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CLOSING THE "GREAT DIVIDE": New Social Theory on Society and Nature

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■ **Abstract** Twenty years ago, two environmental sociologists made a bold call for a paradigmatic shift in the discipline of sociology—namely, one that would bring nature into the center of sociological inquiry and recognize the inseparability of nature and society. In this essay, we review recent scholarship that seeks to meet this challenge. The respective strands of this literature come from the margins of environmental sociology and border on other arenas of social theory production, including neo-Marxism, political ecology, materialist feminism, and social studies of science. Bringing together scholars from sociology, anthropology, geography, and history, each of these strands offers what we consider the most innovative new work trying to move sociology beyond the nature/society divide.

INTRODUCTION

> Jorge Luis Borges once remarked that the absence of camels in the Koran reveals the book's authenticity. It has roots in a culture in which camels are taken for granted. By the same logic, the neglect of nature in contemporary Western social theory perhaps shows the extent to which the massive appropriation of natural resources upon which the modern world depends has come to be assumed as a fact of life. Yet if one instance of habituation expresses a millenarian dynamic between society and nature, the other reflects the abrupt rise of a short-term perspective that threatens the future of both nature and humanity.
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> (Coronil 1997, p. 21)

Twenty years ago, a bold and prescient call for a paradigmatic shift in the discipline of sociology catapulted the field of environmental sociology onto the scene. Two early pioneers, Riley Dunlap and William Catton, emerged from Earth Day and other political demonstrations to argue that sociology, despite the appearance of a wide range of competing social theories, was actually composed of minor variants of a single paradigm, the "human exemptionalism paradigm" (Catton & Dunlap

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1978, Dunlap 1997). From Marxism to symbolic interactionism, all were closely linked by the common trait of anthropocentrism. Social dynamics that produce environmental degradation and resource depletion would remain undertheorized, or worse, ignored, they argued, without a "new ecological paradigm" to displace the chauvinisms of the old. Moreover, the environment should not be introduced as just another new variable or theme, but as a radically new way of thinking about society. As the sun rose on the antinuclear, antitoxics, and limits-to-growth movements, Dunlap and Catton asked sociology to retool with a lens that brings nature into the center of sociological inquiry and recognizes the inseparability of nature and society.

Dunlap and Catton's call to sociology has turned out to represent an exceedingly difficult challenge. In part, this has to do with the history of the discipline. Because early theorists were trying to establish the need for a separate science of society, nature was not a major concern or concept for exploration in classical sociological theory. These classical sociologists sought to emphasize that which was outside the domain of the dominant physical and natural sciences to legitimate themselves and their discipline; the desire by some to distinguish their perspective from the dominant scientific perspective of biological determinism also contributed to this tendency. This was true of Marx and Engels, for example, who were in vigorous debate with Malthusianism. In emphasizing the social construction of natural limits, they underemphasized the importance of the biophysical world (Benton 1989) and the inextricability of nature and society.

A second reason nature has not been better integrated into sociological theory is related to the powerful influence that Enlightenment thought has had on the structure and production of sociological knowledge. Although the subdiscipline of environmental sociology has burgeoned in recent years, most of the literature treats nature as a discrete and external object of study, one that can be known through the application of an objective, dispassionate science. Yet as environmental historians, sociologists of science, and environmental philosophers have pointed out, the Enlightenment ontology of nature as primordial, autonomous, and mechanistic is highly problematic (Merchant 1980, 1989; Latour 1993; FitzSimmons & Goodman 1998). Not only is the idea of nature socially constructed, but the "natural" is deeply embedded in all social forms (cf Williams 1980).

Over the past decade, environmental sociology has focused on the study of "greening" as a new social trend that has worked its way into many of our major social institutions. Environmental sociologists have investigated attitudinal, behavioral, and consumer shifts, finding that the health of the biophysical world really does matter to people, that many are willing to make changes consistent with this, and that some social groups are particularly sensitive to environmental stewardship concerns (Mohai 1992, Scott & Willits 1994, Ozanne et al 1999). They have analyzed state regulatory regimes, industrial production practices, and waste disposal regimes (Schnaiberg & Gould 1994, Szasz 1994, Mol 1995, Sonnenfeld 1998), revealing the nexus among social protest, governmental regulatory activity, media coverage, and industrial receptivity, or "ecological modernization"

(Spaargaren & Mol 1992, Freudenburg & Gramling 1994). They have brought attention to the worst social inequities related to environmental pollution, degradation, and disasters, helping to establish that environmental racism/injustice—or the disproportionate displacement of waste and pollution on people of color and working-class communities—is prevalent throughout the United States and beyond (Bullard 1990, 1993; Bryant & Mohai 1992). In addition, they have tracked the rapid growth of environmental movements and collective behavior around environmental issues, finding new social movements that are vast, differentiated, and highly strategic (Gottlieb 1993, Bullard 1993, Hofrichter 1993, Gould et al 1996).

These contributions have been productive and useful and have begun to influence other areas of sociology (e.g. social movements, development studies) in important ways. Because others have successfully reviewed this literature (Buttel 1996, 1997; Pulido 1996; Dunlap 1997; Redclift & Woodgate 1997; Szasz & Meuser 1997; Mol & Spaargaren 2000) our focus in this review is on literature that grapples specifically with a retheorization of the nature/society divide. The respective strands of this literature come from the margins of environmental sociology and border on other arenas of social theory production. Bringing together scholars from sociology, anthropology, geography, and history, each of these strands—ecological Marxism, new political ecology, environmental feminism, and sociology of knowledge and science—offers what we consider the most innovative new work trying to make a paradigmatic shift away from nature/society dualisms.

At its best, we argue, this work brings into focus four critical insights: (*a*) not only must society be studied as constitutive of nature and vice versa, but nature must be understood as an actor with a conjoined materiality with society (Freudenburg et al 1995, Pickering 1996, Demeritt 1998); (*b*) sociology must become a reflexive science that understands knowledge (including ecological knowledge) as situated, partial, and internal to exercises of power, and people (as subjects and scientists of inquiry) in their organically embodied and ecologically embedded contexts; (*c*) studies of nature-society relations need to consider ecological processes, political-economic structures, and meanings, values, and agency as necessary and complementary components of analysis; and (*d*) the boundaries assumed by traditional units of analysis (e.g. nation, economy, biology, culture, or species) are inherently unstable and permeable (cf Buttel 1998). To the extent that environmental sociology can further develop these insights and incorporate them into its theoretical and empirical core, we suggest that it would not only advance the subdiscipline, but could greatly affect the discipline of sociology as a whole.

ECOLOGICAL MARXISM

Many have argued that the theoretical limit of the Marxist-socialist project has been its preoccupation with a productivist paradigm that endorses unlimited economic growth and ignores environmental degradation (Habermas 1984, Goldblatt 1996).

Yet a new wave of social theory seeks precisely to overcome these charges (see O'Connor 1988, 1998, and much of the work published in the journal *Capitalism, Nature, Socialism*; Toledo 1989; M O'Connor 1994; Benton 1989, 1993, 1996; Redclift & Benton 1994; Leff 1995; Harvey 1996; Foster 1999, 2000).

This theory is not rooted in nineteenth-century politics but in observations of current political and environmental trends—e.g. air, land, and water pollution, workplace and community-based movements against toxic poisoning and other threats to human health—with hardly a trace of the "normative presuppositions of unprincipled vanguardism" (Goldblatt 1996). It is neither stuck in an evolutionary model of progress, nor does it gloss over the contradictions of economic rationality. On the contrary, it explicitly theorizes these contradictions, recognizing the relations between nature and society as profoundly dialectical (Goldfrank et al 1999).

Over the past decade, Marxist political economy has taken a major step forward with James O'Connor's theoretical work on the current contradictions of capitalism (1988, 1994, 1998). O'Connor has revitalized the Marxist notion of contradiction by introducing nature alongside capital and labor as a fundamental category. In addition to the primary contradiction, which exists between capital and labor and reflects an overproduction or realization crisis, is a second contradiction that exists between capital and labor on the one hand, and nature on the other. Under certain circumstances, argues O'Connor, capitalism today undermines its own production conditions, namely, human nature (labor power), nonhuman nature (the external biophysical world), and the built environment (including public space and infrastructure). As ecosystems become heavily polluted and mined, workers and communities poisoned, and infrastructure destroyed, capitalists suffer a cost crisis due to the high costs (economic and noneconomic) of revitalizing degraded production conditions. To overcome these new barriers to expansion, capital must either restructure production conditions in productivity-enhancing ways, or seek more social forms of reproducing the conditions of production. O'Connor (1994) suggests that the latter does not seem likely to occur today because of the large measure of regulation and planning required, which is anathema to current ideological trends in most liberal democracies. More likely, individual capitals will seek to lower their production costs through technological innovation, e.g. through genetic engineering or by employing "toxic-eating" microorganisms to clean up toxic spills. As this happens, "we [will] enter a world in which capital does not merely appropriate nature, then turn it into commodities ... but rather a world in which *capital remakes nature* and its products biologically and physically (and politically and ideologically) in its own image." (O'Connor 1994, p. 158; emphasis ours).

Ted Benton is another sociologist actively pushing Marxist sociology in a more ecological direction (Benton 1989, 1993; Redclift & Benton 1994). His work can be seen as an important touchstone for scholars trying to retheorize nature-society relations through the prism of nature-based productive activities. Taking Marx's focus on the labor process as his starting point, Benton argues that different kinds of human activities have distinct "intentional structures" that go beyond

the primary ideal type identified by Marx (productive-transformative intentional structures). By ignoring appropriative labor processes such as fishing or felling trees, and ecoregulatory activities such as agriculture, Benton contends that "Marx underrepresents the significance of non-manipulable natural conditions of labor processes and overrepresents the role of human intentional transformative powers vis-à-vis nature" (Benton 1989, p. 64).

For Benton, ecoregulatory practices are labor processes that aim to sustain, regulate, or reproduce rather than transform the conditions of agricultural production. Benton suggests that the work of transformation in seed and livestock production is actually carried out by organic and inorganic natural processes such as photosynthesis and metabolism, which are "relatively impervious to intentional manipulation." (Benton 1989, p. 68) There are strong parallels here with the work of Stephen Bunker (1985, 1989, 1992; also see Barham et al 1994), who has also attempted to theorize the difference between industrial or transformative activities and resource extraction, and was one of the first sociologists seeking to ecologize Marxism. Building on the work of both of these authors, a recent paper by Boyd et al (1999) develops the idea of nature as actor in nature-based industries (e.g. mining, agriculture, or silviculture), arguing that a direct reliance on the biophysical world introduces a unique source of surprise, opportunity, and risk into the capitalist production process.

Approaching the idea of nature in capitalist production from the field of semiotics, Martin O'Connor (1993) suggests that capital's response to ecological crisis has been to represent formerly noncapitalist realms—the biophysical world, non-industrialized economies, and the household—as reservoirs and stocks of "capital" and therefore no longer external to capitalism. Once particular conditions of production are colonized in this way, argues O'Connor, it becomes possible to justify their rational and ecological management by economic actors. That is, in the semiotic shift toward the capitalization of nature, environmental degradation and resource exhaustion are being diagnosed as management problems rather than as a crisis or breakdown; this management exercise then becomes a new source of dynamism for capitalism.

David Harvey, perhaps the most accomplished theorist of urban geography and a major contributor to the ecological reformation of Marxism, takes us in yet another direction (Harvey 1996). Instead of romanticizing the imagined world of nature, Harvey focuses on the built environment—arguably the most common environment today, especially to the working class and, in some countries, for minority ethnic groups. Harvey argues that nature is so mediated by capitalist structures and practices that there is no other way to think of nature as currently experienced except as a product of capital. In fact, Harvey's attention to the urban environment could be read as a corrective to the mainstream US environment movement's parochial interpretation of environmental issues (see also Di Chiro 1998).

Besides reconceptualizing the idea of nature vis-à-vis capitalism, ecological Marxists are also emphasizing how social movements and other agents of change respond to capital-driven ecological transformations. James O'Connor (1998)

perceives many of today's social movements, from the public health movement to women's movements to movements of people of color, as a direct response to the ecological contradictions of capitalism. Harvey (1996) has a similar interpretation of the environmental justice movement as it unfolds in multiple local-to-global sites around the world. Harvey draws together Raymond Williams' idea of "militant particularism" with his own notion of "global ambition" as a practical way to overcome the pitfalls of "localist" politics. These politics often exclude people with whom there could be potential solidarity, such as people from different ethnic groups or nations but similar locations in relation to contemporary capitalism (see also Schaeffer 1997, Gille 2000). Daniel Faber's work on U.S. environmental movements makes a clear link between changes in U.S. capitalism, social movement politics, and state regulatory practices (Faber 1998). He shows that local-based environmental activists have stopped numerous planned municipal incinerators and forced many public and private employers to clean up neighborhoods and make workplaces safer. These successful actions have, in turn, fed into national and international political strategies for greater democratic participation in decision-making processes over the means of production and the circulation of toxic waste (see also Schaeffer 1999).

In all of these discussions, the social "production of nature" is central (Smith 1984, 1998). Significantly, when ecological Marxists use the concept of production, they do not relegate themselves only to the corridors of Fordist factories. Indeed, their scholarship reveals an understanding of production in the broadest terms—as social, economic, cultural, and ecological production, circulation, and consumption. Nature is, or natures are, internal to these transformations (LeFebvre 1991). This intellectual project—to comprehend both the social production of nature and the natural production of society—is enormous. Now we will turn to another literature that takes up this challenge from a different perspective.

NEW POLITICAL ECOLOGY

Refashioning traditional methodologies from geography and anthropology with new tools from cultural and postcolonial studies, the new political ecology is a flourishing terrain of scholarship that emphasizes locality-based studies of people interacting with their environments. Whereas once this field was largely a remake of cultural ecology with research on poverty and ecological stress in peasant production practices, recently it has taken remarkable strides to retheorize not only place-based analysis, but also social theory of nature in general. The formidable task of new political ecology has been to articulate the natural as constitutive of the social, and vice versa, unpacking these relations for a better understanding of the political, ecological, and cultural. The literature has taken three approaches in its latest inquiries: theorizing environmental struggles as both material and symbolic, discursive practices as embodying power relations, and, unconventionally, land use practices in the highly industrialized North.

Along the first of these lines, Rocheleau and Ross (1995) analyze the roles of trees as "tools and text." They show how different social groups in the Dominican Republic utilized the *Acacia* tree, as well as ideas about *Acacia* trees, in their efforts to establish claims to land and other productive resources. Similarly, Donald Moore's (1996) work on environmental struggles in Zimbabwe emphasizes the symbolic aspects of peasant land claims. Drawing on Antonio Gramsci and Raymond Williams, Moore contends that symbolic struggles effect material transformation, and that "cultural meanings are constitutive forces, that is, shapers of history, and not simply reflections of a material base" (Moore, p. 127). A number of scholars have interrogated the gendered nature of struggles over meaning (e.g. Carney 1996, Bassett 1999, Rocheleau & Ross 1995), showing, for instance, how men and women mobilize differing cultural understandings to justify their claims over particular resources.

The inspiration for many of these analyses of ideology, symbolism, and the cultural construction of meaning was Nancy Peluso's (1992) pioneering study of the struggle between the Indonesian State and forest dwellers over the Indonesian teak forests. Building on the works of E. P. Thompson and James Scott on cultures of resistance, Peluso shows how the Indonesian State sought to maintain control of the forests through a certain conception of property rights and an ideology of criminality, and how forest dwellers challenged those conceptions by engaging in "criminal behavior" and developing a counter-discourse on what is a fair, legal, and legitimate use of the forest.

The account by Michael Watts (1998) of the putatively environmental struggles over oil in southern Nigeria reveals an extraordinary social movement configuration that created a new politics based on a constructed hybrid identity. Although this "black gold" was found in the swamps where they lived, the Ogoni people accumulated no oil wealth; moreover, the exploitation of oil helped destroy the environment on which these people once thrived. Nonetheless, oil became more than a natural resource for which the Ogoni had a natural affinity or on which they built their natural/moral economy; it came to represent a discourse and artifact of transnational petrol capital and the brutal state apparatuses that allowed for constant oil spills and fires, and murdered Ken Saro-Wiwa and other Ogoni leaders. Watts' key contribution is his observation that this movement does not at all reflect the imagined alternative movement that most seem to find dotting the postcolonial map. The recent history of Ogoni oppositional politics reveals that a unified conception of "Ogoniness" had to be invented for this moment, bringing together the "locals" who otherwise did not have a common political identity, fighting for rights to a nature (oil) for which they had no love, history, or locally privileged knowledge.

Similarly, Fernando Coronil in *The Magical State* retells the modern history of Venezuela from a new perspective that emphasizes oil and oil-producing land as an autonomous force in the making of states and state-society relations. He argues that the oil in petrostates such as Venezuela (and Nigeria) has an enormously transformative effect on the body politic and the historical trajectory of a nation in

terms of nationalism and state-building, wealth production and distribution, and the subaltern modernity of a semiperipheral nation in the world-system (Coronil 1997).

A second, closely related line of the new political ecology scholarship analyzes alternative discourses on nature, the environment, and environmental degradation, seeking to understand the power dynamics circulating through Western truth regimes related to North-South relations. Michael Dove (1993), for example, explores the way in which the Indonesian State, transnational nongovernmental organizations (NGOs), and Northern environmental movements frame the problem of deforestation in the Indonesian rainforest as one of forest dweller impoverishment, instead of as a reflection of the enormous inequalities characterizing Indonesian society, as well as its relationship with the rest of the world. In a similar vein, Lucy Jarosz (1996) analyzes colonial and postcolonial discourses on peasant land use in Madagascar, revealing the state's efforts to control the terms of the debate as to what counts as rational and irrational land use practices. Like Peluso, Jarosz stresses the way in which peasants' subaltern discourses are developed as powerful tools of resistance to state authority and as a basis for organizing against the state. All of these works artfully combine political-economic analysis with much needed attention to the discursive and ideological realms and reveal how perceptions and constructions of nature and politics actively shape material reality. They also respond directly to Watts' criticism that political ecology's understanding of politics needed to be broadened (Watts 1990, Peet & Watts 1996). Finally, discourse analysis has been used to explore and expose the power relations embodied in national and global conservation agendas, including those of seemingly progressive environmental groups (Peluso 1993, Schroeder 1995, Luke 1997, Goldman 1998).

A third approach in the new political ecology involves a shift to the North, where scholars challenge the notion that urbanized and industrialized environments are areas of no nature, with little effect on culture, politics, or identity. Studying the North allows political ecologists to reconsider their assumptions about North-South differences. For instance, in a study of two Chicano struggles in the southwestern United States (the pesticide campaign of the United Farm Workers and the Ganados del Valle Hispano grazing rights campaign), Laura Pulido concludes that struggles over environmental issues are simultaneously struggles over livelihood, an argument that has been made about many environmental struggles in the South (Hecht & Cockburn 1990, Friedmann & Rangan 1993).

In critical dialogue with scholars who analyze the role of race and ethnicity in environmental politics, Pulido suggests that the literature on environmental justice/racism is effective in documenting the landscape of race-based injustice, but does not capture the multifaceted dimensions of racism. When race becomes a variable in studies on pollution, it can be effective in demonstrating a type of racism in which race is statistically significant in the siting of toxic producers. But what about situations when it is not? Because racism is so deeply implicated in our institutions and material life, race-as-variable analyses often fail to capture many structural, insidious, and enduring forms of oppression. Moreover, the evidence

presented by Pulido reveals an identity politics amongst oppressed minority and ethnic communities that does not fit the common portrayal of these communities as either closer to (e.g. Native Americans) or further from nature (e.g. African Americans). In actively creating a new Hispano-pastoral culture to challenge Anglo claims of superior environmental concerns, the Chicanos Pulido studies have effectively mobilized essentialist identities to their advantage (see also Di Chiro 1998). In other words, what counts as nature and what works as nature politics are two arenas that are being effectively remade by some environmental justice organizations and social movements as they confront their respective adversaries and obstacles (Alston 1990, Hofrichter 1993, Szasz 1994).

ENVIRONMENTAL FEMINISM

In social theory, feminist theorists have always played a central role in working through problematic ontological dualisms such as nature/culture, subject/object, human/nonhuman, and the resulting naturalized classifications of sex, race, species, and class (Soper 1995). There is common agreement amongst feminist theorists that these distinctions emanate from a masculinist ideal of what it means to be truly human, i.e. what characteristics do or do not qualify, which are attributed to nature and which to culture, which to the animal kingdom and which to the human. From there, however, agreement wavers; nowhere is it more true than with the wide range of feminists who could fall under the rubric of environmental feminism, which, for this essay, includes gender and feminist analyses of nature/social relations. A brief perusal of works by Merchant (1980, 1992), Mellor (1997), and Sturgeon (1997) shows that a diverse range of analytical frameworks exists on the question of feminism and ecology.

Some find the origins of universalized oppression of women and nature rooted in the Enlightenment and the (Western) scientization of society, with its consequent objectification of nature as the formal object of dispassionate [read: male, scientific] inquiry (Merchant 1980, 1992; Shiva 1989; Mies & Shiva 1993). Others are less convinced by this macrostructural rigidity, yet maintain a strong critique of dominant scientific practices and related oppressive effects for objects of science, such as nature, and for subjects excluded from the scientific professions, such as (until recently) women (Haraway 1991, 1997b; Martin 1994; Ginsburg & Rapp 1995; Downey & Dumit 1997). Nonetheless, the shared project of destabilizing common myths around what is nature, culture, and biology, is yielding some of the most fruitful scholarly work in social theory today. Two substantive areas stand out: gender and the environment, particularly in developing countries; and biotechnology and the politics of the body (human and nonhuman). These areas overlap and cross-pollinate intellectually, with scholars borrowing from and contributing to each other's work.

Through multiple lenses, feminists walk the tightrope of explicating what biological/ecological traits are meaningful for whom, and which are used as weapons.

For example, an assumed promise of late capitalism is that we humans all have the potential of transcending the biological limits of nature: to produce food without soil, prolong human life with techno-surrogate body parts, and consume more than the earth can sustain. Environmental feminists recognize that the promise of limitless consumption exists, but only for the most privileged, for whom "[the] limits are borne by others, including the earth itself" (Mellor 1997, p. 190). They contend that biology does matter and, moreover, that it is a contested zone in which constructed gender, race, class, nationality, and species differences have significant consequences. In contrast to the notion of transcendence, which underlies Enlightenment thought on society's relationship to nature, environmental feminists theorize social-natural relations in terms of ecological embeddedness and biological embodiment (Mellor 1997, Salleh 1997). This alternative perspective is associated with the idea of immanence, or a reflexive awareness of one's position in nature.

Gender and the Environment

An important strand of recent feminist inquiry consists of gender analyses that emphasize the materialist and semiotic dimensions of the relationships of people to each other and to nonhuman nature. The most sophisticated of this gender and the environment (hereafter referred to as G&E) literature eschews the essentialist and universalizing character of the early "ecofeminist" literature (cf Starhawk 1990, Shiva 1989) and the policy-oriented literature on women, environment, and development emanating from the World Bank, United Nations agencies, and some international NGOs. Explicitly rejecting the notion that "women are to nature as men are to culture," G&E scholars show how depictions of Third World women's sacred in their naturalized indigeneity and affinity to nature, say much more about "the gaze of western eyes" (Mohanty et al 1991) than they do about specific relationships that women may have to the environment (Jackson 1994, Leach et al 1995).

G&E scholars argue that society-nature relations are patterned by gender, and gender relations are fundamental to understanding resource access, use, and degradation around the world (Agarwal 1992, 1994; Leach 1991, 1994; Joekes et al 1995). Bina Agarwal (1994), for example, develops a gender analysis of land relations in India to show how gender (as well as class/caste) relations at a variety of levels (e.g. nation, village, household) mediate people's access to land and the effects of India's land reform laws on women. Leach & Fairhead (1995) examine gendered practices of gardening in Kuranko, Guinea, to illustrate how changing gender relations shaped, and were shaped by, local patterns of environmental change. They also show how different land use practices by women and men create gendered knowledges of agroecological systems, a theme also highlighted by Rocheleau (1995) and Mackenzie (1995).

Related to the notion that environmental knowledges are gendered is the point that the very definition of environmental degradation varies not only across different societies and cultures, but also by gender, class, and race within a particular society (Leach et al 1995, Joekes et al 1995, Shah & Shah 1995). Cecile Jackson

(1994, 1995) takes this idea a step further by challenging the notion, common among NGOs and multilateral development institutions, that the interests of women and environmentalism are coterminous. She notes that the presumed synergy between women's interests and environmental interests derives from the observation that "because of their daily tasks—growing food and gathering water, fuel and fodder—poor women are especially dependent upon the natural resources of the environment and the first to suffer when the environment becomes degraded" (Davidson et al 1992, cited by Jackson 1995). However, as her study of conjugal contracts in southern Zimbabwe shows, the well being of particular groups of women and of particular environments can also be at odds. More generally, she observes that the dominant, yet often incorrect, assumption of synergy can lead to development projects that place extra burdens on women, as they are expected to provide the labor to effect change (Jackson 1994).

The Politics of the Body

A second area of theorization is associated with recent work on the reinvention of the body, particularly in the contested terrain of reproduction. One strand of this literature focuses on the technologies of contraception and sterilization used, coercively or otherwise, whereas another emphasizes the latest medical technologies with which women interact in dealing with concerns about pregnancy and fertility. The former reflects on the twin-headed hydra in public discourse on the fate of the planet—overpopulation and environmental degradation—and how solutions are typically sought in "depoliticized" global instruments of reproductive control, namely, contraception and sterilization. The latter draws attention to the fluid divide between private and public, for example public discourses on what parts of a woman's body are hers and which are not and when public citizenship should be awarded to a developing fetus and when it should not.

Over the years, feminists have shown that the discourse on population control/family planning has been characterized by zenophobism as well as reductionism, which not only enables international and state agencies to manipulate the bodies and rights of women but seeks to stabilize certain notions of family, race, nation, and social order (Hartmann 1987, Mohanty et al 1991, Scheper-Hughes 1992, Ginsburg & Rapp 1995, Bandarage 1997). Although this critique of conventional reproduction politics is not new, it has served as the basis for investigating how other bodily interventions have proliferated in scope and scale (Franklin & Ragoné 1998). Both old and new studies help us rethink social theory in light of the contested terrain of human biology, nature, and technology.

Martin, Rapp, Ginsberg, Clarke, Cussins, and others have created a subfield of inquiry on the anthropology of the body with global topics of exploration such as AIDS (Booth 1998, Treichler 1999), viruses and immunities (Martin 1994), and the trade in bodies, body parts, and body fluids. Many of these studies find kinship networks that are effectively strewn across the planet, as far as a frozen embryo, tissue, or sperm can travel, blurring traditional distinctions among—and requiring

new ontological definitions of—animal, human, race, and technology (Cussins 1998). Such analyses lead to questions about the directions in which "possessive individualist" capitalist culture is being taken, if parts of the person/body are being spread across time and space. As Martin (1998, p. 78) asks: "Who is the owner of these new bodies? How do these new techno-science incursions destabilize existing ownership structures of nature and personhood?"

Some suggest that the body itself has become an accumulation strategy. Indeed, capital accumulation now occurs within cell membranes functioning as microfactories within our bodies, giving new meaning to the idea of social (and natural) labor and blurring the line between production and reproduction. Emily Martin (1998) periodizes scientific and popular perceptions of the function of the human body in western capitalist societies into a Fordist accumulation strategy of mass production and distribution of commodified contraceptive and menstrual products, and a post-Fordist regime of individualization and deep intervention in the form of surgical interventions, fetal surveillance, and genetic testing. In the latter, the body and bodily practices are not just commodified, but nature is capitalized and remade (note the overlap with J O'Connor, cited above). Others studying global biodiversity and human genome projects—the collection of seemingly scarce global resources (human/nonhuman) for classifying, saving, and valorizing—reveal how emerging markets for gene information represent new arenas for capital accumulation as well as the reconstitution of meanings and structures of human and nonhuman natures (Hayden 1998; Flitner 1998; Heath 1997; Haraway 1997a, b; Rose 1998; Wilkie 1996). As Haraway (1997a) notes, some view the production and patenting of transgenic organisms as the last straw for upsetting the "natural *telos*, or self-defining purpose" of all life forms; whereas others (such as Haraway herself) see much more ambiguity, contention, and potential political transformation in these and other sociotechnological developments.

Feminist scholars of the body politic and biologic also inquire into the distributional implications of these interventions, asking questions such as: Which social groups have access to these new reproductive technologies, and which are providing the raw material for the cell, tissue, and body-parts trade? Could these scientific-corporate incursions into the bodies of indigenous peoples (the ambition of the alternative Human Genome Diversity Project) and ecosystems (the ambition of bioprospecting projects) find some salve to modern diseases while also deepening local and global structures of inequality? Are these new missions, endowed with rarefied technical expertise and new strategies for capitalizing nature, creating new forms of race- and class-based exploitation (Haraway 1997b, Flitner 1998, Hayden 1998)?

SCIENCE, KNOWLEDGE, AND POWER

As several scholars have astutely observed, environmentalism today (as scholarship, politics, and activism) depends heavily upon environmental science for its reasoning and observations (Yearley 1994, Beck 1992, Buttel & Taylor 1994). From

global warming to bacterial water contamination, most modern environmental issues have become "knowable" only through particular scientific practices and with technologies with limited accessibility (e.g. super-capacity computers, satellites, or laboratory infrastructure). Even for those issues that first become public through detection by those who are not professional scientists (e.g. people living downwind from toxic incinerators), science has become a contested site for problem definition, problem framing, and risk adjudication, with tremendous legal, financial, and political ramifications (Irwin 1995, Agarwal & Narain 1991).

Recognizing that environmental science has been an undertheorized domain, a handful of sociologists have begun to critically examine the practice of environmental science and the production of scientific knowledge on nature and the environment. Among the first to try to fill this lacuna were Buttel and colleagues (Buttel et al 1990, Taylor & Buttel 1992, Buttel & Taylor 1994). In "How Do We Know We Have Global Environmental Problems?," Taylor & Buttel (1992) used The Limits to Growth study and the global climate change issue to show that "politics are woven into environmental science at its 'upstream' end" (Taylor & Buttel 1992, p. 406). They argued that global constructs of environmental issues involve a universalizing discourse that steers us away from the difficult politics of enduring structural inequalities and differentiated interests and toward technomanagerialist remedies, preferred (and constituted) by elite, Northern-based scientists and bureaucrats.

Although acknowledging the insights of Buttel and Taylor's "interest-based" analysis of science, Brian Wynne (1994) argues that it does not fully capture "the deeper sense in which scientific knowledge tacitly reflects and reproduces normative models of social relations, cultural and moral identities, as if these were natural" (Wynne 1994, p. 176). Wynne contends there is a need to interrogate science for its virtually invisible cultural constructions of the human subject (e.g. as a rational, utility-maximizing actor) and its connections to the cultural milieu of late modern society. The point of such an interrogation is not to debunk scientific knowledge, but rather to expose its unspoken social and moral commitments (Wynne 1994, p. 188). Such cultural analyses of science underscore the point that there is no one-to-one correspondence between nature and its representations, and that all human understandings of nature are crucially mediated by social and cultural practices, assumptions, and belief systems.

The "social studies of science" literature, of which Wynne is a part, has stimulated innovative conceptualizations of nature-society relations and agency. The most exciting of this work theorizes nature and society not as separate—or separable—entities, but in terms of their "conjoined materiality" (Demeritt 1998) or "conjoint constitution" (Freudenburg et al 1995). In these renderings of nature-society relations, nature and society are effectively coproduced through the reciprocal and symmetric interplay of the social and the physical (Pickering 1996).

Bruno Latour (1993), operating within the framework of actor-network theory, suggests that there is no such thing as pure nature or pure society, only

nature-culture hybrids (for useful reviews of actor-network theory, see Hess 1997 and the forthcoming book by CT Cussins). Following Michel Serres, Latour suggests that nature-culture hybrids are "quasi-objects, quasi-subjects" which stand in between the two Modern poles of Nature and Society. In this "Middle Kingdom," humans and nonhumans produce "artifactual nature" through their collective associations, known as networks. Donna Haraway (1991) also develops the idea of nature as artifact, introducing the notion of the "cyborg" to suggest that we are all composed of the natural-technological-social. She uses the metaphor of kinship to acknowledge that humans and nonhumans are active partners in the enterprise of making nature, society, and what counts as reality. These and other authors working in this vein (Pickering 1995, 1996; FitzSimmons & Goodman 1998) advocate an understanding of agency that encompasses human as well as nonhuman actors, emphasizing the collective, rather than individual, character of natural-social agency (Latour 1993, Callon & Law 1995).

'Green' Knowledge/Power

Whereas some look at the production of scientific knowledge from the perspective of political interests (e.g. Taylor & Buttel 1992), others take a different approach by considering how particular cultural-social values become naturalized and diffused beyond the intentions of any particular interests (Mackenzie 1995; Escobar 1995; Luke 1997; Goldman 1998, 2000; Darier 1999). These scholars deploy a Foucauldian analysis of power/knowledge (Foucault 1980, Burchell et al 1991) for which exercises of power and the accumulation of (environmental) knowledge are co-constitutive, producing power relations and scientific discourses that are intentional yet nonsubjective. These power/knowledge relations are imbued with calculation, rationality, and a productive influence on global norms of ecological and social governance (i.e. what constitutes the eco-rational citizen or state). Hence, we find globalizing discourses of environmentalism, reproduced by nonstate international institutions—e.g. NGO, intergovernmental, and scientific networks—that energetically push to establish universalizing norms, behaviors, and procedures to regulate the security of the environment. These power/knowledge incursions elide heterogeneity and conflict and instead represent the world as rational, consensual, and easily molded for sustainability.

For example, tools such as environmental impact assessments and green cost-benefit analyses are now commonly used by public and private agencies around the world, and they are, in fact, often requirements for governments seeking international debt relief and financial support from institutions such as the World Bank and the International Monetary Fund. Yet despite their practice in vastly different settings (e.g. Laos, Lesotho, or Lithuania), environmental impact assessments and cost-benefit analyses rarely reflect localized cultural forms and norms, but, rather, newly contrived universal norms and models of sustainability,

resource valuation, and degradation. The kinds of questions this knowledge/power literature asks include the following: What specific micro-technologies of power do these new methodologies and sciences engender? What perspectives, issues, and questions get disguised, buried, or eliminated (i.e. subjugated knowledges) in the production and circulation of these universal scientific tools and models (i.e. elite knowledge)?

Scholars working from this perspective have begun to theorize nature-society relations in Foucauldian terms of biopolitics and biopower (Dean 1994, Burchell et al 1991). For example, Arturo Escobar's (1995) analysis of development discourse deconstructs the concept of sustainable development as deployed in the South by Northern-based institutions. Playing with Carolyn Merchant's trenchant analysis of the Enlightenment, Escobar argues that these institutions have brought about the semiotic "death of nature" and replaced it with the "rise of the environment," a discursive strategy rooted in the destructive processes of post-World War II development and the proliferation of new governing strategies of nature. Everything in nature that is useful for increased industrial production falls under the rubric of the environment; all else disappears. Moreover, localized forms of knowledge become useful only in as much as they serve the new disciplinary mechanisms of local "participation" and global integration. The new scientific discourses of economism and ecologism coalesce under new regimes of power that, Escobar concludes, do more to undermine ecological-social balances around the world than to sustain them.

Studying the changing agrarian landscape in rural India, Akhil Gupta (1998) argues that new technological innovations in biotechnology, intellectual property rights, and bioengineered seeds and food products are factors in the respatialization of sovereignty, that is, who controls what farmers can grow on what land, and the reconfiguration of socio-ecological relations. Gupta contends that new global environmental regulations emanating from the 1992 Rio Earth Summit and other global accords have given birth to new technologies of government unhitched from the nation-state and found in the realm of transnationality (cf Ong 1999). In his work on the World Bank, Michael Goldman (2000) uses the term eco-governmentality to denote the rapid diffusion of power/knowledge technologies that simultaneously operate on the levels of the individual, society, and the state. These practices are at the center of new political battles over what counts as nature and environmental problems, and what constitutes an eco-rational citizen.

According to these scholars, this type of green knowledge production has become prolific, controversial, and hegemonic. Its "ways of seeing" have poured through the arteries of popular, political, and economic networks that have as their mission the accumulation of knowledge for the control of nature's value. It is a process that frames current discourses of sustainability, and disguises the engines of capitalist expansion as liberalizing and rational. In short, the production of green knowledge should be understood as internal to, and constitutive of, new and existing exercises of power.

CONCLUSION

In this essay, we have tried to show that recent theorizing on social-natural relations has been highly dynamic. From a multitude of perspectives, social theorists are grappling with the entrenched idea that nature and society are phenomenologically and scientifically distinct. In the process, new research agendas and methodological approaches are being crafted. Because ecological (and social) problems traverse conceptual, geographic, and species boundaries, human membranes as well as cultures, these scholars suggest that social analysis must follow them wherever they lead.

From this literature, we have also learned to recognize nature-culture hybrids—people, organisms, and things that are more complex than the distinctions between human and nonhuman suggest. This idea is useful for understanding the production and effects of new biotechnologies and commodities, which can lead to new political identities, tools, and strategies. However, it is not useful—and this is our biggest caveat—if the lens on this latest trend in commodity production sidetracks social theorists into digging up the spectacular at the cost of losing sight of the fundamental. Sociology remains at its best when it tries to understand how new and enduring structures, institutions, and practices exploit and dominate people and nature, as well as reveal new strategies for emancipatory politics. We believe that once scholars begin to rethink the framework of the society-nature divide, other cherished but flawed ideas will also reveal their weaknesses. We hope that from this process, a new sociological imagination will spring.

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