Globalization and the Capitalization of Nature: A Political Ecology of Biodiversity in Mesoamerica

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Globalization, as a technological and economic phenomenon, asserts specific models for the governance of common resources. In particular, the technological and economic impulses of globalization further the capitalization of nature. This process is evident in the regionalization of bioprospecting efforts in Mesoamerica.

Keywords: *globalization; capitalization; regionalization; biodiversity; bioprospecting; Mesoamerica; Costa Rica*

Globalization gives rise to particular resource governance regimes, the scale and scope of which are, to a great extent, determined by the logics of capital and technology. Biological diversity prospecting (bioprospecting) in Mesoamerica represents one of the newest frontiers in the advance of a global political ecology committed to nature's transformation "from a phenomenal order to a value vector that meets the needs and interests of technological civilization" (Byrne, Glover, & Martinez, 2002, p. 281). A "symbolic conquest of nature" (Escobar, 1996, p. 56), bioprospecting represents the use of scientific knowledge to bring nature into the semiotic realm of capital and, thereby, to prepare it for economic valuation. Unlike earlier uses of natural resources that, when processed by human beings, are converted into commodity forms, the scientific symbolization of nature enables a new valuation process—described by Martin O'Connor (1994b) as *capitalization.* It is argued here that this symbolization and capitalization of nature reflect the emergence of a new governance regime for common resources in which nature's enduring character itself is valorized. The evolving bioprospecting regime is offered as a concrete expression of this new process.

Bioprospecting in general, and specifically in Mesoamerica, offers a glimpse of the depth of penetration of techno-capitalist interests into the governance of common resources. The strategy of capitalization embodied in two emerging regional policies, Plan Puebla-Panama (PPP) and the Mesoamerican Biological Corridor (MBC), suggests the existence of an emerging regime of nature-society relations that is intended to transform the biology of the region into a "value vector" (Byrne et al., 2002, p. 281). This regional policy regime is at least partly attributable to technical and capitalist impulses of globalization. Technical advances make possible this increase in the scope of capitalization to the level of genetic and biochemical resources, whereas the logic of capital accounts for the increasing spatial scale of this emerging political ecology.

Globalization and the Capitalization of Nature

As M. O'Connor (1994a) wrote, "Contemporary environmental problems represent not only a major economic crisis of supply, but also a new crisis of legitimacy for the market system" (p. 3). Anthropogenic climate change, desertification, and biodiversity loss signal social interference not only in the viability of particular ecosystems but in ecological processes themselves. This eco-destructive possibility raises serious concerns about contradictory contemporary relations between society and nature. Capital's response to this second contradiction (J. O'Connor, 1986, 1989)[1] issues in a phase of capitalist political economy

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fundamentally different from the commodity-based phase that was an answer to the first contradiction (Byrne et al., 2002).

This ecological phase is a response to the underproduction of capital through the depletion of the conditions of production (J. O'Connor, 1986; M. O'Connor, 1994b). In this phase, nature is valued as capital—"as a source of reproduction of ecological services, and as a source of knowledge" (Byrne et al., 2002, p. 281). M. O'Connor (1994b) depicted this capitalization of nature as follows:

> [It] is a response within capitalism to (1) the ostensible supply problem of depletion of natural resources and degradation of environmental services required for support of commodity production, and (2) the resistance of communities and whole societies to the ecological and cultural depredations wreaked by expanding capital. . . . [Capitalization is] the representation of the biophysical milieu (nature) and of nonindustrialized economies and the human domestic sphere (human nature) as reservoirs of capital, and the codification of these stocks as property tradeable in the marketplace—saleable at a price that signifies the value (utility) of the goods and services flows as inputs to commodity production and in consumption. (p. 126)

M. O'Connor regarded this process as the "the semiotic expansion of capital" (1994b, p. 126), whereas Escobar (1996) described capitalization as "the symbolic conquest of nature" (pp. 56-57). In other words, capital responds to the depletion of resources and the degradation of the conditions of production by bringing them into the semiotic realm of accumulation. "The main effect of the pricing-capitalization process," wrote M. O'Connor, "is to signify that all the items are being signified as means to the end of capital accumulation" (1994b, p. 146). This process of capitalization is one of the chief characteristics of contemporary capitalist political economy.

Another dominant feature of the current political economy is globalization. Byrne and Glover (2002) defined globalization as "the erosion of the barriers of time and space that constrain human activity across the earth *and* the increasing social awareness of these changes . . . [involving] an increasing diffusion and penetration of global connections into social life" (p. 7). Globalization is, thus, a multifaceted phenomenon. Stern, Dietz, Dolsak, Ostrom, and Stonich (2002, p. 475) listed six aspects of globalization, which include the following:

- Enhanced integration and interdependence of ideas, cultures, people, and places that had previously been isolated from or independent of each other;
- Enhanced integration of people and communities into national and global markets;
- Integration of what had been local commons managed by informal, traditional systems into international and global economic and governance systems;
- Tensions between motives for economic integration and motives for political decentralization and devolution, especially in developing countries;
- Efforts by international institutions to impose standards and obligations on national governments; and
- A blurring of distinctions between local and global (e.g., the claim that tropical moist forests are a global management issue).

Globalization and its various characteristics are not, however, a priori trends. Rather, they emerge from a particular political-economic reality. "Driven by capitalism," wrote Byrne and Glover, globalization "carries forward the alliance of modern science, technology, and markets in shaping society" (2002, p. 7).

As a political-ecological force, globalization shapes not only society but also ecology. In its technological and economic impulses, globalization asserts a particular model of society and nature and of their relationship. The process advances a specific normative element, inherent in which are various ideas of what nature and society should be, thereby propagating "certain views of nature and society in terms of production and efficiency, not of respect and the common good" (Escobar, 1996, p. 53).

Technical advances constitute one foundation for the propagation of this norm of production and efficiency. Technical developments drive the increase in the scope of the capitalization of nature by increasing the possibilities for accidental and purposed social intervention into ecological processes. These possibilities guide policies that construct nature-society relations commensurable with the governing logic of global capital and the deepening of capitalized forms of nature-society relations. As M. O'Connor (1994a) wrote, "Technological advances sharpen our capabili-

ties for calculated intervention in human and nonhuman systems" (p. 6).

Although technical developments increase the scope of capitalization, the geographic interest or "spatial fix" (Harvey, 2000, pp. 26-31; see also Harvey, 2001) of capitalism assures an increase in the scale of its political-ecological effects. Among other phenomena, the regionalism reflected in many emerging policy schemes (e.g., the North American Free Trade Agreement, the European Union) is a feature of this geographic interest. As Mittelman (1997b) wrote, "Paradoxically, regionalism both shields domestic society from and integrates it into the global division of labor. . . . All regional experiences are fluid and tethered to the global division of labor" (p. 11). The emergence of these regional entities signals a shift in identity formation from political, national, ethnic, or linguistic foundations to other bases. For example, Rosenau (1997) wrote that "the boundaries of states with respect to economic matters have begun to yield to those of economic markets" (p. 105).

In this way, regionalization shares in various characteristics of the process of globalization. Its universalizing tendencies support a process of delocalization (Martinez, 1990). As Manuel Castells (1996) wrote, a "space of flows" replaces "the historically rooted spatial organization of our common experience: *the space of places*" (p. 378). Castells argued that regionalization is indeed an impulse of this reorganization:

> Regions, under the impulse of their governments and business elites, have restructured themselves to compete in the global economy, and they have established networks of cooperation between regional institutions and between region-based companies. Thus, regions and localities do not disappear, but become integrated in international networks that link up their most dynamic sectors. (1996, p. 380)

Regions, then, are perceived as a necessary element of competitiveness in and integration into the fabric of the global economy. "In the new global context," wrote Gordon (1994), "localized agglomeration . . . becomes the principal basis for participation in a global network of regional economies" (p. 46) in which the logics of capital and technology guide the economic, political, cultural, and institutional flows of human activity to rationalize social and ecological relations. In this sense, the rationality demonstrated by globalization is techno-economic: It is what makes sense from the standpoint of technical and economic systems. Regional regimes are an outgrowth of this process in which local institutions, policies, and practices are harmonized with the global rationale.

The Capitalization of Biodiversity

This harmonization of the political-economic milieu, however, is not without its contradictions, and the loss of biological diversity (biodiversity) is an especially disturbing example of the type of environmental crisis to which capital must respond in its ecological phase. Heywood et al. (1995) defined biodiversity as

> . . . the number of species in given areas, the ecological roles that these species play, the way that the composition of species changes as we move across a region, and the groupings of species (ecosystems) that occur in particular areas (such as grassland or forest), together with the processes and interactions that take place within and between these systems. It also covers the diversity of ecosystems within landscapes, of landscapes in biomes, and of biomes on the planet. (p. 5)

It can also refer to genetic diversity, which accounts for "variations within and variations between populations of species" (Heywood et al., 1995, p. 6). As the United Nations Environment Programme's *Global Biodiversity Assessment* suggests, "Biodiversity represents the very foundation of human existence" (Heywood, 1995, p. vii). Ecological and genetic diversity, are, together, the underpinning of life itself. As Bouma-Prediger (2001) noted, biodiversity "constitutes one *sine qua non* of human life" (p. 46).

Nevertheless, estimates suggest that no fewer than three species are lost every day—a trend that Myers (1999) has described as a "biotic holocaust" (p. 31) and John Tuxill (1998) has identified as "a global evolutionary convulsion with few parallels in the entire history of life" (p. 9). Regarding the urgency of the biodiversity crisis, Mittermeier, Myers, Gil, and Mittermeier (1999) wrote, "What distinguishes it perhaps more than anything else is the fact that its loss is an *irreversible process*" (p. 21).

Biodiversity loss, then, is a particularly pressing issue, and the prospect of a human-induced "spasm of extinctions" at a pace that exceeds by 100-1,000 times the natural background rate represents the emerging "social structure of nature" (Byrne, Martinez, &

Hoffman, 1991, p. 67; Myers, 1987, p. 14; Totten, 2002; Tuxill, 1998). By virtue of its significance in sustaining human life and ecological integrity, biodiversity is also an important aspect of the conditions of production in capitalist political economy. As such, its irreversible loss represents a crisis of legitimacy and a threat to the reproduction of capital and capitalist social relations.

Although the political-economic response to the loss of biological diversity is varied, one of its elements is bioprospecting, which is "the exploration of biological diversity for commercially valuable genetic and biochemical resources" (Reid et al., 1993, p. 1). This commercialization is commensurate with the capitalization of nature in which "even the genes of living species are seen in terms of production and profitability" (Escobar, 1996, p. 47). As a response to the loss of biodiversity, bioprospecting leaves untouched the root causes of the crisis, namely, the social and ecological relations at the foundation of capitalist political economy.

Capitalization and Globalization in Mesoamerica

Since 1992, Costa Rica has cultivated a bioprospecting program through the country's National Institute for Biodiversity (INBio), which is quickly being embraced as an international model. Created by a "government planning commission and a large number of concerned scientists," INBio's mission is "to facilitate the organized and non-damaging use of the biodiversity in [Costa Rica's] conservation areas" (Sittenfeld & Gamez, 1993, p. 71). An integral part of this mission is INBio's work to establish Costa Rica as a market leader in intellectual property for the production of commercially valuable biodiversity derivatives. The leading edge of this national program involves contracting with multinational corporations (mostly pharmaceutical companies) for the rights to exploit discoveries made in the search for genetic and biochemical resources. INBio began its work with one contract of this sort with the U.S.-based pharmaceutical company Merck (Blum, 1993; R. Gamez et al., 1993; Zebich-Knos, 1997). It now has contracts with more than 30 corporations spread over five continents (L. Gamez & E. Vargas, personal communication, January 21, 2003).

Technical advance has, of course, played a major role in INBio's successes. The ability to identify, extract, and use genetic and biochemical resources has improved dramatically over the last 11 years. As this capacity has extended, bioprospecting has become a formative influence upon Costa Rican environmental policy and shaped it in such a way that it is commensurable with the drive for capital accumulation in the global political economy. INBio's efforts in this regard are those of making biodiversity conservation profitable (Blum, 1993). As Sachs (1999) suggested, it now appears possible that "technical and organizational intelligence could concentrate on increasing the productivity of nature" (p. 35). Indeed, this increased scope for the aims of capital accumulation is demonstrated in INBio's case, as technical advances have paved the way for its successes in bioprospecting and provided for the establishment of a model program for the capitalization of nature. One of three chief tasks of INBio is the integration of "non-destructive use of biodiversity into the intellectual and economic fabric of national and international society" (R. Gamez et al., 1993, p. 56). This process serves to legitimize a capitalist political economy at both the national and international levels while assuring the continued accumulation of capital and the reproduction of its social relations.

Although technical developments in bioprospecting increase the scope of capitalization, thus allowing for capital's more intensive entrée into the genetic and biochemical resources of the region, recent spatial developments provide for the more extensive development of genetic resources in Mesoamerica. *Mesoamerica* is a term historically more at ease in the discourses of archaeology and physical anthropology. However, the exigencies of international markets, the global division of labor, and the emergence of regional integration in the Americas have more recently brought the term into vogue in the political arena through the articulation of regional policy regimes spanning a geography that extends from Southern Mexico to Panama.

Regional integration in the Americas is demonstrated in the materialization of regional trade and development agreements beginning with the North American Free Trade Agreement, which entered into effect in 1994 and includes Canada, the United States, and Mexico, and continuing with several emerging agreements including the PPP, the MBC, the Central American Free Trade Agreement, the Electrical Interconnection System for Central America, and the Free Trade Area of the Americas. Together, these regional initiatives advance a particular model of sustainable development in which the INBio model is no longer

limited to the national level. In particular, Costa Rican politics of ecology are being regionalized through the emergence of the PPP and the MBC. The PPP is primarily a development initiative that extends from Puebla, Mexico, to Panama, whereas the MBC links more than 380 protected areas in a conservation arrangement that includes the four southern states of Mexico (Campeche, Chiapas, Quintana Roo, and Quintana Roo) and all seven countries of the Central American isthmus (Belize, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama) (Chapela, 2000; La Coordinacion General del Plan Puebla Panama, 2001; Minc et al, 2001; Mittermeier et al, 1999; The World Bank Group, 2001; United Nations Development Program, 2000; United Nations Development Program, The World Bank, & the Department of Protected Areas & Wildlife, 2001; Vargas & Vargas, 2000).

In one sense, the two initiatives are quite dissimilar. One advances a model of regional free trade and development (PPP), whereas the other represents perhaps the most ambitious conservation initiative in the world (MBC). Yet both are bound by a commitment to global sustainable development. The PPP is a free-trade and development proposal with a sustainable development component, which includes an initiative to exploit the region's genetic and biochemical resources through bioprospecting (La Coordinacion General del Plan Puebla Panama, 2001). The MBC is a conservation plan with a significant social element, consisting of economic development through the sustainable use of natural resources, including bioprospecting (United Nations Development Program, 2000; Vargas & Vargas, 2000). Both initiatives are the result of concerted efforts on the part of state and non-state actors to construct a regional regime of nature-society relations more friendly to the accumulation of capital through the semiotic conquest of nature. These policies are shaped, in large part, by the capitalist impulses of globalization that expand the scale of capitalization through regionalization. Whereas each offers a much more extensive slate of policy initiatives, both programs include regional planning for bioprospecting modeled on INBio's successes.

Whereas the PPP signals the emergence of the economic zone as a political boundary in Mesoamerica, the MBC bounds the region by ecological zone. The Mesoamerican land bridge between the neo-tropical and the neo-arctic has served for centuries as a corridor for diverse species, thus creating a unique biodiversity hotspot (Cincotta, Wisnewski, & Engelman, 2000; R. Gamez et al., 1993; Mittermeier et al., 1999; Myers, Mittermeier, Mittermeier, da Fonseca, & Kent, 2000; The World Bank Group, 2001; Vargas & Vargas, 2000). Of Central America, R. Gamez et al. (1993) wrote, "Dramatic topographic and climatic variations have made this small area one of the world's biologically richest places" (p. 53). Combined, the PPP and the MBC serve to bond the ecological and economic characteristics of Mesoamerica to form a political entity more fit for participation in a global political ecology intent on the continued accumulation of capital in the face of underproduction. This bridge for the accumulation of genetic resources is fast becoming a bridge for the accumulation of capital as the economic impulse of globalization bends ecologies to its rationality.

The ecological and economic characteristics bonded in these regional initiatives are brought together by the conservation triad of *know-use-save*—a principle that is, in fact, paradigmatic for the capitalization process. Indeed, this principle is at the foundation of the sustainable use components of both the MBC and the PPP and forms the basis for the advance of bioprospecting as an element of sustainable development in Mesoamerica. In these initiatives, biological diversity is symbolized through scientific knowledge. Its use, as determined by this knowledge, is the deciding factor in establishing an exchange value and placing it on the global market. In an elegant harmonization of capitalization and globalization, whole ecologies and the very genes of living species are brought into the global market, thereby joining new economic and scientific frontiers.

This process is quite different from the commodification of biodiversity. Previously, particular industries, such as the timber industry or the trade in exotic and endangered species, transformed the resource of biodiversity and promoted exchange values for its products, thus linking the global market to the unsustainable use of biodiversity in the region. Under a regime of capitalized nature, sustainable uses are being promoted in which biodiversity must remain intact for the sake of present and future economic values that may lie hidden within.

Capitalization, Sustainability, and Ecological Justice

Does the capitalization of nature contribute to the sustainability of the ecology of Mesoamerica? It is quite possible that short-term successes will be seen.

However, once the genetic and biochemical resources of the region have been classified, synthesized, and commodified, there may remain no compelling reason for conservation in perpetuity. Furthermore, the possibility of *ex situ* collections of species and genes may make their *in situ* conservation redundant. The sustainability of capitalization also assumes a higher exchange value for sustainable uses such as bioprospecting. However, to the extent that a particular ecosystem does not offer ecological services, ecotourism opportunities, or genetic and biochemical resources that are highly valued by the global market, they are in danger of converting back to unsustainable uses such as timber or hydroelectricity.

Finally, the issue of ecological justice must be considered. The capitalization of biodiversity, and its integration into the global market, precludes other practices. Indigenous and campesino groups more closely dependent upon their immediate natural environment may be excluded from conservation areas that are targeted for bioprospecting or other sustainable uses. Ultimately, the capitalization of biodiversity in Mesoamerica is an exercise in the production of unequal nature (Byrne et al., 2002), in which access to biodiversity is given to those who wield much power in the global political economy and is taken from those with little by enclosing the biological and intellectual commons. As Gorg and Brand (2000) argued,

> While in the public domain the predominant opinion is that this issue is about measures that can stop or slow down the loss of biological diversity, the international agreements regulating this field must be regarded rather as establishing a regime to regulate the rights of access to, and more or less exclusive rights of disposition of, biological diversity. (p. 372)

Perhaps more pernicious is the fact that, as Escobar (1999) wrote, "From tropical rain forests to advanced biotechnology laboratories, the cultural and biological resources for collectively inventing natures and identities are very unevenly distributed" (p. 2). The capitalization of biodiversity contributes to this uneven distribution by subjecting genetic and biochemical resources, the very building blocks of life on earth, to the principle of efficient allocation by the global market. Finally, many regard the enclosure of the biological and intellectual commons inherent in bioprospecting efforts as biopiracy (Shiva, 1997a). Indigenous knowledge appropriated in the exploration of biological diversity demonstrates the "symbolic conquest . . . of local communities; also [requiring] the semiotic conquest of local knowledges" (Escobar, 1996, p. 57; see also Shiva, 1993, 1997b).

Conclusion

Globalization has been recognized by many as a political-economic phenomenon that advances commodified forms of political and social relations (Mittelman, 1997a). However, the effects of globalization are not confined to political and social integration alone. Globalization proceeds to shape nature-society relations congruent with these commodified and, indeed, capitalized forms. One result of this process in Mesoamerica is that biodiversity is being associated with particular discourses and political-economic institutions such as intellectual property rights and sustainable development (e.g., see Escobar, 1996, 1998).[2] The PPP and MBC effect these discursive links as a spatial reality, thus threatening to erode the fabric of nature-society relations throughout Mesoamerica. In these two initiatives, capitalization becomes the normal politics of ecology for the region.

Through the model of sustainable development espoused in these policies, capitalization is advancing through the technical and capitalist impulses of globalization to the level of a regional policy initiative. Policy initiatives such as the PPP and the MBC can be seen as texts describing a harmonized path for regional social and ecological relations with the global political economy. These texts at once offer advice to the remaining local reality as to how it might be mobilized and modified to fit with the global order and, at the same time, affect relations between the global and local that are based on a techno-capitalist rationale and commensurable with the capitalization of nature.

These policy regimes and the regionalization of this model, though, are certainly not without conflict. Stern et al. (2002) suggested,

> Some aspects of globalization are creating new phenomena that are likely to become increasingly important for common pool resource management. One is resistance to globalization at local, regional, national, and international/global levels. Local and national movements against the spread of genetically engineered

> crops, for protection of local rights to intellectual property (e.g., medicinal use of local plants), and against global trade liberalization have spawned new social movement organizations, many of them concerned with maintaining local control over local resources or protecting local rights to use and manage commons. (pp. 475-476)

In Mesoamerica, grassroots efforts have emerged among campesino and indigenous groups to challenge bioprospecting as the colonization of both the biological and intellectual commons. Resistance to this semiotic and material enclosure movement has seen some success by forcing the exclusion of bioprospecting as an element of the MBC in Mexico and articulating alternative governance strategies for commons resources at the local level.

This resistance may issue in a new locally based politics of ecology for Mesoamerica. As Enrique Leff (2001) noted, although globalization advances a monolithic and self-centered logic with little regard for spatial, social, and environmental diversity, locally oriented alternatives are advancing a politics founded upon cultural and ecological specificity. In so doing, elements of civil society advance an alternative vision for nature-society relations to offer hope that this process will remain contested. In this respect, movements with different purposes (e.g., anti-globalization, ecological justice, and sustainable livelihoods) may find the resistance to biopiracy a measure of common ground that promises reintegration of ecological community on scales that can effectively challenge the most recent manifestations of capitalization.

Notes

1. J. O'Connor (1986) noted,

> In traditional Marxist theory, the contradiction between production and realization of value and economic crisis takes the form of a "realization crisis," or overproduction of capital. In ecological Marxist theory, economic crisis assumes the form of a "liquidity crisis," or underproduction of capital. (p. 4)

The former crisis is often referred to as the first contradiction of capital, whereas the latter is often referred to as the second contradiction of capital.

2. Of these, Escobar (1998) wrote, "The intellectual property rights discourse dominates the biodiversity debates on benefit sharing and compensation. This is clearly a neoliberal imposition of the industrialized countries (particularly the US) rather than an option democratically agreed upon" (p. 58).

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