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The New Ecological Anthropology

Older ecologies have been remiss in the narrowness of their spatial and temporal horizons, their functionalist assumptions, and their apolitical character. Suspending functionalist assumptions and an emphasis upon (homeo)stasis, “the new ecological anthropology” is located at the intersection of global, national, regional, and local systems, studying the outcome of the interaction of multiple levels and multiple factors. It blends theoretical and empirical research with applied, policy-directed, and critical work in what Rappaport called an “engaged” anthropology; and it is otherwise attuned to the political aspects and implications of ecological processes. Carefully laying out a critique of previous ecologies by way of announcing newer approaches, the article insists on the need to recognize the importance of culture mediations in ecological processes rather than treating culture as epiphenomenal and as a mere adaptive tool. It closes with a discussion of the methodologies appropriate to the new ecological anthropology. [*“the new ecology,” political ecology, applied or engaged anthropology, linkages methodology*]

Ecological anthropology was named as such during the 1960s, but it has many ancestors, including Daryll Forde, Alfred Kroeber, and, especially, Julian Steward. Steward’s cultural ecology influenced the ecological anthropology of Roy Rappaport and Andrew P. Vayda, but the analytic unit shifted from “culture” to the ecological population, which was seen as using culture as a means (the primary means) of adaptation to environments. Columbia University can be identified as the birthplace of ecological anthropology and the related cultural materialism of Marvin Harris, which, however, drew as much on Steward’s concern with culture change (evolution) and culture core as on his cultural ecology. More diachronically and comparatively oriented, cultural materialism shared with ecological anthropology an interest in the adaptive functions of cultural phenomena, including religion (e.g., Rappaport’s [1968] focus on ritual in the ecology of a New Guinea people and Harris’s [1966, 1974] analysis of the adaptive, conservatory role of the Hindu doctrine of *ahimsa*, with special reference to the cultural ecology of India’s sacred cattle).

The ecological anthropology of the 1960s was known for systems theory and negative feedback. Cultural practices were seen as optimizing human adaptation and maintaining undegraded ecosystems. Factors forcing us to rethink old assumptions today include population increase and high-tech-mediated transnational flows of people, commerce, organizations, and information. The new ecological, or environmental, anthropology blends theory with political awareness and policy concerns. It attempts to un-

derstand and devise culturally informed solutions to such problems/issues as environmental degradation, environmental racism, and the role of the media, NGOs, and environmental hazards in stimulating ecological awareness and action. While recognizing that local and regional systems are permeable, the new ecological anthropology must be careful not to remove humans and their specific social and cultural forms from the analytic framework.

The following reviews the salient features of the old ecological anthropology, setting the stage for an exploration of important aspects of an emerging new ecological anthropology.

The Old Ecological Anthropology and Its Units of Analysis

The ecological anthropology of the 1960s was known for its functionalism, systems theory, and focus on negative feedback. Anthropologists examined the role of cultural practices and beliefs in enabling human populations to optimize their adaptations to their environments and in maintaining undegraded local and regional ecosystems. Various scholars (for example, Friedman 1974) attacked both ecological anthropology and cultural materialism for a series of presumed faults, including circular reasoning, preoccupation with stability rather than change and simple systems rather than complex ones, and Panglossian functionalism (the assumption that adaptation is optimal—creating the best of all possible worlds). Rappaport’s distinction between cognized and operational models was related to ethnoscience, which grew out of linguistics but became

another expression of the ecological anthropology of the 1960s. Flourishing at Stanford, Yale, Pennsylvania, and Berkeley, ethnoscience focused on cognized rather than operational models and on classification rather than action, and it received some of the same criticisms just mentioned for ecological anthropology.

The basic units of the ecological anthropology of the 1960s were the ecological population and the ecosystem, treated, at least for analytical purposes, as discrete and isolable units. The comparable unit for ethnoscience was the ethnosemantic domain (for example, ethnobotany, ethnozoology, ethnobotany). Assumptions of the old ecological anthropology, now clearly problematic, are apparent in some of its key definitions—most importantly ecological population and ecosystem.

Rappaport defines an ecological population as “an aggregate of organisms having in common a set of distinctive means by which they maintain a common set of material relations within the ecosystem in which they participate” (1971a:238). Several elements of this definition must now be questioned. Given contemporary flows of people, information, and technology across cultural and social boundaries, how *distinctive* are the cultural adaptive means employed by any group? Given the fact and recognition of increased diversity within populations, how *common* is the set of material relations within ecosystems? Nor do most people today participate in only one ecosystem.

Rappaport also characterizes ecological populations as “groups exploiting resources entirely, or almost entirely, within certain demarcated areas from which members of other human groups are excluded.” Similarly, he defines ecosystem as “the total of living organisms and non-living substances bound together in material exchanges within some demarcated portion of the biosphere” (1971a:238). Rappaport’s case example of a local ecological population was the Tsembaga Maring, a local territorial group comprised of 200 tribal people living in colonial New Guinea. But in today’s world full of rural-urban and transnational migration, and ensuing remittances, how many groups subsist almost exclusively on local resources? How many human groups live in precisely demarcated ecosystems that are free of intrusion by others? To be sure, Rappaport was careful to recognize regional as well as local ecological populations and ecosystems. He noted in 1971 that local ecosystems are not sharply bounded and that their discrimination rests to a considerable extent on the aims of a particular analysis. Thus, “local ecological populations . . . participate in regional exchange systems composed of several or many local populations occupying a wider geographic area” (1971a:251). In fact, the articulation of local and regional ecosystems was an important part of Rappaport’s famed account of the ritual cycle in the context of Maring warfare and land use. His *Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People* (1968) became the classic case study of human ecology in a tribal so-

ciety, the role of culture (especially ritual) in local and regional resource management, negative feedback, and the application of system theory to an anthropological population.

However enlightening Rappaport’s analysis may have been for understanding Maring adaptation, the limitations of such an approach for the study of more complex societies were apparent even in the 1960s. I had to confront them as I planned my own ecological study of the Betsileo of Madagascar, a much more populous group with a much more complex (chiefdom/state) sociopolitical organization. In *The Past in the Present: History, Ecology, and Cultural Variation in Highland Madagascar* (Kottak 1980), a large-scale comparative and historical study based on fieldwork done in 1966 and 1967, I attempted an ecological analysis of the Betsileo—some 800,000 people distributed over a much larger territory than the Tsembaga Maring. Combining ethnography with survey techniques, I evaluated ecological adaptation (of the Betsileo and other Malagasy) by focusing on associations or bundles of interrelated material variables (correlations across time and space) rather than by trying to define and demarcate precise local ecosystems. The categories of material conditions I (like Rappaport) considered included aspects of the physical and biotic environments and such regional factors as trade and warfare, but they also extended to the role of stratification and the state in determining differential access to strategic and socially valued resources. Clearly, the ecological analysis of state-level societies could not be the same as that of bands and tribes.

Madagascar also raised the complicated question of the relation between culture (ethnicity), ecology, and the state. Fredrik Barth (1958, 1969) had postulated that, especially when there is niche specialization plus exchange, convergence and assimilation of contiguous ethnic groups are not inevitable; ethnic distinctions can be maintained over time. I noted that abrupt environmental and ethnic shifts have been possible in Madagascar. For example, when people moved to a certain area of Madagascar’s forested eastern escarpment, they became Tanala, which means “people of the forest.” (This, by the way, is no longer as clearly true.) Here, an ethnic label seems to have corresponded fairly closely to an ecological distinction.

But such correspondence was not generally true in Madagascar, where ethnic labels owed more to the political situation than to the natural environment. Within territorially large and populous “ethnic groups” (e.g., Betsileo, Merina, Sakalava), there is considerable variation in environment, modes of production, and means of adaptation. Also, the existence of ecoclines—regions of gradual rather than abrupt shifts from one set of ecological variables to another—makes it difficult to claim a neat correspondence between ethnicity and ecology. Historically, in Madagascar as elsewhere, the state has often intervened—creating

ethnic labels and distinctions that may or may not have much to do with ecology.

It is much more evident today than it was during the 1960s that there are no isolated ecosystems and that all humans participate in a world system. In the context of population increase (more than a doubling since the mid-1960s), the transnational spread of information, images, people, commerce, and organizations, and contemporary high-tech systems of transportation and communication, many of the assumptions of the old ecological anthropology need rethinking.

For example, Rappaport's "cognized model" (Rappaport 1968:237ff.; see Wolf, this issue) requires modification. In his formulation, the cognized model refers to native interpretations of the world, the set of rules and expectations, orienting principles, concepts, meanings, and values that are significant to an individual culture bearer and that account for why he or she does things. Contemporary people still have cognized models, but anthropologists must increasingly wonder where such models originate, how they are transmitted, and the extent to which they are unique and shared. Diffusion may be as important as enculturation in the contemporary creation and transmission of cognized models. This would seem to be an issue of as much concern to the new psychological anthropology (for example, cognitive anthropology) as to ecological anthropology.

The same is true of his "operational model" (Rappaport 1968:237ff.). Rappaport used the term to describe the ethnographer's abstraction from and analysis of what he or she studies: an outsider's account of behavior and its material determinants, context, and results; the trained observer's interpretation of why people do things; and the specification of the limits that determine what individual actions may be tolerated without destroying the system that sustains them. Specification of these dimensions of the operational model would seem to be as important today as it was a generation ago. The world has grown more complex and probably less comprehensible to most natives. Social scientists need new methods (see below) to study this complexity and the myriad forces, flows, and exchanges that now affect "local" people in their various immediate milieus.

The New Ecological Anthropology

The differences between the old and the new ecological anthropology involve policy and value orientation, application, analytic unit, scale, and method. The studies in the old ecological anthropology pointed out that natives did a reasonable job of managing their resources and preserving their ecosystems (albeit through some rather unsavory means, including mortal combat and female infanticide); but those studies, relying on the norm of cultural relativism, generally aimed at being value-neutral. By contrast,

the new ecological, or environmental, anthropology blends theory and analysis with political awareness and policy concerns. Accordingly, new subfields have emerged, such as applied ecological anthropology and political ecology (Greenberg and Park 1994).

We cannot be neutral scientists studying cognized and operational models of the environment and the role of humans in regulating its use when local communities and ecosystems are increasingly endangered by external agents. Many anthropologists have witnessed personally a threat to the people they study—commercial logging, environmental pollution, radioactivity, environmental racism and classism, ecocide, and the imposition of culturally insensitive external management systems on local ecosystems that the native inhabitants have managed adequately for centuries. Today's world is full of neocolonial actions and attitudes; outsiders claim or seize control over local ecosystems, taking actions that long-term residents may disdain. Concerned with proposing and evaluating policy, the new environmental anthropology attempts not only to understand but also to devise culturally informed and appropriate solutions to such problems and issues as environmental degradation, environmental racism, and the role of the media, NGOs, and various kinds of hazards in triggering ecological awareness, action, and sustainability.

Environmental anthropologists focus on new units of analysis—national and international, in addition to the local and regional, as these levels vary and link in time and space. Entering into a dialogue with schools of natural resources and the environment, anthropology's comparative perspective adds an international dimension to the understanding of issues like environmental justice and ecosystems management, which natural resource specialists have been studying for decades, though mainly with a U.S. focus. Conversely, anthropologists use methods and perspectives developed in other nations and cultures to shed light on environmental issues in the United States and Canada as North America itself becomes an increasingly common field of study in anthropology. And new methods—from surveys to satellite imagery—are used to place ecological issues in a context far larger, deeper, and broader in space and time than the bounded-system approach of the 1960s. Methodologies within the new ecological anthropology must be appropriate to the complex linkages and levels that structure the modern world.

The changes in ecological anthropology mirror more general changes in anthropology: the shift from research focusing on a single community or "culture," perceived as more or less isolated and unique, to recognizing pervasive linkages and concomitant flows of people, technology, images, and information, and to acknowledging the impact of differential power and status in the postmodern world on local entities. In the new ecological anthropology, everything is on a larger scale. The focus is no longer mainly the local ecosystem. The "outsiders" who impinge on local

and regional ecosystems become key players in the analysis, as contact with external agents and agencies (for example, migrants, refugees, warriors, tourists, developers) has become commonplace. Ecological anthropologists must pay attention to the external organizations and forces (for example, governments, NGOs, businesses) now laying claim to local and regional ecosystems throughout the world. Even in remote places, ecosystem management now involves multiple levels. For example, among the Antankarana of northern Madagascar (Gezon 1997), several levels of authority claim the right to use and regulate natural resources and local ecosystems. Actual or would-be regulators there include local communities, traditional leaders (the king, chief, or *mpanjaka*), provincial and national governments, and WWF (the World Wide Fund for Nature), which is partly funded by USAID.

Issues for the New Ecological Anthropology

One firm conclusion of the old ecological anthropology in all its guises (for example, the “ecological anthropology” of Rappaport and Vayda, the “cultural materialism” of Harris, and the “ethnoscience” of Berlin, Conklin, Frake, and Goodenough) was that indigenous groups have traditional ways of categorizing resources, regulating their use, and preserving the environment. An *ethnoecology* is any society’s traditional set of environmental perceptions—that is, its cultural model of the environment and its relation to people and society. Today’s world features a degree of political and economic interconnectedness unparalleled in global history. Local ethnoecologies are being challenged, transformed, and replaced. Migration, media, and industry spread people, institutions, values, and technologies. Imported values and practices often conflict with those of natives. In the context of population growth, migration, commercial expansion, and national and international incentives to degrade the environment, ethnoecological systems that have preserved local and regional environments for centuries are increasingly ineffective.

Ethnoecological Clashes: Developmentalism and Environmentalism

Challenging traditional ethnoecologies are two, originally Euro-American, ethnoecologies: developmentalism and environmentalism (Kottak and Costa 1993). These models enter myriad cultural settings, each of which has been shaped by particular national, regional, and local forces. Because different host communities have different histories and traditions, the impact of external forces is not universal or unidirectional. The spread of either developmentalism or environmentalism is always influenced by national, regional, and local ethnoecologies and their powers of adaptation and resistance.

Environmentalism entails a political and social concern with the depletion of natural resources (Bramwell 1989:3–6; Douglas and Wildavsky 1982:10–16). This concern has arisen with, and in opposition to, the expansion of a cultural model (developmentalism) shaped by the ideals of industrialism, progress, and (over)consumption (Barbour 1973; Pepper 1984). Environmental awareness is rising today as local groups adapt to new circumstances and to the models of developmentalism and environmentalism. Hazards created by development have been necessary conditions for the emergence of new perceptions of the environment. Environmental safeguards and conservation of scarce resources are important goals—from global, national, long-run, and even local perspectives. Still, ameliorative strategies must be implemented in the short run and in local communities. If traditional resources and products are to be destroyed, removed, or placed off limits (whether for development or conservation), they need to be replaced with culturally appropriate and satisfactory alternatives.

A new, possibly mediating, ethnoecological model—*sustainable development*—has emerged from recent encounters between local ethnoecologies and imported ethnoecologies, responding to changing circumstances. Sustainable development aims at culturally appropriate, ecologically sensitive, self-regenerating change. It thus mediates between the three models just discussed: traditional local ethnoecology, environmentalism, and developmentalism. “Sustainability” has become a mantra in the discourse surrounding the planning of conservation and development projects, but clear cases of successful sustainable development are few.

Issues addressed by the new ecological anthropology arise at the intersection of global, national, regional, and local systems, in a world characterized not only by clashing cultural models but also by failed states, regional wars, and increasing lawlessness. Local people, their landscapes, their ideas, their values, and their traditional management systems are being attacked from all sides. Outsiders attempt to remake native landscapes and cultures in their own image. The aim of many agricultural development projects, for example, seems to be to make the world as much like Iowa as possible, complete with mechanized farming and nuclear family ownership—despite the fact that these models may be inappropriate in settings outside the midwestern United States. Development projects often fail when they try to replace native forms with culturally alien property concepts and productive units (Kottak 1990). Also problematic is the modern intervention philosophy that seeks to impose global ecological morality without due attention to cultural variation and autonomy. Countries and cultures may resist interventionist philosophies aimed at either development or globally oriented environmentalism.

A clash of cultures related to environmental change may occur when development threatens indigenous peoples and

their environments. Native groups like the Kayapó of Brazil may be threatened by regional, national, and international development plans (such as a dam or commercially driven deforestation) that would destroy their homelands. A second clash of cultures related to environmental change occurs when external regulation threatens indigenous peoples. Thus, native groups, such as the Tanosy of southeastern Madagascar, may be harmed by regional, national, and international environmental plans that seek to *save* their homelands. Sometimes outsiders expect local people to give up many of their customary economic and cultural activities without clear substitutes, alternatives, or incentives. A traditional approach to conservation has been to restrict access to protected areas, hire park guards, and punish violators.

Problems usually arise when external regulation replaces the native system. Like development projects, conservation schemes may ask people to change the way they have been doing things for generations to satisfy planners' goals rather than local goals. In locales as different as Madagascar, Brazil, and the Pacific Northwest of North America, people are being asked, told, or forced to change or abandon basic economic activities because to do so is good for "nature" or "the globe." Environmentalists from northern nations increasingly preach ecological morality to the rest of the world—raising issues of national and local autonomy. "Good for the globe" doesn't play very well in Brazil, where the Amazon is a focus of environmentalist attention. Brazilians complain that Northerners talk about global needs and saving the Amazon only after they destroyed their own forests for First World economic growth. Akbar Ahmed (1992) finds the non-Western world to be cynical about Western ecological morality, seeing it as yet another imperialist message. "The Chinese have cause to snigger at the Western suggestion that they forgo the convenience of the fridge to save the ozone layer" (Ahmed 1992:120). Well-meaning conservation efforts can be as insensitive as development schemes that promote radical changes without involving local people in planning and carrying out the policies that affect them. When people are asked to give up the basis of their livelihood, they usually resist.

Consider the case of a Tanosy man living on the edge of the Andohahela reserve of southeastern Madagascar. For years he has relied on rice fields and grazing land inside the reserve. Now external agencies are telling him to abandon this land for the sake of conservation. This man is a wealthy *ombiasa* (traditional sorcerer-healer). With four wives, a dozen children, and twenty head of cattle, he is an ambitious, hard-working, and productive peasant. With money, social support, and supernatural authority, he is mounting effective resistance against the park ranger who has been trying to get him to abandon his fields. The *ombiasa* claims he has already relinquished some of his fields, but he is waiting for compensatory land. His most effective

resistance has been supernatural. The death of the ranger's young son was attributed to the *ombiasa's* magical power. After that the ranger was less vigilant in his enforcement efforts.

Biodiversity Conservation

Biodiversity conservation has become an issue in political ecology, one of the subfields of the new ecological anthropology. Such conservation schemes may expose very different notions about the "rights" and value of plants and animals versus those of humans. In Madagascar, many intellectuals and officials are bothered that foreigners seem more concerned about lemurs and other endangered species than about Madagascar's people. As one colleague there remarked, "The next time you come to Madagascar, there'll be no more Malagasy. All the people will have starved to death, and a lemur will have to meet you at the airport." Most Malagasy perceive human poverty as a more pressing problem than animal and plant survival.

On the other hand, accepting the idea that preserving global biodiversity is a worthwhile goal, one vexing role for applied ecological anthropology is to devise socially sensitive and culturally appropriate strategies for achieving biodiversity conservation—in the face of unrelenting population growth and commercial expansion. How does one get local people to support biodiversity conservation measures that may, in the short run at least, diminish their access to strategic and socially valued resources?

I am one of several anthropologists who have done social-soundness analysis for conservation and development projects. Such projects aim, in theory at least, at preserving natural resources and biodiversity while promoting human welfare through "development." My experience designing the social-soundness component of the SAVEM project (Sustainable and Viable Environmental Management), intended to preserve biodiversity in Madagascar, suggested that a gradual, sensitive, and site-specific strategy is most likely to succeed (Kottak 1990; Kottak and Costa 1993). Conservation policy can benefit from use of a flexible "learning process" model rather than a rigid "blueprint" strategy (Korten 1980; see also Kottak 1990). The approach I recommended for Madagascar involves listening to the affected people throughout the whole process in order to minimize damage to them. Local people (with at least some secondary education) were trained as "para-anthropologists" to monitor closely the perceptions and reactions of the indigenous people during the changes.

Like development plans in general, the most effective conservation strategies pay attention to the needs and wishes of the people living in the target area. Conservation depends on local cooperation and participation. In the Tanosy case mentioned above, the outsider guardians of the reserve needed to do more to satisfy affected people, through boundary adjustments, negotiation, and compensation. For

effective conservation (as for effective development) the task is to devise culturally appropriate strategies. Neither development agencies nor NGOs will succeed if they try to impose their goals without considering the practices, customs, rules, laws, beliefs, and values of the people to be affected.

Reasons to conserve should be explained in terms that make sense to local people. We found in Madagascar that the economic value of the forest for agriculture (as an anti-erosion mechanism and reservoir of potential irrigation water) provided a much more powerful incentive against forest degradation than did such global goals as "preserving biodiversity." Most Malagasy have no idea that lemurs and other endemic species exist only in Madagascar. Nor would such knowledge provide much of an incentive for them to conserve the forests if doing so jeopardized their livelihoods.

In the long run millions of Malagasy stand to benefit from forest conservation. This figure includes the urbanites, who depend on forested areas for water and electricity, as well as the rural people, whose rice cultivation will be hurt by increased erosion and diminishing watersheds. In 1990 and 1991 my associates and I found that some villagers in northern Madagascar already recognized the link between deforestation and a low water table. Their ecological awareness was rising slowly. Rural people were starting to realize that irrigation water gets scarcer after nearby forests are cut.

Ecological Awareness and Environmental Risk Perception

The "applied" ("engaged" in Rappaport's [1994] terms) role of today's ecological anthropologist may be as agent or advocate—planner and agent of policies aimed at environmental preservation or amelioration—or advocate for local people actually or potentially at risk through various forces and movements, including developmentalism and environmentalism. One research-and-development role for today's ecological anthropologist is to assess the extent and nature of ecological awareness and activity in various groups and to harness parts of native ethnoecological models to enhance environmental preservation and amelioration.

With Brazilian colleagues Alberto Costa and Rosane Prado, I have researched environmental risk perception and its relation to action at several sites in Brazil (Costa et al. 1995; Kottak and Costa 1993). Our assumption has been that, although people won't act to preserve the environment if they perceive no threats to it, risk perception does not guarantee action. Our research sought answers to several questions: How aware are people of environmental hazards? How do, can, and will they respond to them? Why do some people ignore evident hazards while other people respond to minor dangers with strong fears? How is

risk *perception* related to *actions* that can reduce threats to the environment and to health? (For an American take on such questions, see Kempton et al. 1995.)

A key assumption underlying our Brazilian research is as follows: although the presence of an actual hazard increases risk perception, such perception does not arise inevitably through rational cost-benefit analysis of risk. Instead, risk perception emerges (or lags) in cultural, political, and economic contexts shaped by encounters among local ethnoecologies, imported ethnoecologies (often spread by the media), and changing circumstances (including population growth, migration, and industrial expansion).

Environmental awareness was especially evident in Brazil immediately before and after the Earth Summit or UNCED (the United Nations Conference on the Environment and Development), held in Rio de Janeiro in June 1992. Ecological awareness has been abetted by the media, particularly television—to which Brazil is well-exposed, with the world's most watched commercial television network, Globo. Brazilian environmentalism began to grow in the mid-1980s, reflecting the return of public debate along with democracy—*abertura*, the Brazilian *glasnost*, after two decades of military rule. Brazilian environmentalism, strongest in cities in the southcentral part of the country, is a growing political force, but with mainly urban support.

There is much less ecological awareness outside the main cities. A simple illustration comes from my own research in Arembepe (Bahia state), an Atlantic fishing town I have been studying since 1962 (Kottak 1999). Since the early 1970s, Arembepe has suffered air and water pollution from a nearby multinationally owned titanium dioxide factory. In three decades, Arembepe's municipal seat, Camaçari, has grown tenfold, from a sleepy rural town into a major industrial (petrochemical) center. Chemical pollution of the region's streams, rivers, and coastal waters now endangers wildlife and people.

Like others in their municipality, Arembepeiros face real and immediate hazards—industrial pollution of the air, fresh water, and the ocean. Several times, reporters from the nearby metropolis of Salvador have covered the chemical pollution of Arembepe's coastal water and freshwater lagoons. Most villagers have seen those reports on TV. Still, local awareness of immediate environmental threats hasn't increased as rapidly as the hazards have. Thus, walking along the beach north of Arembepe one day in 1985, I passed dead sea gulls every few yards. There were hundreds of birds in all. I watched the birds glide feebly to the beach, where they set down and soon died. I was stunned and curious, but local people paid little attention to this matter. When I asked for explanations, people said simply "the birds are sick." Neither Arembepeiros nor scientists I spoke with in Salvador (who speculated about an oil spill or mercury poisoning) could provide a definitive explanation for the dead birds. Like other contemporary

Brazilians, Arembepeiros seem to pay more attention to distant threats than to local ones.

In Brazil, nationally publicized environmental threats have included a radioactive-cesium accident at Goiânia, the degradation of the Amazon rain forest, the murder of the ecologically minded labor leader Chico Mendes, and the effects of gold extraction, highway and dam construction, and other intrusions of the world system on native peoples and their lands. The media have reported about risks posed by mercury in the rivers, industrial pollution, and poor waste disposal.

Although Brazilian environmental awareness has grown, media accounts have followed the international lead by focusing on the Amazon as *the* ecologically threatened region. Community-level data we have collected at several sites show that Amazonian deforestation is the nonlocal ecological issue most familiar to ordinary Brazilians. When they are asked about "ecology," most Brazilians mention the Amazon instead of hazards closer to home. But environmental threats with global implications (including deforestation) exist in many areas of Brazil besides the Amazon.

Although the Brazilian media have increased their environmental coverage, there is little evidence for increased ecological awareness and activity at the local level, especially among lower-class people. Such activity is more likely to be initiated by NGOs and politicians than by threatened communities. My research in Brazil and Madagascar convinces me that people won't act to preserve the environment (regardless of what environmentalists and policymakers tell them to do) if they perceive no threat to it. They must also have some good reason (for example, preserving irrigation water or a tax incentive) for taking action to reduce the environmental threat. They also need the means and the power to do so. Risk perception per se does not guarantee environmental organization and action.

NGOs and Rights Movements

The worldwide proliferation of nongovernmental organizations is a major trend in late-twentieth-century political organization. This proliferation merits the attention of the new ecological anthropology because so many NGOs have arisen around environmental and "rights" issues. Over the past decade, the allocation of international aid for "development" (including conservation as well as development) has systematically increased the share of funds awarded to NGOs, which have gained prominence as social change enablers.

In the "development community" (for example, the World Bank, USAID, UNDP [United Nations Development Programme]), it is widely assumed that a strategy of channeling funds to NGOs, PVOs (private voluntary organizations), and GROs (grass roots organizations) will maximize immediate benefits to community residents.

NGOs are generally viewed as more responsive to local wishes and more effective in encouraging community participation than are authoritarian and totalitarian governments. However, this strategy is being increasingly criticized, especially in cases (for example, Madagascar) in which powerful, expatriate-staffed international NGOs are allowed to encroach on the regulatory authority of existing governments. There is a real issue of neocolonialism when it is assumed that NGOs with headquarters in Europe or North America are better representatives of the people than are their own elected governments, although certainly they may be.

The emergence and international spread of "rights" movements (human, cultural, animal) is also of interest to ecological anthropology. The idea of human rights challenges the nation-state by invoking a realm of justice and morality beyond and superior to particular countries, cultures, and religions. Human rights are seen as inalienable (nation-states cannot abridge or terminate them) and metacultural (larger than and superior to individual nation-states). Cultural rights, on the other hand, apply to units *within* the state. Cultural rights are vested not in individuals but in identifiable groups, such as religious and ethnic minorities and indigenous societies. Cultural rights include a group's ability to preserve its culture, to raise its children in the ways of its forebears, to continue its language, and not to be deprived of its economic base (Greaves 1995:3). Greaves (1995) points out that because cultural rights are mainly uncodified, their realization must rely on the same mechanisms that create them—pressure, publicity, and politics. Such rights have been pushed by a wave of political assertiveness throughout the world, in which the media and NGOs have played a prominent part.

The notion of indigenous intellectual property rights (IPR) has arisen in an attempt to conserve each society's cultural base—its core beliefs and principles, including its ethnoecology. IPR is claimed as a group right—a cultural right, allowing indigenous groups to control who may know and use their collective knowledge and its applications. Much traditional cultural knowledge has commercial value. Examples include ethnomedicine (traditional medical knowledge and techniques), cosmetics, cultivated plants, foods, folklore, arts, crafts, songs, dances, costumes, and rituals. According to the IPR concept, a particular group may determine how indigenous knowledge and its products may be used and distributed and the level of compensation required.

Environmental Racism

The issues of interest to the new ecological anthropology are myriad, but a final one may be mentioned: environmental racism. This is a form of institutional discrimination in which programs, policies, and institutional arrangements deny equal rights and opportunities to, or

differentially harm, members of particular groups. Bunyan Bryant and Paul Mohai define environmental racism as “the systematic use of institutionally-based power by whites to formulate policy decisions that will lead to the disproportionate burden of environmental hazards in minority communities” (1991:4). Thus, toxic waste dumps tend to be located in areas with nonwhite populations.

Environmental racism is discriminatory but not always intentional. Sometimes toxic wastes *are* deliberately dumped in areas the residents of which are considered unlikely to protest (because they are poor, powerless, “disorganized,” or “uneducated”). (This is why a polluting titanium dioxide factory was placed near my Brazilian field site of Arembepe rather than in an area having more political clout [see Kottak 1999].) In other cases property values fall after toxic waste sites are located in an area. The wealthier people move out, and poorer people, often minorities, move in, to suffer the consequences of living in a hazardous environment.

Methodology in the New Ecological Anthropology

The new ecological anthropology can draw on a series of high-tech research methods. Satellite imagery (deployed synchronically or diachronically) has been used to locate ecological hotspots (e.g., areas of deforestation or pollution), which have then been investigated on the ground by multidisciplinary teams (See Green and Sussman 1990; Kottak et al. 1994; Sussman et al. 1994). GIS (geographical information systems) and other approaches may be used to map various kinds of data on human and environmental features (See Sponsel et al. 1994). Macroscopic software, developed by J. Stephen Lansing and others, facilitates the mapping—on a computer screen—of various kinds of information, such as yields in Balinese fields in relation to pest damage and farming practices. Survey data can be collected across space and time and compared. However, the availability of such high-tech methods should not seduce us away from anthropology’s characteristic focus on people. Ethnographic research in varied locales helps us discover relevant questions, which some of the techniques just mentioned can help us answer. The new ecological anthropology can use high-tech methods, while taking care not to let electronic dazzle divert attention from direct, firsthand ethnographic study of people and their lives.

Also relevant to the new ecological anthropology is linkages methodology, as elaborated by Kottak and Colson (1994). As Elizabeth Colson and I have pointed out, anthropologists are increasingly developing models of their subject matter that are isomorphic with the structure of the modern world, including the various regional, national, and international linkages within it. We use the term *linkages methodology* to describe various recent multilevel, multisite, multitime research projects. A definition of link-

ages in relation to research methodology and content was the goal of a working group of anthropologists who first met in 1986.¹ All of us were concerned with the impact of international and national forces, including development projects, on our research locales. Most members of the Linkages Group (as we called ourselves) had worked more than once in the same region. We knew the advantages of observing how people respond to different opportunities and perturbations at various stages of their lives.

We recognized the value of research samples (both communities and mobile individuals) that could be followed through time. What kinds of links did they have with others, including external agencies? This line of inquiry entailed a census approach, a network approach (to trace relationships associated with geographical mobility and external interventions), plus survey and ethnographic techniques. The linkages approach to change also required attention to the roles of governmental and nongovernmental organizations, and of changes in marketing, transportation, and communication systems.

One method of linkages research is to study a site or sites over time. Another is systematic intercommunity comparison, requiring multiple sites that are chosen because they vary with respect to key criteria. These sites can be drawn from the same region, and the data collected would be part of the same study. They can also be from different regions (even different countries), if anthropologists can provide minimum core data (Epstein 1978:220) to make comparison possible. Linkages research extends to the levels at which policies are worked out, examining archives and official records and interviewing planners, administrators, and others who impinge on the study population(s). The aim of linkages methodology is to link changes at the local level to those in regional, national, and world systems.

Linkages research is planned as an ongoing process requiring teamwork. Time and personnel are needed to follow a dispersing population, to study different sites, to interview at many levels, to explore archives and records, and to do follow-up studies. Involvement of host country colleagues, including local assistants and other community residents, is a key to continuity. Thus, *linkages* also refers to cooperation by people with common research interests in the effort to generate a fund of data.

One example of linkages methodology is the research I directed in Brazil on industrialization and commercial expansion, focusing on environmental hazards and risk perception. The investigation proceeded at two levels: (1) national—Brazil as a whole, where the government introduced a policy of industrialization in the early 1950s, and (2) local—across a range of sites differently exposed to risks (Costa et al. 1995; Kottak and Costa 1993). The field research design was systematic intercommunity comparison (based on quantitative and qualitative data). This methodology adds an analytic level to traditional “risk analysis,”

which studies populations *directly exposed* to environmental hazards like nuclear repositories. Given *that* research design, public reactions to a threat are inevitably interpreted within a stimulus-response framework (a threat causes certain responses). By contrast, our design assumed that variation in environmental awareness and risk perception could be most accurately understood by studying a range of sites differentially exposed to hazards. Comparison is essential. Any approach limited to endangered groups can't help but see risk perception mainly in response to an immediate stimulus. (For other linkages projects, see Kottak and Colson 1994.)

The linkages approach (summarized in Table 1) accords with anthropology's traditional interest in cultural change. Its roots can be traced to earlier work, including Julian Steward's large-scale evolutionary and comparative projects (Steward 1950, 1955, 1956), the research of Max Gluckman and others who did "extended-case analysis," and world system approaches that emphasize the embeddedness of local cultures in larger systems (Comaroff 1982; Mintz 1985; Nash 1981; Roseberry 1988; Schneider 1977; Wallerstein 1974; Wolf 1982).

The linkages approach agrees with world system theory that much of what goes on in the world today is beyond anthropology's established conceptual and methodological tools. Traditional ethnography, based on village interviews and participant-observation, assumed that informants knew what was going on in that delimited space. Today, however, no set of informants can supply all the information we seek. Local people may not be helpless victims of the world system, but they cannot fully understand all the relationships and processes affecting them.

Not just the old ecological anthropology but traditional ethnography in general also propagated the illusion of isolated, independent, pristine groups. By contrast, the linkages approach emphasizes the embeddedness of communities in multiple systems of different scale. Local people take their cues not just from neighbors and kin but also from a multitude of strangers—either directly or via the media. Linkages research combines multilevel (international, national, regional, local) analysis, systematic comparison, and longitudinal study (using modern information technology). Challenging the tradition of the lone ethnographer, linkages methodology develops large-scale, explicitly comparative *team projects* (ideally involving international research collaboration). Ideally research is organized so that as new forces impinge on the study region, they can be examined in terms of their differential effects on known research populations. Dealing with social transformation, the linkages perspective considers both the exogenous pressures toward change and the internal dynamic of local cultures. Unlike the old ecological anthropology (and traditional sociocultural anthropology in general), linkages projects study process, engage with history, consider the role of political and economic power, and systematically

Table 1. Linkages methodology summarized.

| |
|-------------------------------------------------------------------------------------|
| • longitudinal |
| • systematic intercommunity comparison |
| • multiple sample populations |
| from same region |
| from different regions |
| from different countries |
| • research extends to levels at which policies are developed |
| • interview planners, administrators, others who impinge on the study population(s) |
| • examine archives and official records |
| • research planned as ongoing process |
| • requiring team work |
| • key to continuity—involvement of |
| host country colleagues |
| local assistants |
| other community residents |

consider feedback among local, regional, and national institutions. However, linkages methodology still requires a basis in fieldwork.

Putting People, and Anthropology, First

While recognizing that local and regional systems are permeable and that contact and power relations are key features of ecological adaptation, the new ecological anthropology must be careful not to remove local people and their specific social and cultural forms from the analytic framework. We must pay attention to the specifics of local culture and social structure—even though people in many settings face common problems caused by world system expansion. To illustrate the importance of local specificity and of using a distinctively anthropological perspective, I will return to the social-soundness analysis I did and recommendations I made for the USAID SAVEM project aimed at biodiversity conservation in five areas of Madagascar. (The Tanosy case described above was drawn from this analysis.) To maximize the likelihood of success, the project's social design for change was founded in the traditional social forms of each target area.

The large island of Madagascar features substantial ecological and cultural diversity, such that the size and characteristics of affected groups varied with type of human ecological adaptation, from region to region and even within the reserves and other protected areas. The project had a site-specific design, recognizing that affected groups existed at various levels and in different regions. Members of the project design team visited five protected areas: the Amber Mountain complex, Beza Mahafaly, Ranomafana, Andringitra, and Andohahela. The social characteristics of each area were charted for incorporation in project design. To exemplify, I will describe the different kinds of social groups identified to be involved in the project for the four

protected areas I actually visited: Ranomafana in the Tanala homeland, Andringitra in Betsileo country, Andohahela in Tanosy-Tandroy territory, and Amber Mountain in Tankarana country.

Ranomafana

Ranomafana National Park is a protected area within the Tanala homeland. The Tanala are not a populous and thriving ethnic group, and this has become a transitional zone with considerable ethnic diversity. Descendants of nineteenth-century conquering armies from Imerina still live in the area, along with more recent Merina migrants, including merchants and slave descendants from Antananarivo (the national capital). The Betsileo, whose homeland lies just west, in the southcentral highlands, have also been expanding and migrating to the Ranomafana area, along with Tambahoaka migrants from the southeast coast.

Social issues are problematic at Ranomafana because of ethnic diversity, continuing immigration, land poverty, and stratification patterns. Most of the immigrants have come as land-poor people—slave-descended or free. Villages near the road are socially fragmentary and disorganized, with ethnic diversity, multiple unrelated families, and a higher than usual (for Madagascar) percentage (one third) of female-headed households. Some villages more distant from the road are more ethnically homogeneous, offering more cohesive structures and organizations of potential use in implementing the project—that is, in gaining local support, raising environmental awareness, and channeling benefits.

Given the extent of poverty, stratification, ethnic diversity, and social fragmentation around Ranomafana, project implementation needed to be especially sensitive. The potential for noncompliance and resistance was great. Tanala and other horticulturalists would be hurt by a prohibition on using the forest for slash-and-burn cultivation. Land-poor people who used the forest to hunt and gather for subsistence and sale would also be harmed. And those who relied on the forest to graze their cattle and hide them from rustlers would suffer, too. Most likely to benefit were people with clear land claims whose fields might be improved by small dams, better irrigation, and other agricultural inputs—the “development” part of the Conservation and Development project.

Andringitra

The Andringitra mountain area is a long-established reserve in the extreme south of the Betsileo homeland. The ethnic diversity around Andringitra is of a different and less problematic sort than that at Ranomafana. Two ethnic groups (Betsileo and Bara) have villages near Andringitra. However, each village tends to be ethnically homogeneous. Nor are issues of stratification and land poverty as troubling as in Ranomafana.

Surrounding Andringitra were at least 13 *fokontany* (village clusters), having about 10,000 total inhabitants. Each *fokontany* included smaller villages and hamlets, although there was a tendency toward settlement centralization in the area because of the fear of cattle rustlers, who were said to use the forests to hide and dismember the cattle they steal. (Peasants are also said to use the forests to hide their cattle from rustlers.) Around Andringitra the Betsileo villages lie to the north, and the Bara villages lie to the south.

I knew the traditional social organization and economy of the Betsileo villages around Andringitra from my previous research in the 1960s. This is a relatively recently settled (nineteenth-century) addition to the Betsileo homeland. The local economy combines irrigated rice cultivation with cattle pastoralism. Agriculture is less diversified here—focused more exclusively on rice than in the eastern, central, and northern parts of Betsileo territory. The typical Betsileo village near Andringitra contained branches of several (3 to 5) different clans. The village founders in this sparsely populated and land-rich area were small family migrants from more densely populated Betsileo areas. They came in search of land for their herds and rice cultivation. After the French conquered Madagascar they were joined by freed slaves from Betsileo country and Imerina. All now consider themselves Betsileo but maintain their different clan (*foko*) affiliations and names.

It was likely that project implementation would be easier around Andringitra than in Ranomafana. Both Betsileo and Bara have solitary descent groups, some arranged in larger associations (*phratry*s). Ties of marriage and blood siblinghood linked people in different villages and ethnic groups. Because irrigation was traditional and widespread, inputs would be appreciated. There was room for agricultural diversification. Agricultural outreach seemed appropriate for this area. Descent group lines could also be used to enlist support and channel benefits among the Bara around Andringitra.

Andohahela

Andohahela is located near Fort Dauphin on the southeast coast. Most of the reserve lies in the traditional homeland (Anosy) of the Tanosy people. The reserve has two main ethnic groups: Tanosy (the numerically predominant group) in the east and Tandroy in the west. The mammoth eastern part of the reserve—by far the largest at 63,100 ha.—is separated from the western part (12,240 ha.) by nonreserve lands where the Tanosy farm productive irrigated rice fields. These fields rely on the Andohahela forests for their water supply. Unlike Androy (Tandroy land) and the rest of the southeast coast, Anosy is not an area of strong emigration. Despite some deforestation near Fort Dauphin, population pressure on available resources was less obvious here than at Ranomafana or Amber Mountain (see below).

The traditional Tanosy economy is diverse, with both swiddens and irrigated rice fields. Roots and tubers (sweet potato, taro, manioc) are also cultivated. Cattle is another focus of the traditional Tanosy economy and a matter of great cultural interest, as it is among the Tandroy and southern and western Malagasy generally.

In implementing this project (or any other community-level project in Madagascar), project personnel must understand the contrast between formal and informal structures—between structures and offices of the state and those of traditional social organization. The latter will often be more useful than the former for project goals. Thus, the fokontany (village cluster) president, a government office found throughout Madagascar, is an elected official and administrator. His or (rarely) her authority varies, however, from place to place. Traditional authority figures are often more important than the fokontany president. In those fokontany where one cohesive group predominates, the person chosen to stand for election (and the sure winner) is someone with little real authority. He is a stooge for the real powers—the descent group elders. He is expected to be their agent, errand boy, and foil in encounters with the state.

Both Tanosy and Tandroy retain powerful descent groups. Identification of descent group heads is vital in implementing this project in Andohahela. Descent group heads must give the project their blessing—thus maximizing the cooperation of the entire group. Descent group structure can be used to channel benefits and spread information. All the ethnic groups abutting on Andohahela have these kind of structures and leaders. The National Forestry Department has used them to distribute seedlings and gain cooperation with its tree planting programs.

Amber Mountain

The area around Diego Suarez in northern Madagascar is the traditional homeland of the Tankarana (Antankarana). Like the Tanosy near Andohahela and the Tanala near Ranomafana, the Tankarana have not expanded. The area is one of immigration rather than emigration. Indeed, the Tankarana seem to have retracted to their mountain homeland at Ankarana, where their prince (*mpanjaka*) still lives, holds court, and heads ceremonies at his capital, Ambilobe. In a country such as Madagascar, where many foreigners have been deceived by the claims of false princes, this is a real and effective prince. The project must pay attention to him, his assistants, their customs, and their ceremonies in implementing the project. Fortunately the Amber Mountain WWF staff took care (initially at least) to implement the project in ways that are culturally appropriate.

All areas of Madagascar have traditional owners, called *tompotany*—masters of the land. The Tankarana are the *tompotany* for the Diego Suarez area. Also important are

the Anjoatsy (a mobile, seagoing group of spiritual-ritual specialists, with traditional ties to an informal version of Islam and ports on the east coast). The Anjoatsy have spiritual authority at Ambohitra (Amber Mountain proper). The WWF staff arranged for an Anjoatsy *mpijoro* (priest) to bless the park in a traditional ceremony. Similarly, at Ankarana, WWF enlisted the aid of the prince and the power of traditional Ankarana ritual to enhance cooperation with project agents.

There are immigrants throughout the Amber Mountain complex area. They include Merina (still hated in the area because of their nineteenth-century conquest of the Tankarana), Betsileo (including woodcutters working for a commercial firm that posed a threat to the forest), people from the southeast coast (Taimoro, Taisaka, Zafisoro, et al.). There are also Sakalava (from the west and northern coast), Tsimihety (from further south), and Comorians. For generations this has been an area of coastal trade (extending to the Comoros and the East African coast), interethnic contacts, and mixture. The town of Joffreville is a microcosm of the ethnic diversity that exists in this region. Although it lacked descent groups, we did identify some ethnic, religious, and school associations that might be used in project implementation, and people still heeded the ancestral ritual authority of the *tompotany* and their priests.

Such site-specific analysis and recommendations for a conservation-and-development project illustrate that analysis of social forms should not be subordinated to approaches that emphasize the environment at the expense of society and culture, and ecology over anthropology. People must come first. Cultural anthropologists need to remember the primacy of society and culture in their analysis and not be dazzled by ecological data. Funding sources that give priority to the hard sciences, fund expensive equipment, and support sophisticated technology should not lead us away from a focus on cultural specificity and social and cultural variables. Ecological anthropologists must put anthropology ahead of ecology. Anthropology's contribution is to place people ahead of plants, animals, and soil.

In Conclusion—Romer's Rule

The paleontologist A. S. Romer (1960) developed the rule that now bears his name to explain the evolution of land-dwelling vertebrates from fish. The ancestors of land animals lived in pools of water that dried up seasonally. Fins evolved into legs to enable those animals to get back to water when particular pools dried up. Thus, an innovation (legs) that later proved essential to land life originated to maintain life in the water. Romer's lesson—important for both the old and the new ecological anthropology—is that an innovation that evolves to *maintain* a system can play a major role in *changing* that system. Evolution occurs in increments. Systems take a series of small steps to maintain themselves, and they gradually change. Rappaport

recognized Romer's lesson in his definition of adaptation: "the processes by which organisms or groups of organisms maintain *homeostasis* in and among themselves in the face of both short-term environmental fluctuations and long-term changes in the composition and structure of their environments" (Rappaport 1971b:23-24, emphasis added).

Romer's rule can be applied to development, which, after all, is a process of (planned) socioeconomic evolution. Applying Romer's rule to development, and here especially to ecologically oriented initiatives, we would expect people to resist projects that require major changes in their daily lives, especially ones that interfere with subsistence pursuits. People usually want to change just enough to keep what they have. Motives for modifying behavior come from the traditional culture and the small concerns of ordinary life. Peasants' values are not such abstract ones as "learning a better way," "increasing technical know-how," "conserving biodiversity," or "making the world safe for democracy." (Those phrases exemplify intervention philosophy.) Instead, their objectives are down-to-earth and specific ones. People want to improve yields in a rice field, amass resources for a ceremony, get a child through school, or be able to pay taxes. The goals and values of subsistence producers may at times differ from those of people who produce for cash, just as they differ from the intervention philosophy of development planners. Different value systems must be considered during planning.

This is one more way of saying that (ecological) anthropologists should not forget culture and people as they grapple with complexity, comparison, and change. Change always proceeds in the face of prior structures (a given sociocultural heritage). The direction and nature of change is always affected by the organizational material (sociocultural patterns) at hand when the change begins. Thus, cultural ways cannot be regarded as blank checks on which the environment, or history, can freely and mechanically write.

Notes

1. This perspective was formalized at two Wenner-Gren supported conferences organized by Douglas White and held in La Jolla, California, in 1986. Participants, who became founding members of Linkages: The World Development Research Council, included Lilyan Brudner-White, Michael Burton, Elizabeth Colson, Scarlett Epstein, Nancie Gonzalez, David Gregory, Conrad Kottak, Thayer Scudder, and Douglas White.

Linkages' goals include assisting in organizing and coordinating basic scientific research on development on a worldwide basis. This includes formulation of theory, testing of hypotheses, development of appropriate databanks for testing theoretical formulations, monitoring change, establishing trends, and identifying specific linkages or mechanisms involved in social change, including development interventions.

A crucial vehicle for development research, including study of both spontaneous and planned social change, is the systematic integration of data from longitudinal field sites. Such sites allow analysis and evaluation of long-term trends and effects, including cyclical changes relating to human populations and their ecologies, including the ecology of world systems and networks.

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