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After Nature

Steps to an Antiessentialist Political Ecology¹

by Arturo Escobar

This paper presents the outline of an anthropological political ecology that fully acknowledges the constructedness of nature while suggesting steps to weave together the cultural and the biological on constructivist grounds. From tropical rain forests to advanced biotechnology laboratories, the resources for inventing natures and cultures are unevenly distributed. The paper proposes an antiessentialist framework for investigating the manifold forms that the natural takes in today's world. This proposal builds on current trends in ecological anthropology, political ecology, and social and cultural studies of science and technology. The resulting framework identifies and conceptualizes three distinct but interrelated nature regimes—organic, capitalist, and techno—and sketches their characteristics, their articulations, and their contradictions. The political implications of the analysis are discussed in terms of the strategies of hybrid natures that most social groups seem to be faced with as they encounter, and try to stem, particular manifestations of the environmental crisis.

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1. The basic framework of this paper was first presented in a panel on the anthropology of science at the 1994 annual meetings of the American Anthropological Association. I thank Rayna Rapp for her comments on that occasion. The first full-length version was prepared for Neil Smith's special seminar, "Ecologies: Rethinking Nature/Culture" at Rutgers University, October 22, 1996. I thank him and the other participants for their generous and creative comments. I also thank Dianne Rocheleau, Soren Hvalkof, Aletta Bier-sack, and students in my graduate seminar on the anthropology of nature (Fall 1996) for critical comments on the paper's ideas.

At the end of the 20th century, the question of nature remains unresolved in any modern social or epistemological order. By this I mean not only modern people's inability to find ways of dealing with nature without destroying it but the fact that the answers given to "the question of nature" by modern forms of knowledge—from the natural to the human sciences—have proven insufficient to the task, despite the remarkable leap forward they seem to have taken in recent decades. That at the root of most environmental problems lie particular forms of social organization—domineering, capitalist, patriarchal, or what have you—is no explanation for the impasse at which the environmental sciences find themselves today. The fact is that we (who, and why?) seem compelled to raise the question of nature in a new way. Could it be because the basic constructs with which modernity has equipped us for this task—including nature and culture but also society, culture, polity, and economy—no longer allow us to interrogate ourselves and nature in ways that might yield novel answers? Or perhaps because, as Marilyn Strathern (1992a) has suggested, we have entered an epoch which is defined by the sense of being "after nature"?

The "crisis of nature" is also a crisis of nature's identity. The meaning of nature, to be sure, has shifted throughout history according to cultural, socio-economic, and political factors. As Raymond Williams succinctly put it, "the idea of nature contains, though often unnoticed, an extraordinary amount of human history" (1980:68). Rejecting essential statements about the nature of nature, he goes on to assert that in such statements "the idea of nature is the idea of man . . . the idea of man in society, indeed the ideas of kinds of societies" (p. 71). That nature came to be thought of as separate from people and increasingly produced through labor, for instance, is related to the view of "man" brought about by capitalism and modernity. Following in Williams's tradition, Barbara Bender writes that people's experience of nature and landscapes "is based in large measure on the particularity of the social, political and economic relations within which they live out their lives" (1993a:246). A landscape ethnography emerges from these works which would read history back into the seemingly natural text of nature.

There are other sources that newly unsettle our long-standing understanding of nature. As various writers have observed (Haraway 1991, Strathern 1992b, Rabinow 1992, Soper 1996), we might be witnessing—in the wake of unprecedented intervention into nature at the molecular level—the final decline of the modern ideology of naturalism, that is, the belief in the existence of pristine Nature outside of history and human context. Let us be clear about what this ideology entails. We are talking here about nature as an essential principle and foundational category, a ground for both being and society, nature as "an independent domain of intrinsic value, truth, or authenticity" (Soper 1996:22). To assert the disappearance of this notion is quite different from denying the existence of a biophysical reality—prediscursive and presocial, if you wish—with structures and

processes of its own which the life sciences try to understand. It means, on the one hand, that for us humans (and this includes life scientists and ecologists) nature is always constructed by our meaning-giving and discursive processes, so that what we perceive as natural is also cultural and social; said differently, nature is simultaneously real, collective, and discursive—fact, power, and discourse—and needs to be naturalized, sociologized, and deconstructed accordingly (Latour 1993). On the other hand, it means that our own beliefs in nature as untouched and independent are giving way—with molecular technosciences from recombinant DNA to gene mapping and nanotechnology—to a new view of nature as artificially produced. This entails an unprecedented ontological and epistemological transformation which we have hardly begun to understand. What new combinations of nature and culture will become permissible and practicable?

Worldwide, the transformation of the biological is yielding a great variety of forms of the natural. From tropical rain forests to advanced biotechnology laboratories, the cultural and biological resources for collectively inventing natures and identities are very unevenly distributed. As much as identities, natures can be thought of as hybrid and multiform, changing in character from place to place and from one set of practices to another. In fact, individuals and collectivities are compelled today to hold various natures in tension. One might situate these natures according to various coordinates or draw cartographies of concepts and practices to orient oneself in the complex field of the natural. This paper will suggest one such particular cartography in terms of the axes of the organic and the artificial.

The first part presents the basic principles of philosophical and political antiessentialism. The second proposes a framework of nature regimes on antiessentialist grounds, identifying organic, capitalist, and technonatures. The third part argues from the perspective of rain-forest social movements for the inevitability of hybrid natures in the contemporary world. This part also readdresses the question of the possible relation between the biological and the social sciences in terms of antiessentialist conception. In the conclusion I deal with some of the political implications of the analysis.

Antiessentialism: From History to Political Ecology

Political ecology is the most recent field to claim a stake in illuminating "the question of nature." Its main predecessors were the variety of orientations in cultural and human ecology in vogue from the 1950s to the 1970s (see Hvalkof and Escobar 1998 for a review and Kottak 1997, Moran 1990). The field seems to be experiencing a renaissance today. While geographers and ecological economists have taken the lead in this endeavor (Blaikie and Brookfield 1987, Bryant 1992, Peet and Watts 1996, Martinez Alier 1995, Rocheleau, Thomas-

Slyater, and Wangari 1996) other fields, such as anthropological political economy (Johnston 1994, 1997; Greenberg and Park 1994; Brown n.d.), social ecology (Heller n.d.), feminist theory, environmental history, sociology, and historical archaeology, are joining in this collective effort. The initial step, as some recent reviewers see it, was the infusion, in the 1970s, of cultural and human ecology with considerations of political economy (Bryant 1992, Peet and Watts 1996). In the 1980s and the 1990s, this political-economy-driven political ecology absorbed other elements, particularly the poststructuralist analyses of knowledge, institutions, development, and social movements (Peet and Watts 1996) and feminist insights into the gendered character of knowledge, environment, and organizations (Rocheleau, Thomas-Slyater, and Wangari 1996). From these two recent volumes—intended to guide research under the rubrics of liberation ecology and feminist political ecology, respectively—a more nuanced account of both nature-society relations and political ecology is emerging. It highlights the interwoven character of the discursive, material, social, and cultural dimensions of the human-environment relation. While empirical studies based on these frameworks have been taking place for some years, "in a sense the theoretical work has only just began" (Peet and Watts 1996:39).

This paper takes these accomplishments as a point of departure in reexamining the human-environment relation in the context of both the ontological transformation of nature and its unevenness. Building upon the breakdown of the ideology of essential nature and echoing trends in poststructuralist feminist, political, and critical race theories,² it asks: Is it possible to articulate an antiessentialist theory of nature? Is there a view of nature that goes beyond the truism that nature is constructed to theorize the manifold forms in which it is culturally constructed and socially produced, while fully acknowledging the biophysical basis of its constitution? Moreover, is an antiessentialist stand not a necessary condition for understanding and radicalizing contemporary social struggles over the biological and the cultural? On the political side, what implications would such a stand have for social struggles, collective identities, and the production of expert knowledge? Finally, is it possible to construct a theory of nature that will give us an indication of the totality of forms nature takes today without being totalizing?

Postmodernists and poststructuralists have too hastily come to think that since there is no nature outside of history, there is nothing natural about nature. As Kate Soper (1996) constructively points out, this has placed cultural theorists at odds with environmentalists, who for the most part continue to espouse the be-

2. For poststructuralist political theory I rely particularly on Laclau and Mouffe (1985; Mouffe 1993; Laclau 1996). A comprehensive reader on critical race theory is Delgado (1995). Poststructuralist and antiessentialist debates in feminist theory cover a vast field impossible to summarize in this paper; I will refer the reader to those that focus on nature and environment issues, particularly Haraway (1989, 1991, 1996).

lief in external, prediscursive nature (Soule and Lease 1995). It is necessary to strive for a more balanced position that acknowledges both the constructedness of nature in human contexts—the fact that much of what ecologists refer to as natural is indeed also a product of culture—and nature in the realist sense, that is, the existence of an independent order of nature, including a biological body, the representations of which constructivists can legitimately query in terms of their history or political implications. It is thus that we can navigate between “‘nature-endorsing’ and ‘nature-sceptical’ perspectives” in order “to incorporate a greater awareness of what their respective discourses on ‘nature’ may be ignoring and politically repressing” (Soper 1996: 23; see also Berglund 1998). For constructivists, the challenge lies in learning to incorporate into their analyses the biophysical basis of reality; for realists it is examining their frameworks from the perspective of their historical constitution—accepting that, as scholars in science and technology studies have been demonstrating, the natural sciences are not ahistorical and nonideological. This double and pressing need must be addressed in any political ecology framework. As Roy Rappaport put it, “the relationship of actions formulated in terms of meaning to the systems constituted by natural law within which they occur is, in my view, the essential problematic of ecological anthropology” (1990:69). This statement suggests the need for a dialogue between those who study meanings and those who study “natural law.”

From here, however, to an antiessentialist theory of nature that acknowledges equally the cultural and the biological there is a vast terrain to cover.³ Politics and science do not lend themselves to easy articulation. A political theory of nature has yet to be built. The sources of antiessentialism are multiple. Two of its more eloquent proponents, Ernesto Laclau and Chantal Mouffe, start by recognizing that the political “must be conceived as a dimension that is inherent to every human society and determines our very ontological condition” (Mouffe 1993:3). (I would add, including our condition as biological beings.) Social life, they argue (Laclau and Mouffe 1985, Mouffe 1993, Laclau 1996), is inherently political in that it is the site of antagonisms that arise out of the very exercise of identity. Every identity is relational, which means that the existence of any identity entails the affirmation of difference and, hence, a potential antagonism. Antagonisms are constitutive of social life. In addition, given that meaning cannot be permanently fixed—a basic postulate of hermeneutics and poststructuralism—identities are the result of articulations that are always historical and contingent. No identity or society can be described from a single and universal perspective.

Similarly, with poststructuralism’s theory of the sub-

ject we are further compelled to give up the liberal idea of the subject as a self-bounded, autonomous, rational individual. The subject is produced by/in historical discourses and practices in a multiplicity of domains. Antiessentialist conceptions of identity highlight the fact that identities (racial, sexual, ethnic, or what have you) are continually and differentially constituted—partly in contexts of power—rather than developing out of an unchanging and preexisting core. What matters, then, is to investigate the historical constitution of subjectivity as a complexity of positions and determinations without any true and unchanging essence, always open and incomplete. Some see this critique of essentialism arising out of poststructuralism, the philosophy of language, and hermeneutics as a *sine qua non* for radical social theory today and for understanding the widening of the field of social struggles (Laclau 1996, Alvarez, Dagnino, and Escobar 1998).

Is the category “nature” susceptible to this kind of analysis? If seemingly solid categories like society and the subject have been subjected to antiessentialist critique, why has nature proven so resistant? Indeed, even so entrenched a category as “the capitalist economy” has been the target of a recent antiessentialist decentering (Gibson-Graham 1996). The poststructuralist rethinking of the social, the economy, and the subject—and other targets of antiessentialist thought, particularly binary gender and essential racial identities—suggests ways of rethinking nature as having no essential identity. As in the case of the other categories mentioned, the analysis would have a double goal: to examine the constitutive relations that account for “nature”—biological, social, cultural—and to open the way for revealing ethnographically or imagining discourses of ecological/cultural difference that do not reduce the multiplicity of the social and biological worlds to a single overarching principle of determination (“the laws of the ecosystem,” “the mode of production,” “the knowledge system,” genetics, evolution, etc.). If discourses of nature can be said to have been either biocentric (particularly in the natural sciences) or anthropocentric (in the social and the human sciences), it is time to question what is taken as essential to “nature” or “Man” in these discourses. At the end of the road we might be able to recognize a plurality of natures—capitalist and noncapitalist, modern and nonmodern, let us say for now—in which both the social and the biological have central, albeit not essential, roles to play.

Let us now attempt a definition of political ecology that will facilitate this antiessentialist exercise. I propose this definition as a theoretical minimum for the task at hand: Political ecology can be defined as the study of the manifold articulations of history and biology and the cultural mediations through which such articulations are necessarily established. This definition does not rely on the common categories of nature, environment, or culture (as in cultural ecology, ecological anthropology, and much of environmental thinking) or on the sociologically oriented nature and society (as in Marxist theories of the production of nature). The

3. “The contradiction, perhaps inevitable, between the cultural and the biological is, in my view, among the most fundamental problems to be addressed by an ecologically-aware anthropology” (Rappaport 1990:56).

choice of history and biology has a precedent in Michelle Rosaldo's (1980) attempt at analyzing the relation between sex and gender in terms of what she called "the mutual accommodation of biology and history." It also resonates with some recent proposals for looking at history/biology interaction from phenomenological perspectives. It may be objected that in the proposed definition I am introducing biology and history as new and perhaps essential and binary centers of analysis. This may be so, although the binarism will be complicated shortly. The definition does, however, displace nature and society from their long-held position of privilege in Western analyses. "Nature" is a specifically modern category, and many nonmodern societies have been shown to lack such a category as we understand it (Williams 1980, Strathern 1980); I have already suggested that our modern notion of nature is also disappearing under the weight of new technologies. "Society" has similarly been shown by poststructuralist critics to lack the structure and laws with which it has been endowed by the social sciences and not to exist in many nonmodern contexts. Thus in both the nonmodern and the postmodern domain we find nature and society absent conceptually, and the attempt to construct an analysis that does not rely on these categories has political and epistemological dimensions.

Defined as the articulation of biology and history, political ecology examines the manifold practices through which the biophysical has been incorporated into history—more accurately, in which the biophysical and the historical are implicated with each other. Examples range from those that can be gleaned from the prehistoric past to the most contemporary and futuristic—from ancient articulations through agriculture and forestry to molecular technologies and artificial life, if we understand this latter as a particular representation of the biology/history relation. Each articulation has its history and specificity and is related to modes of perception and experience, determined by social, political, economic, and knowledge relations, and characterized by modes of use of space, ecological conditions, and the like. It will be the task of political ecology to outline and characterize these processes of articulation and its goal to suggest potential articulations realizable today and conducive to more just and sustainable social and ecological relations. Another way to state this goal is to say that political ecology is concerned with finding new ways of weaving together the biophysical, the cultural, and the technoeconomic for the production of other types of social nature.

Antiessentialist Political Ecology: Regimes of Nature

To facilitate the task of visualizing the span of articulations of the biological and the historical, let us conduct a brief imagination exercise. Let us situate ourselves in a tropical rain-forest area such as the Pacific Coast of

Colombia, where I have been working in recent years.⁴ We see here three actors at work. The first of these is made up of local black and indigenous communities that for several centuries have been active in the creation of lifeworlds and landscapes of particular kinds. These lifeworlds and landscapes are unfamiliar to us. Let us say that we start our journey at the source of one of the innumerable rivers that flow from the Andean slopes towards the littoral and that as we descend we find that indigenous communities give way to black settlements and, as the river opens into an estuary, we start seeing small towns and even a few whites. Soon we find ourselves faced with a very different landscape, one that we immediately recognize. Perhaps it is a plantation of African palm or an orderly succession of large rectangular pools (over a hectare each) for the artificial cultivation of shrimp for export. Here we find a capitalist at work, making development happen and, he argues, providing jobs for hundreds of black workers in the plantations or in the shrimp and fish packaging plants; in his view, such workers would otherwise be idle in the slums of a nearby town, which has doubled its population in scarcely a decade, from 50,000 to 100,000. This capitalist is our second actor.

Not far from the plantation is an indigenous territory that has recently received a strange visitor, already known in other places as a biodiversity prospector. She has come to the region, perhaps sent by a botanical garden in the United States or Europe, perhaps by a pharmaceutical company, in search of plants with potentially useful commercial applications. She is in fact interested not in the plant itself but in its genes, which she will take back to her home country. Let us imagine that these genes eventually end up being used to modify humans in ways that make them resistant to certain

4. My research in this area includes 18 months of fieldwork (January 1993–January 1994; Summers 1994, 1996, 1997) and a continuous engagement with black movement activists, biodiversity conservation and development planners, and the growing scholarly network focused on the region. Very briefly, the Pacific coast region extends from Panama in the north to Ecuador in the south and from the westernmost chain of the Andes to the ocean. The region has one of the highest levels of biological diversity in the world. About 60% of the region's 900,000 inhabitants (800,000 Afro-Colombians, 50,000 Embera, Waunana, and other indigenous people, and mestizo colonists) live in the few large towns, the rest inhabiting the banks of the more than 240 rivers of the area. Black and indigenous people have maintained distinct material and cultural practices, such as multiple subsistence and economic activities involving agriculture, fishing, hunting, gathering, and small-scale gold mining and timber collection. Conventional development and capitalist activities (African palm, timber, gold mining, shrimp cultivation, tourism) have increased greatly since the 1980s. The new Colombian constitution of 1991 granted cultural and territorial rights to the black communities; a significant black movement of ethnocultural and ecological orientation has been growing as an attempt to defend the region from development and capitalist intrusion and to press for the demarcation or titling of collective territories. For general background and ethnographic information, see Escobar and Pedrosa (1996); on ethnographic treatment of biodiversity conservation, see Escobar (1997, 1998a); on the region's black movement, see Grueso, Rosero, and Escobar (1998). The black movement's political ecology is discussed in Escobar (1998a).

diseases, to produce transgenic organisms or products, or perhaps even to create an entire tropical environment in a northern latitude out of a collection of genes from many tropical forests—whether in actual biological or virtual form. This is the third and final actor in the narrative of nature we want to construct.⁵

Finally, let us now situate ourselves in the space of perception of an activist of the social movement of black communities that has emerged in this region as a result of the many changes that have taken place there, including the arrival of the capitalist, the development planner, and the prospector. This activist grew up in a river community and migrated to one of the big cities in the Andean part of the country in search of education; she is now back organizing for the defense of the cultural and biophysical landscapes of her region (many activists are in fact women). If we take a step back and look at what she is doing, we can say that she is holding various landscapes, various natures in tension: foremost in her mind is the landscape of forest and rivers and settlements of her childhood, populated with all kinds of beings, from the beautiful coconut and *naidí*⁶ palm trees to the visions and spiritual beings that populate the under- and supraworlds. If she is in her early twenties, perhaps she also grew up alongside of the disciplined landscape of the plantations. As an activist, she has become aware of the discourse of biodiversity and of the fact that her region is in the mire of international organizations, Northern environmental NGOs, multinational corporations, and the government of her own country, all intent on having access to the allegedly rich genetic resources of the region.

Social movement activists—along with all of us in our own ways and with different natures in mind—have to hold these various landscapes in tension—the “organic” landscape of the communities, the capitalist landscape of the plantations, and the technoscape of the biodiversity and biotechnology researchers and entrepreneurs. At the risk of oversimplification and rigidity, I want to suggest that the three actors just sketched embody significantly different regimes of articulation of the historical and the biological. I will refer to these regimes as organic nature, capitalist nature, and technonature respectively. I retain the term “nature” because of our historical proximity to the modern regime, for which nature is a dominant category. In what follows, I would like to lay down the rudiments of a characterization of each of these regimes, but it is first necessary to make some general and cautionary observations about the model to clarify its character.

5. I do not mean to reduce the biodiversity conservation movement to biodiversity prospecting; this entire exercise is only suggestive of certain trends and possibilities.

6. The tips of these trees are used to produce the “hearts of palm” that are sold in supermarkets of wealthy countries in canned form. The entire palm is usually cut down for this purpose. Attempts are under way in some parts of the Pacific region to establish plantations of a different species for commercial production, but the naturally occurring *naidí*, which does not reproduce easily, has been decimated.

First, this is an antiessentialist model. It is well accepted already that nature is differently experienced according to one’s social position and that it is differently produced by different groups or in different historical periods. These assertions, however, imply a modern order in which experience can be gauged according to modern forms of production and social relations. They do not allow a theorization of the radical alterity in the social forms of nature. The nature regimes can be seen as constituting a structured social totality made up of multiple and irreducible relations, without a center or origin, that is, a field of articulations (Gibson-Graham 1996:29); there is a double articulation, within each regime and between one and another. The identity of each regime is the result of discursive articulations—with biological, social, and cultural couplings—that take place in an overall field of discursivity wider than any particular regime (Laclau and Mouffe 1985).⁷

Second, the three regimes do not represent a linear sequence or series of stages in the history of social nature. They coexist and overlap. Moreover, they co-produce each other; like cultures and identities, they are relational. What matters is examining their mutual articulations and contradictions—the ways in which they vie for control of the social and the biological. Humans in these three regimes are differently located, have different conceptualizations, and place differentiated demands on the biological. What they locate in biology or in history varies; said differently, they bring different histories into the biological, and, conversely, the biological takes different forms and possibilities in each (although at some level nature is “always the same”?). The three regimes are thus the subject of tensions and contestations; biophysical laws, meanings, labor, knowledge, and identities are important, although with diverging intensities and configurations, in all of them. The regimes represent actual or potential apparatuses for the production of the social and the biological. They could be seen as moments in the overall and differentiated production of social-biological nature. Finally, it is important to say from the outset that the organic regime is not essential but historical; it does not correspond to “the natural”; it is not stable or settled, and it is as constructed and connected to other assemblages as capitalist and technonatures. Organic nature does not rest on a wholesome cultural framework—although it is characterized by a more integral connection between culture and biology—but relies on reassemblages and recombinations of organisms and practices, albeit some-

7. The nature regimes can also be likened to a fractal totality, in the sense in which Paul Gilroy (1993) speaks of the black Atlantic as a fractal structure wherein many identities, political cultures, and cultural politics coexist. A fractal structure has no beginning or end but is always in flux between states that are different yet similar to each other, according to a ceaseless recursivity. Fractal theories—like theories of articulation—offer a vision of a totality without being totalizing. It can be said that the various regimes of nature production create a fractal ecology. Finally, the antiessentialist model of nature regimes can be related to Polanyi’s proto-antiessentialist model of the economy as instituted process (1957) and to Foucault’s (1973) notion of epistemes.

times incongruent with those characteristic of modern capitalist nature.

Third, the knowledge we have at our disposal for examining each regime is uneven and differentiated. I propose to approach each regime from the perspective of the particular form of knowledge that seems best suited to its study. I will suggest that we can more appropriately study organic nature through the anthropology of local knowledge, capitalist nature in terms of historical materialism, and technonature from the perspective of science-and-technology studies. These frameworks are regime-specific modes of analysis because of their affinities, commitments, and theoretical orientations. A final corollary of these qualifications is that the model is built from a certain partial perspective, that of the critical, antiessentialist political ecologist bound by history to modern capitalist nature but attempting to visualize a discourse of difference in which organic and techno- natures can become visible in all of their alterity and in which alternative discourses of nature and culture can be cultivated.⁸

CAPITALIST NATURE: PRODUCTION AND MODERNITY

The regime we know best is capitalist nature, which emerged in post-Renaissance Europe and crystallized with capitalism and the advent of the modern epistemic order in the late 18th century. A number of its aspects will be reviewed here under four rubrics—new ways of seeing, rationality, governmentality, and the commodification of nature linked to capitalist modernity.

The development of new ways of seeing has been directly linked to the emergence of capitalist nature: the invention of linear perspective, linked to realist painting (freezing place from a particular point of view and locating the viewer outside of the picture and thus outside of nature and history); the objectification of landscape as vista with a concomitant politics of vision (Thomas 1993); an equation of consciousness with vision—a scopic regime (Jay 1988)—and the initiation of surveillance and monitoring on a large scale (Foucault's [1979] panopticism); and a totalizing male gaze which objectifies landscape and women in particular ways (Haraway 1988, Ford 1991). With landscape art, nature took on a passive role, deprived of agency under a totalizing perspective that created the impression of unity and control.

In a more philosophical vein, this gaze was instrumental in the birth of the modern sciences; the development of clinical medicine, in opening up the corpse for observation at the end of the 18th century, established an alliance "between words and things, enabling one to see and to say," thus integrating the individual (and the biological) into rational discourse (Foucault 1975:xii). From the analysis of tissues through the microscope

and the camera in the 19th century to satellite surveillance, GIS, and sonography, the importance of vision in our treatment of nature and ourselves has only grown. But the most fundamental feature of modernity in this regard is what Heidegger (1977) has called the creation of "a world picture" within which nature is inevitably enframed, that is, ordered as a resource for us to use as we wish. With the Frankfurt school, the domination of nature became one of the quintessential features of instrumental rationality, an aspect that has been highlighted from feminist and ecological perspectives by various writers (Merchant 1980, Shiva 1993). As Foucault (1973) vividly showed, all of these developments are aspects of the emergence of "Man" as an anthropological structure and the foundation of all possible knowledge. With economics, "Man" became entrapped in an "analytic of finitude," a cultural order in which we are forever condemned to labor under the iron law of scarcity. This separation of nature and society is one of the basic features of modern societies—although, in actuality, as Latour (1993) argues, the divide has only made possible the proliferation of hybrids of nature and culture and of networks linking them in multiple ways.

The history of Man and of bourgeois perception is related to other factors such as the colonization of time (Landes 1983), the development of maps and statistics, and the association of particular landscapes with national identities. More pertinent, capitalist modernity required the development of rational forms of management of resources and populations based on the expert knowledge of planners, statisticians, economists, demographers, and the like—what Foucault (1991) has called "governmentality." Governmentality is a quintessentially modern phenomenon by which increasingly vast domains of daily life are appropriated, processed, and transformed by expert knowledge and the administrative apparatuses of the state. This process has reached the natural order from scientific forestry and plantation agriculture to the managerialism of sustainable development. The ways in which nature has been governmentalized—made the object of expert knowledge, regularized, simplified and disciplined, managed, planned for, etc.—are still understudied (Brosius 1997).

Most of the attention of those seeking to understand capitalist nature has been occupied by the examination of nature as commodity. The articulation of biology and history in capitalist nature takes the primary form of the commodity, and analyses at this level have aimed at explaining the production of nature as commodity through the mediation of labor. From a Marxist perspective the separation of nature and society is seen as ideological; the unity of capital entails the fusion of use value and exchange value in the production of nature. Historically, the production of surplus with the concomitant social and institutional differentiation allowed humans to emancipate themselves from nature, albeit at the price of enslaving part of the population. With capitalism the production of nature reached a higher, societal level. Through the mediation of labor,

8. Partial perspective and standpoint epistemology are well-known principles introduced by feminist critics of science, particularly Donna Haraway and Sandra Hardin.

"society" emerged from "nature," resulting in the production of what has been called a second nature, namely, the ensemble of social institutions which regulate the exchange of commodities, including the nature(s) produced by humans. Nature became a universal means of production. With the development of science and machines, nature and society achieved a unity in the generalized production brought about by capitalism. The very distinction between first and second nature became obsolete once the production of nature had become the dominant reality. Capitalist nature became a hegemonic regime (Smith 1984).⁹

All of the factors outlined so far are a product of a particular phase of history—patriarchal capitalist modernity. Recent Marxist-inspired writings have gone a long way towards conceptualizing this regime in both its classical and current forms and its relation to capitalism as a whole (Smith 1984, J. O'Connor 1988, Haraway 1989, Leff 1995). It is not the point here to summarize these developments or their ecological implications, which represent one of the most active sites of work on the question of nature today (but see Escobar 1996). It is important, however, to highlight one aspect that will be important for our explanation of technonature. Capitalist nature is uniform, legible, manageable, harvestable, Fordist. The accumulation of uniform nature is becoming an obstacle to capital accumulation for both social and ecological reasons.¹⁰ It is therefore necessary to start the process of accumulation of diverse nature (or "flexible nature," if we accept that diversity in the biological domain is somewhat isomorphic with flexibility in the social domain). The discourses of sustainable development and biodiversity conservation are a reflection of this tendency, and so is the argument that capitalism is entering an ecological phase in which its modern, reckless form will coexist with a postmodern, conservationist one (M. O'Connor 1993 and, for discussion, Escobar 1996).

9. See Smith's pioneering work (1984:54–55): "Once the relation with nature is determined by the logic of exchange value, and first nature is produced from within and as part of second nature, first and second nature are themselves redefined. With production for exchange, the difference between first and second nature is simply the difference between the non-human and humanly created worlds. This distinction ceases to have real meaning once the first nature is too produced. Rather, the distinction is now between a first nature that is concrete and material, the nature of use-values in general, and a second nature which is abstract, and derivative of the abstraction from use-value that is inherent in exchange-value." 10. This is another side of what James O'Connor (1988) has called the "second contradiction" of capitalism. According to this thesis, capitalist restructuring today takes place chiefly at the expense of "production conditions" (labor, land, nature, space, the body, that is, those elements of production that are not produced as commodities although they are treated as such). Driven by competition and cost shifting among individual capitals, this restructuring signifies a deepening of capital's encroachment on nature and labor, an aggravation of the ecological crisis, and a further impairment of capital's conditions of production and the reproduction of these conditions. The restructuring is contradictory for capital, which seeks to overcome this dynamic through a variety of measures that simply displace the contradiction onto other terrains. An active debate on this thesis has been maintained in the journal *Capitalism, Nature, Socialism* since the late 1980s.

As a provisional conclusion, I want to suggest a partial definition of the political ecology of capitalist nature as the study of the progressive incorporation of nature into the twin domains of governmentality and the commodity. Both aspects have biological, cultural, and social consequences that need to be examined more carefully. It is now time, however, to move on to the organic regime. From the perspective of capitalist nature, this regime may seem a case of ecological atavism or a local manifestation of universal nature and its cultural and symbolic mechanisms nature idolatry or primitivism. However, the natures of the local native communities cannot be reduced to inferior manifestations of capitalist nature, nor can they be said to be produced only according to capitalist laws.

ORGANIC NATURE: CULTURE AND LOCAL KNOWLEDGE

Understanding the regime of organic nature calls for different forms of analysis; ecosystems and production analyses are no longer sufficient.¹¹ One defining feature of this regime is the fact that nature and society are not separated ontologically. Anthropological and ecological studies demonstrate that many rural communities in the Third World "construct" nature in strikingly different ways from modern forms; they signify and use their natural environments in very particular ways. For purposes of argument I will refer to the anthropological literature on the subject as the "anthropology of local knowledge," although it is by no means restricted to such knowledge.¹² What is certain is that there is an incredible ferment of activity in this area; whether this amounts to the emergence of a "new ecological anthropology" (Kottak 1997) or to a refounding of ecological anthropology on a surer footing (Descola and Pálsson 1996) remains to be seen.

In a classic article on the subject, Marilyn Strathern

11. I am aware that the label "organic" is problematic, given its association with terms such as "purity," "wholeness," "timelessness," etc. While forest peoples in particular have been seen as quintessentially organic and embedded in nature, I suggest that it is possible to launch a defense of the organic as a historical regime and to use it as a point of support for theory construction and political action. An antiessentialist notion of the organic can serve as a counterpoint to the essentialist and at times colonialist emphasis on wholeness and purity of much environmental discourse. I will explain the meaning of "organic" more fully below.

12. Again, it is impossible to list the pertinent literature, which grows out of earlier concerns in ethnobotany, ethnoscience, and ecological anthropology. Strathern's work (1980, 1988, 1992a, b) constitutes the most systematic attempt in anthropology at theorizing nature as locally produced, whether in nonmodern or postmodern ("post-nature") settings. State-of-the-art discussions of cultural models of nature are found in Descola and Pálsson (1996) and Gudeman and Rivera (1990). For a recent and useful assessment of ecosystems-inspired anthropological analyses, see Moran (1990). Debates on ethnobiology are summarized in Berlin (1992). Structural-oriented analyses are best exemplified by Descola (1992, 1994), landscape ethnography by Lansing (1991), Bender (1993b), and Tilley (1994). The anthropology of local knowledge proper is advanced most cogently in Hobart (1993), Milton (1993), and Descola and Pálsson (1996).

(1980) made it clear that we cannot interpret native {nonmodern} mappings of the social and the biological in terms of our concepts of nature, culture, and society. Among the Hagen of the highlands of Papua New Guinea, as among many indigenous and rural groups, "culture" does not provide a distinctive set of objects with which one manipulates 'nature.' . . . nature is not 'manipulated'" (pp. 174, 175). These dichotomies are imposed onto other social orders because of our particular interests, among these the control of the environment. "Nature" and "culture" thus need to be analyzed not as given and presocial but as constructs if we want to ascertain how they function as devices for cultural creations from human beliefs to gender and the economy (MacCormack and Strathern 1980).

From the perspective of an anthropology of local knowledge, then, there are questions such as how other societies represent the relation between their human and biological worlds, what distinctions and classifications of the biological they make, in what languages (including oral traditions, myths, and rituals) they express such distinctions, through what practices such distinctions are effected, whether there is a place for "human nature" in native representations and cognitive maps, and what the relationship is between cultural constructions and production relations and between meanings and uses of biological entities. In a more political vein, one may ask how local constructions relate to our present-day concerns, particularly sustainability, and whether there are notions akin to management or control in native representations and local models of nature.

There are already some answers to these questions, mostly in the form of case studies in nonindustrialized societies. There is, of course, no unified view of just what characterizes local models of nature. Perhaps the most well-established feature today is that the cultural models of nature of many societies do not rely on a nature-society (or culture) dichotomy. Unlike modern constructions, with their strict separation between the biophysical, human, and supernatural worlds, it is commonly appreciated now that local models in non-Western contexts are often predicated on links between these three domains. This continuity—which may nevertheless be experienced as problematic or uncertain—is culturally established through rituals and practices and embedded in social relations different from capitalist or modern ones. Thus living, nonliving, and often supernatural beings do not constitute distinct and separate domains—certainly not two spheres of nature and culture. Descola, for instance, argues that "in such 'societies of nature' plants and animals and other entities belong to a socioeconomic community, subjected to the same rules as humans" (1996:14).¹³

13. As far as the supernatural is concerned, even when there are wild spirits at work the aim is less to dominate them than to come to terms with them so that human activity can take place (Strathern 1980). Indeed, "none of these distinctions implies that the domains of darkness, wilderness, or Dreaming are other-worldly, su-

A local model of the natural may exhibit features such as the following, which may or may not correspond to the parameters of capitalist nature: specific categorizations of human, social, and biological entities (for instance, of what is human and what is not, what is planted and what is not, the domestic and the wild, what is innate and what emerges from human action, etc.), boundary settings, and systematic classifications of animals, spirits, and plants. It may also contain mechanisms for maintaining good order and balance in the biophysical, human, and spiritual circuits (Descola 1992, 1994) or a circular view of biological and socioeconomic life ultimately grounded in Providence, gods, or goddesses (Gudeman and Rivera 1990). There may also be a theory of how all beings in the universe are "raised" or "nurtured" out of similar principles, since in many nonmodern cultures the entire universe is conceived as a living being with no strict separation between humans and nature, individual and community, community and the gods (Grillo 1991, Apfel-Marglin and Valladolid 1995).

Although the specific formulae for arranging all of these factors vary greatly from one native or peasant group to another, they tend to have certain features in common: they reveal a complex image of social life that is not necessarily opposed to nature (in other words, one in which the natural world is integral to the social world) and which can be thought about in terms of human relations such as kinship, extended families, and vernacular or analogic gender. Local models also evidence a particular attachment to a territory conceived as a multidimensional entity that results from many types of practices and relations. They establish links between worlds (biological, human, spiritual; bodies, souls, and objects) which some have interpreted as "a vast community of living energy" (Descola 1992:117) or as a theory of all beings (human and not) as perpetually reborn (see Restrepo and del Valle 1996 for an Afro-Colombian model of perpetual rebirth on the Pacific coast). Ritual is often integral to the interaction between the human and natural worlds. An activity such as clearing the forest for planting may be seen as bringing together villagers, spirits, ancestors, and the crops themselves or their corresponding gods or goddesses. In cases such as these, the relationship between symbolic systems and productive relations can be highly complex, as Lansing (1991) shows in detail in his study of the system of water temples that regulate the engineered landscapes of Bali. Rice terraces reflect a biological view of time and result from the cooperation of hundreds of farmers under the management of these temples. Here we have symbolically mediated produc-

per-natural, or non-empirical. On the contrary, they are worlds that enter experience and of which direct experience is had. They are, so to speak, dimensions of the lifeworld not ordinarily brought into consciousness, but they are integrally part of empirical reality" (Jackson 1996:15; see also Biersack 1997). They are equally integral to many cultural models of nature throughout the world.

tion relations that cannot be understood in conventional terms, Marxist or other.¹⁴

The idea of identifying the mechanisms underlying various models and the commensurability of those models are important issues with consequences for political ecology: "Must we restrict ourselves to describing as best we can the specific conceptions of nature that different cultures have produced at different times, or must we look for general principles of order enabling us to compare the seemingly infinite empirical diversity of nature-culture complexes?" (Descola 1996:84). The question dates back to debates in ethnobiology (summarized in Berlin 1992) concerning the universality of taxonomic structures arising from an underlying "map of nature." Symbolically minded ecological anthropologists have responded to the restricted ethnobiological concern with folk taxonomies by displacing classification from its place of privilege, arguing that it is but one aspect of the process by which humans endow features of the natural environment with significance. These anthropologists are unwilling, however, to give up the idea of underlying mechanisms or structuring procedures ("schemata of praxis" for Descola [1996], cognitive axes for Ellen [1996]) that organize human-environment relations.¹⁵

These debates are beyond the scope of this paper, but it is important to address a closely related issue, that of local knowledge, before concluding this section. There is a certain convergence in anthropology (still being worked out) on the treatment of knowing as "a practical, situated activity, constituted by a past, but changing, history of practices" (Hobart 1993:17; see Ingold 1996). This practice-oriented view of local knowledge—

14. The social relations that underlie local models are often conflictual—for instance, in gender and age terms (Biersack 1997). Organic regimes do not suppose a social or ecological Garden of Eden. The notion of things' being perpetually reborn among some black people of the Colombian Pacific coast, for instance, has been used by natives to legitimate—under the pressure of capitalist forces—a faster rate of tree felling. Dahl (1993:6) summarizes well our state of knowledge in this respect: "All people of necessity maintain ideas about, and of necessity act on, their natural environment. This does not necessarily mean that those who live as direct producers have great systematic insights, although on the whole subsistence producers have detailed knowledge about the working of many small aspects of their biological environment. Much of this knowledge has from experience proved true and efficient, some is misconceived and counterproductive, and some is incorrect but still functions well enough." For some, local models of nature reveal a certain degree of self-consciousness and objectification of nature, including mechanisms of management and control—say, of local fauna or crops (Descola 1992).

15. In reviewing Atran's work (1990), Bloch (1996) has recently suggested that it is life itself (and not, say, "nature" or essential living types and ranks) that is seen as a shared, unchanging, and essential feature. He specifies three requirements for adequate explanations of constructions of nature: "1) constraints coming from the natural world as it is and as it presents itself as an opportunity for human production together with 2) the particular cultural history of groups or individuals, and 3) the nature of human psychology" (p. 3). It is Bloch's belief that psychologists, ethnobiologists, and anthropologists are far from having settled the question of cognition of the natural world, despite important strides in this direction.

inspired by a variety of positions from Bourdieu to Giddens—is an exciting and complex development. A related trend emphasizes the embodied aspect of local knowledge, appealing to philosophical principles outlined by Heidegger, Dewey, Marx, and Merleau-Ponty. For Ingold (1995, 1996), the most ardent and articulate of these scholars, we dwell in a world that is not separate from us, and our knowledge of it can be described as a process of enskillment in practical engagement with the environment. Humans are embedded in the world and engaged in situated practical acts. For Richards (1993), local agricultural knowledge must be seen as a set of context-specific improvisational capacities rather than as constituting a coherent "indigenous knowledge system" as earlier literature proclaimed. This notion finds an echo in the anthropology of experience, for which "use, not logic, conditions belief" (Jackson 1996:12).¹⁶

These welcome trends do not answer all the questions regarding the nature and modes of operation of local knowledge. Whether all knowledge is embodied, whether embodied knowledge can be seen as formal or abstract in any way, whether it is organized in ways that contrast with or resemble scientific discourse, and whether there is a continuous or sporadic shift between practical knowledge and theoretical/formal knowledge that arises from systematic reflection on experience are all open questions. Gudeman and Rivera (1990) have suggested that peasants may possess a "local model" of land, economy, and production that is significantly different from modern models and that exists chiefly in practice. Local models of this sort are "experiments in living"; they are "developed through use" in the imbrication of local practices with larger processes and conversations (1990:14). This proposal suggests that we can treat practical, embodied knowledge as constituting a somewhat comprehensive model of the world.

The consequences of this rethinking of local knowledge and cultural models are enormous. While there is a danger of reinscribing local knowledge into hierarchical constellations of knowledge forms, recasting the devaluation and subordination of local knowledge that has characterized much discussion on the subject (including biodiversity conservation debates), the displacement effected by this ethnographically oriented rethinking is hopeful in a variety of ways. The new thinking helps to debunk the nature/culture dichotomy that is fundamental to the dominance of expert knowledge; accordingly, the common view of distinct domains of nature and culture that can be known and managed separately from each other is no longer tenable.

Similar radical lessons can be drawn from the reinter-

16. We need to ponder the reasons for this forceful—and generally welcome—comeback of phenomenological approaches in ecological anthropology and other fields. It is likely related to the forms of denaturalization of body and life by new technologies and to ecological and cultural crises more generally. This trend needs to be more explicitly politicized.

pretation of cognition found in a related trend that has yet to be incorporated into anthropology, namely, the phenomenological biology of Humberto Maturana, Francisco Varela, and co-workers. Briefly, these biologists suggest that cognition is not the process of building representations of a pre-given world by a pre-given mind external to that world but embodied experience that takes place in a historical background and must be theorized from the perspective of the "unbroken coincidence of our being, our doing, and our knowing" (Maturana and Varela 1987:25). In what they call an enactive approach, cognition becomes the enactment of a relation between mind and world based on the history of their interaction. "Minds awaken in a world," say Varela, Thompson, and Rosch (1991:3), suggesting our ineluctable double embodiment (a concept they borrow from Merleau-Ponty)—that of the body as lived, experiential structure and as the context of cognition—and pointing to the fact that every act of knowledge brings forth a world. This constitutive circularity of knowledge and existence is not without consequences for the investigation of local models of nature (Maturana and Varela 1987:241–44):

our experience—the praxis of our living—is coupled to a surrounding world which appears filled with regularities that are at every instant the result of our biological and social histories. . . . The whole kit bag of regularities proper to the coupling of a social group is its biological and cultural tradition. . . . [Our] common biological heritage is the basis for the world that we human beings bring forth together through congruent distinctions . . . this common biological heritage allows a divergence of cultural worlds brought forth through the constitutions of what can become widely different cultural traditions.

In refusing to separate knowing from doing and these from being, these biologists provide us with a language with which to question the dualisms and asymmetries of nature and culture, theory and practice; they corroborate the ethnographic arguments about the continuity of nature and culture, the embodied aspect of knowledge, and the ideas of enskillment and performativity. Concepts of performativity, enskillment, practice-based models, and enactment do not, of course, exhaust the domain of "local knowledge," and they will have to be further distinguished and refined analytically. However, they constitute a solid basis on which to move forward with the anthropology of knowledge, particularly in the ecological domain of application. They also establish an alternative framework for thinking about a variety of issues from biodiversity conservation to the politics of place and globalization (Escobar 1988a, b).

To sum up, cultural models of nature are constituted by ensembles of meanings/uses that, while existing in contexts of power that increasingly include transnational forces, can neither be reduced to modern constructions nor be accounted for without some reference

to grounds, boundaries, and local culture. They are based on historical, linguistic, and cultural processes that without being isolated from broader histories nevertheless retain a certain place-based specificity. Ethnographically, the documentation of these ensembles of meanings/uses should be situated in the larger contexts of power and articulation with other nature regimes and global forces more generally. This is a step that ecological anthropologists have shied away from until now but that political ecologists are tackling. Local models are in contact with and influenced by modern models of nature and economy (Escobar 1998b).

A final word about the concept of "organic nature": In proposing a new relation between anthropology and biology by reembedding the anthropology of persons in a post-Darwinian biology of organisms, Ingold (1990) highlights the need for a relational view of both organic and social life. Organic life originates and is maintained because of a perpetual interchange with its environment. The formation of an organism and the environment are one and the same, and life cuts across the boundary between the two. Persons develop in a nexus of relations with the environment and with other persons, and therefore becoming a person is integral to becoming an organism, all of which occurs within a relational field. This view is very different from the genetic-based neo-Darwinian theory of diversity or the anthropological view of cultural diversity based on traits (it is also different, one might add, from Latour's [1993] concept of the "short" networks linking nature and culture in premodern societies). Ingold's proposal seeks to free our thinking from "the conceptual straitjacket of genes, culture, and behavior" (p. 221). His provocative reconceptualization of the relation between biological and cultural life can be shown to be closely aligned with Maturana and Varela's deeply historicized view of biological life and evolution in terms of the organism's structural coupling to the environment with maintenance of autopoiesis. More important for our argument, it can be linked to the works already reviewed that dissolve the binarisms and boundaries between nature and culture, mind and world. It is in this sense that I use the term "organic"; it suggests a type of process and relationality that sees social life "in topological terms, as the unfolding of a total generative field" (Ingold 1990: 223). This field is at once cultural and biological.

This conception of the organic enables a corresponding partial definition of political ecology for this regime as the study of manifold constructions of nature (ensembles of meanings/uses) in contexts of power. Power here needs to be studied not only in terms of social and production relations but in relation to local knowledge, culture, and organic life. It is clear, of course, that the variety of organic natures is immense—from humid forests to dry ecosystems, from the green hills of peasant farming to the steppe of the nomads—and has its own set of actors, practices, meanings, interactions, and social relations. The study of organic nature thus goes well beyond the study of ecosystems with their functions, structures, boundaries, flows, and feedback loops

and with people as simply one more element of "the system." Ecosystems ecology is an outsider's and top-down perspective that overlooks organic nature's experiential and constitutive relational dimensions. The political ecology of organic nature also transcends analyses of production, governmentality, and the commodity. "The anthropology of local knowledge" serves as a shorthand for what is missing from these analyses, however valuable and necessary.¹⁷

TECHNONATURE: ARTIFICIALITY AND VIRTUALITY

If organicity exists in the knowledge and practices of a variety of social groups throughout the world, it is also true that a domain of artificiality is on the rise. Here it is neither local knowledge nor labor-based production that mediates between biology and history but technoscience. Meanings, knowledge, and labor are of course important in all three regimes. The questions are momentous: Do technonatures make possible a new experience of the natural that could facilitate the re-creation of a (different) continuity between the social and the natural? Will they allow us to overcome the alienation brought about by capitalist nature, its dependence on the exploitation of labor, or the fetishism of nature as commodity? Alternatively, will they deepen the tendencies of capitalist nature? Are they necessarily capitalist, and, whether capitalist or not, will they foster human capacities to sustain and care for life and each other or instead subordinate life to technology and the production of value? Provisional answers to these questions will largely depend on our assessment of the new technosciences. Unfortunately, positions in this regard are commonly polarized, oscillating between the extremes of uncritical celebration and condemnation. To gain some understanding it is necessary to navigate between these extremes.

With contemporary technoscience (from recombinant DNA on), the modern model of the relationship between the social and the natural is newly unsettled. More than ever the natural is seen as a product of the social. The belief is settling in that biology is under control and, as Strathern adds, "biology under control is no longer 'nature'" (1992b:35). Nature disappears and becomes the result of constant reinvention (Haraway 1991). Developments after recombinant DNA—including the development of the polymerase chain reaction (Rabinow 1996), the human genome project, biological modeling, nano-biotechnologies, cloning, transgenic foods, etc.—have reinforced this belief. This possibility

17. Aletta Biersack (personal communication) raises the issue of whether Foucauldian governmentality does not apply to the organic regime. To the extent that governmentality is defined explicitly in terms of modern expert power-knowledge apparatuses, I believe this is not the case. This does not mean that organic regimes do not have mechanisms of regulation and control, which is a key question. In conservation settings today, however, local groups are increasingly faced with the governmentalization of their environments and pushed to participate in that process (see also Brosius 1997).

has been present ever since the discovery of the structure of the first macromolecules (certainly DNA) but has made a qualitative leap with contemporary developments in molecular biology.¹⁸

The treatment of new biotechnologies by the public indicates that it is becoming culturally possible to play with unprecedented combinations of the organic and the artificial (Strathern 1992b). With technonature we enter an era of pure antiessentialism (although new essentialisms are introduced in other domains). Organic and technonatures converge in this antiessentialism to the extent that they are both irrevocably local and particular (although there are pressures on technonature to develop universal applications, especially in the medical field). In addition, nature is no longer enframed in a certain order in relation to "Man"—which is another way of saying that we are "after nature"; the biological, including human nature, becomes to a great extent a question of design.¹⁹ The significance of the reinvention of nature lies here, as well as in technonature's ability to create radical biological alterity. Whereas capitalist nature introduced nature into sameness and organic nature was/is always predicated on localized forms, technonature makes alterity proliferate. "Diversity"—a key concept in both biology and anthropology—takes on new meanings.²⁰

What will happen to organic and capitalist natures under the reign of technonature? Some clues for answering this question can be found in current assessments of new technosciences. Some see in the rise of virtuality the demise of both organic and capitalist na-

18. The choice of recombinant DNA as a marker for technonature may appear arbitrary. While molecular biology—as a movement of people and ideas at the interface of biology, physics, chemistry, and computing—has been on the rise since the 1930s, it was only in the 1960s that it achieved prominence, displacing some of its competitors (particularly biochemistry) and resulting in what some considered a revolution similar to that of physics in the first quarter of the century. This newly achieved prominence was profoundly political—a power-knowledge affair around what has been termed "the politics of macromolecules" (see Abir-Am 1992).

19. With artificial life and other forms of biological modeling it is possible to say that we have entered the era of evolution design, at least in the minds of their proponents (see Helmreich and Suchman n.d. and Fujimura n.d.).

20. New biological, information, and computer technologies pre-empt an important historical rupture. They create a new pole of culture and subjectivity in addition to the existing poles of orality and writing—that of virtuality. Some of the features of these poles, schematically, are the following: Orality is characterized by biological/circular time, narrative and ritual as forms of knowledge, historical continuity, face-to-face communication, oral tradition, and organic nature; writing by linear time, theory and interpretation as modes of knowledge, written history, accumulation, text, and capitalist nature; and virtuality by real time (punctual, with no lags), simulation and modeling as dominant modes of knowledge, overlapping of times and becoming (speed, space/time compression), digital (and biodigital?) networks, hypertext, and technonature. Again, these poles of subjectivity are not stages of history but coexist today, although with varying intensities; in the same way that scriptural modes redefined and subordinated orality, informatic/hypertextual modes are today subordinating writing and hermeneutic-based modes of knowledge (including anthropology). This hypothesis is developed by Pierre Lévy (1991, 1995).

tures (Kroker and Weinstein 1994). The dominant logic driving this transformation is that of recombination: recombinant body, nature, commodity, culture (Heller 1998). This inaugurates a period of postcapitalism that marks the eclipse of the organic and the triumph of a virtual class fully committed to the informational logic of recombinant nature/culture. Under the illusion of interactivity, the virtual class will be free to design cyber bodies and disappear into pure virtuality (Kroker and Weinstein 1994). Despite these writers' penchant for rhetorical excess, it is important to recognize that virtuality—like organicity and capitalism—is an important principle of production of the social and the biological today.²¹ Virilio (1997) underscores a similarly crucial aspect of the emerging order, the impact of real-time technologies. Operating at the speed of light, these technologies erode the value of the here and now in favor of a communicative elsewhere that has nothing to do with concrete presence and places. Real-time technologies mark the decline of place, territory, and the body in favor of a terminal-citizen, the global delocalization of human activity, and the devaluation of local time. The unicity of time replaces the unicity of place, signaling a new form of pollution characterized by the displacement of extension and duration. We fall into "a split between activity and interactivity, presence and telepresence, existence and tele-existence" (p. 44). The resolution of this split, it can be argued, will depend on an unprecedented cultural politics linking organicity, virtuality, and the transformative defense of place and identity (Escobar 1998c).

For other thinkers, virtuality affords new opportunities for the creation of subjectivities and ecological practices. For Guattari (1995a, b), while new technologies today are reinforcing the most retrograde aspects of capitalist valorization, they also adumbrate other forms and modalities of being. "The contemporary world—tied up in its ecological, demographic and urban impasses—is incapable of absorbing, in a way that is compatible with the interests of humanity, the extraordinary technico-scientific mutations which shake it. It is locked in a vertiginous race towards ruin or radical renewal" (1995a:91). A political ecology of virtuality will engender new conditions for cultural life and subjectivity. A generalized ecology—"ecosophy," as Guattari calls it—will have to create not only new relations to nature and each other but a new ethics that challenges technocapitalist valorization. Freed from the hegemony of capital, a politics of the virtual would vindicate processuality, connectivity, and singularization.

At the root of this visionary stance is a different view of technology itself. New technologies bring into existence new significations and universes of reference. They are conducive to alterity and ontological heterogenesis—manifold forms of being. For Guattari, the decentering of the economy as the organizing principle of social life is a precondition for this transformation: "an

expanded ecological consciousness . . . should lead to putting the ideology of production for the sake of production back into question," guided by "the deconstruction of the market and the recentering of economic activities on the production of subjectivity" (1995a: 122). Ecological, technoeconomic, cultural, and subjective dimensions need to be incorporated into the pursuit of "a new type of social practice better suited both to issues of a very local nature and to the global problems of our era" (p. 121). Ecosophy entails new existential territories where biosphere, sociosphere, and technosphere can be constructively articulated. This view echoes Haraway's (1991) call for rethinking of the possibilities opened to various groups by the breakdown of clear boundaries between the organic and the machine through the achievement of control over the social relations of science and technology.

These are not only utopian possibilities. Networks of all kinds linked to new technologies are being used in creative ways all over the world; the fragmentation fostered by new technologies also presents opportunities for coalition building and for building strengths out of differences (Chernaik 1996), and in the case of social movements—such as women's, ethnic, and indigenous movements—such networks can already be seen as giving rise to not insignificant forms of "glocality" (Dirlik 1997). The more social groups learn to denaturalize taken-for-granted constructions of (gender, sexuality, ethnic) identity, the more open they are to new relational configurations in connection with enabling networks. Science-fiction writers are actively imagining these possibilities; they visualize other bodies, families, kinship, and ways of life that play on new combinations of the organic, the cultural, and the technological (Haraway 1992, Chernaik 1996). We need to think about the social and political conditions that could turn these imaginings into life-affirming processes in concrete situations. The possibilities created by new technologies are most promising when thought out in conjunction with the defense of place and place-based ecological, social, and cultural practices. Alternative networks linking humans and nonhumans could also be seen in this light (Escobar 1998b, c; see also Dirlik 1997).

Science-and-technology studies provide us a series of concepts for examining the new realities and possibilities. Some of these are well developed, others only suggestive. Among them are the apparatus of bodily/nature production—the ensemble of technoeconomic, institutional, and discursive processes that account for nature's production today, including the discourses of science (Haraway 1992); the cyborg as a metaphor for new modes of being and for alliances between the organic and the artificial; and simulation as the chief mode of knowledge and interactivity and positionality as principles of knowledge in the age of technonature and virtuality (Hayles 1995). The field of social studies of science and technology facilitates the study of the co-production of technoscience and society (see Hess 1995 and Franklin 1995 for reviews). In the sciences, the language of complexity is a promising attempt at a new under-

21. This view is elaborated in dystopian science fiction, most notoriously by William Gibson.

standing of the world; this language can suggest ideas for extricating nature, economy, and the world from the constraints of objectivism and moving in the direction of Guattari's call.²²

A definition of political ecology for technonature would emphasize the biocultural configurations that are emerging and those that are possible according to particular constellations of actors, technologies, and practices. The political ecology of technonature would study the actual and potential biocultural arrangements linked to technoscience, particularly along the axes of organicity-artificiality and reality-virtuality. It would examine discourses and practices of life and the extent to which they are conducive to new natures, social relations, and cultural practices. It is important that the ethnographies of technonature not focus on elite contexts only or on their impact on nonelite communities; they should also explore the locally constituted cultural and material resources that marginalized communities are able to mobilize for their adaptation or hybridization in the production of their identities and political strategies.²³

The Politics of Hybrid Natures

Is it necessary to say that social groups are being propelled towards the biological in such a way that the hybridization of different regimes is perhaps inevitable? Is it possible to talk about hybrid natures as others have talked about hybrid cultures? In the Latin American debates on the subject (see García Canclini 1990 and, for a critical summary, Escobar 1995), hybridization is conceptualized as a process, a means to alterity and cultural affirmation. It is a way of crossing the boundary between the traditional and the modern and of using both local and transnational cultural resources to create unique collective identities. Cultural hybridization involves complex processes of identity production in transnationalized environments where the local nevertheless retains significant vitality.

To hint at the possibility of hybrid natures, let us return to the rain forest. Social movements of the rain for-

est commonly emphasize four fundamental rights: to territory, identity, political autonomy, and their own view of development or economy. They are, in this way, movements of ecological and cultural attachment to a territory. For them, the right to exist is a cultural, political, and ecological question. They necessarily engage with certain forms of the commodity and market exchange while resisting a purely capitalistic valorization of nature (Guha 1997, Martínez Alier 1995). By adopting a cautious opening towards technonature in their engagement with the transnational biodiversity apparatus, they adumbrate the possibility of hybridizing the organic with the artificial. Could they be seen, then, as advancing through their practice a strategy of hybrid natures in which the organic serves as anchor for the struggle? What is certain is that such a project would find in the defense of territory and culture its reason for being and its politics.²⁴

Hybrid natures might constitute for these groups an attempt to incorporate multiple constructions of nature in order to negotiate with translocal forces while maintaining a modicum of autonomy and cultural cohesion. They might allow social groups to introduce some diversity into their political strategies for engaging with the dominant. On what types of micro- and macropolitics of nature and culture must hybridization rely in order to be a reasonably productive strategy for social movements of the rain forest? What would be the relation between collective identities, political strategy, and ecological rationality that might make hybridization possible and practicable for local groups? What would be the constraints (local and global) to this type of strategy? What discourses and strategies—biodiversity conservation, indigenous rights/knowledge, gene prospecting, intellectual (property) rights, etc.—might provide useful surfaces of engagement between local groups and other social actors (scientists, biodiversity prospectors, feminists, NGOs, et al.)? These questions are beginning to be examined by students doing research at the conservation/development interface, as well as by some social movements and NGOs in Asia, Africa, and Latin America (Gupta 1997).²⁵ They are presented here chiefly as hypotheses to be explored, although their significance can already be glimpsed in rain-forest struggles.

To the extent that biodiversity conservation and biotechnology have become powerful interfaces between rain-forest natures and social practice, these possibilities cannot be overlooked. Could rain-forest social

22. A key question for this political ecology is the relation between capitalism and the new technologies. Inquiry into the political economy of new technologies is barely beginning, but it might be possible to imagine novel noncapitalist processes of appropriation and distribution of surplus in connection with organic and technonatures (Gibson-Graham 1996). The transformations created by new technologies cannot be reduced to capitalist power formations. While conventional and new capitalisms will certainly be in force, technoscientific processes will require an expanded and transformed definition of capital. The formula for surplus value, for instance, is extremely limited in this regard. Insights into how power and resistance work in technoculture (nomadic, decentralized, dispersed) need to be related to questions of political economy (Critical Art Ensemble 1996).

23. Ron Eglash proposed a panel for the 1996 American Anthropological Association meetings along these lines: "Appropriating Technology: Adaptation and Production of Science and Invention among Marginalized Communities and Identities." See also Hess (1995).

24. Elsewhere I analyze the political ecology of the Pacific region black movement at length with particular reference to the movement's sophisticated approach to the question of biodiversity conservation (Escobar 1998a).

25. Anil Gupta (1997), for instance, discusses a mechanism for hybridizing traditional and high-tech knowledge systems through networks that allow for registering and developing grassroots innovations. His Honey Bee Network is becoming well known in this respect. A good deal of experimentation is taking place in this area, particularly in conjunction with the search for alternatives to the mainstream intellectual property rights regimes promoted by the World Trade Organization (see Brush and Stabinski 1996).

movements envision alliances between organic and techno- natures against the ravages of capitalist nature that nevertheless retain some of the biocultural autonomy of the organic? And, to the extent that women and indigenous groups are posited in dominant discourses as "stewards" of nature, are not new articulations of gender, power, and culture also needed to infuse new life into nature and history? Hybridizations of nature and culture and new narratives of gender and biodiversity are emerging from the collective practice of social movements and communities despite difficulties and contradictions and against tremendous odds (Escobar 1998a, b).

Hybridization is not restricted to articulations of organic and techno- natures. They may also be possible among different types of organic regimes and their corresponding social actors (for instance, among groups within the same ecosystem, such as different ethnic groups in a rain-forest area confronting common enemies, or among groups in rain forests worldwide) or between capitalist and organic natures (via agroforestry, for instance, or ecotourism). Capitalism and new technologies also create their own forms of the organic (ecotourism, natural reserves, CD-ROM naturalism, etc.). These "organic" forms, however, document forms of the artificial. Hybridization could also shed light on the manifold economic forms—capitalist and not, market and not—that are at play or being created in peasant and rain-forest contexts (Gudeman 1996), as well as on redefinitions of gender and environment that are emerging from women's forms of struggle and cooperation (Rocheleau, Thomas-Slayter, and Wangari 1996). All of this is despite the fact that dominant discourses of intellectual property rights and genetic resources amount to a new sort of predation on the life spaces of those who have existed on the margins of the chemical and money economies. As Shiva (1997) says, multinational corporations are having to loot from the poorest peasants to generate new knowledge for commercial life applications. At the same time, however, Third World actors are for the first time in the international development experience noticeably present in discussions of these issues. This is another indication that the politics of nature and culture today defies easy categorizations.

The view of hybridization presented here is somewhat different from Latour's influential analysis of the networks of humans and nonhumans through which hybrids of nature and culture are produced. For Latour, moderns and so-called premoderns are alike in that they both "build communities of natures and societies. . . . All natures-cultures are similar in that they simultaneously construct humans, divinities and nonhumans" (pp. 103, 106). In this way, all natures are hybrid—which makes sense from the perspective of this paper. The difference among societies, Latour argues, lies in the size and scale of the networks they create. Moderns are different because they mobilize nature more effectively for the construction of culture by enlisting more powerful nonhumans (technologies), which in turn provide more and more hybrids for remaking society. An

analysis of this suggestive view is beyond the scope of this paper; suffice it to say that in reducing the difference between moderns and premoderns to the size of the networks they invent Latour overlooks other important factors in the production of natures/cultures—from the relations of power among networks (Dirlik 1997) to the requirements for constructing ecological and just societies through technological networks. How can moderns regulate the production of hybrids while respecting ecological and cultural difference? Latour's view, while antiessentialist in emphasizing that networks must be seen in terms not of essences but of processes and passages, is influenced by the modern networks (academic, Euro-centered) in which he himself is enmeshed; this fact blinds him to other ways of thinking about difference in connection to place and place-based practices (Escobar 1998c).

This is to say that we need a more political view of hybridization. In discussing the construction of new public spheres out of today's fragmented society, Laclau (1996:65) succinctly summarizes the politics of antiessentialism for social struggles:

Differences and particularism are the necessary starting point, but out of it, it is possible to open the way to a relative universalization of values which can be the basis for a popular hegemony. This universalization and its open character certainly condemn all identity to an unavoidable hybridization, but hybridization does not necessarily mean decline through the loss of identity: it can also mean empowering existing identities through the opening of new possibilities. Only a conservative identity, closed on itself, could experience hybridization as a loss. But this democratic-hegemonic possibility has to . . . take full advantage of the political possibilities that this undecidability opens.

Finally, can nature be theorized within an antiessentialist framework without marginalizing the biological? This is an extremely complex epistemological and political question which is bound to receive a lot of attention if we want to go on thinking about these issues at all. The current fragmentation of knowledge can give us only a dispersed image of biocultural reality, and this makes a solution to the environmental crisis unworkable if not unthinkable. The cultural, biological, and historical orders may require different epistemological strategies, and the objects of the social and the ecological sciences must not be carelessly conflated, but they do have to be articulated into a novel type of environmental inquiry. Some clues for this task have been provided by a handful of writers. Ingold, for instance, suggests that a much-needed overhaul of the relationship between anthropology and biology requires "nothing less than a paradigm-shift within biology itself" (1990: 208) and a significant transformation of anthropology. A recentering of biology on the organism—marginalized by neo-Darwinianism, modern genetics, and molecular biology—and a recontextualization of the an-

thropology of persons within a biology of organisms are essential principles for this new synthesis. All of this takes place, in Ingold's provocative proposal, within a processual and relational conception of organic and social life.

At stake is a new "biocultural synthesis" which can be pursued from a variety of perspectives. Goodman, Leathermann, and Thomas have spearheaded this effort from the perspective of political economy (1996; Goodman and Leathermann 1998), that is, by bringing political economy considerations to bear on core concepts of biological anthropology such as adaptation. Their project opens the way for complementary perspectives—feminist and poststructuralist, for instance (Hvalkof and Escobar 1998). Pálsson (1997) has recently advocated an integration of human ecology and social theory drawing on pragmatism and phenomenology while moving away from dualist thinking. The work of Maturana and Varela can be reinterpreted in this light from a biocultural perspective, but much work remains to be done to make it effective as a source of insights for anthropology. In general, work on novel biocultural theories that take new trends in both biology and social theory into account is just beginning.

The perspective developed by the Mexican ecologist Enrique Leff is promising in this regard. He proposes that we can work towards a new articulation of the natural and human sciences in the context of creating a new environmental rationality that weaves together regime-specific cultural, ecological, and technoeconomic productivities (nature is material but signified and appropriated in culturally and technoeconomically specific ways). The ecological needs to be understood in biological terms but in complex relation with cultural and economic practices. This will entail redeploing paradigms and reorienting technoscientific development. The articulation of material, cultural, and social processes will take into account the scientific knowledge of the world without adopting a reductionistic orientation and foster the analytical elucidation of new scientific objects for ecological studies (Leff 1995, 1986). This new type of transdisciplinarity has yet to be created.²⁶

A final guidepost for a new bioculturalism is provided by Hayles (1995), who says that it is time for environmentalists, scientists, and social constructivists to seek common ground. As antiessentialists, how do we theorize the "unmediated flux" of biophysical reality?

26. Most of Leff's work is in Spanish: on the articulation of the sciences, see especially Leff (1986). See, in English, Leff (1993, 1994, 1995). Leff's argument is Marxist, Foucauldian, and ecological. On the ecological side, the key for Leff lies in enhancing natural capacities through the negentropic production of biomass from photosynthesis and designing technological systems that minimize entropic transformations. Biotechnology can increase ecological productivity so conceived while preserving the complexity of an ecosystem. Negentropic processes of biomass production, self-organizing processes of ecological succession, biological evolution, and metabolism, technological and political processes of appropriation, and cultural processes of signification must be considered as a whole to imagine an alternative productive rationality.

Hayles suggests that we need to acknowledge that we are always positioned observers and that our observations always take place in continuous interaction with the world and ourselves. It is only from a perspective of fully accepted interactivity and positionality that we can pursue consistency in our scientific accounts of reality. This, of course, does not completely solve the profound epistemological problems posed by the encounter between science and constructivism (the object of the recent "science wars"), but it provides provisional steps for moving beyond the present impasse. The "question of nature" may well be the most fertile terrain for this endeavor and for a new dialogue among the natural, human, and social sciences.

Conclusion: The Politics of Political Ecology

An important goal of political ecology is to understand and participate in the ensemble of forces linking social change, environment, and development. This goal suggests new questions for political ecologists. How do we situate ourselves in the circuits of power-knowledge (say, in the apparatus of biodiversity production) that we seek to understand? What sorts of elements can we contribute to the articulation of the politics of nature production by subaltern or other groups and, depending on our expertise, to the elaboration of alternative ecological and economic proposals? These questions require that we make explicit the "ecological attachments" that are intensified by our participation in particular nature regimes and cultures, including the very peculiar culture of the modern social and biological sciences.

I began by suggesting that the crisis of nature is a crisis of nature's identity, and this idea led to an outline for an antiessentialist theory of nature. Nature has ceased to be essentially anything for most people, including, in some cases, those attached to organic natures.²⁷ It is no coincidence that the rise of technonature and artificial life coincide with a planetary preoccupation with the fate of biological diversity. Could the new life technologies foster other types of creativity and means for wresting control of life away from purely capitalist goals? Could the present rupture in the meaning of the natural lead to a new art of living in society/nature? What about the establishment of new grounds for existence—a rearticulation of subjectivity and alterity in their social, cultural, and ecological dimensions? In various spaces across the three regimes of nature and in their intersections we are witnessing an unprecedented historical movement of cultural and biological life. This movement seems most promising at the level of the organic and techno-regimes. It is necessary to think about

27. I make this statement cautiously. Many native peoples explain their views of the natural world in terms of an essential connection to nature, but accepting this statement at face value does not imply placing them—their views or relations to nature—outside of history.

the political and economic transformations that would make intersections of the organic and the artificial a hopeful turn of events in the history of social nature.

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Escobar's suggestion of an "anthropological political ecology" is a timely and welcome contribution to a so far diffuse effort to bring the insights of cultural and social anthropology to bear on the politics of environmental protection. This effort should also enrich the theoretical toolkit of the discipline and enable it ever better to address a whole range of questions relating to political and epistemological transformations. Escobar's plea for updating of the basic constructs of nature, culture, society, polity, and the economy finds ample echo in the work of many anthropologists who are seeking not only to go beyond the sterile dichotomy between the given and the constructed but to reconnect the emergence of such theoretical formulations with the world we try to understand. I wish to take up this link between theory and illustration or practice and to make some observations about essentialism and reading practices.

In the first paragraph Escobar states that it is not enough to note that "particular forms of social organization" are at the root of the "question of nature." It may not be *enough* to make it clear that ecological and social conditions are inextricably linked to each other, but it is an important beginning and a contribution to political debate that anthropology is exceptionally well-placed to reiterate and also to illustrate. So why not tell us even more about the Colombian rain forest—engage in more than a "brief imagination exercise" for exploring the promises of political ecology and the regimes-of-nature model? Some of the broad-ranging theoretical discussion would be lost in the process, certainly, but I am rather overwhelmed by the sense of a search for a "theory of everything" here. Besides, or instead of, working through more empirical material, might this be remedied by choosing to attend primarily to only one of the two issues at the heart of the paper, as I read it—the ontological and epistemological character of (what we intuitively interpret as) nature, or alternatively, the unevenness in people's possibilities of deconstructing and reconstructing ecological relations?

Certainly, more direct linkages to empirical examples might pose too great a risk of essentialism and its twin vice, tokenism. The risk is not insignificant, but neither is it avoidable. In this regard, the whole paper in its complexity raised for me the questions of reading and of the uses of the kinds of knowledge that can be decontextualized. It seems that those of us working on the

politics of nature, broadly construed, are forever obliged to preempt misreadings born of the use of rhetorically powerful terminology. The temptation to read any unhedged reference to nature and its myriad near-synonyms as sustaining a politically naive stance seems irresistible within a profession so aware of the conceptual and physical violence perpetrated in the name of true knowledge, based, of course, on the idea of a presocial nature. Unfortunately, I am not sure that Escobar's "cautionary observations" against reification, for example, convince the unsympathetic reader. At the same time, his caveats seem superfluous if only because by now they are so familiar. Is this danger of misreadings partly responsible for the rather tenuous relationship of the theoretical discussion to the empirical examples offered?

Of course, seeking to resolve the question of nature as this paper sets out to is bound to lead to some mental acrobatics. The most troubling aspect of confronting nature as an intellectual and political concept head-on is that in practice nature remains a key ontological foundation, indefinite as it may be, for operating both intellectually and morally in the world in which we find ourselves today. A simpler aim, with a clearer sense of how the theory aids an understanding of the practice, would make the paper more accessible. I cannot help but feel that it would be more helpful to the task of establishing anthropology as a contributor to an important debate of our times to hear more about the Colombian rain forest even at the risk of reification if not essentialism. Some, if not all, of the intricacies of the "question of nature" as Escobar sees them would become clearer, providing more grounding for readers whose main theoretical interests or, quite simply, reading habits find nourishment in other debates, maybe even other disciplines.

The point is that in establishing an interest in the ecological or in environmental politics, anthropologists can do more than create a sense that the debate is important and complicated. For this we need salient and distinguishable analytical terms, on the one hand, and antiessentialist readings, on the other, both informed by the articulations of the biological and the historical in which we ourselves and those about whom we write engage.

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In recent years anthropologists have contributed significantly to a remarkable transdisciplinary florescence of environmental scholarship. Escobar has been one of the most noteworthy, and the present effort to articulate an antiessentialist political ecology stands as one of his most consequential contributions thus far.

The term "political ecology" is one that appears with ever-greater frequency in contemporary environmental scholarship, though different writers mean different

things when they speak of it. Broadly, however, it is possible to recognize two primary forms. The first, which Escobar describes, represents a fusion of human ecology with political economy. It takes as its point of departure the existence of an unproblematic material/ecological base and a series of actors, differentially empowered but with clear interests, contesting the claims of others to resources in a particular ecological context. Opposed to this is a form of political ecology informed by poststructuralist social theory and represented by the work of Watts, Rocheleau, and others. What most characterizes this perspective is that it takes "nature," as well as the identities and interests of various agents, to be both contingent and problematic. By describing political ecology as the articulation of history and biology and by defining three specific "regimes of articulation," Escobar builds upon and extends this latter form of political ecology in several ways. In his insightful treatment of the idea of "nature," Escobar goes a long way toward transcending the theoretical impasse that has developed over our long-standing adherence to the nature/culture dichotomy. Equally significant, the form of political ecology he articulates brings together several disparate domains of recent environmental scholarship, most notably the study of social movements and explorations of the emergence of technonature, and provides a basis for the development of an engaged critical environmental praxis.

It seems to me that Escobar's argument could be strengthened by the clarification of several points. First, in identifying three regimes of articulation, it is not clear whether he is suggesting that these are the only three possible regimes. It would be useful if he could address the possibility of other regimes of articulation and perhaps explore what some of these might be. I wonder, for instance, whether the activist he speaks of is holding three regimes in tension, as he suggests, or whether we might in fact be seeing another regime of articulation altogether. And what of the ecologist, conservation biologist, or newly arrived landless peasant? In short, I believe that the analytical potential of the framework developed by Escobar would be enhanced if it were more explicitly open-ended and provided for the possibility of other forms of articulation.

Second, Escobar proposes that each regime of articulation can be examined "from the perspective of the particular form of knowledge that seems best suited to its study." In the case of organic nature he proposes what he terms "the anthropology of local knowledge," in the case of capitalist nature historical materialism, and in the case of technonature cultural studies of science and technology. While there is no question that each of these modes of analysis has provided valuable insights, it seems premature to foreclose the possibility that other modes of analysis may be equally informative. It would be useful if Escobar could clarify his views on this possibility.

Finally, though Escobar is explicit in disavowing any semblance of essentialism in his articulation of the idea of organic nature, he nevertheless expresses some dis-

comfort with the notion of organicity. Indeed, as I believe he recognizes, the idea of the organic may be put to any number of nefarious uses: the blood-and-soil essentialism of National Socialism is but one example. As I have pointed out elsewhere (Brosius 1997), at a time when conservation is increasingly tied up with identity politics, the line between what is potentially emancipatory and what is potentially reactionary is no longer clear. Given the potential for a reactionary politics whenever organicity is invoked, it would seem to me preferable to employ some other term that describes the "local model of the natural."

This essay represents one of the most significant attempts yet to develop a poststructuralist political ecology that provides the basis for an engaged examination of "the crisis of nature's identity" and its significance for understanding a range of contemporary human interventions into nature. In so doing, it both opens up a series of new lines of inquiry and lays the groundwork for new forms of engagement in the politics of nature.

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"It is dangerous to have two cultures which can't or don't communicate," wrote C. P. Snow in 1963, referring to the cultures of the humanities and sciences (Snow 1964:98). His essay brought to the attention of at least part of the postwar world yet another way of framing a core problem of the human condition: How do we understand and act in an objective, physical world when our understanding can only be subjective?

I agree wholeheartedly with Escobar's stated goal of escaping the excesses at both extremes of the epistemological/ontological spectrum—the poststructuralism/postmodernism constructivist position that there is "nothing natural about nature" and the objectivist position that nature can be defined entirely as "external" and "prediscursive." We need to work toward healing the great division in contemporary intellectual inquiry in general (and anthropology in particular) and focus on understanding and resolving the crisis of human-environment relationships: if human behavior is not altered in the near future we will obliterate our own future and that of many other species. Escobar has done an excellent job in summarizing some of the main issues, and my comments are meant to encourage movement toward the same goal of balance.

First, we have to try harder to move beyond our own biases. Escobar advocates "a more balanced position," one that acknowledges (1) "the constructedness of nature in human contexts—the fact that much of what ecologists refer to as natural is indeed also a product of culture" and (2) "nature in the realist sense, that is, the existence of an independent order of nature . . . the representations of which constructivists can legitimately

query in terms of their history or political implications."

The constructivist bias in this statement (and throughout the article) is revealed by rewriting it to make the phrases parallel: (1) nature as cultural construct—the fact that much of what some natural scientists refer to as natural is indeed also a product of culture, yet scientists can legitimately query cultural representations of nature in terms of their basis in biophysical reality—and (2) nature as objective reality—the fact that much of what some constructivists refer to as culturally constructed is indeed also a product of biophysical reality, yet constructivists can legitimately query the representations of this objective reality in terms of their basis in history or politics.

Escobar says that approaching the problem of human–environment relations requires that we make explicit our "ecological attachments." Shouldn't this include being as explicit as possible about our own assumptions and trying to understand to what extent they are based on values that can be validated through social negotiation and to what extent on assumptions about "biophysical reality" which can be framed as hypotheses and tested with empirical data? Escobar does not explicitly address the values that underlie the various approaches he discusses, most important his own, and the extent to which they determine the outlook on human–environment relations.

Second, we need to try harder not to essentialize. Escobar's three "regimes" of nature seem to perpetuate stereotypical thinking from one perspective. To say, for example, that in the organic regime "nature is not 'manipulated'" (quoting Strathern) ignores the many empirical data suggesting that premodern peoples have taken an active role in "governing" nature to serve their own consumption needs (e.g., Steadman 1995).

While allowing that local knowledge may be complex, Escobar privileges the knowledge-as-practice interpretation as a contrast to modern knowledge, ignoring the abundant literature suggesting that local knowledge may be a complex blend of practice, empiricism, and theory (e.g., Scoones and Thompson 1994). He essentializes modern scientific epistemology as well. One of the important points that Richards makes in the chapter Escobar cites is that modern scientific knowledge is epistemologically complex (e.g., Richards 1993), and this means that it may not be fundamentally different from local knowledge.

Third, our critiques of various epistemological approaches need to contribute to praxis. How can Escobar's program for political ecology make a difference in terms of social and environmental change? If the task of this political ecology is analysis leading to "more just and sustainable social and ecological relations," then we must recognize that the concepts of "just" and "sustainable" are subjective. An important part of praxis is encouraging the discussion of these values from different cultural perspectives (Cleveland and Murray 1997).

If we can agree, at least partially, on what "justice" and "sustainability" mean, how do we get there? Un-

derstanding in detail the similarities and differences between local and scientific knowledge (e.g., Cleveland, Soleri, and Smith n.d.) may be one important way toward the new kinds of "transdisciplinarity" that Escobar advocates, one with practical value.

We need to work together to create epistemological processes which acknowledge both the biophysical and the cultural and can move us beyond the present impasse that renders so much of our intellectual activity irrelevant. Some see the possibility for a firm resolution (e.g., Wilson 1998). It seems more likely that ambiguity is inherent in the problem, for example, in Harding's (1998:19) strong objectivity, in which there is "not just one adequate standard for knowledge" but not all proposed standards "are equally good." The urgency of the current crisis in human–environment relations demands that we continue to work for links between the cultural and biophysical worlds that will allow them to coexist.

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Escobar has done a fine job of outlining some of the major components of an antiessentialist political ecology. Key elements of his theory are the three nature regimes—organic, capitalist, and techno—understood as dynamic, interactive articulations of biology and history. Escobar's political ecology is specifically designed to overcome past limitations of ecological anthropology such as the tendency to circumvent processes of meaning construction and their relations to practical usage and the failure to situate such complexes of meanings in larger contexts of history and power.

Escobar draws heavily from South American ethnology for examples of organic regimes of nature. Although these examples are useful illustrations of organic regimes, there are other works in the South Americanist literature that provide clearer models of how an ecological concern for human–environmental relations can be fused with questions of meaning construction and historical interactions between competing organic and capitalist regimes. Norman Whitten (1978) argued for an understanding of indigenous cosmologies of lowland Ecuador as a dynamic set of ecological master images through which local peoples interpreted and acted in collective opposition to capitalist practices that threatened the region's tropical rain forests with catastrophic collapse. Whitten's elegant analysis contained all the elements for a critical, historical theory of political ecology.

The challenges and opportunities posed by Whitten's unique synthesis of interpretive, ecological, and political approaches had surprisingly little influence on mainstream ecological anthropology in the 1980s. One exception was my own attempt to build on Whitten's synthesis in an essay on ritual production of environ-

mental history among the Arawakan fishing and horticultural societies of northwestern Amazonia (Hill 1989). In that essay, I explored ritual productions of environmental history as a double-sided process of exercising ritual power that entailed (1) constructing historical consciousness through use of names of places, natural species, and geographic features as metaphors for the development of political relations among distinct peoples and (2) imbuing the natural environment of nonhuman species and objects with specifically human bodily and social meanings. By focusing on processes of meaning construction and power that underlie environmental histories, my argument anticipated Escobar's call for studies of local knowledge as the construction of "living landscapes" through narratives and other communicative genres as well as the "hybridization" of discourses from organic and capitalist regimes. Perhaps Escobar's terms "biology" and "history" are analogous to or even homologous with my "socialization of nature" (or construction of a cultural landscape) and "naturalization of society" (or metaphors of animal nature, objects, and places as a mode of historical discourse)?

Escobar's tripartite model of political ecology leaves open a major gap in the historical space between organic and capitalist nature regimes: colonialism. To fix this problem, one might turn to Michael Taussig's (1987) concept of the colonial mode of producing reality and constructions of nature as a hostile, dangerous entity that must be coerced, tamed, dominated, and in some cases eliminated. Corresponding to this colonialist nature regime is an ideology of local peoples as subhuman animals whose labor can be extracted through debt fetishism, psychological terror, brute force, and even genocide. The rubber boom (ca. 1860–1920) in lowland South America provides a tragic illustration of the colonialist regime: entire indigenous peoples vanished in the rubber camps, and groups that tried to flee to safety were often hunted down and destroyed like game animals. This was a period when the blood and bodies of indigenous Amazonian peoples paid for the industrializing nations' thirst for raw latex and the indebtedness of Latin America's new republics. Although boom-and-bust cycles like the rubber boom and the so-called Guano Age (ca. 1845–75) in South America were driven by emerging industrial capitalism in Europe and the United States, their local manifestations are best understood as articulations of colonialist and organic regimes in contexts of weak, heavily indebted nation-states. On a global scale, the colonialist regime of nature can be interpreted as ecological predation of organic, tropical "nature-cultures" by technologically advanced capitalist regimes based in the northern hemisphere. The process continues today in many Third World countries that rely on primary exports as sources of revenue. Fernando Coronil's concept of "nature-exporting societies" (1977:7) provides a valuable exploration of such neocolonialism in contexts where nations "are frequently recast in their old colonial role as sources of primary products, a role now re-

written in terms of the neoliberal rationality of globalizing capitalism." Escobar's political ecology is a valuable attempt to set the stage for a new ecological anthropology that will allow researchers to address ecological problems in conjunction with questions of meaning construction as well as the problems of colonialism and nationalism.

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In an admirable effort to interweave the cultural and the biological in understandings of nature, Escobar proposes an intriguing and provocative theoretical framework for what he terms an antiessentialist political ecology. As analytic models which specify certain interrelationships between key features of ethnographic data, the three nature regimes that he identifies are useful heuristic devices. Not only do they enable anthropologists to generalize and categorize the empirical data for comparative purposes but they alert us to relationships we might otherwise have overlooked.

I am troubled, however, by Escobar's suggestion that each nature regime requires its own distinct form of analysis. This part of his argument seems tautological, since each form of analysis (and its corresponding methodology) will necessarily "discover" the very nature regime it sets out to analyze. The methods and paradigms of the anthropology of local knowledge, for example, will elicit "local" meanings and uses of nature but provide little information on historical changes in such meanings and uses or the contemporary supralocal political-economic contexts (Escobar does note the need to explore "local" contexts of power) that influence their production. Consequently, the "findings" (which foreground meaning and use and overlook change and broader "nonlocal" context) will look much like an organic regime, the very regime that was first presumed to exist and thus guided the choice of methodology and analysis. How do we, for example, account for those people who now emphasize and occasionally exaggerate and even "market" their "organic" nature to acquire political capital, take advantage of financial opportunities, or protect lands and livelihoods in interaction with capitalist intrusions, global campaigns for the environment and "indigenous" rights, biodiversity prospectors, and so forth? Surely more than an anthropology of knowledge is required to reveal these critical dimensions.

Of course, Escobar would probably reply that what I have just described is an example of "hybrid nature" similar to the social movements of the rain forest which he discusses. But when would a nature regime *not* be hybrid? Does some pristine organic nature exist somewhere in the world, untouched by capitalism, imperialism, global media, or other processes of contact, change, and challenge? Similarly, are capitalist natures or tech-

nonatures completely bereft of all features of organic nature, such as "native" rituals and practices which establish and regulate continuities between the biophysical, human, and supernatural worlds? More important in terms of my argument here, how would one discern a nature regime's hybrid nature if one employed only its designated methodology?

One result of this circular self-confirmation of proposition, methodology, and conclusion is therefore to bolster and reify the differences between the three regimes. First, it presumes that we can only "know" each regime in a particular way, requiring a distinct methodology. As a result, we are hampered from discovering, much less analyzing, the nebulous borders, "articulations," and overlaps between the regimes. Instead, epistemological and methodological boundaries are created which foreground and reinforce their differences rather than their similarities and connections. Second, each form of analysis emphasizes distinct notions of culture, history, and space for each nature regime, heightening the contrasts between them. Briefly, organic regimes seem profoundly "cultural," grounded in "local" space, and ahistorical, capitalist regimes are preeminently "historical," "global," and supracultural, and technonatures can exist in a virtual space seemingly unfettered by culture or history. Finally, although Escobar is careful to include all the appropriate caveats about the historicity, contemporaneity, and fluidity of each regime, his designated forms of analysis perpetuate and reinforce problematic hierarchies between them. Thus "native" understandings of the meanings and uses of nature in rural communities in the Third World are categorized as "local knowledge," while those of Euro-American intellectuals are "science." Yet surely technonature is as culturally embedded and produced as organic nature?

To circumvent the epistemological and methodological quandary I have described, I would propose a more holistic methodology which integrates aspects of each nature regime's proposed "political ecology." No matter how distinct its defining features, each nature regime should be analyzed in a manner attentive to its cultural, biological, social, historical, political, economic, spatial, and artificial/virtual facets and interrelationships. Only by combining, amplifying, and evenly applying the forms of analysis described by Escobar can we be sure that the resulting regime is a product of our data, not a preordained consequence of our mode of analysis.

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Escobar develops a political ecological approach to "nature regimes" defined as a complex emergent set of power relations in which nature is hybridized by culture, economics, and technology. One of his most suggestive points is his antiessentialist approach to na-

ture—postnatural nature—in which nature, interfered with by culture, capital, and technology, loses its constitutive essence. In fact, "after-nature" emerged when culture began naming, symbolizing, and signifying nature. Later in history, "cultured nature" was displaced, externalized, and recodified by strategies of capital accumulation and by scientific and technological domination. The "reinvention of nature" today is a social response to the environmental crisis produced by this domination.

The nonessentialist character of political ecology displaces the intrinsic value of nature as a model for social organization and a basis for a politics of nature. It takes us beyond the naturalism so dear to conservationism and transcends the discourses of deep ecology and social ecology that have become the dominant ideology of ecologism. Escobar's map of nature regimes discovers power strategies produced by the culturization, capitalization, and technologization of nature, as well as power relations that cut across alternative strategies for the appropriation of these nature/culture/economy/technology matrices. Thus, Escobar's approach views the reappropriation of nature hybridized by cultural meanings, economic valorization, and technological transformation and builds a standpoint for analyzing the divergent interests involved in the reconstruction of nature as a condition and a potential for sustainable development.

When culture places its imprint on the evolution and appropriation of nature, nature begins to depart from its organic essence. Thus, the organic regime becomes "cultured nature." While Escobar uses "culture" as a more general category that encompasses the organic and includes capital and technology, in my view it would be more appropriate conceptually and politically to rename his "organic nature" as "cultured nature" and characterize capital and technology regimes as anticultural and antinatural, as they tend to homogenize nature and destroy cultural organization and diversity.

With capitalist nature, nature is recodified and valued as capital to be appropriated by the economic order; however, nature maintains its organic essence. This is lost with the technologization of life. Today technology has penetrated the very essence of biological nature. With genetic engineering and biotechnology we can no longer assign to nature the determination of evolution—the organization of the biological order and the realm of life. The hybridizing of nature and technology have produced new entities, where the laws of nature and the workings of technology combine to *design life*, transforming the core of the real and generating a new complex ontological order.

Nature regimes interrelate to different degrees and in conflictive ways. The hybridizing of nature, economics, technology, culture, and knowledge are crosscut by power relations. However, these result not in different strategies of hybrid natures (actually nature can have no strategy of its own) but in new strategies for the reappropriation of hybridized natures in alternative scenar-

ios for sustainable development. Economic globalization emphasizes the capitalist regime of nature, while local strategies for sustainable development are based on nature regimes signified by different matrices of "cultural rationality." Capitalist and cultured nature regimes imply different and alternative policies for nature technification as well as for the production and appropriation of knowledge. Thus, the political ecological approach to rain-forest social movements focuses on their new strategies for appropriation of nature, culture, and technology in confrontation with the dominant globalized capitalist-technonature strategies.

Beyond antinaturalism, antiessentialism rejects reductionist epistemological positions in analyzing nature-society relations. The hybridizing of nature, culture, economy, and technology result in articulated processes that are not reducible to ecological laws, to the determinations of the market, to thermodynamic laws of nature, or to symbolic processes of cultural organization. This epistemological position is fertile in promoting the articulation of sciences and a dialogue of knowledge to account for the interlinking of different processes and knowledge beyond biocentrism, economicism, and anthropocentrism.

Escobar's approach provides the means to articulate the ontological and epistemological processes whereby nature regimes are hybridized and the political processes whereby these regimes are appropriated. Thus, political ecology is based on a *political epistemology of nature*. However, political ecology cannot encompass the study of the manifold articulations of history, biology, culture, and knowledge as Escobar suggests. Political ecology deals more concretely with the power relations involved in current social movements for the reappropriation of nature, culture, technology, and knowledge.

It seems somewhat paradoxical to refer to these hybrid entities produced by the articulation of the biological, the cultural, and the technological as nature regimes while at the same time trying to denaturalize nature. From this perspective, calling the more integral connection between culture and biology "organic" is misleading. The biological is organic; culture is symbolic. Thus, political ecology transcends ecologism to envision symbolically mediated production relations. In viewing the organic as "the unfolding of a total generative field" as Escobar suggests we run the risk of losing the specificity of symbolic processes and power relations, viewing them through the lens of a unified field of biocultural relations.

Escobar's nature regimes should be viewed as alternative nature-culture-technology regimes, either dominated by economic rationality or guided by different social strategies for the appropriation of these hybridized conditions and potentials for sustainable development, mobilized by rain-forest social movements and other emergent peasant and indigenous people's organizations.

Today, technology seems the most efficient means for dematerializing production and ecologizing the

global economy. However, technology has no intrinsic ends or rationality. It follows alternative economic and social strategies. I think Escobar places too much hope in technonature as the driving force enabling the proliferation of heterogenesis, alterity, and diversity. The goal of reopening evolution toward biodiversity should be based on culture, democracy, and politics assigning different meanings to nature, respect to otherness, and value to diversity.

Escobar's paper is a very valuable contribution to this new field of ontological, epistemological, and political inquiry into a hybridized and ever more differentiated and complex world.

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I found this paper difficult to understand, and my comments are an attempt to explain why. The reader can judge whether the difficulty is the author's fault or my own. I am perfectly willing to accept that it may be the latter and to learn from the experience.

My main difficulty lies in separating Escobar's analytical framework from the object(s) of his analysis. He identifies diverse "regimes" of nature and speculates about the ways in which they combine in political situations. One expects to see an analytical framework which is clearly distinguishable from any particular regime and capable of encompassing all of them. On the face of it, a constructivist, "antiessentialist" perspective seems appropriate, for anthropologists and other social scientists have been using such a perspective for similar purposes for some years. But a constructivist position must, by its own logic, suspend judgement on the content of what is being analysed. This is the central dilemma of constructivism: how to study people's constructed views of nature while suspending judgement on what nature is (for to pre-judge it would be, effectively, to deny its constructedness).

This leads me to ask in what sense the regimes identified by Escobar are regimes of *nature*. For example, if the "separation of nature and society is one of the *essential* features of modern societies" (emphasis added), in what sense is nature which has been interfered with by society still *nature*? Modern capitalists might call it nature, but they have no obligation to conform to the demands of analytical rigour and, in any case, might not agree with Escobar's statement about modern societies. But the label is not presented as part of capitalist vocabulary. "Capitalist nature," "organic nature," and "technonature" are labels of the analyst's choosing and create the impression that there is something called "nature" of which these are cultural variants. Is this antiessentialism?

This is one feature of Escobar's analysis which does not square with my understanding of constructivism. Another is his question of whether the category "na-

ture" is susceptible to antiessentialist analysis: "If seemingly solid categories like society and the subject have been subjected to antiessentialist critique, why has nature proven so resistant?" What sort of constructivism is it that can speak of "seemingly solid categories"? Is not the underlying assumption of constructivism that there are no solid categories? A constructivist to whom any category seems solid is surely a confused constructivist. In addition, is not the suggestion that nature has proven resistant to this treatment denied by the very anthropological debate to which Escobar's paper is a contribution?

The central question addressed by Escobar is "Is there a view of nature that goes beyond the truism that nature is constructed to theorize the manifold forms in which it is culturally constructed and socially produced, while fully acknowledging the biophysical basis of its constitution?" My answer would be no, for we would be admitting biophysicality as the essence of nature, thereby negating the quest for an antiessentialist, fully constructivist understanding and denying the "truism" that nature is constructed. We could only do what Escobar seeks to do by stepping back from a strictly constructivist position and accepting what Ingold (1992) and others have argued, that at least some of what people know about the world is not constructed but generated in some other way.

What these comments amount to is a suspicion that Escobar's project is doomed by its own parameters. Nature cannot be "theorized within an antiessentialist framework without marginalizing the biological," because antiessentialism marginalizes everything. This suspicion is supported by Ellen's (1996) unashamedly essentialist analysis of "the cognitive geometry of nature," which begins from the position that nature is essentially (and ironically, in the context of Escobar's analysis) a hybrid of three dimensions and argues that this model can be used to identify in any culture a category that might be translated as "nature." Escobar is also treating nature as a cross-cultural category, but his analytical framework does not seem to be equipped for the task. To return to my initial point, I think he has confused that framework with the object of his analysis. It may or may not be true that "Nature has ceased to be essentially anything for most people," but this cannot be the case for the analyst who seeks to understand people's cultural constructions of nature. If it were, how should that analyst know where to begin?

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Escobar challenges us to articulate the biological and social sciences in a novel type of environmental inquiry and proposes to stretch political ecology to encompass this articulation. I concur in principle but advocate a slightly narrower focus on the social relations of power and the formation and functioning of ecologies and

landscapes. Within "ecology" I include material culture and technology, ecological structures and processes in landscapes, and the composition and status of biotic communities, including humans, in place(s). Ecosystems include the living beings in a place as well as bedrock, soil, and water; they encompass the play of landforms with the rhythms of light and dark, wet and dry, hot and cold, and the comings and goings of the seemingly infinite varieties of life. The social relations of power include both conflict and cooperation and refer not only to power-over but also to power-with (see Schmitt 1996), where power may derive from solidarity as well as difference and solidarity may stem from identity, affinity, or contingent coalitions around particular shared interests (see Harding 1986, Haraway 1991, and Fraser 1989).

Escobar argues that nature is a legitimate but not exclusive concern of ontology and epistemology and that a constructivist approach in political ecology need not mean a denial of biophysical reality. I would add that the ontological and epistemological crisis of nature has to do with humans as beings and our being-in-relation to other species and to each other. The exploration of this "rupture" must extend to the rules of relation, redrawing the boundaries of nested categories of biological and social entities. What is "natural" is also really a matter of what is necessary and inevitable versus what is possible, permissible, and malleable. Escobar's inquiry raises questions about intrinsic, relative, and instrumental value in both "social" and "biological" domains and the proper units of analysis, sites of intervention, and points of encounter between cultures and ecologies.

The concept of social regimes of nature that coexist and interact with biological realities is a powerful and useful innovation, but the typology is both intriguing and troubling. Although the categories are meant to be relational, not essential, and they do coexist, overlap, and co-produce each other, their names tend to evoke specific historical associations. "Capitalist nature" calls to mind a period dominated by mechanical and industrial technology and reduces the visibility of linkages (by design) and leakages (by default) of a capitalist ethos and logic into organic and techno-natures. Three other typologies unevenly embedded within the three regimes may suggest alternatives: (1) technologies: bio-organic, mechanistic, and information/communication-based; (2) ontologies: integrated (social-in-nature), divided (nature/society dualism), and recombinant (cyborg/synthesis of "organic" and "artificial" natures); (3) consciousness: immersion (humans-in-nature), instrumentality (differentiated humans using nature), and virtuosity (reintegrated humans creating with nature or transcendent humans re-creating themselves and nature).

Escobar also postulates distinct research approaches for the three regimes, but ontology, epistemology, and technology are all at play in these shifting fields of power-nature, and I suggest that we study each regime with all the tools of philosophy and "natural science" as

well as all his three suggested social science paradigms. There is scope for narrative analysis and deconstruction of the systems of gendered power/knowledge embedded in local language and practice in many non-Western sciences. There is good reason to illuminate the national and international political economic context for bio-prospecting as well as deconstructing the cultural codes of its scientific practice. Both deconstruction and ethnographies can clarify the cultural manipulation of environmental ideas and images by capital (and states) to serve economic ends. And why leave out the biology? We need to conduct material ecological analyses of the socially restructured movement of energy and materials, of the complex webs of interactions, both obligatory and optional, between and among species living in relation within and across places, all implicated as both cause and effect in social relations of power. Social regimes of nature have biological and physical as well as social consequences, and we should document their material manifestations.

The concept of hybrid natures is also a significant contribution. The Afro-Colombian activist exemplifies people holding various natures in tension, a phenomenon which extends well beyond the frontiers of the rain forest. For example, Steingraber (1997), who traverses the chemically endangered ecologies of contrasting landscapes of the East Coast and Midwestern United States, holds many natures in tension as she contemplates the saturation of "organic" nature by the chemical pollution of a "capitalist" one and confronts the threats and promises of techno-nature in the material and ideological responses of medical and environmental science to widespread cancer. Critical cultural ecology, ethnobotany, and environmental histories of forests constitute another line of recent work that could be incorporated into Escobar's arguments for hybrid natures. Daryll Posey, Arturo Gomez-Pampa, William Denevan, Christine Padoch, Paul Richards, Melissa Leach and James Fairhead, Nancy Peluso, Susanna Hecht, David Demeritt, Bruce Willems-Braun, myself, and many others have documented the social construction of material and metaphorical forests by distinct groups within and across places.

Bridges across the gulf between social constructivism and biological realities can also be built from the biological side and grounded in many points between. Recent work by the ecologist Timothy Allen and collaborators (Allen and Hoekstra 1993, Ahl, Allen, and Lerner 1996) in psychology, forestry, and ecology converges with many of the works cited in this article, including psychological theories of relational identity and open-ended development processes as well as ecological theories of complexity. The ecologist Daniel Botkin (1990) has boldly stated that the nature of the 21st century will be a nature that we make, inviting a debate on the nature of "we"—our sense of ourselves and our relations to each other and other beings under different constructs of nature. Likewise, the biological theories of Lynn Margulis blur the edges of cells, organisms, and species. She presents extraordinary examples of creative

recombination of separate organisms into new entities as a major evolutionary strategy that gave us life-as-we-know-it. Political ecology represents a promising site of engagement between these eclectic but convergent bodies of research, and Escobar's work on hybrid natures maps a productive point of encounter at that site. The works he cites combine to provide a glimpse of a synthesis in progress.

One path forward clearly leads to the fusion of cultural politics and social movements (in place) with studies of the regimes of nature. Another option is the analysis of distinct social and environmental movements, across places, grounded at very different points in hybrid regimes of nature, connected through emergent networks (new kinds of places in noncontiguous spaces). The latter often reflect shared interests in specific ecological processes and properties and their intersection with identities and affinities. Yet another direction is to link theories of complexity in biology with social theories of power to develop a situated, practical political ecology. I propose that we see ourselves as involved in social and biological modes of being-in-relation and think of ecologies as socially inscribed and socially implicated collectivities of beings-in-relation (related entities, including people), in place(s). To get beyond the implied dualism of hybridity I would call upon the language of complexity theory—contingency, indeterminacy, simultaneity, and multiple subjectivities (by other names), all compatible with the recent explorations of poststructuralist social sciences. "Landscapes," "ecologies," and "environments" all suggest a plurality of sites and situations where a variety of beings relate to each other and to surrounding spaces and the "natural" and the necessary are embedded in a rich field of choices, possibilities, and potential recombinations. All of these elements are building blocks for a nonessentialist and practical political ecology that deals with difference and diversity, embraces contingency, change, and uncertainty, and accepts the challenge to act, in place(s), in the everyday ecologies of an imperfect and complex world.

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Escobar argues for an antiessentialist political ecology stemming from the belief that nature is culturally and socially constructed. From this perspective culture and especially discourse are seen as active agents that create and produce nature as well as frame knowledge and related conflicts associated with nature. This constructivist approach, along with its emphasis on discursive formations, has added a significant critical dimension to much of the earlier work of political ecologists. Especially important have been constructivist examinations of the role of "science" in environmental campaigns/debates and the role of discourse in framing environ-

mental conflicts related to development (especially in the Third World). Despite these contributions, there are critical limitations associated with the strong idealist position inherent in constructivist arguments. First, the concept "cultural (and/or social) construction of nature" can overestimate the power of human behavior and actions to create, transform, or otherwise control environmental forces while simultaneously underestimating the transformative power of the environment (or nature). Unfortunately, this kind of imbalance is too common in the work of anthropologists, sociologists, and others with little aptitude, knowledge, training, and/or experience in the natural and physical sciences. The complex repercussions of the recent El Niño–Southern Oscillation (ENSO) is a forceful example of the power of the environment as an active agent capable of provoking widespread human social and cultural responses. A critical political ecology must balance the cultural/social construction of nature with a meaningful consideration (and analysis) of the natural construction of the cultural and the social. Mindful of this criticism, Escobar acknowledges this problematic, although the approach advanced in his article does not accomplish this. Second, an overemphasis on constructivist discourse analysis may diminish the concern for the material issues that first provoked the emergence of political ecology. From the perspective of a political ecologist, the importance of understanding discursive formations lies precisely in what that understanding reveals about the behaviors of the diverse actors involved in social and environmental conflicts.

To a great extent, Escobar's article is tangential to rather than building on the current state of the field of political ecology—much of which is already quite anti-essentialist in character. In his brief summary of the emergence of political ecology, Escobar quickly dismisses most of what has been done in political ecology and underestimates the important contributions of anthropologists to this evolving, diverse, and interdisciplinary research field. Since the 1970s, political ecology has advanced an interdisciplinary approach to complex human–environmental interactions, especially those related to economic development in the Third World. A primary objective has been to understand the underlying causes of mounting human and environmental crises—especially in the Third World—and figure out ways to ameliorate or eliminate them. Although efforts to define the evolving field of political ecology are far from complete, anthropologists, geographers, political scientists, and other scholars generally use the political ecology framework to understand how environmental and political forces interact to affect social and environmental changes through the actions of various social actors operating at different scales (levels of analysis). Recently, political ecologists have expanded their domain to include considerations of history, gender, social movements, and discursive formations. Much of the analysis centers on the role of power in mediating the relations among diverse interest groups and/or social/cultural actors. Such power is manifest in the relative

abilities of actors to control access to and use of environmental resources, to transfer environmental risk to other actors, and to affect certain policies and projects (often partly through the control of public discourse).

Eric Wolf was among the first to use the term "political ecology" in his 1972 critique of cultural ecology and ecological anthropology, in which he emphasized the need to contextualize local ecological realities within the broader political economy. Since then, a number of anthropologists have been actively engaged in shaping this vibrant field—Marianne Schminck, Peter Little, Michael Horowitz, Michael Painter, Barbara Johnston, and myself, to name a few. Many of the anthropologists who share a political ecological perspective also share several other characteristics: they are engaged in enhancing anthropology's role in understanding and solving real-world problems—including increasing anthropology's contribution to policy formation; they have had at least some training and/or experience beyond anthropology and even the social sciences; they work comfortably and effectively in broad interdisciplinary settings; and they are committed to integrating sound scholarship with practice. These shared characteristics have facilitated their ability to integrate newer ecological concepts (e.g., instability, disequilibria, chaotic fluctuations, environmental "surprises") into political ecological analysis and interdisciplinary efforts with biophysical colleagues. Escobar's argument will undoubtedly generate much vigorous and fruitful debate among political ecologists, as has much of his previous work. However, it is doubtful that it will generate many converts among political ecologists without a more rigorous synthesis of the relationships between theory, discourse, behavior, and practice.

Reply

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This is a very rich set of commentaries, and I have learned a lot from it. Practically all of the comments are quite pertinent and significant. While epistemological concerns seem to be the most prominent, the commentaries also address important aspects related to the genealogy of political ecology, method and focus, and, last but not least, terminology. There are clear points of agreement with and validation of the main thrust of the paper, but there are also strong disagreements and points of tension. It would be tempting to reduce the disagreements to pervasive dichotomies in the field of environmental studies and beyond—for instance, idealist versus materialist, Foucauldian versus marxist, realist versus interpretivist, essentialist versus constructivist, and social science versus natural science. Some of these dichotomies are certainly at play in the reading strategies of the various commentators, a reflection of

the profound and seemingly intractable binarisms that still plague the modern sciences (ideal/material, production/signification, meaning/practice, and so forth). Yet the disagreements persist even in cases where the dichotomies do not operate.

It would seem appropriate to start with contested notions of "political ecology," since they are in great part driven by differential positioning along the binarisms just sketched. Brosius suggests a useful distinction in the genealogy of political ecology between a first form, which emerges out of the fusion of cultural ecology and political economy, that tends to accept as unproblematic the material/ecological base of social action and a more recent one, informed by poststructuralist theory, that takes "nature" itself as problematic. For those imbued with the tenets of realist political ecology, the poststructuralist vision of my paper appears "idealist" (Stonich) or biased toward constructivism (Cleveland) or "confused constructivism" (Milton). Stonich seems to trace poststructuralist political ecology's misfortunes to its proponents' "little aptitude, knowledge, training, and/or experience in the natural and physical sciences" and to an apparent disregard for questions of practice and "real-world problems." Although I have had significant training in the sciences, it is fair to say that I am committed to the constructivist stance. However, there are natural scientists who find it increasingly necessary to engage with poststructuralism and to abandon conventional science epistemologies (such as those mentioned in Rocheleau's commentary), as well as biological anthropologists engaged in a dialogue with both political economy and poststructuralism (see Goodman and Leathermann 1998). In addition, there are development anthropologists who find the poststructuralist critique of development fundamental for transforming their practice (see, e.g., Gardner and Lewis 1996). Stonich's resistance, to my mind, arises from her attachment to particular science and political economy paradigms that at least some of their practitioners have been challenging for some time. This attachment would be perfectly legitimate, of course, if in doing so she did not disqualify any attempt at doing political ecology differently, describing this as "tangential" and unlikely to "generate many converts among ["real"] political ecologists." The truth is that political ecology is a contested domain of thought and action (see Brown n.d.); no one perspective can claim control over it. It is not a question of generating converts but of examining the various discourses that vie for control of the field's definitions; we need to open up to the possibility of finding common ground among the various perspectives and be willing to examine critically our own positions. (I am aware, of course, that what is at stake is not only concepts and paradigms—or even nature—but competition for positions, graduate students, and the reproduction of a given academic generation. Experience has taught me that the exclusion of particular perspectives can have very tangible consequences.)

I would like to reiterate that the answer does not have to be either/or. The scope for a real dialogue across

some of these divides (realist/constructivist, political economy/poststructuralism) is increasing. In this vein, I fully accept Hill's questioning of my failure to include works that I usually associate more with the political economy orientation of political ecology, such as Norman Whitten's. This absence is the more glaring since I know Whitten's work well from my work in the Colombian Pacific. My paper really takes as a point of departure the more recent emergence of Brosius's second form of political ecology. Although I have written about the political ecology that emerged in the 1970s elsewhere (Hvalkof and Escobar 1988), I need to consider more systematically the contributions to today's political ecologies made throughout the years by the scholars Hill mentions, among others, from Whitten to Coronil. The notion of a colonialist regime of nature is also an important qualification, one that cannot be reduced to being generated by a capitalist mode of production. There is a lot of work—such as Hill's own work on ritual power, nature, and place—that needs to be incorporated into any political ecology project. The only qualification I would make to his formulation is that poststructuralism has added new elements and dimensions to the field. Not everything that political ecology needs to deal with was already contained in the works of the late 1970s.

Poststructuralism, constructivism, and antiessentialism are relatively new theories and modes of analysis. There are still many aspects of them to be worked out and many misunderstandings about their claims. Milton and I seem to have contrasting views of constructivism that, as she says, make it difficult for us to understand what each other is saying. When I talk about the deconstruction of "seemingly solid categories" like society and the subject, I mean not that I believe they are solid but that they are taken to be so. Economism and naturalism are certainly based on the belief in essential, solid cores at the heart of the "real entities" of economy and nature. Antiessentialism questions this belief. And when I say that the "separation of nature and society is one of the essential features of modern societies," I mean that it is a *central* feature ("essential" was an unhappy choice of word). In poststructuralism there is a self-reflexive relation between framework and object of analysis. It is impossible to define an object of analysis called "regimes of nature" without first designing a mode of analysis on the basis of which such an object can be constituted. It is from this framework that a set of practices and empirical facts can be read as nature regimes. This implies a rejection of the empiricist illusion according to which facts and framework are independent of each other. One final, and important, point of contention regarding poststructuralism raised by Milton is the question of judgment. I say "important" because this is one of the most common misconceptions of poststructuralism—that it leads to complete relativism. I do not believe this is the case. Poststructuralism provides very clear criteria for making judgments and taking action based on the analysis of discourse and power and the overall aim of transforming

entrenched political economies of truth. That these criteria can never be universal and valid once and for all does not disable action. Stuart Hall's notion of arbitrary closure provides a principle for linking theoretical analysis and political decisions. Praxis, as Cleveland says, starts by discussing the values that arise from various cultural perspectives; it must then consider issues of power and knowledge linked to those values and perspectives.

This applies equally to the issue of the definition of "justice" and "sustainability" raised by Cleveland. Leff makes the case that sustainability cannot be defined independently of the specific ecological, cultural, technological, and economic conditions of the appropriation of nature. But Cleveland also points to a crucial issue: the persistent difficulty of talking across the science divide. As far as ecology is concerned, this might be stated, following Rappaport, as an aspect of the contradiction between the cultural and the biological (see my n. 3). I accept what Cleveland sees as a "constructivist bias" in my paper and welcome his suggestions for transcending it. This goal, he suggests, might require certain "social negotiations"—starting with acknowledging one's biases—and willingness to reexamine our notion of what constitutes "biophysical reality" and how it can be tested empirically. This is a positive suggestion. The problem does not stop there, however. True, there are empirical data that suggest that people in organic regimes manage, control, or "manipulate" their environments. When Strathern says that in these regimes nature is not manipulated I believe what she has in mind is the different rationalities imputed or attached to "manipulation" in modern and nonmodern settings—that is, the fact that certain practices read within a modern regime as manipulation of nature cannot be read in the same way in other regimes, where (to start with) "nature" itself is not a meaningful or powerful distinction. Whether nature regimes are incommensurable or whether it might be possible to build a metadomain of discourse in which comparisons become possible and fruitful is still an open question. It is an important issue, even if, as Berglund warns, one has to be mindful of the dangers of wanting to build "a theory of everything." I generally agree with her on this point. Besides a certain aesthetic and epistemological drive toward "big theory," however (which might possibly be associated with male epistemological styles—perhaps one of the things Berglund meant to say), I wonder if there are not certain moments at which an attempt at more encompassing theory building is warranted. Arizpe (1996), for instance, has called upon anthropologists to be less timid in the development of more comprehensive frameworks of global problems, building of course on our ethnographic strengths. This paper is a case in point. It is actually one of a set of articles (most of which are listed in the paper's bibliography) which I have been writing as a preparation for a book on the subject. Part of the ethnographic information that Berglund would wish to see is in these papers; the rest will be in the book. (The book is divided into chapters each

of which is centered on a key concept in political ecology: Place, Nature, Capital, Development, Identity, and Network.)

This is not to say that the framework presented in the paper is complete, privileged, or even correct. I can now see many of its gaps and flaws. Hodgson, Rocheleau, and Leff point to some of the most insidious. Hodgson is absolutely right in criticizing the paper's suggestion that each nature regime be studied according to a distinct form of analysis, a point underscored by Brosius. Her argument in this regard is very insightful and leads me to abandon this feature of the framework. I agree that it is important to study each regime with all the tools at our disposal. In practice, however, we are hampered from doing so by entrenched intellectual divisions of labor (historical materialists make organic natures invisible or subordinate and have yet to account for the relation between capital and technonature; those studying local models shy away from looking at capitalist nature as a knowledge system and shun any consideration of technonature by remaining too wedded to certain domains of study and empirical situations, etc.). Under these conditions, integrative and holistic syntheses seem daunting. It is no accident that most attempts at articulating a transdisciplinary field of environmental studies have met with very limited success. Established modes of knowledge are "regional" and uneven discursive formations. My suggestion of contrasting modes of knowledge pointed to these difficulties. The eloquence of Hodgson's commentary is an indication that more integrative frameworks are becoming possible, but the issue is far from settled. Some paradigms are more apt to examine particular historical periods, and when they enter into crisis it is because they no longer provide "all the answers" (this is clearly happening with historical materialism today). But there is also the notion, for instance, in Latin American debates on modernity and postmodernity (but also in other formulations, such as that of Pierre Lévy, cited in n. 20), of the coexistence of social regimes characterized by different temporalities that intensify contrasting forms of knowledge. Hodgson's commentary has also made me fully aware that a consequence of studying each regime according to a distinct mode of knowledge is that it emphasizes the differences rather than the connections among regimes. A related issue is that of the status of "local knowledge" versus "science," also pertinently raised by Cleveland. My main interest in this regard lies in analyzing their respective claims to truth and the effects of power linked to those claims, although the more strictly epistemological considerations are equally important.

Rocheleau and Leff seem to agree in principle that it is possible to develop an antiessentialist political ecology that does not deny biophysical reality. They both want the paper's argument, however, to be more careful about the integration of the biological and social dimensions of the natural. Like Hodgson and Brosius, Rocheleau advocates studying nature regimes with all the tools of philosophy and the natural and social sciences.

She also considers, and I agree, that the typology of the three nature regimes reduces the visibility of "linkages and leakages" among them. She would favor instead a typology of ecologies and landscapes in terms of technologies, ontologies, and forms of consciousness. I believe this is a very important proposal; it adds richness and complexity to the idea of nature regimes. It could also be said that technology, ontology, and epistemology crosscut the three nature regimes I outlined. Rocheleau advocates building more bridges in the account of hybrid natures between social constructivism and biological realities, from both sides of the equation. The works of Posey, Leach, Gomez-Pampa, Allen and Hoekstra, and others that she mentions certainly constitute steps toward such a project. Linking biological theories of complexity with social theories of power "to develop a situated, practical political ecology" is an equally exciting prospect. Rocheleau's lucid prose already presages the alternative models of knowledge and ecologies that might result from these efforts. Her essay is full of rich insights, such as the importance for ecologists of thinking of power-with as much as of power-over (also a feature emphasized by social ecologists), the notion of emergent networks of hybrid natures as "new kinds of places in noncontiguous spaces" (which suggests a useful angle for rethinking network theories), and the importance of thinking about ecologies as socially inscribed collectives of being-in-relation, of ensembles of place(s), people(s), and nature(s). Rocheleau's antiessentialism is decisively plural and practice-oriented. I look forward to seeing its development into a fuller formulation.

Leff's reworking of nature regimes in terms of culture/technology/economy matrices—that is, as alternative nature-culture-technology regimes—is related to Rocheleau's revised typology in terms of technology, ontology, and consciousness. Leff, however, anchors his view in an acceptance of the organic essence of nature. "Organic nature" in this way is really, in Leff's account, cultured nature; this regime still respects the ecological and cultural specificity of nature. This integrity starts to break down with capital's construction of nature in terms of a universal culture and is definitely shattered with the molecular technologization of nature, which robs the cultural/organic of its fundamental role as the basis of evolution. From this point on, nature regimes will encompass fundamentally different ontological orders (linked to different forms of technology and consciousness, we could add, following Rocheleau). This is why, as he points out, the articulation of hybrid regimes cannot be reduced to ecological laws, economic forces, thermodynamics, or cultural rationalities. From this follows his sustained call for an articulation of the sciences beyond biocentrism, economism, and anthropocentrism, respecting nevertheless the ontological foundation of each science's object of study ("the biological is organic; culture is symbolic"). It is still unclear if this articulation can fully account for the fact that technology seems to point the way toward the dematerialization and ecologizing of the econ-

omy, as he also observes. Of course, the potentialities of technonature can only be realized if linked with significant transformations in cultural, economic, and political practices. The reorientation of evolution toward diversity is a relative, not an absolute, utopia (in Mannheim's sense of these terms). As Leff and Rocheleau point out, this possibility may largely depend on the cultural politics of those social movements which advocate the reappropriation of nature, culture, knowledge, and technology according to the logic of diversity.

Several commentators express reservations about the labels given to the three regimes and to the fact that I retain the category of "nature." It is true that it may be impossible to separate the signifiers "organic," "capitalist," and "techno-" from the signifieds with which they have been burdened by history. This is particularly true of the "organic" label, as Brosius claims. Nevertheless, are we so imprisoned by certain labels that they cannot be reclaimed? For me the issue is the extent to which the organic can be constituted as the basis for theory construction and political action (see n. 11). Reclaiming the organic will of course depend on the relation and balance between these two processes. Perhaps the nature regimes can be seen as juxtapositions of distinct narratives and practices shaped by power relations that extend from the local to the global, all of them with their own complex histories and hybridities. Are all of them "nature"? Nature, as Berglund says, is an intellectual and political concept, and it remains an ontological foundation. Milton, with Leff, seems to prefer restricting the concept of nature to the organic/biophysical. If one were to heed current philosophical critiques of foundationalism and essentialism, one would have to conclude that biophysicality is as much the essence of nature as society is the essence of history. In other words, we construct biophysical reality as nature. Following Foucault, one could say that "nature" is a result of certain problematizations, a "game of truth" through which biophysical reality is constituted as experience. No more real than "sex," it anchors very real and powerful discourses and practices. Indeed, if political ecology has been firmly associated with the study and defense of nature, this association need not be permanent. But that is another story. For now, I appreciate the comments that have enabled me to rewrite and extend the story contained in the present paper.

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