmental problems facing the world today (Sillitoe 1998).

THE ANTHROPOLOGY OF ENVIRONMENTALISM

The many environmental problems that have emerged from the multiplicity of interrelations between humans and their environments have been accompanied by a concomitant surge in environmentalisms, each with their respective environmentalists. The ethnographic analysis of and political involvement in these many environmentalisms on the part of anthropologists and other social scientists have generated, during the past two decades, a field of study in its own right. In this section, the pertinent literature is analyzed in terms of environmental movements, rights, territories, and discourses.

Environmental Movements

The study of social movements with environmental concerns has expanded the notion of environmentalism in anthropology to include not only explicitly environmentalist nongovernmental organizations (NGOs) in the northern hemisphere, but also a large number of movements in the industrializing nations of poor or marginalized peoples that are struggling with such environmentally based issues as control over and access to natural resources, encroachment on their

lands and livelihood, and protests against environmentally destructive development projects. The concept of the environmentalism of the poor developed by Martinez-Alier (1991) has been applied to India by Guha (1997:19–20), who mentions situations that have "pitted rich against poor: logging companies against hill villagers, dam builders against forest tribals, multinational corporations deploying trawlers against artisanal fisherfolk rowing country-boats."

Meanwhile, women's environmental movements tend to arise when gender is a determining factor in issues involving the division of labor, access to natural resources, and property relations in ways that are disadvantageous to women (Carney 1996). In efforts to maintain existing rights or to resist new policies that seek to extinguish them, the emergence of women's resistance movements that are directly related to environmental issues has generated the new fields of feminist political ecology (Rocheleau et al 1996) and ecofeminism (Towsend 1995, Merchant 1996).

One widely known environmental movement that combines the issues of the poor with those of gender is the Chipko movement of the Indian Himalayas that emerged in the 1970s. In a social history of the movement (Guha 1989), it is explained as one aspect of a long history of social protest in the region, particularly in regard to the resistance against forest management. The author emphasizes how this movement was able to unite private peasant concerns with public ecological ones. In a continuation of this history, Rangan (1996) describes how the Uttaranchal statehood movement has in many ways eclipsed the Chipko movement as the most powerful movement of protest in the region, although it is far less environmentalist in character and in fact promotes a strong developmentalist agenda.

The rubber-tappers of Brazilian Amazonia gained worldwide attention through their political strategies that combined local direct action with international environmental campaigns (Hecht & Cockburn 1989). Their confrontations with loggers and ranchers in the 1970s as part of their effort to protect the forest and their homelands rapidly evolved during the 1980s under the inspired leadership of Chico Mendes (1989). Rubber-tappers organized at a national level and simultaneously forged a strategic alliance with the international environmentalist movement when global environmental concern over deforestation was at its height. As a result, the support provided for the rubber-tappers union continued even after the assassination of Mendes, carried out by ranchers in 1988. The subsequent creation of several extractive reserves—an innovative, comanaged protected area under the rules of common property—gave the rubber-tappers and other extractivist peoples new legal support and spawned new forms of associationism (Allegretti 1994).

Local peoples do not only form structured social movements in defense of their interests, they also rely on a host of everyday forms of resistance in what Scott (1985) classifies as the "weapons of the weak." In a historical account of control of the forest in Java, Peluso (1992) analyzes the many confrontations between the "cultures of control" of state forestry agencies and the "cultures of resistance" of forest-based peasant groups that have been involved for centuries

in struggles for the control of land, trees, forest labor, and ideology. In still other cases, local, everyday resistance to the construction of hydroelectric dams has led to the establishment of national "impacted peoples" movements both in Brazil (Magalhães 1990) and in India (WF Fisher 1995).

Parajuli (1998:17) categorizes these many groups under the rubric of "ecological ethnicities," which he uses in reference to "those people who have developed a respectful use of the natural resources and consequently a commitment to creating and preserving a technology that interacts with local ecosystems in a sustainable manner," and that can include "peasants, indigenous peoples, rural inhabitants, fisherfolk, forest dwellers, nomadic shepherds, and a host of people marginalized by development projects and the programs of environmental modernization." What is particularly noteworthy about these ethnicities is that they represent viable, functioning, ecological alternatives to existing models of modernization and environmental destruction.

Within the First World countries, particularly the United States, movements for environmental justice have emerged among the poor and people of color. Harvey (1996:368) pinpoints one of the socio-environmental sources of these movements when he notes that "one of the best predictors of the location of toxic waste dumps in the United States is a geographical concentration of people of low-income and color." Bullard (1993:24) diagnoses the phenomena of "environmental racism" in the United States and chronicles the efforts of grassroots African American, Latino, Asian, Pacific Islander, and Native American groups to "organize themselves around waste-facility siting, lead contamination, pesticides, water and air pollution, Native self-government, nuclear testing, and workplace safety." Martinez-Alier (1997) places these movements in an international context by describing the unequal "ecological distribution of conflicts" involving the actions of multinational oil, mining, and agrobusiness companies that internationalize their toxic wastes and environmental destruction. Johnston (1994:229) summarizes the basic thrust of these varied movements: "Social justice environmentalism, with its emphasis on human rights and wrongs, calls for a reordering of priorities in decision-making systems, and for restructuring the balance and loci of power in the decision-making process."

Ethnographic and sociological analyses of environmental organizations within a national context exist in both First and Third World countries, as evidenced by analyses of movements in Brazil (Leis & Viola 1996), Canada (Harries-Jones 1993), India (Agarwal 1994), Ireland (Peace 1993), the United States (Snow 1992), and Venezuela (García 1992). On a global level, the "Amazonia for Life!" campaign coordinated by the Ecuadorian environmental NGO Acción Ecológica (1994) has made petroleum development in tropical forests the focus of an international campaign that has facilitated South-South interchanges between activists from Nigeria, Indonesia, Malaysia, Peru, Colombia, and Ecuador. Keck & Sikkink (1998:147) explore the ways that different "environmental advocacy networks," whose power resides in their "ability to generate and use information strategically," have been crucial factors in mobilizing and maintaining international campaigns against tropical deforestation in Brazil and Sarawak. McCor-

mick (1989) provides a good historical overview of the emergence and consolidation of a global environmental political space structured around intergovernmental organizations such as the United Nations and international environmentalist NGOs.

Environmental Rights

The complex domain of environmental rights refers to those cases where the claims and rights of peoples to territories, natural resources, knowledge systems, and even their bodies are being ignored or abused (Miller 1993). The rights of indigenous, or "first peoples" (Burger 1990), to the lands and natural resources they have historically occupied and continue to use have been a central focus of anthropologists working with these groups (Chirif Tirado et al 1991). The territorial rights of these peoples are now being analyzed from the vantage point of their historical patterns of and future potential for the environmental protection of their respective lands (Cárdenas et al 1992, Schwartzman & Santilli 1999). On an explicitly political level, the rights of indigenous peoples to their territories are also analyzed with regard to the concepts of sovereignty (Goldtooth 1995), autonomy (Bartolomé 1995), and self-determination (Hannum 1996).

Anthropological research on property rights has ethnographically documented numerous cases of existing common property regimes located in all parts of the planet that involve a wide variety of natural resources (McCay & Acheson 1987, Bromley 1992). In refinements of common property theory, Guillet (1992) analyzes autonomous Andean "irrigation clusters" that harbor both pre-Columbian origins and modern innovations and that remain a building block of Andean irrigation organization; Johha (1994) describes how common property regimes fulfill crucial roles in the daily subsistence activities of poor peasants in India; and Berkes (1996) emphasizes the importance of local institutions and their role in maintaining feedback loops between natural resources and the common property regime. Meanwhile, Park (1993) offers a critique of common property theory within the perspective of arid, high-risk lands by noting that, although common property can function as a long-term, collective means of coping with high-risk environments, such situations can often be based in stratified, authoritarian social systems rather than in a community of equals.

The rights to environmental knowledge developed and used by indigenous peoples and rural farmers have become a highly contested issue as a result of the growth of multinational biotechnology firms and their search for scientifically unknown, highly valuable plants, which has taken them to remote parts of the globe and placed them in contact with the local people (Peritore & Galve-Peritore 1995). One response by local groups has been to issue calls for payment of royalties for use of their knowledge, and a more anthropological one has called into question the clash of cosmovisions whereby "western legal concepts of 'originality' and 'innovation' embedded in intellectual property law are not only sharply at odds with their indigenous counterparts, but are primed to serve the interests of biocolonialism" (Whitt 1998:34).

Davis (1993:21) presents an anthropological critique of the current discussion on biodiversity prospecting and intellectual property rights by arguing that it fails to comprehend the "sacred or spiritual quality of indigenous plant knowledge," and Orlove & Brush (1996) review the varying ways that local peoples can and do participate directly in the conservation of biodiversity resources. Cleveland & Murray (1997:510) show that indigenous peoples have widely varying, autochthonous concepts of intellectual property that diverge from the Western industrial model and conclude that a broadly conceived notion of sustainable agriculture is needed, one that serves the goals of "promoting both livelihood security for farmers at the local level and the world's food security."

The patenting of genetic material collected on lands belonging to the local people that is subsequently modified in the laboratories of biotechnology firms has been criticized by both indigenous organizations and anthropologists because these firms have refused to recognize that in many cases this material harbors centuries of human selective input, and because this material is being privatized on the sole basis of their manipulation. The indigenous outcry over the US patent issued for *ayahuasca*, an Amazonian hallucinogen used ritually for centuries by indigenous groups, and the controversy over the neem tree in India (Shiva & Holla-Bhar 1996) are just two of a host of cases that have emerged over the past few years and serve as a portent of future conflicts. All of these issues are being debated at local, national, and international levels, where social scientists are playing central roles in framing debates, including those over local (Estado do Acre 1997) and national (Silva 1996) biopiracy laws, the codification of the Convention of Biological Diversity ratified at the 1992 Rio Earth Summit (Posey & Dutfield 1996), and the implementation of the Trade-Related Aspects of Intellectual Property Rights agreements of the Uruguay Round of the General Agreement on Tariffs and Trade (Grenier 1998).

The issue of the rights to one's body has centered on the Human Genome Diversity Project (Weiss 1998:295–98) and has created divisions among anthropologists. On one side are those biological anthropologists who were involved in drawing up the initial list of 722 indigenous populations from around the world for use as subjects in genetic studies, and on the other side are those social and cultural anthropologists, many of whom have developed strong critiques of colonialism, and who argue that the project considers its subjects to be "much like the 19th-century anthropological 'primitive', who, envisioned as vestiges of an earlier moment in human history, represented a mirror on the past" (Cunningham 1998:212–13). The defense of the rights to one's body also questions the patenting of discrete human organs, tissues, cells, and genes and criticizes the lucrative global market in body parts (Kimbrell 1996).

Environmental Territories

The numerous national parks, biological reserves, wilderness areas, and other protected areas that have been established by governments throughout the world, along with a host of UN-designated Biosphere Reserves, have their origin in the wilderness preservation current of the environmentalist movement. Protected

areas encompass specific geographic spaces, have designated social purposes, and are managed by political institutions, which makes them both natural and human territories (Little 1996). One promising line of research is the documentation of the human processes behind the establishment of protected areas and the description of the environmental philosophies or cosmologies that undergird them. Foresta (1991) offers a detailed reading of the varied social actors—local environmentalists, the military government, international NGOs, natural scientists—who were involved in the process of establishing protected areas in Brazilian Amazonia during the 1970s and 1980s and shows how they were influenced by the reigning scientific theories of conservation of the time, most notably by the Pleistocene Refuge Theory, the Island Biogeography Theory, and Phytogeographic Mapping.

Barretto Filho (1997) extends this research in an explicitly ethnographic direction through a comparative study of the processes of analysis, proposal, creation, and management of two Brazilian Amazonian protected areas, with the additional factor that they are inhabited by traditional riverine populations. Cases such as these raise the even broader topic of parks and people, involving the multiple conflicts and issues that emanate from those sites where traditional and/or indigenous peoples have long utilized natural resources, but which have since come to be classified as protected. These debates are directly tied to the increasing visibility and power of social movements that are defending their environmental and human rights and, in spite of the generalized conciliatory tone of the parks and people literature, two basic perspectives—a conservationist one and an indigenist one—are still clearly evident.

In a broad-based theoretical attempt by conservationists to get a handle on this issue (West & Brechin 1991), the topics of displacement, ecodevelopment, and planning are explored within the framework of the concept of resident peoples, which defines highly diverse societies in relation to their presence in protected areas that are taken for granted as an existing good. Amend & Amend (1992) document that 86% of the national parks in South America are inhabited or regularly used by local peoples and propose the establishment of environmental education and consciousness-raising programs for these inhabitants. Integrated conservation and development projects are also being implemented in numerous countries, but they operate under the principle that "once biological criteria have been taken into account, then social and political criteria should be considered" (Brown & Wyckoff-Baird 1992:12). The "Parks in Peril" program launched by the Nature Conservancy in 1990 (Brandon et al 1998) also seeks rapprochement with local peoples, although it does not question the underlying philosophies and actual practices that led to establishment of protected areas on lands where people have lived for long periods of time.

Neumann (1998:9) rejects many of these conservationist assumptions by arguing not only that national parks are "active sociopolitical forces in their own right" but also that they are "historically implicated in the conditions of poverty and underdevelopment that surround them." Gray (1991) expresses concern over how conservation policies involve the potential for major violations of indige-

nous peoples' human rights and outlines the dangers of the subordinate incorporation of indigenous peoples in the market, the theft and commodification of their knowledge, the social engineering geared to make them useful to external interests, and their controlled assimilation. Diegues (1996), based on extensive work with traditional *caipira* populations of the Brazilian Atlantic forest, criticizes the imposition in Latin America of what he calls the Yellowstone model of protected areas and argues that ecosystems are best protected when the traditional peoples who have managed them in a sustainable manner for generations are left in place and granted communal title to these lands.

In an attempt to orient these debates, McNeeley (1993:253) offers a set of principles that "could help demonstrate that integrating conservation with development of local human communities is both relatively painless and likely to lead to enhanced benefits to the community, the nation, and the world." One of the most ambitious efforts in this respect was the international Pucallpa (Peru) Conference held in 1997, which brought together indigenous leaders and conservationists in an effort to assess the state of the question and develop joint future work (Gray et al 1998). Ecotourism has also emerged as a possible means of promoting conservation and at the same time of offering local peoples a source of income through activities that place economic value on their local skills and knowledge (Boo 1992). Such endeavors, although appearing good on paper, run into a host of practical problems, be they cultural ones around the deployment of neoprimitivist ideologies (MacCannell 1992) or economic ones, such as the emergence of internal social stratification in previously nonstratified societies as a result of the profits gained from tourist services controlled by one clan at the expense of rival clans (Little 1992:121–141).

Environmental Discourses

The ethnographic description and analysis of the multiple ways that human societies conceptualize their relationship to their human and biophysical environments has served to relativize the Western concepts of nature and culture. Bird-David (1993), in a comparative analysis of tribal societies from Australia, Africa, Asia, and North America, describes different forms of "metaphorization of human-nature relatedness" that include such metaphors as sexual intercourse, procreation, and namesake and adult-child relatedness. Various analyses of ethnographic material from Amerindian societies in Amazonia are calling for a reevaluation of animism as a contemporary means of understanding human-nature relations (Descola 1998). Århem (1996:200–1) describes Makuna eco-cosmology, in which "animal 'others' are treated as 'equals' and 'persons,' parties to a moral pact governing relations within human society as well as the grander society of all beings." All of these examples diverge from the Western object-subject relationship to pose distinct types of subject-subject relationships between nature and humanity. The cross-cultural study of discourses of human-environmental relations has bred a host of theoretical propositions calling for the development of a grammar (Descola 1992), a cognitive geometry (Ellen 1996), or a meta-language (Hviding 1996) to be used in comparative epistemology.

Analyses of Western discourses on the natural environment have focused on such core concepts as nature (Evernden 1992, Cronon 1995), wilderness (Oelschlaeger 1991), ecology (Bramwell 1989), and environmentalism (Milton 1993, Pepper 1996). Other studies explore marginal and/or counterhegemonic discourses that are emerging in the West. Ecofeminist thought offers ways of critiquing the dominant Western mode of understanding the human/environment relationship and has developed differing essentialist (Shiva 1989) and political (Agarwal 1992) currents. Merchant's (1992) review of radical ecology includes analyses of deep, spiritual, and social variants in ecology. Experimental nature-writing is also emerging as a force for reconceptualizing and resensitizing the relationship between nature and culture, with the magazine *Terra Nova: Nature and Culture*, founded in 1996, as a locus of such writing.

The ideological critique of sustainable development (Redclift 1987) has several anthropological thrusts: Ribeiro (1991:83) views it as a "metanarrative with utopian characteristics that establishes a common discursive field, creating possibilities for alliances between environmentalists and those social agents interested in economic growth"; Escobar (1995:196) argues that the term represents an "inscription of the economic onto the ecological" that has the effect of affirming and contributing to "the spread of the dominant economic worldview"; and Little (1995:268) shows the potential this term has for the construction of a new international political cosmology, but describes how, at the Earth Summit in Rio de Janeiro, it was part of a "global magic act, in which the leaders of the world solved their problems through the invocation of discursive catchwords." Researchers working at the grassroots level who are documenting the sustainable ways that local groups have of interacting with local ecosystems have begun to promote the terms sustainable lifeways (Taylor 1995) and livelihoods (Fox 1996, Amalric 1998).

The discursive appropriation of indigenous peoples as natural conservationists and tropical forests as pristine habitats by northern environmental movements has created an arena of heated anthropological debate (see Headland 1997). Redford (1990:27) critiques the notion of the "ecologically noble savage" and argues that as indigenous peoples enter into contact with the Western world, they reveal "the same capacities, desires, and perhaps, needs to overexploit their environment as did our European ancestors" (for a modified position see Redford & Mansour 1996). Edgerton (1992) also "challenges the myth of primitive harmony" by documenting a host of "sick societies" that have made maladaptive decisions in the past and then maintained them, sometimes driving themselves into extinction. Sponsel (1995:283) rebuts this position with the forceful argument that "for millennia, these [Amazonian indigenous] people have developed the land, generally in ways that used land and resources on a sustained basis without major, irreversible environmental degradation and destruction." Bodley (1997:612) takes up what can perhaps be taken as an intermediate position and affirms that "when a group has no politically or commercially driven cultural incentive for expanding its population, production, and consumption, its members do not need to be self-conscious conservationists."

Regarding the discursive appropriation of the Amazonian rainforest by environmentalists, Fisher (1996:196) chronicles the way the perception of Amazonia as wilderness was consolidated in the twentieth century with the effect that "indigenous peoples disappear from the social history of the area and from the policy recommendations of local administrators only to be later resurrected as part of the natural attributes of the wilderness region." Nugent (1993) makes a similar argument regarding Amazonia's *caboclo* population, which for years were "invisible" in Amazonian anthropological research and even today, with the new interest in environmental issues, are still not recognized as a historically specific peasantry that was forged from the economic forces of Amazonian colonial history but rather are recognized as examples of sustainable development. Arnt (1992) describes how a naturalist allegory for understanding Amazonia was a key element in the development of Brazil's nationalist ideology and how this ideology was then made a pretext for the rapacious exploitation of this region in the name of national development.

The flip side of these analyses concerns the ethnographic presentation of how Amazonian indigenous peoples are responding to their appropriation by environmentalists. Conklin & Graham (1995:696–97) postulate the existence of a "middle ground of Amazonian eco-politics" involving indigenous peoples and environmentalists as a "political space, and arena of intercultural communication, exchange, and joint political action." They also highlight that "there is an inherent asymmetry at the core of the eco-Indian alliance." Albert (1993:368) analyzes the way the contemporary political indigenous discourse of Yanomami shaman and political leader Davi Kopenawa Yanomami involves both the selective incorporation of elements of the external environmental discourse and the reelaboration of Yanomami cosmology, such that from the "indigenous point of view, the political interculturality of ecological discourse cannot be maintained." Regarding the Kayapó, both Turner (1991) and Fisher (1994) downplay the role of environmentalism and instead place ethnographic emphasis on the resilience, flexibility, and creative use of Kayapó internal social structures and political strategies.

All these critiques are linked to the even broader issue of how environmental discourses are constructed at a global level and point to the difficult cross-cultural issue of developing a global discourse that is shared rather than imposed. Shiva (1993:150) takes the latter position and argues that "the global does not represent the universal human interest, it represents a particular local and parochial interest that has been globalized through the scope of its reach." Milton (1996:218) explores the possibilities of a shared position by showing how global environmentalist discourse "encompasses a number of transcultural perspectives which both compete and overlap with one another" and outlines a specific role for anthropologists in the study of global discourses. Yearley (1994:167) postulates that environmentalism has a type of global specificity based in the three factors of "its intimate relationship to science, its practical claims to international solidarity, and its ability to offer a concerted critique of, and alternative to, capitalist industrialism."

PROSPECTUS: FACING A NEW MILLENNIUM

Although admittedly much of the hoopla over the coming of the Third Millennium is both arbitrary and ethnocentric—arbitrary because it reflects a particular fetish with round numbers, and ethnocentric because it places all human history within a Western, Christian calendar—it nonetheless can be used for the purpose of pausing and reflecting on recent dramatic changes in human/environment interrelations and, from that vantage point, taking a prospective look at emerging methodological, political, and ethical issues that will dominate the coming years.

A central theme in this review has been that the concept of the environment provides a powerful tool with which to understand some of the complexities of life on earth and the role played by humans as an integral part of those complexities. One of the most salient aspects of new technology is its power to transform existing environments and generate new ones. As new environments emerge and grow in importance, new types of ecological analyses will be needed to understand the interrelations that human groups maintain with them. Four such environments—urban, virtual, viral, and warfare—are briefly mentioned as harbingers of the future.

The accelerated urbanization of the earth's human population during the twentieth century has turned urbanism into a global ecological issue and transformed the immediate environments of an increasing number of humans into urban ones. Some important research issues that these environments pose are: urban environmental history, urban landscapes, urban ecology and health, urban sustainable development, and urban environmental rights. Virtual environments, most notably the much-hyped and little-understood cyberspace, are changing the ways that humans construct identities, organize themselves, conduct politics, and relate to the biophysical environment. Research on the interrelations between humans and their virtual environments involves an interdisciplinary dialogue among the informational, psychological, and anthropological sciences, where the very means of studying these interrelations can involve extensive use of cyber research techniques.

The speed with which bacteria, viruses, and diseases move across the globe today requires that anthropological ecological research focus on viral environments and the multiple types of human interrelations that serve to channel, propagate, deflect, and/or disrupt the transmission of these microorganisms. The already voluminous literature on AIDS is being supplemented by research on epidemiological history, demography and disease, and the new, uncharted terrain of the cross-transmission of viruses between humans and nonhuman animals, such as the recent cases of British mad cow scare and the Hong Kong chicken slaughter show. Meanwhile, the protracted wars in the Balkans, Central Africa, the Caucasus, the Middle East, Colombia, Afghanistan, Angola, Guatemala, and numerous other sites make warfare environments a tragic, but essential, area of research in which the conjuncture of military technologies, topography, global geopolitics, ethnic loyalties, local resource struggles, and environmental degradation must be understood in their dynamic interrelation.

The establishment of new environments and the problems that emerge from them, invariably breed new environmentalisms that can, and are, being studied ethnographically in what is called in this review the anthropology of environmentalism. This research has highlighted the growing role and size of the civil society operating at all levels of social scale. As anthropologists study environmental movements, they simultaneously become witness to the serious environmental problems facing local peoples, often as the result of powerful outside interests, and become involved in the issues of human and environmental rights.

The combination of ecological and ethnographic approaches to the environment provides an expanded anthropological research field that offers new possibilities for uniting empirical research with the political and environmental projects of human groups that are facing pressing, often life-threatening, problems. This represents one of the broadest and most innovative developments in environmental research in anthropology and broaches many of the issues that Sponsel (1995) raises with regards to indigenous peoples in his call for an (external) "paradigm shift" in ecological anthropology that incorporates new trends, priorities, and audiences from both applied and advocacy anthropology, a call that complements the (internal) paradigmatic transformations mentioned earlier.

These transformations in the ecological paradigm are responding to serious, worldwide social and environmental problems that are operating within what Beck (1992) calls the risk society, which is based in the distribution of "bads," or dangers, as opposed to the industrial society, which is based in the distribution of goods. He adds that the creation of these risks increasingly eludes the control by protective institutions of industrial society. Murphy (1994:250), in noting that many past societies have been risk societies, specifies the peculiarity of the current historical moment as lying in the fact that today's human actions "imperil life on the planet" and "have potentially global effects on ecosystems." This is also the point made by Serres (1995:20) in noting that humanity's new technological and scientific powers have reached such proportions that our "being-in-the-world [has been] transformed into being as powerful as the world." This provides the basis for his call for a "natural contract" between humanity as a new, total subject and planet earth as global nature.

Of course, planet earth may not be interested in signing on. From the perspective of billions of years of geological and biological development, human presence and impact on the earth may well be insignificant. Lovelock (1988:159) reminds us—working from the premise of Gaia—that "it is not much comfort to know that, if we inadvertently precipitate a punctuation, life will go on in a new stable state. It is near certainty that the new state will be less favorable for humans than the one we enjoy now." Nonetheless, the rapid destruction of the world's biodiversity (Wilson 1988), a product of nearly four billion years of evolution, at the capricious hand of humans, and the destruction of the world's sociodiversity (Neves 1992) as a result of the policies of powerful global and national economic and political agents, represent a dramatic and troubling development for all species interested in the long-term survival of life on earth.

Hence, the documentation of the impacts that humans have made and continue to make on the planet, impacts that have reached an unprecedented scale and are creating major disturbances in the world's natural cycles, raises the specter of driving ourselves, and many other species, into extinction. Kohák (1997:13) cogently summarizes this situation: "The survival of the human race and its mammal and vertebrate kin on this earth depends upon our willingness to accept the responsibility that goes with our freedom." Along with responsibility, another theme that crops up repeatedly in the literature, and that comes from researchers on both sides of the natural/social scientific divide, is the need to develop a new attitude of caring for the earth and its inhabitants, human and other (Soulé 1995, Busch et al 1995, Merchant 1996). Caring, and the collective responsibility that it entails, offer essential bioethical guidelines for research and activism as environmental anthropology enters the twenty-first century.

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