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CONSTRUCTION NATURE

Elements for a post-structuralist political ecology

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This paper argues for the development of a poststructuralist political ecology. While political ecology studies the relationships between society and nature in contexts of power—particularly from the perspective of political economy—this study, it is proposed, must include a consideration of the discourses and practices through which nature is historically produced and known. The paper examines the complex cultural and discursive articulations between natural and social systems established by capital and technoscience, particularly through discourses of sustainable development and biodiversity conservation. The paper concludes with the implications of the analysis for imagining alternative productive rationalities in conjunction with social movements. © 1996 Elsevier Science Ltd

This article argues for the development of a post-structuralist political ecology. This need reflects not only the growing belief that nature is socially constructed (entirely different from saying 'there is no real nature out there'); it takes a step further in insisting that the constructs of political economy and ecology—as specifically modern forms of knowledge—as well as their objects of study must be analysed discursively. It is necessary to reiterate the connection between the making and evolution of nature and the making and evolution of the discourses and practices through which nature is historically

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produced and known. The relationship between nature and capital has been articulated historically by different discursive regimes, including in recent times—as we see below—the discourses of sustainable development and biodiversity conservation. The argument developed here is thus a reflection on the discourses of nature from the vantage point of recent theory on the nature of discourse.

From a certain post-structuralist perspective (Foucaultian and Deleuzian, in particular), there cannot be a materialist analysis which is not at the same time a discursive analysis. The post-structuralist analysis of discourse is not only a linguistic theory; it is a social theory, a theory of the production of social reality which includes the analysis of representations as social facts, inseparable from what is commonly thought of as 'material reality'. Post-structuralism focuses on the role of language in the construction of social reality; it treats language not as the reflection of 'reality' but as constitutive of it. That was the whole point, for instance, of Said's *Orientalism*. For some, there is no materiality unmediated by discourse, as there is no discourse which is unrelated to materialities.[1] Discourse, as used in this paper, is the articulation of knowledge and power, of statements and visibilities, of the visible and the expressible. Discourse is the process through which social reality inevitably comes into being.

Anthropologists have recently incorporated these insights in their analyses of systems of production and systems of signification, systems of meanings of nature and systems of use of resources, as inextricably bound.[2] This is a fruitful trend that political ecologists are beginning to emulate. Space, poverty and nature—among others—begin to be seen through the lens of a discursive materialism 'where ideas, matter, discourse, and power are intertwined in ways that virtually defy dissection'.[3] The insistence that we look at the way local cultures process the conditions of global capital and modernity[4] is another important step in this direction.

In this article, I also take as a point of departure a recent claim in political economy; this is the suggestion that capital is undergoing a significant change in form, and is entering an 'ecological phase'. No longer is nature defined and treated as an external, exploitable domain; through a new process of capitalization, effected primarily by a shift in representation, previously 'uncapitalized' aspects of nature and society become internal to capital. 'Correspondingly, the primary dynamic of capitalism changes form, from accumulation and growth feeding on an external domain, to ostensible self-management and conservation of the system of capitalized nature closed back upon itself'.[5] This transformation is perhaps most visible in discussions of rainforest biodiversity: the key to the survival of the rainforest is seen as lying in the genes of the species, the usefulness of which could be released for profit through genetic engineering and biotechnology in the production of commercially valuable products, such as pharmaceuticals. Capital thus develops a conservationist tendency, significantly different from its usual reckless, destructive form.

This proposal is a significant qualification of recent views of the dialectic of nature and capital. As has been argued, capitalist restructuring today takes place at the expense of production conditions, such as nature, the body and space. Driven by competition and cost-shifting among individual capitals/capitalists, this restructuring signifies a deepening of the encroachment of capital on nature and labour, an aggravation of the ecological crisis, and an impairment of capital's own conditions of reproduction—what James O'Connor has called 'the second contradiction'.[6] For M O'Connor, the expansionist drive of capital on to external nature implied by the second contradiction is only a tendency. A

second entails a more pervasive discursive incorporation of nature as capital. This calls not for exploitative accumulation—with the concomitant impairment of production conditions—but, on the contrary, the sustainable management of the system of capitalized nature. In this view, although the two forms may coexist, the first is the prelude to the second, which appears when brute appropriation is contested by social movements. To the extent that the second entails deeper cultural domination—even the genes of live species are seen in terms of production and profitability—we are led to conclude that this second form will continue to achieve dominance in the strategies of both capital and social movements.

The present article is a contribution to the understanding of the articulations established by capital between natural and social systems. It argues that: both forms of capital—exploitative and conservationist, modern and post-modern, let us say—are necessary to capital given current conditions in the Third and First Worlds; that both—not only the second form—require complex cultural and discursive articulations; both take on different but increasingly overlapping characteristics in the Third and First Worlds, and must be studied simultaneously; both can be studied by appealing to a post-structuralist political ecology; social movements and communities are increasingly faced with the double task of building alternative productive rationalities and strategies, on the one hand, and of resisting culturally the inroads of new forms of capital and technology into the fabric of nature and culture.

This article develops a nuanced reading of the discourse of sustainable development, in order to show the mediation between nature and capital effected by this discourse, particularly in the Third World. The second part elaborates on the two forms of ecological capital; a brief example from the Pacific Coast region of Colombia is presented to show the respective rationalities and modes of operation of the two forms of capital. The article then analyses the discourses of technoscience and biotechnology through which a veritable reinvention of nature is being effected, most clearly in the most industrialized countries, but increasingly in the Third World as well. Then follows discussion of the implications of the analysis for social practice; it focuses on the possibility of building alternative productive rationalities by social movements faced with the two logics of ecological capital. The conclusion restates the case for the development of a post-structuralist political ecology as a means to ascertaining the types of knowledge that might be conducive to eco-socialist strategies.

'Sustainable development': death of nature, rise of environment

By starting with the contemporary discourse that most forcefully seeks to articulate our relation to nature, we can 'unpack' dominant assumptions about society and nature, and the political economy that makes such assumptions possible: the discourse of 'sustainable development', launched globally in 1987 with the report of the World Commission on Environment and Development convened by the United Nations under the chair(wo)manship of Norway's former prime minister, Gro Harlem Bruntland. That report, published under the title *Our Common Future*, begins as follows:

> In the middle of the 20th century, we saw our planet from space for the first time. Historians may eventually find that this vision had a greater impact on thought than did the Copernican revolution of the 16th century, which upset the human self-image by revealing that the earth is not the center of

the universe. From space, we saw a small and fragile ball dominated not by human activity and edifice, but by a pattern of clouds, oceans, greenery, and soils. Humanity's inability to fit its doings into that pattern is changing planetary systems, fundamentally. Many such changes are accompanied by life-threatening hazards. This new reality, from which there is no escape, must be recognized—and managed.[7]

The category 'global problems', to which *Our Common Future* belongs, is of recent invention. It derives its main impetus from the ecological fervour fostered by the Club of Rome reports of the 1970s, which provided a distinctive vision of the world as a global system where all parts are interrelated, thus demanding management of planetary proportions.[8] That nature and the earth can be 'managed' is a historically novel assertion. Like the earlier scientific management of labour, the management of nature entails its capitalization, its treatment as commodity. Moreover, the sustainable development discourse purports to reconcile two old enemies—economic growth and the preservation of the environment—without any significant adjustments in the market system. This reconciliation is the result of complex discursive operations involving capital, representations of nature, management and science. In the sustainable development discourse nature is reinvented as environment so that capital, not nature and culture, may be sustained.

Seeing the earth from space was not as great a revolution as has been claimed. This vision only re-enacted the scientific gaze as it was established in clinical medicine at the end of the 18th-century. The representation of the globe from space is but another chapter of the alliance which, two centuries ago, 'was forged between words and things, enabling one *to see* and *to say*'.[9] 20th-century space exploration belongs to the paradigm defined by the spatialization and verbalization of the pathological, effected by the scientific gaze of the 19th-century clinician. As with the gaze of the clinician at an earlier time, environmental sciences today challenge the earth to reveal its secrets to the positive gaze of scientists. This operation only ensures, however, that the degradation of the earth be redistributed, and dispersed, through the professional discourses of environmentalists, economists, geographers and politicians. The globe and its 'problems' have finally entered rational discourse. Disease is housed in nature in a new manner. In a similar vein, as the medicine of the pathological led to a medicine of the social space (the healthy biological space was also the social space dreamt of by the French revolution), so will the 'medicine of the earth' result in new constructions of the social that allows some version of nature's health to be preserved.

In the Bruntland Report, we find a reinforcing effect between epistemology and the technologies of vision. 'The instruments of visualization in multinationalist, postmodernist culture have compounded [the] meanings of disembodiment. The visualizing technologies are without apparent limit. ... Vision in this technological feast becomes unregulated gluttony; all seems not just mythical about the god trick of seeing everything from nowhere, but to have put the myth into ordinary practice'.[10] The Report has thus inaugurated a period of unprecedented gluttony in the history of vision and knowledge with the concomitant rise of a global ecocracy. This might sound too harsh a judgment; we should construct the argument step by step. To begin with, management is the sibling of gluttonous vision, particularly now when the world is theorized in terms of global systems. The narrative of management is linked to the visualization of the earth as a 'fragile ball'. Carrying the baton from Bruntland, *Scientific American*'s September 1989 special issue on 'Managing Planet Earth' reveals the essence of the managerial attitude. At stake for these

scientists (all either male academics or businessmen) is the continuation of the models of growth and development through appropriate management strategies. 'What kind of planet do we want? What kind of planet can we get?'—asks the opening article.[11] 'We' have the responsibility for managing the human use of planet earth. 'We' 'need to move peoples and nations towards sustainability' by effecting a change in values and institutions that parallel the agricultural or industrial revolutions of the past.

The question in this discourse is what new manipulations can we invent to make the most out of nature and 'resources'. But who is this 'we' who knows what is best for the world as a whole? Once again, we find the familiar figure of the (white male) Western scientist-turned-manager. A full-page picture of a young Nepalese woman 'planting a tree as part of a reforestation project' is exemplary of the mindset of this 'we'. Not portrayed are the women of the Chipko movement in India, with their militancy, their radically different forms of knowledge and practice of forestry, defending their trees politically and not through carefully managed 'reforestation' projects. Instead there is a picture of an a-historical young dark woman, whose control by masculinist and colonialist sciences, as Shiva[12] has shown, is assured in the very act of representation. This regime of representation assumes that it is up to the benevolent hand of the West to save the earth; it is the fathers of the World Bank, mediated by Gro Harlem Bruntland, the matriarch-scientist and the few cosmopolitan Third Worlders who made it to the World Commission, who will reconcile 'humankind' with 'nature'. It is still the Western scientist that speaks for the earth.

But can reality be 'managed'? The concepts of planning and management embody the belief that social change can be engineered and directed, produced at will. The idea that poor countries could more or less smoothly move along the path of progress through planning has always been held as an indubitable truth by development experts. Perhaps no other concept has been so insidious, no other idea gone so unchallenged, as modern planning. The narratives of planning and management, always presented as 'rational' and 'objective', are essential to developers.[13] A blindness to the role of planning in the normalization and control of the social world is also present in environmental managerialism. As they are incorporated into the world capitalist economy, even the most remote communities in the Third World are torn from their local context, redefined as 'resources' to be planned for and managed.

The rise of sustainable development is related to complex historical processes, including modifications in various practices (of assessing the viability and impact of development projects, obtaining knowledge at the local level, development assistance by NGOs); new social situations (the failure of top-down development projects, new social and ecological problems associated with that failure, new forms of protest, deficiencies that have become accentuated); and international economic and technological factors (new international divisions of labour with the concomitant globalization of ecological degradation, coupled with novel technologies that measure such degradation). What needs to be explained, however, is precisely why the response to this set of conditions has taken the form of 'sustainable development', and what important problems might be associated with it. Four aspects are involved in answering this question.

First, the emergence of the concept of 'sustainable development' is part of a broader process of the problematization of global survival, a process which induces a reworking of the relationship between nature and society. This problematization has appeared as a response to the destructive character of development, on the one hand, and the rise of

environmental movements in both the North and the South, on the other, resulting in a complex process of internationalization of the environment.[14] What is problematized is not the sustainability of local cultures and realities, but rather that of the global ecosystem, the 'global' being defined according to a perception of the world shared by those who rule it. Ecosystems professionals tend to see ecological problems as the result of complex processes that transcend cultural and local contexts. The slogan 'think globally, act locally' assumes not only that problems can be defined at a global level, but also that they are equally compelling for all communities. They believe that since all people are passengers of spaceship earth, all are responsible for environmental degradation. They do not always see, in short, that there are great differences and inequities in resource problems between countries, regions, communities and classes.

Second, the sustainable development discourse is regulated by a peculiar economy of visibilities. Over the years, ecosystems analysts have discovered the 'degrading' activities of the poor, but seldom recognized that such problems were rooted in development processes that displaced indigenous communities, disrupted peoples' habitats and occupations, and forced many rural societies to increase their pressure on the environment. Now the poor are admonished not for their lack of industriousness but for their 'irrationality' and lack of environmental consciousness. Popular and scholarly texts alike come to be populated with representations of dark and poor peasant masses destroying forests and mountain sides with axes and machetes, thus shifting visibility and blame away from the large industrial polluters in North and South and the predatory way of life fostered by capitalism and development to poor peasants and 'backward' practices such as slash-and-burn agriculture.

Third, the ecodevelopmentalist vision expressed in the mainstream versions of sustainable development reproduces the central aspects of economism and developmentalism. The sustainable development discourse redistributes in new fields many of the concerns of classical development: basic needs, population, resources, technology, institutional cooperation, food security and industrialism are found reconfigured and reshuffled in the sustainable development discourse. The discourse upholds ecological concerns, although with a slightly altered logic. By adopting the concept of 'sustainable development', two old enemies, growth and the environment, are reconciled,[15] unfolding a new field of social intervention and control. Given the present visibility of ecological degradation, today this process necessitates an epistemological and political reconciliation of ecology and economy.

This reconciliation of economy and ecology is intended to create the impression that only minor corrections to the market system are needed to launch an era of environmentally sound development, hiding the fact that the economic framework itself cannot hope to accommodate environmental concerns without substantial reform.[16] The sustainable development strategy, after all, focuses not so much on the negative consequences of economic growth on the environment, as on the effects of environmental degradation on growth and potential for growth. It is growth (ie capitalist market expansion), and not the environment, that has to be sustained. Since poverty is believed to be a cause, as well as an effect, of environmental problems, growth is needed with the purpose of eliminating poverty and with the purpose, in turn, of protecting the environment. Unlike the discourse of the 1970s which focused on 'the limits to growth', the discourse of the 1980s became fixated on 'growth of the limits'.[17]

Fourth, the reconciliation of growth and environment is facilitated exactly by the new

concept of the 'environment', the importance of which, in ecological discourse, has grown steadily in the post-World-War II period. The development of ecological consciousness that accompanied the rapid growth of industrial civilization also effected the transformation of 'nature' into 'environment'.[18] No longer does nature denote an entity with its own agency, a source of life and discourse, as was the case in many traditional societies, with European Romantic literature and art of the 19th century. For those committed to the world as resource, the 'environment' becomes an indispensable construct. As the term is used today, environment includes a view of nature according to the urban-industrial system. Everything that is relevant to the functioning of this system becomes part of the environment. The active principle of this conceptualization is the human agent and his/her creations, while nature is confined to an ever more passive role. What circulates are raw materials, industrial products, toxic wastes, 'resources'; nature is reduced to stasis, a mere appendage to the environment. Along with the physical deterioration of nature, we are witnessing its symbolic death. That which moves, creates, inspires—that is, the organizing principle of life—now resides in the environment.

The danger of accepting uncritically the sustainable development discourse is highlighted by a group of environmental activists from Canada:

> A genuine belief that the Bruntland Report is a big step forward for the environmental/green movement ... amounts to a selective reading, where the data on environmental degradation and poverty are emphasized, and the growth economics and 'resource' orientation of the Report are ignored or downplayed. This point of view says that given the Bruntland's Report endorsement of sustainable development, activists can now point out some particular environmental atrocity and say, 'This is not sustainable development'. However, environmentalists are thereby accepting a 'development' framework for discussion.[19]

Becoming a new client of the development apparatus by adopting the sustainable development discourse means accepting the scarcity of natural resources as a given fact; this leads environmental managers into emphasizing the need to find the most efficient forms of using resources without threatening the survival of nature and people. As the Bruntland report put it, the goal should be to 'produce more with less'.[20] The World Commission is not alone in this endeavour. Year after year, this dictum is reawakened by The Worldwatch Institute in its *State of the World* reports, one of the chief sources for ecodevelopers. Ecology, as Wolfgang Sachs[21] perceptively says, is reduced in these reports to a higher form of efficiency.

Although ecologists and ecodevelopmentalists recognize environmental limits to production, a large proportion does not seem to perceive the cultural character of the commercialization of nature and life integral to the Western economy, nor do they seriously account for the cultural limits which many societies have posed to unchecked production. It is not surprising that their policies are restricted to promoting the 'rational' management of resources. As long as environmentalists accept this presupposition, they also accept the imperatives for capital accumulation, material growth, and the disciplining of labour and nature, since in doing so they are extrapolating the occidental economic culture to the entire universe. Even the call for a people-centred economy runs the risk of perpetuating the basic assumptions of scarcity and productivism which underlie the dominant economic vision. In sum, by rationalizing the defence of nature in economic terms, advocates of sustainable development contribute to extending the economization of life and history.

This effect is most visible in the World Bank approach to sustainable development, an

approach based on the belief that, as the President of the World Bank put it shortly after the publication of the Bruntland Report, 'sound ecology is good economics'.[22] The establishment in 1987 of a top level Environment Department, and the 'Global Environmental Facility' (read: the earth as a giant market/utility company under Group of Seven and World Bank control) created in 1992, reinforce the managerial attitude towards nature: 'Environmental planning'—said Conable[23] in the same address—'can make the most of nature's resources so that human resourcefulness can make the most of the future'.

Again this is about the further capitalization of nature, the propagation of certain views of nature and society in terms of production and efficiency, not of respect and the common good. This is why Visvanathan calls the world of Bruntland and the World Bank 'a disenchanted cosmos'. The Bruntland Report, and much of the sustainable development discourse, is a tale that a disenchanted (modern) world tells itself about its sad condition. As a renewal of the contract between the modern nation-state and modern science, sustainable development seeks not so much to caricature the past, as with early development theory, as to control a future whose vision is highly impoverished. Visvanathan is also concerned with the ascendancy of the sustainable development discourse among ecologists and activists. It is fitting to end this section with his call for resistance to cooptation:

> Bruntland seeks a cooptation of the very groups that are creating a new dance of politics, where democracy is not merely order and discipline, where earth is a magic cosmos, where life is still a mystery to be celebrated ... The experts of the global state would love to coopt them, turning them into a secondary, second-rate bunch of consultants, a lower order of nurses and paramedics still assisting the expert as surgeon and physician. It is this that we seek to resist by creating an explosion of imaginations that this club of experts seeks to destroy with its cries of lack and excess. The world of official science and the nation-state is not only destroying soils and silting up lakes, it is freezing the imagination ... We have to see the Bruntland report as a form of published illiteracy and say a prayer for the energy depleted and the forests lost in publishing the report. And finally, a little prayer, an apology to the tree that supplied the paper for this document. Thank you, tree.[24]

Capitalization of nature: modern and postmodern forms

The sustainable development strategy is the main way of bringing nature into discourse in what still is known as the Third World. The continuous reinvention of nature requires not only bringing nature into new domains of discourse but also bringing it into capital in novel ways. This process takes two general forms, both entailing discursive constructions of different kinds. Let us call these forms the modern and post-modern forms of capital in its ecological phase.

The modern form of capital

The first form that capital takes in its ecological phase tends to operate according to the logic of the modern capitalist culture and rationality; it is theorized in terms of what J. O'Connor[25] calls 'the second contradiction' of capitalism. Let it be recalled that the starting point of Marxist crisis theory is the contradiction between capitalist productive forces and production relations, or between the production and realization of value and surplus value. This first contradiction is well known to political economists. Important to emphasize from the perspective of traditional Marxist theory is that capitalism restructures itself through realization crises.

But there is a second contradiction of capitalism that has become pressing with the aggravation of the ecological crisis and the social forms of protest this crisis generates. This theorization shows that we need to refocus our attention on the role played by the *conditions of production* in capital accumulation and capitalist restructuring, insufficiently theorized by Marx but placed at the centre of inquiry by Polanyi's[26] critique of the self-regulating market. Why? Because it has become clear that capitalist restructuring increasingly takes place at the expense of these conditions. A 'condition of production' is defined as everything that is treated as if it were a commodity, even if it is not produced as a commodity, that is according to the laws of value and the market: labour power, land, nature, urban space, fit this definition. Recall that Polanyi called 'land' (that is, nature) and 'labour' (that is, human life), 'fictitious commodities'. The history of modernity and the history of capitalism must be seen as the progressive capitalization of production conditions. Trees produced capitalistically on plantations, privatized land and water rights, genetically altered species sold in the market, and the entire training and professionalization of labour—from its crudest form in slavery to today's PhDs—are all examples of the 'capitalization' of nature and human life.

This process is mediated by the state; indeed, the state must be seen as an interface between capital and nature, including human beings and space. As far as human beings are concerned, the disciplining and normalization of labour, the management of poverty and the rise of the social[27] marked the beginning of the capitalization of life within the modern era, while urban planning normalized and accelerated the capitalization of space.[28] This type of capitalization has been central to capitalism ever since the beginning of the primitive accumulation process and the enclosure of the commons. The instrumental tendency of science has also been crucial in this regard, as discussed by philosophers, feminists and ecologists.[29]

In fact, one of the defining features of modernity is the increasing appropriation of 'traditional' or pre-modern cultural contents by scientific knowledges, and the subsequent subjection of vast areas of life to regulation by administrative apparatuses based on expert knowledge.[30] The history of capital is thus not only the history of exploitation of production conditions; it is also the history of the advance of the scientific discourses of modernity in areas such as health, planning, the family, education, the economy and the like, through what Habermas[31] refers to as the colonization of the lifeworld and Foucault[32] as the advance of bio-power. The accumulation of capital, in other words, required the accumulation of normalized individuals and the accumulation of knowledge about the processes of capital and populations. This is the primary lesson of what might be called the anthropology of modernity of Western societies since the end of the 18th century. With this observation we wish to emphasize that the modern form of capital is inevitably mediated by the expert discourses of modernity.

Capital's threatening of its own conditions of production elicits manifold and contradictory attempts to restructure those conditions in order to reduce costs or defend profits. Conversely, social struggles generated around the defence of production conditions must face two objectives: to defend life and production conditions against capital's excesses; and to seek control over the policies to restructure production conditions, usually via further privatization. In other words, social movements have to face simultaneously the destruction of life, the body, nature and space, and the crisis-induced restructuring of these conditions.[33] These struggles often set the poor against the rich as both cultural and economic actors; there is an 'environmentalism of the

poor'[34] which is a type of class struggle and, at the same time, a cultural struggle to the extent that the poor try to defend their natural environments from material and cultural reconversion by the market. These struggles are often gender struggles in that many aspects of the destruction of production conditions affect women particularly and contribute to restructure class and gender relations.[35]

The postmodern form of ecological capital

In the Third World, the continued existence of conventional forms of capitalist exploitation of people and the environment is organized according to the rules of the dominant development discourse of the past 40 years, for which nature exists as raw material for economic growth activities.[36] While there are areas which are 'sold' to the sustainable development discourse, others remain under the firm grasp of crude and reckless developmentalism that has characterized most of the post-World-War-II period. As we see in our example from Colombia, both forms may coexist schizophrenically in the same geographical and cultural region.

M O'Connor is right, however, in pointing to a qualitative change in the form which capital tends to take today. If with modernity one can speak of a progressive semiotic conquest of social life by expert discourses and economistic conceptions, today this conquest is being extended to the very heart of nature and life. This new conquest takes for granted the normalization already achieved by the modern discourses of science and its administrative apparatuses; not only does it move on to new territories, it also develops new modes of operation, which O'Connor understands particularly in the Baudrillardian sense of the pre-eminence of the sign. Once modernity is consolidated, once 'the economy' becomes a seemingly ineluctable reality (a true descriptor of reality for most), capital and the struggles around it must broach the question of the domestication of all remaining social and symbolic relations in terms of the code of political economy, that of production. It is no longer capital and labor that are at stake *per se*, but the reproduction of the code. Social reality becomes, to borrow Baudrillard's phrase,[37] 'the mirror of production'.

This second form of capital relies not only on the symbolic conquest of nature (in terms of 'biodiversity reserves') and local communities (as 'stewards' of nature); it also requires the semiotic conquest of local knowledges, to the extent that 'saving nature' demands the valuation of local knowledges of sustaining nature. Local, 'indigenous' and 'traditional' knowledge systems are found to be useful complements to modern biology. However, in these discourses, knowledge is seen as something existing in the 'minds' of individual persons (shamans or elders) about external 'objects' ('plants', 'species'), the medical or economic 'utility' of which their bearers are supposed to transmit to us. Local knowledge is seen not as a complex cultural construction, involving movements and events profoundly historical and relational. Moreover, these forms of knowledge usually have entirely different modes of operation and relations to social and cultural fields.[38] By bringing them into the politics of science, more often than not they end up being recodified by modern science in utilitarian ways.

This triple cultural re-coversion of nature, people and knowledge represent a novel internalization of production conditions. Nature and local people themselves are seen as the source and creators of value—not merely as labour or raw material. The discourse of biodiversity in particular achieves this effect. Species of microorganisms, flora and fauna

are valuable not so much as 'resources', but as reservoirs of value—this value residing in their very genes—that scientific research, along with biotechnology, can release for capital and communities. This is one of the reasons why communities—particularly ethnic and peasant communities in the tropical rainforest areas of the world—are finally recognized as the owners of their territories (or what is left of them), but only to the extent that they accept viewing and treating territory and themselves as reservoirs of capital. Communities in various parts of the world are then enticed by biodiversity projects to become 'stewards of the social and natural "capitals" whose sustainable management is, henceforth, both their responsibility and the business of the world economy'.[39] Once the semiotic conquest of nature is completed, the sustainable and rational use of the environment becomes an imperative. It is here that the fundamental logic of the discourses of sustainable development and biodiversity must be found.

'Biodiversity conservation' in Colombia

A brief example will illustrate the differences between forms of capital. The Pacific coast region of Colombia has one of the highest degrees of biological diversity in the world. Covering about 5.4 million hectares of tropical rainforest, it is populated by about 800 000 Afrocolombians and 40 000 indigenous people belonging to various ethnic groups, particular Emberas and Waunanas. Since the early 1980s the national and regional governments have increased their development activities in the region, culminating in the elaboration of ambitious development plans.[40] The 1992 'Sustainable Development Plan' is a conventional strategy intended to foster the development of capitalism in the region. Since the early 1980s, capital has flowed to various parts of the region, particularly in the form of investments in sectors such as African palm plantations, large-scale shrimp cultivation, gold mining, timber and tourism. These investments operate, for the most part, in the mode of the first form of capital. All the activities of this type of capital tend to contribute to ecological degradation, the displacement and proletarianization of local people—who can no longer subsist as farmers and have to find precarious jobs in the palm oil plantations and the shrimp-packing plants.

Parallel to this, the government has launched a more modest, but symbolically ambitious, project for the protection of the region's almost legendary biodiversity, in peril of being destroyed by activities mediated by the development plan. The Biodiversity Project,[41] conceived under the directives of the Global Biodiversity Strategy[42] and within the scope of the World Bank's Global Environmental Facility (GEF), purports to effect an alternative strategy for the sustainable and culturally appropriate development of the area. The project is organized along four different axes: 'to know' (to gather and systematize modern and traditional knowledge of the region's biodiversity); 'to valorize' (to design ecologically sound strategies to create economic value out of biodiversity); 'to mobilize' (to foster the organization of the black and indigenous communities so that they can take charge of the sustainable development of their environments); and 'to formulate and implement' (to modify institutional structures so that they can serve as support for community-oriented sustainable development strategies).

The Biodiversity Project obeys the global logic of the second form of ecological capital. The project became possible not only because of international trends, but also out of the pressure exerted on the state by black and indigenous communities in the context of the new territorial and cultural rights accorded to them by the reform of the national

constitution of 1991. The project designers had to take into account the views of local communities, and had to accept as important interlocutors the representatives of the black movement that has grown in the context of the developmentalist onslaught and the reform of the constitution. A few progressive professionals associated with the black movement have been able to insert themselves in the national and regional staff of the project. While these professionals seem aware of the risks involved in their participation in a government project of this kind, they also believe that the project presents a space of struggle that they cannot afford to ignore.

Along with new forms of biotechnology, the discourse of biodiversity conservation produced mostly by Northern NGOs and international organizations in the 1990s, in sum, achieves an important transformation in our consciousness and practices of nature. As far as the world rainforests are concerned, this discourse constructs an equation between 'knowing' (classifying species), 'saving' (protecting from total destruction), and 'using' (through the development of commercial applications based on the genetic properties of species). Biodiversity prospectors would roam the rainforest in search of potential uses of rainforest species, and the biotechnological developments that would allegedly ensue from this task would provide the key to rainforest preservation—if appropriately protected, of course, by intellectual property rights so that prospectors and investors have the need incentive to invest in the epic enterprise of saving nature.[43] Both capitalism and nature would not only survive but thrive under the new scheme dreamed of by scientists, planners, multinational corporations, and genetic and molecular biology laboratories, among others. Social movements confront a greening of economics, knowledge, and communities more pervasive than ever before.

Making nature: from (modern) death to (post-modern) reinvention

It should be clear by now that sustainable development and biodiversity strategies play a crucial role in the discursive production of production conditions. Production conditions are not just transformed by 'capital': they have to be transformed in/through discourse. The Bruntland report, indeed the entire sustainable development movement, is an attempt at resignifying nature, resources, the earth, human life itself, at a scale perhaps not witnessed since the rise of empirical sciences and their reconstruction of nature—since nature's 'death', to use Carolyn Merchant's expression.[44] Sustainable development is the last attempt to articulate nature, modernity, and capitalism before the advent of cyberculture.

The reconversion of nature effected by the discourses of biodiversity and sustainable development may be placed in the broader context of what Donna Haraway[45] calls 'the reinvention of nature'. This reinvention is being fostered by sciences such as molecular biology and genetics, research strategies such as the Human Genome Project, and biotechnology. For Haraway, however, this process of reinvention started with the languages of systems analysis developed since the early post-World-War-II period, and is marking the final disappearance of our organic notions of nature. The logic and technologies of command-control have become more central in recent years, particularly with the development of immunological discourses[46] and projects such as the mapping of the human genome. The language of this discourse is decidedly post-modern and is not inimical to the post-Fordist regime of accumulation,[47] with its new cultural order of 'flexible labour', which might also be read symbolically as an attempt to keep dark invaders at a distance or quickly isolate them if they come close enough or become

numerous enough to pose a threat of contagion and disorder.

Haraway reads in these developments the de-naturalization of the notions of organism' and 'individual,' so dear to pre-World-War-II science. She sees the emergence of a new entity, the cyborg, which arises to fill in the vacuum[48] Cyborgs are hybrid creatures, composed of organism and machine, 'special kinds of machines and special kinds of organisms appropriate to the late twentieth century'.[49] Cyborgs are not organic wholes but strategic assemblages of organic, textual, and technical components. In the language of sustainable development one would say that cyborgs do not belong in/to nature; they belong in/to the environment, and the environment belongs in/to systems.

Haraway concludes that we need to develop a different way of thinking about nature and ourselves in relation to nature. Taking Simone de Beauvoir's declaration that 'one is not born a woman' into the postmodern domain of late 20th-century biology, Haraway adds that 'one is not born an organism. Organisms are made; they are constructs of a world-changing kind'.[50] To be more precise, organisms make themselves and are also made by history. This deeply historicized account of life is difficult to accept if one remains within the modern traditions of realism, rationalism, and organic nature. The historicized view assumes that what counts as nature and what counts as culture in the West ceaselessly change according to complex historical factors. Since at least the end of the 18th century, 'the themes of race, sexuality, gender, nation, family and class have been written into the body of nature in western life sciences', even if in every case nature 'remains a crucially important and deeply contested myth and reality'.[51] Nature as such (unconstructed) has ceased to exist, if indeed it ever existed.

Nature, bodies and organisms must thus be seen as 'material-semiotic' actors, rather than as mere objects of science preexisting in purity. Nature and organisms thus emerge from a discursive processes involving complex apparatuses of science, capital and culture. This implies that the boundaries between the organic, the technoeconomic, and the textual (or, broadly, cultural) are permeable. While nature, bodies and organisms certainly have an organic basis, they are increasingly produced in conjunction with machines, and this production is always mediated by scientific and cultural narratives. Haraway emphasizes that nature is a co-construction among humans and non-humans. Nature has a certain agency, an 'artefactuality' of sorts. We thus have the possibility of engaging in new conversations with/around nature, involving humans and non-humans together in the reconstruction of nature as public culture. Even more, 'there are great riches for feminists [and others] in explicitly embracing the possibilities inherent in the breakdown of clean distinctions between organism and machine and similar distinctions structuring the Western self'.[52]

Haraway's work reflects and seeks to engage with the profound transformation being brought about by new computer technologies and biotechnology that is just beginning but quickly advancing in the centre countries of the capitalist system. The advent of the new era—which we can perhaps call cyberculture, as a truly post-industrial and post-modern society[53]—entails a certain cultural promise for more just social configurations. We should have no doubts by now that a fundamental social and cultural transformation is under way, which promises to reshape biological and social life, and which involves both dangers and possibilities. A new regime of bio-sociality is upon us, implying that 'nature will be modeled on culture understood as practice. Nature will be known and remade through technique and will finally become artificial, just as culture becomes natural'.[54] This might bring the dissolution of modern society and of the nature/culture split, marking

also the end of the ideologies of naturalism—of an organic nature existing outside of history—and even the possibility that the organic might be improved on by artificial means.

What all this means for the Third World is yet to be examined. This examination has to start with inventing a new language to speak of these issues from Third World perspectives, a language of transformative self-affirmation that allows the Third World to reposition itself in the global conversations and processes that are reshaping the world, without submitting passively to the rules of the game created by them. Sustainable development will not do. Biodiversity, on the contrary, is becoming inextricably linked to other discourses, such as biotechnology, genetics, and intellectual property rights.[55] But the implications for the Third World communities placed as 'stewards' of organic nature are by no means well understood. The issues are crucial for the communities, as the Afrocolombian activists of the Pacific coast have discovered. Not in vain are corporations developing aggressive policies of privatizing nature and life. Communities in various parts of the Third World will have to conduct a dialogue with each other in order to face the internationalization of ecological capital. Ecological solidarity (South–South and North–South) must travel this perilous terrain, and perhaps entertain the idea of strategic alliances between the organic and the artificial (in terms of biotechnology applications of rainforests' biodiversity, for instance) against the most destructive forms of capital.

Semiotic resistance and alternative productive rationality

The role of discourse and culture in organizing and mediating 'nature' and 'production conditions' is still undeveloped in both the eco-socialist and eco-feminist conceptions. For the most part, the economistic culture of modernity is taken as the norm. Behind this question lie the relationships between natural and historical processes. Haraway's work provides valuable elements for examining this relation particularly in the context of raising technoculture. The Mexican ecologist, Enrique Leff, has made a general case for theorizing the mutual inscription of nature, culture and history in terms useful for thinking about Third World situations. As the ecological becomes part of the accumulation process, Leff argues, the natural is absorbed into history and can thus be studied by historical materialism. Yet he insists that culture remains an important mediating instance. The transformation of nature and ecosystems by capital depends on the cultural practices of specific societies and the processes of cultural transformations that are taking place.[56]

Leff's[57] conceptual effort is linked specifically to the articulation of an alternative, ecologically sustainable productive rationality from an integrated perspective of ecology, culture, and production. For Leff, ecological, technological and cultural productivity must be woven together in order to theorize a new view of rationality that generates processes that are equitable and sustainable. 'The environment should be regarded as the articulation of cultural, ecological, technological and economic processes that come together to generate a complex, balanced, and sustained productive system open to a variety of options and development styles'.[58]

On the cultural level, cultural practices should be seen as a principle of productivity for the sustainable use of natural resources. Most clearly in the case of indigenous and ethnic groups, every social group possesses an 'ecological culture' that must be seen as forming part of the social relations and forces of production. At the level of production, Leff advocates for the development of 'a productive paradigm that is not economistic yet

pertains to political economy'.[59] The result would be an alternative production paradigm that relates technological innovation, cultural processes, and ecological productivity. Less clear in Leff's work is how concepts such as 'production' and 'rationality' can be theorized from the perspective of different cultural orders.

Based on his reformed view of the environment, Leff calls on ecology activists and theorists to think in terms of 'ecological conditions of production' and a 'positive theory of production', in which nature is not only seen as a production condition, but actively incorporated into a new productive rationality along with labour and technology. This call parallels J O'Connor's redefinition of production conditions from the standpoint of the second contradiction, particularly through the action of social movements. Leff's formulation brings into sharper focus the real need that social movements and communities have to articulate their own views of alternative development and alternative productive schemes specifically from the perspective of ecology. The pressure on social movements and community activists in many parts of the world to engage in this constructive task is mounting, as the case of the black and indigenous activists in the Colombian Pacific coast shows. Leff's ongoing effort at conceptualizing an alternative productive rationality is helpful in this regard.

The creation of a new productive rationality would entail forms of environmental democracy, economic decentralization, and cultural and political pluralism. The creation of spaces in which to foster local alternative productive projects is one concrete way to advance the strategy. In sum, Leff seeks to redefine and radicalize three basic constructs: production, away from economistic cultural constructions and pure market mechanisms; rationality, away from the dominant reductionistic and utilitarian views; and management, away from its bureaucratized practice and towards a participatory approach. A strategy such as this, one might add, implies cultural resistance to the symbolic reconversion of nature; socioeconomic proposals with concrete alternative strategies; and political organizing to ensure a minimum of local control over the entire process. In the landscape of Latin American hybrid cultures,[60] strategies that combine modern and non-modern, capitalist and non-capitalist forms and practices seem to be required.

One thing is clear in this debate: social movements and communities in the Third World need to articulate alternative productive strategies that are ecologically sustainable, lest they be swept away by a new round of conventional development. The fact that these alternatives must also be culturally defined—from the perspectives of cultures which, although hybrid, nevertheless retain a socially significant difference *vis a vis* Western modernity—necessarily entails that a certain semiotic resistance will take place. The worst would be for communities to opt for conventional development styles. To accede to an era of post-development—in which the hegemonic effect of the constructs of modernity might be held in check[61]—communities will need to simultaneously practise experimentation with alternative productive strategies and cultural resistance to capital's and modernity's material and symbolic restructuring of nature. Communities will need to prevent conventional development, green redevelopment via sustainable development discourses, and the greening of communities and local knowledge via discourses of biodiversity.

Is it really possible to imagine an alternative ecological economy based on a different cultural (not only social) order? If one accepts that this has become an essential political task today, how could analysts investigate the concrete cultural practices that might

serve as a basis for it? What are macroeconomic conditions and political processes that could make its implementation and survival possible? How should this alternative social reality engage with dominant market-dominated forces? The importance of these questions will grow as researchers come to realize the increasing complexity of the cultural politics of nature under way in the wake of new forms of capital, technoscience and globalization.

Conclusion: towards a post-structuralist political ecology

The two socially necessary forms of capital—modern and postmodern—maintain an uneasy articulation that depends on local, regional and transnational conditions. Both forms are mediated by discourse: conventional discourses of development, plus the scientific discourses of modernity, in the case of the first form of ecological capital; discourses of biodiversity and sustainable development (particularly in the Third World), and molecular biology, biotechnology and cyberculture in the First (and increasingly the Third) Worlds, in the case of the second form of ecological capital. The regimes of sustainable development in the South, and of biosociality and cyberculture in the North show a certain degree of geographical unevenness; yet the connections among them are becoming clearer. While some regions in the Third Word are joining the ranks of cyberculture, poor communities in the First are affected by the logic of reckless capital and the paradoxes of sustainability. The division between First and Third World is undergoing a fundamental mutation in the wake of post-Fordism, cyberculture, and the ecological phase of capital.

The discursive nature of capital is evident in the case of the production of 'production conditions'. The resignification of nature as environment; the reinscription of the earth into capital via the gaze of science; the reinterpretation of poverty as an effect of destroyed environments; the destruction of vernacular gender and the concomitant proletarianization and rearticulation of women's subordination under modern principles; and the new lease on management and planning as arbiters between people and nature, all these are effects of the discursive construction of sustainable development. As more and more professionals and activists adopt the grammar of sustainable development, the reinvention of production conditions effected by this discourse will be more effective. Institutions will continue to re/produce the world as seen by those who rule it.

Although everybody today seems to be aware that nature is 'socially constructed', many continue to assume a relatively unproblematic rendition of nature. Central to this rendition is the assumption that 'nature' exists out there, beyond our constructions. Nature, however, is neither unconstructed nor unconnected. Nature's constructions are effected by history, economics, technology, science and myths of all kinds as part of the 'traffic between nature and culture'.[62] Leff[63] emphasizes a similar point in his own way. Capital accumulation, he says, requires the articulation of the sciences to the production process, so that the truths they produce become, themselves, productive forces in the economic process. Thus the sustainable development discourse must be seen as part of the creation of knowledge linked to capital, to the extent that the concepts produced participate in reinscribing nature into the law of value. Although the process of transdisciplinarity involved in the sciences of ecology is hopeful, Leff[64] believes, the lack of epistemological vigilance has resulted in a certain disciplining of environmental themes which has precluded the creation of concepts useful for the formulation of alternative

ecological rationalities. The analysis of discourses can serve as a basis to elaborate practical concepts useful to reorient strategies concerning development and the environment.

If nature and other life forms must now be understood as articulations of organic, technoeconomic, and cultural elements, does this not imply that we need to theorize this mixture as the appropriate object of biology and ecology, perhaps at the same time—and dialectically—that these sciences seek to theorize the 'laws of nature' in and of themselves? As Leff (personal communication) rightly says, one must be cautious in this endeavour, and raise the question of 'to what extent by manipulating nature as reality you manipulate the scientific object of biology. By manipulating evolution and genetics, to what extent do we also manipulate and reconstruct the object and the internal laws of biology and genetics?' Perhaps what is needed is a new epistemology of biology, such as the one being proposed by the phenomenological biology of Humberto Maturana and Francisco Varela.[65] Works of this type, that attempt to step outside the traditional space of science by taking seriously the continuity between cognizant self and world, between knowledge and the social practices that make that knowledge possible, might have important elements to contribute to a new biology and ecology. The question of the epistemology of the natural sciences is being broached from post-structuralist perspectives, and from a reformed phenomenology in Maturana and Varela's case. Should it not be broached as well from that of political ecology?

The worldwide spread of value seems to privilege the new biotechnologies. These further capitalize nature by planting value into it through scientific R&D. Even human genes become conditions of production, an important arena for capitalist restructuring and, so, for contestation. The reinvention of nature currently under way, effected by/within webs of meaning and production that link the discourses of science and capital, should be incorporated into a political ecology appropriate to that new age whose dawn we are witnessing. What will count as 'organisms' and even 'human' for biology, ecology, geography, and biological anthropology will be intimately mediated by these processes.

Nature is now modelled as culture; sooner or later, 'nature' will be produced to order. If the production of trees in plantations constituted an important step in the capitalization of nature, for example, the production of genetically produced trees (or the 'perfect' tomatoes produced at the University of California at Davis) takes this process to new levels; it takes the tree a step further away from 'organic nature'. The implications of this are unclear. This is why the raising regime of biosociality must find its place at the basis of a political ecology and biology as forms of knowledge about material-semiotic objects—organisms and communities—that are historically constituted.

This is to say we need new narratives of life and culture. These narratives are likely to be hybrids of sorts; they will arise out of the mediations that local cultures are able to effect on the discourses and practices of nature, capital and modernity. This is a collective task that perhaps only social movements are in a position to advance. The task entails the construction of collective identities, as well as struggles over the redefinition of the boundaries between nature and culture. These boundaries will be reimagined to the extent that the practice of social movement succeeds in reconnecting life and thought by fostering a plural political ecology of knowledge. As the analysis of concrete practices of thinking and doing, discursive approaches have much to contribute to this reimagining. Materialist approaches do not need to exclude this type of analysis.

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