

SOCIAL THEORY AND THE GLOBAL ENVIRONMENT

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ENVIRONMENTAL SOCIOLOGY AND GLOBAL ENVIRONMENTAL CHANGE

A critical assessment

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INTRODUCTION

The conditions for advance of the subdiscipline of environmental sociology in the early 1990s could hardly be more propitious. Environmentally related issues are more prominent in policy and public discourse across the world than at any time in the history of the subdiscipline. The recent Rio de Janeiro 'Earth Summit' (the UN Conference on Environment and Development) was clearly the largest and most high publicized international conference in the history of the world. Debates prior to, at, and following the Earth Summit on the global conventions on greenhouse gases (and thus on energy and industrial pollution control policies), biodiversity, and forest policy - which, along with stratospheric ozone depletion, have been the leading issues associated with 'global environmental change' - have given these issues an extraordinary amount of public and scholarly visibility.

Despite the remarkable opportunities afforded by this new era of global environmentalism, environmental sociology is not yet making as strong a contribution to understanding global environmental change as a biospheric and sociopolitical phenomenon as it could. There have, in our view, been two distinct, but related limitations of the response of the environmental sociology community to global environmental change. One limitation has been the surprisingly small amount of attention within environmental sociology to the major issues of global environmental change, particularly those such as global warming and stratospheric ozone depletion which have been most closely associated with the rising attention paid to 'global change'. The other limitation is that when sociologists have attended to global change issues, they have tended to do so by uncritically accepting and appropriating the global 'constructions' of modern environmental problems that have emerged within both the environmental sciences and the environmental movement. This is especially problematic since, within both

science and politics, the 'globalization' of the environment has served to steer attention to common human interests in environmental conservation, and away from analysing the difficult politics that result from different social groups and nations having highly variegated - if not conflicting - interests in contributing to and alleviating environmental problems (Taylor and Buttel 1992). In particular, as we note later, the environmental sociology community was largely caught unawares by the increasingly bolder Third World opposition to the global climate, biodiversity, and forest management conventions that were prepared for ratification at the 1992 Earth Summit (Pearce 1991a).

While we do not develop this point in this chapter, the modest response of the environmental sociology community to global environmental change is consistent with several traditions within the sub-discipline and its parent discipline. Sociology has long had difficulty conceptualizing global dynamics such as the international state system, international regimes, and the world market. The classical tradition, which remains the basic thrust of modern sociology, has been to take the national-state and national society as the self-evident units of analysis, and to see 'nationally-ordered' problematics (e.g., national class structures, national political processes and policies, and societal-level cultural shifts) as the most important research questions (Sklair 1991). The tradition of environmental sociology since its founding about 20 years ago, in terms of its conceptualization of the environment and environmental dynamics, has paralleled that of the parent discipline. This tradition has been dualistic and of limited applicability to global (or ostensibly global) environmental issues. On one hand, many environmental sociologists have tended to approach environmental dynamics in terms of the specificities of a single, typically localized, environmental problem such as toxic waste contamination (for example, Levine 1982), while employing the community as the level of analysis. On the other, the environment has been conceptualized as a mostly homogeneous, undifferentiated whole in a national framework (for example, Schnaiberg's (1980) notion of societal-environmental dialectic and his implicit contradiction of nationally ordered economic growth vs the environment). Neither approach, however, is well-suited to understanding the multifaceted reality of global change, which involves very complex ecological relations (between locally functioning and globally functioning ecological systems), and complex social-environmental relations (within and between the local, meso, and global levels).

In our view, a more productive role for environmental sociology in addressing issues of global environmental change will require advance on two fronts. The first is that of conceptualizing the mutual relations of causality among the national-state/society, the

international state system, and the global economy. As Sklair (1991) and McMichael (1990) have made notable contributions to this end, we do not address this matter here. Second, given the many intersections of science, social change, and politics in global environmental issues, we argue that environmental sociology will need to elaborate an explicit sociology of (environmentally related) science in order to address these issues. We suggest below some promising avenues along which an explicit sociology of science, rooted in the debates over the past 15 years in the field of social studies of science, can be formulated. Before doing so, however, we begin by revisiting the principal vantage point from which environmental sociologists have conceptualized the increasingly stronger environmentalist sentiments within modern societies, and assess the applicability of this vantage point to understanding the growing concern with global environmental change.

GREENING AND NEW SOCIAL MOVEMENTS

Social change, greening and new social movements

One of the ways that environmental sociologists have made notable contributions to our knowledge on environmentally related phenomena has been through their acumen in recognizing and anticipating social trends and in conceptualizing the emergence of new social forces. One of the most important social trends of our time is 'greening', which sociologists have studied from a variety of angles from the time that it was only an incipient social force. There have been a number of notable attempts to explain the rise of greening on distinctively - though not necessarily exclusively - sociological grounds. One of the major theoretical premises of modern sociology, and the most comprehensive view of the rise of greening to date, concerns the phenomenon of 'new social movements' (NSMs), particularly useful overviews of which are Olofsson (1988) and Scott (1990).² The environmental movement and its close cousin, green parties, are typically seen to be the prototypes of new social movements, the rise of which is accounted for by some major structural changes and inertial forms in modern advanced-industrial social structures.

The first and most important force underlying the rise of NSMs has been the progressive demise of the numerical and political position of the traditional industrial working classes in the overall class structures of the advanced countries - from about 45 to 50 per cent of the workforce during the ten years after the Second World War (Singelmann 1978) to less than 20 per cent today (Prezworski 1985, Prezworski and Sprague 1986). The traditional labour, working-class, or social democratic parties thus have increasingly exhibited

a structural crisis: they must attempt to accommodate their historic working-class constituency and related ones such as subordinate racial or ethnic minorities (for example, African-Americans in the US). At the same time, the relative size of working-class and related subordinate groups in the electorate has declined to the point that it is too small a base for a winning coalition. Thus, social democratic parties must simultaneously appeal to other classes and groups, to such an extent that non-working-class voters must typically be twofold or more those of its working-class voters in order to win elections. In the main, this means that the social democratic parties must make limited appeals to the middle classes, particularly middle-class liberals among whom (NSM-type) concerns such as feminism, environment, peace/disarmament, or anti-nuclear are particularly salient. Working-class voters, however, have generally not proved to be very vital constituencies of 'new social movements' agendas, while members of the 'new class' are often critical of the centre-left or social democratic parties for so timidly embracing their concerns.

There are two major consequences of the crisis of social democratic parties: (a) As increasingly widespread state fiscal crises have undermined, or threatened to undermine, the traditional social democratic agenda of social Keynesianism, the welfare state and the social wage, many working-class voters desert to the rightist parties. Not enough working-class voters and white-collar liberals stay with the social democratic parties consistently or dependably enough to give them working majorities. This accounts in substantial measure for the pronounced rightward shift in the political centres of gravity of the OECD countries, typified not only by Reaganism and Thatcherism, but also by the growing incidence of Christian Democratic rule even in some of the Northern European Nordic countries, which as recently as a decade ago were thought to be permanently under Social Democratic Party rule; (b) The failure of white collar liberals to achieve their agendas through party politics has led middle- and upper-middle-class activists to shift their focus to social movements - so-called new social movements - as an alternative to conventional party and parliamentary politics. This means a growing orientation within the 'new class' (and more broadly in the class structure) to membership in and financial support of a growing array of local to national (and, increasingly, international or internationally oriented) environmental, feminist and peace/disarmament organizations that serve as freestanding, usually formally nonpartisan, pressure and lobbying groups, rather than as party constituents. Even where these organizations choose to enter party politics, they do so as self-proclaimed nonconventional or no-business-as-usual parties such as the Grünen of Germany.³

To the degree the NSM account is correct, it suggests a structural connection between the neoliberal or conservative drift of the politics of the major industrial nations on one hand, and the rising tide of the increasingly bolder expression of green sentiments on the other. Increasingly, it would seem, NSMs have begun to supplant social democratic parties and trade unions as the bulwark of opposition to conservative parties and politics. (See Scott 1990 for a useful discussion of this issue.)

The limits of NSM reasoning

As comprehensive and insightful as the NSM account of the rise of greening is, the NSM perspective none the less has a number of limitations in serving as an orienting posture on the politics of global environmental change. One potential problem with the standard NSM account is that it will tend to see global environmental concerns and mobilization as being (a) merely logical and unproblematic extensions of 'environmental enlightenment', in which bearers of pro-environmental values shift their attention to the international environmental issues that environmental scientists increasingly agree are the more serious ones, and (b) a logical extension of long-standing concerns, such as disarmament and peace, among groups such as the German Grünen.

As we suggest below, however, these views of the globalization of environmental politics and discourse have some important limitations. One is that the 'global construction' of environmental issues is as much a matter of the social construction and politics of knowledge production as it is a straightforward reflection of biophysical reality. The second is that the globalization of environmental policy involves shifts of institutional forums and processes - from national and subnational politics to particular geopolitical arenas such as the international development finance and assistance establishment - that very substantially affect the framing of environmental issues and the consequences of policy decisions.

A second shortcoming of the NSM- and social-values-oriented formulation is that it tends to give short shrift to - and in some cases has misunderstood - the role of scientific knowledge claims and their relationships to NSM movement structure, ideology, and strategy (as Frankel 1987, has noted in a particularly insightful way). NSM theory, of course, recognizes that many ecological issues (for example, industrial toxic wastes, pesticide pollution, land degradation) are derivative of science and technological change. Much of NSM theory, particularly its 'culturalist' variant (see Scott 1990: Ch. 6), has accordingly stressed the anti-science, anti-technology, or anti-technocratic aspect of green movements.

However, in our view, science has played a quite different, and arguably more influential and complex, role in the 'greening' trend. One of the major factors that has contributed to the rise of greening has, in fact, been the accumulation of ecological and environmental data and knowledge claims over the past three decades or so, and especially the explosion of global-change-related data and knowledge claims since roughly the mid-1980s (Norgaard 1991a).⁴ Further, in contrast to stress in NSM theory on the 'anti-science' and anti-technology undertow of NSM adherents, the rising persuasiveness of environmental and global-change data has contributed to shifting the essential thrust of modern environmentalism towards an increasingly thoroughly 'scientized' *Weltanschauung* and mode of social movement strategy. To be sure, many of the most radical Greens and Earth First!ers distrust all or most 'establishment' science (including academic ecology or environmental science), and prefer to base their claims and agenda on ethical principles rather than mainly on scientific data. None the less, modern environmentalism, where the rubber meets the road, is increasingly an arena characterized by the deployment of scientific and technical knowledge, often in combat with rival data and knowledge claims that are set forth by their industrial, governmental, or quasi-governmental adversaries in an attempt to 'deconstruct' and delegitimize environmental claims (Buttel 1992, Jasanoff 1992, Taylor and Buttel 1992, Yearley 1991). In sum, a more complete account will need to directly consider the sociology of environmental science, which has yet to be grafted on to either the standard 'realist' NSM account of Claus Offe (1987), and especially on to the 'culturalist' account of Touraine (1981).

Another limitation of the standard NSM account of environmentalism is that it has considerable difficulty in explaining Third World environmentalism. Environmental movement organizations have emerged in a number of developing countries over the past half dozen years or so (Adams 1990). But in most Third World contexts, the rise of environmental movements and organizations can hardly be accounted for by either the demise of the mass industrial working class (which they have never had) or a reaction against the mass consumerism of mature industrial society (which they have yet to experience in a thoroughgoing way). In other words, the new social movements account has difficulty understanding greening in Third World nation-states that, in general, are not undergoing the structural or cultural-ideological shifts attributed to the advanced industrial countries. As we suggest below, one cannot account for Third World environmentalism without understanding the social construction and political economy of environmental knowledge - all the way from the laboratory to geopolitical forums such as that of the Earth Summit.

**ENVIRONMENTAL SOCIOLOGY'S IMPLICIT
SOCIOLOGY OF SCIENCE AND ECOLOGICAL
KNOWLEDGE: ITS NATURE AND LIMITS**

As suggested earlier, the very nature of environmental sociology is that it involves a sociology of science, at minimum *implicitly*. In this section we make some brief observations about environmental sociology's approach to science, since we believe these postures and presuppositions vitally affect the work that can be done by sociologists on the phenomena of global environmental change. We make several propositions in this regard:

1 Environmental sociologists are mostly strongly pro-environmental, but in general have little formal training in the environmental sciences (which henceforth we refer to in the broad sense of pertaining to the disciplines of ecology, atmospheric/'planetary' science, conservation biology, ecotoxicology, physical geography, and so on).⁵ Sociologists interested in any particular environmentally related issue will thus tend to work from popularized accounts of science written by prominent or publicly visible environmental scientists (for example, N. Myers on tropical deforestation; L.R. Brown on land degradation and declining net primary productivity of ecosystems; C. Sagan and S. Schneider on global climate change; and E.O. Wilson and P.R. Ehrlich on biodiversity destruction).

2 Much of environmental sociology could logically be seen as an implicit sociology of science and technology, since it must inevitably deal with scientific knowledge claims about the nature of environmental problems and recommended solutions. Environmental sociologists are by no means innocent of the 'science and technology connection'. Two of the major groups of American environmental sociologists, those in the relevant sections/divisions of ASA and SSSP, have over the past decade gone so far as to relabel their sections 'environment and technology'. But environmental sociologists, even those whose work has a major focus on science, technology, and technological change, tend to have relatively little background on modern debates in the sociology and social studies of scientific knowledge and technology (some relevant summaries of which are Woolgar 1988, Yearley 1988).

3 In any case, however, environmental sociologists cannot yet obtain all the necessary guidance from the current sociology of science and scientific knowledge. This is the case because, for a variety of reasons internal to this field to be discussed briefly here and at greater length below (see pp. 238-40), there have been two major tendencies in the sociology of science over the past two

decades or so, neither of which has given much attention to environmental science as a subject or provided an adequate framework for addressing such a subject.

Traditionally, most sociologists of science trained in the 1960s or earlier have tended to focus their theoretical and empirical work on the Mertonian sociology of scientists and scientific careers (as in Robert Merton's 1973 classic *The Sociology of Science*, and the related work of Zuckerman 1977, Cole and Cole 1973, or Hagstrom 1975). In this tradition there is little focus on the content of scientific knowledge production, since science is conceptualized as a distinctive institution with a particular normative structure appropriate to uncovering the laws of nature. Accordingly, it is assumed that the content of knowledge production in science will mirror the biophysical parameters of the natural world that scientists must inevitably uncover. Research in this tradition has thus tended to stress the structuring of scientific careers within these normative patterns, and within scientific institutions. Most importantly, science tends to be taken to be analytically demarcatable from society, and to be self-evidently scientific - representing a distinctive combination of formal rationality and value rationality in the Weberian sense.

The other major branch of the sociology of science has been built on a critique of Mertonianism, on the grounds that Mertonianism has served to deny that the character of the knowledge produced by scientists is itself worthy of sociological study. This non- or anti-Mertonian approach was given its original impetus by Thomas Kuhn (1962) in his *The Structure of Scientific Revolutions*, but more recently it has been deepened through recourse to 'interpretive' frameworks such as hermeneutics, symbolic interactionism, ethnomethodology, and cultural sociology. Thus, much of the thrust of the field over the past 15 years has been to invoke various forms of relativism from the sociology of knowledge. In the main, this has meant that the most 'paradigmatically scientific' disciplines, in which one would expect that the Mertonian categories of scientific norms and practices - such as universalism and disinterestedness - would be most strongly manifest, are considered more interesting or stronger test cases for relativism against the more standard Mertonian treatment.⁶ If, for example, one can see evidence that scientific knowledge is affected by material interests, social power, rhetorical strategies, and so on in the basic sciences most removed or insulated from the society at large, then a compelling case can be made that these forces operate in all of science. This has meant, in turn, that empirical work in the sociology

of science has been focused mainly on the physical sciences, and on the very basic biological sciences such as molecular biology that are either closely connected to the physical sciences or whose subject matter is perceived to be equally insulated from societal forces.

4 The relativist/constructivist turn of the modern sociology of science has been a step forward from the standard Mertonian account, and it has even been reflected in a minor, though yet limited, way in environmental sociology (for example, Dietz 1987, Dietz *et al.* 1992). It is our observation, however, that there has been an overall pattern of selective relativization of scientific knowledge claims in environmental sociology. Environmental sociologists have been at home in relativizing, or demystifying, the knowledge claims that come from anti-environmental quarters such as industrial corporations and industrially funded scientists (for example, as being based on interests, ideology, and the like). They have tended, however, to eschew this type of approach to the environmental sciences in general (Bird 1987), and to the science(s) of global change in particular (Buttel *et al.* 1990).⁷ There is, in environmental sociology no less than other branches of social science, a tendency to relativize science one does not like, and to assume that science one likes is self-evidently scientific and valid.

5 As we note at greater length below, social scientists, including but not limited to sociologists, have tended to take at face value, and be largely uncritical of, 'global' notions that have been developed within the environmental science and environmental activist communities (but see Turner *et al.* (1990) for a significant exception). Beginning with the Meadows *et al.* (1972) limits to growth study, and continuing through more recent efforts relating to atmospheric pollution, stratospheric ozone depletion, tropical deforestation, and loss of biodiversity, there has been a tendency within the scientifically oriented sector of the environmental movement (for example, Myers and Myers 1982) and the movement-oriented sector of environmental science (for example, Ehrlich and Wilson 1991) to frame these issues in a supranational framework. Some such issues (for example, greenhouse gas emissions) are actually or potentially intrinsically global - that is, they involve global antecedents, affect globally functioning systems, and may have global social and ecological impacts. However, the 'global' status of other environmental dynamics often insinuated to be components of 'global environmental change' - such as industrial toxic pollution, desertification, and soil erosion - is ambiguous, since many of these are largely localized in their antecedents, social consequences, and

environmental implications (Stern *et al.* 1992, Turner *et al.* 1990). Even more important than this occasionally arbitrary pattern of global labelling are two additional facets of this pattern of social construction and political-economic framing of ecological knowledge: (a) the factors that lead to global constructions of ecological knowledge to be privileged over 'sub-global' frameworks, and (b) the sociopolitical concomitants of complex global-level computer modelling of global environmental phenomena. Each is taken up briefly below (see pp. 242-3, 244-5).

6 There has been a tendency in sociological - and, in general, in social science - circles for there to be premature closure on the 'fact' or 'facts' of global change (especially on the global threats posed by atmospheric warming, tropical rain-forest destruction, and loss of biodiversity). While, for example, there has been a substantial amount of debate and conflicting evidence in the climate and environmental sciences about global environmental change (compare Reifschneider 1989 and Bryson 1990 with Kellogg 1991 and Schneider 1991 on global warming; and Ehrlich and Wilson 1991 and Mann 1991 on biodiversity) and 'scientific uncertainty' is ritualistically acknowledged, sociologists have seldom inquired into the processes by which claims of the likelihood of global catastrophe have been selected for over others (Mol and Spaargaren 1992, Taylor and Buttel 1992). Global warming, in particular, has generally been taken more or less at face value as established scientific fact.⁸

7 Due to premature closure on the stylized facts of global change, there has accordingly been a premature stress on global change problem amelioration, usually as defined *vis-à-vis* the agendas set forth by authoritative spokespeople in the environmentally related sciences and environmental movement organizations. Good examples are Stern *et al.* (1992) and recent special issues of *Evaluation Review* (vol 15, February 1991) and *Policy Studies Journal* (vol. 19, Spring 1991) devoted to global climate change and policy. Research of this type tends to work from the parameter estimates (or some range of estimates), usually as presented by scientifically oriented environmental activists or movement-oriented environmental scientists in a position to speak authoritatively on these issues. In the case of global warming, most of the social science literature begins with the most widely circulated data and projections on global warming (that is, estimates of 4°C or so global warming by the middle of the twenty-first century).⁹ Even the most original, critical, and provocative work on global change in the social sciences - that on the distributional and political implications of current and prospective strategies for ameliorating global environmental problems

(see, for example, Kasperson and Dow 1991 in the *Evaluation Review* collection cited earlier) – invariably takes such stylized parameter estimates as its point of departure. Work of this sort is valuable but, as we suggest below, it does not exhaust the range of contributions that environmental sociology can make to global change issues.

TOWARDS A REORIENTATION OF ENVIRONMENTAL SOCIOLOGY SCHOLARSHIP ON GLOBAL CHANGE: SOME ILLUSTRATIVE APPROACHES

Let us now suggest some approaches to diversifying the role of sociology in the study of global change. We begin with some relatively general orientations and then take up some of the specificities of alternative ways to supplement the current approach to global change issues.

Approach 1: Reconsidering environmental sociology's implicit sociology of science and technology

It is useful to begin with an overall view of the (metatheoretical) property space of the sociology of science and technology in order to grapple with how environmental sociologists and others have tended to approach science and technology phenomena. The basis of the typology is two dimensions of science and technology, both of which reflect dualities that are *a priori* reasonable views of the nature of science and technology and the role of science and technology in society.

The first dualism is that which we call 'deference' towards vs 'demystification' of science and technology. A deferential orientation towards science is one in which science is viewed as either intrinsically good, on account of its distinctive decision rules ('rational', 'scientific', 'universalistic', 'disinterested', etc.) that demarcate it from 'non-science', or as being, in principle, an *a priori* socially desirable activity if organized appropriately or rationally. Demystification of science, by contrast, involves relativizing scientific knowledge claims or scientific accomplishments as being relatively 'ordinary' social constructions, or by being derivative of interests, political-economic relations, class structure, socially defined constraints on discourse, styles of persuasion, and so on. The second dualism is that of science and technology as a social 'practice' or ideational sphere on the one hand, and science and technology as a material-productive force on the other. The typology thus has four cells, with its major categories or exemplars being Mertonian

functionalism (deference/practices), relativism/constructivism (demystification/ideational), political economy of science (demystification/material-productive), and a mixed category, consisting of a diversity of approaches such as induced innovation, technology assessment, sociology of risk/risk assessment, and so on (deference/material-productive).

There are two related conclusions about these essential dualisms of science and technology in society. The first is that while each of the major prevailing perspectives in the field - Mertonian-style functionalism, relativism/constructivism, induced innovation, political economy of science and technology - has its role to play, each is incomplete, since each is based in only one quadrant of the typology. The second is that a mature sociology of science and technology, and accordingly a mature environmental sociology, must transcend each of these dualisms so as to straddle each of the quadrants of the typology and incorporate their insights.

It is also important to note for present purposes that for many decades the bulk of the sociology of science has been tilted towards the practices/ideational pole and, in recent years, towards the relativism/constructivism quadrant. By contrast, the bulk of environmental sociology, in so far as it actively considers science and technology, has been tilted towards the material-productive pole, and mostly towards the risk/technology assessment-type mixed approach of the lower left hand quadrant. Further, the approach in most of environmental sociology towards science and technology is usually pursued quite autonomously from the existing literatures in the sociology and social studies of science. It is, as noted in the foregoing, a mostly implicit sociology of science.

There are, of course, some major exceptions to these tendencies. One is the work of Dorothy Nelkin, a scholar whose sociology of science work is cited quite frequently by environmental sociologists, who has eschewed relativism/constructivism and who has focused her work on the premise that science and technology are, first and foremost, components of the material-productive spheres (see, for example, Nelkin 1984). Another exception is the environmental sociologist, Thomas Dietz, some of whose work on environmental risk assessment lies towards the relativism quadrant of the typology (for example, Dietz and Rycroft 1987, Dietz 1987). It is also worth stressing here that Dietz, while a member of a sociology department, has his Ph.D. in environmental studies. He is in a better position than most environmental sociologists to understand the science, and to scrutinize the processes by which environmental knowledge is constructed when this aids sociological explanation. None the less, our typology suggests in schematic terms why, these exceptions

notwithstanding, there is not much cross-fertilization between environmental sociology and the sociology of science, even though their subject matters obviously overlap to a considerable degree.

While this is not the time and the place to give a full exposition of what this mature sociology of science and technology might look like, a few remarks are in order. To the extent that the exponents of the four different metaperspectives see their work as being conceptually or methodologically in competition then the synthesis must be more than a simple combination of them. The synthesis we have been exploring also warrants the name *constructionism*, but let us distinguish it from the social constructionism of the upper right quadrant. To claim that scientific knowledge is constructed is, very broadly, to say that it is not given by nature. Instead, what counts as knowledge is contingent on the scientists establishing (or disputing) it, and through them, on their social context. In exposing the ordinary quality of the practices of scientists and demystifying the special status of science, social constructionism emphasizes the malleability of scientific knowledge, practices, and institutions. The synthesis we have in mind moderates this tendency to relativism, but not by reasserting the traditional view that the strength of science rests on the correspondence of scientists' models and theories to *natural reality*. Instead, we interpret constructionism to mean that science and politics are co-constructed: that is, scientific accounts are difficult to modify to the extent that they facilitate and are, in turn, facilitated by favoured social policies, actions and interventions (Taylor 1992, Taylor and Buttel 1992). This proposition about 'action-oriented' constructionism derives from the following observations: a scientist's accounts can be accepted or disputed by many different agents. Scientists seek to ensure their work is promoted rather than discounted by these agents by mobilizing diverse resources - categories, equipment, data, experimental protocols, citations, colleagues, the reputation of research institutions, rhetorical devices, funding, media publicity. In doing so, technical and social considerations tend to reinforce each other, that is, theories and actions render each other more difficult to modify *in practice*. (See Taylor 1992, 1993, for elaboration on this necessarily condensed exposition.)

The two dualisms then become special emphases within this action-oriented constructionism, varying according to who is trying to modify some science/technology, who resists them, and the divergent resources that are exposed in the process. In contrast, a mature sociology of science and technology - and, accordingly, a sound environmental sociology - will have a more diversified approach. It will give more stress to the ideational or 'practices' components of these phenomena, but without sacrificing its entirely justifiable stress on science and technology as material-productive forces.

**Approach 2: Exploring the relationships between
environmental science/concepts and ideologies/movements:
the construction and deconstruction of global environmental
knowledge**

It is arguably the case that environmental sociology has been limited by confining its attention to phenomena outside of the laboratory, while the modern sociology of science, particularly its dominant relativist/constructivist wing, has been limited by giving predominant stress to knowledge at the laboratory level (Latour 1987, Cozzens and Gieryn 1990). One of the most promising foci for both subdisciplines for transcending their limitations is that of the environmental sciences and environmentalism (Taylor 1991).

Global change is a good example of a construction that serves simultaneously as a scientific concept (and knowledge claim) and as a movement ideology (of environmentally related movements). This is by no means a novel circumstance; modern environmentalism in its early years was undergirded by the notion of the 'population bomb' (a derivative of population biology) *à la* P.R. Ehrlich (1968), and later by the 'limits to growth' (derived from the application of system-dynamics to ecological systems) *à la* Meadows *et al.* (1972). The ascension of global change as the predominant ideology of the environmental movement (particularly within its dominant, internationally oriented wing) thus reflects a more long-standing trend of the 'scientization' of environmentalism and NSMs.

As suggested earlier, the environmental sciences and environmental movements, both broadly construed, exist in a state of mutual dependency and contradiction. At the most general level, the environmental movement depends on persuasive environmental science knowledge claims, and the environmental sciences stand to benefit substantially from a politically persuasive environmental movement.

The environmentalist/environmental science relationship is revealed further in the interrelated roles that environmental scientists and activists increasingly play. One such role, alluded to earlier, is that in which environmental scientists engage in activism. A related one is that in which environmentalists take on the role of 'quasi-scientists'. Increasingly, these roles are being collapsed. For example, contemporary environmental organizations are increasingly staffed with Ph.D. holders who have scientific titles, and often résumés that resemble those of academics. Persons such as S. Schneider and N. Myers are good examples of the emerging ideal type of scientist-activist.

Despite the tendency to complementarity between the environmental movement and environmental science, this cannot explain why particular kinds of environmental knowledge claims - in particular,

ones positing a global-level dynamic and constructed at a global level of analysis - will tend to be privileged over others. We believe there are two particularly important social forces, one within environmentalism and the other within environmental science, that must be considered in accounting for these dynamics. The first, which we have treated elsewhere (Taylor and Buttel 1992) and so only mention here, is the tendency within environmental science for global formulations *to be privileged or selected over others*. The second has to do with the constraints on environmental mobilization and political action.

Global change/warming has proved to be very attractive to the international environmental movement because of two imperatives, both intrinsic to environmental issues, with which the movement must deal. First, in so far as environmental goals tend to be public goods, 'saving' the environment is in everyone's interest, and hence no one's in particular, leading to a potentially very difficult collective mobilization problem. Second, the environmental agenda, as a disparate congeries of specific issues (for example, reducing pollution, conserving biodiversity and natural habitats, conserving natural resources, promoting recycling, increasing the efficiency of energy utilization), tends to involve too many forums, too many battles, too many conflicting interests, and too many opponents to be realistically achievable. Global formulations readily lend themselves to dealing with the problems of environmental mobilization and multiple policy forums. Global (scientific) formulations permit 'packaging' of multiple environmental problems and concerns within a common, overarching rubric, at the same time that they convey the legitimacy and persuasiveness afforded by their being rooted in science. Formulations that provide scientific justification for world-wide 'alarm' or 'dread' are particularly attractive in both authenticating this 'packaging' approach, as well as in creating the political rationale for responding urgently (Mol and Spaargaren 1992). The creation of a supranational climate (no pun intended) of urgency in responding to humanity- and biosphere-threatening problems enables the movement to make authoritative moral and ethical claims that it is imperative for all groups to co-operate in overriding the politics-as-usual associated with the multiple local, regional, and national forums in which pro-environmental policies would otherwise need to be pursued. The international political pressures that led to the two 1970s UN environmental conferences (on environment and population) and to the 1980s World Commission on Environment and Development (see WCED 1987), and to the conventions and treaties prepared for ratification at the 1992 Earth Summit, are cases in point.

Global change/warming, much like the 'population bomb' and the 'limits to growth' in previous decades, became plausible as a

consolidating framework, and thus as an overarching movement ideology, for several reasons. In addition to the legitimacy afforded by its scientific imprimatur, global change was particularly appropriate for aggregating the bulk of the traditional environmental agenda (for example, industrial pollution control, energy conservation, preservation of tropical ecosystems, population control) under a single umbrella and rationale. Global change/warming lent itself to popularization¹⁰ on account of multiple projected 'dread factors': massive coastal inundation due to rising sea-levels, increases in cancer due to ozone layer depletion, destructive impacts of climate alterations on agricultural productivity (especially in the American and other temperate breadbaskets), a growing incidence of drought and climatic extremes, the spectre of wholesale loss of biodiversity, and so on. These dread factors, or what Mol and Spaargaren (1992) have called 'eco-alarmism', were integral in constructing a portrait of global change in which it was stressed that communities, regions, and nations are impotent to deal with these problems on their own - hence the need to override 'politics-as-usual' and urgently to erect a new global regulatory order with the moral imperative to address these profound threats to human survival and biospheric integrity.

The recent tendency towards fusion or convergence of the roles of environmental activist and scientist notwithstanding, the mutual dependency of movements and science may also be conflictual or contradictory. The environmental movement, for example, has long tended to regard environmental scientists as being too timid in bringing their findings to the public and in taking political stands on environmental issues. Scientists likewise may become uncomfortable when faced with the transparency of the ideological moorings or implications of their research. One such example, in the case of global warming, was the tendency that emerged among some climate/planetary scientists, beginning in late 1989 and early 1990, to express ambivalence about the political uses of their data, and to distance themselves from movement ideology and the more radical fringes of green forces (Buttel *et al.* 1990).

As much as global change/warming was successful as an environmental ideology and mobilization strategy, it must be recognized as well that movements that base their claims and agenda on scientific knowledge claims are also vulnerable to their ideas being 'deconstructed' by and through science. 'Scientific uncertainty' can be an enormously powerful tool, and is one that is often wielded against environmentalists with particular effectiveness (Jasanoff 1992). In so far as the perception of scientific consensus about the likelihood of the 'greenhouse effect' was one with which not all climate/planetary scientists were entirely comfortable, it was almost inevitable that

there would emerge scientific studies and opinion that would cast doubt on the portrait painted by environmentalists. Accordingly, the work of scientists who resisted or were agnostic about the conclusions or policies advocated by proponents of global warming - on either ideological (Marshall Institute 1989) or more conventionally scientific grounds (Bryson 1990) - would ultimately play a significant role in global warming politics. While active opposition to policies to ameliorate global warming is currently confined largely to the Bush Administration and to a number of governments and activists (as well as tropical timber entrepreneurs) in the Third World, the scientific data and opinions that contradict the environmentalist rendering of global climate data are playing a very significant and growing role in justifying opposition to 'greenhouse policies' (useful examples of which in the mainstream media are Nordhaus 1990a, 1990b; *The Economist* 1991).

Approach 3: Global change mobilization in a context of free-market resurgence

We noted earlier some of the limitations of NSM-type value-oriented theories as an orienting perspective on global environmental change. Here it is useful to extend these observations by noting that NSM-type theories, by focusing on the politics of the environment from the vantage point of broad social values rather than institutional structures, may exaggerate the degree to which NSMs are a potent oppositional force in modern politics or in geopolitics. In particular, NSM perspectives alone have difficulty accounting for two interrelated political realities of the current era of global environmental change. There is a seeming contradiction between the ostensible radicalness and oppositional character of NSM ideologies and two current phenomena: (a) global environmental change has yet to prompt concerted attempts at corporate veto; and (b) environmental movement organizations have not only accommodated themselves to the free-market resurgence of the 1980s and 1990s, but some of them have aligned themselves with the dominant institutions of global society (particularly the international development finance and monetary establishment), often against the (immediate) interests of groups and nations of the South.

It is useful to begin by noting that the limits to growth, which has many similarities to global change,¹¹ was in substantial measure delegitimated almost from the start through corporate veto. Implementation of a limits-to-growth world view would have severely constrained capital accumulation, would have virtually required a nationally planned economy and sharply increased state intervention, and would have threatened those whose interests were tied to growth.

Global change, which has been widely popularized since the summer of 1988, has attracted little scrutiny of this sort. To our knowledge, the only significant advanced-country corporate opposition to ongoing attempts to forge a climate change convention (prepared for ratification at the Earth Summit, ultimately in a very diluted form) has been that of the Climate Council, a US lobbying group representing electrical utilities that depend heavily on fossil fuels, particularly coal (Pearce 1991b).

To some extent the puzzle of the lack of intense corporate opposition to, or attempts at corporate veto of, global warming policy can be explained by the business opportunities that currently popular responses to global environmental change will afford. These policies will, in particular, involve the likelihood that carbon taxes will be the centre-piece of a global climate convention. Carbon taxes could lead to the revitalization of the civilian nuclear power industry as a means of providing growing levels of energy with lower levels of CO₂ emissions (*The Economist* 1989a). Another area of considerable profit potential is that of R&D into new industrial chemicals and plant-based biotechnology processes that can substitute for petroleum-based production of CFCs and other chemicals (*The Economist* 1989b).¹²

Over and above the new R&D and commercial opportunities, the lack of corporate opposition to the global climate convention probably stems from the green world view and environmentalist strategy themselves. At one level, as we have observed elsewhere (Buttel *et al.* 1990, Taylor and Buttel 1992), global change was promoted in a selective way, so as to generate support among prospective environmental supporters and to minimize opposition among the political and corporate officialdoms in the advanced industrial countries.¹³ At another, modern environmentalism has accommodated itself surprisingly readily to the global free-market resurgence. While international environmental groups yet reserve the right to criticize the World Bank and related institutions about the environmental destruction that results from particular projects or types of projects (especially dam, road construction, and mining projects; see Lewis 1991, Hunt and Sattaur 1991), environmental groups have generally worked with the Bank in a surprisingly harmonious manner in implementing conservation/preservation policies and programmes in the Third World (Parker 1991). There is a key coincidence of interest in the environmental group/World Bank/IMF relationship: the Bank and IMF gain legitimacy in the eyes of the citizens and political officialdoms of the advanced countries by helping to implement environmental and conservation policies, while the implied threat of Bank or IMF termination of bridging, adjustment, and project loans is useful in securing developing-country compliance with environmental initiatives.

Given the relative harmony of this relationship, the environmental community has been disinclined to take on the world debt crisis, the net South-to-North capital drain, and the international monetary order (which is substantially regulated by the World Bank and IMF; see Wood 1986) as being fundamental contributors to global environmental degradation. In a breaking of ranks that is the exception that proves the rule, Postel and Flavin of the Worldwatch Institute have recently (1991) stated that the South-to-North capital drain (now approaching US\$50 billion annually) and the environmentally destructive imperatives of Bank- and IMF-supervised debt repayment must be addressed before permanent solutions to global environmental problems can be implemented.¹⁴

Approach 4: Turning up the heat: global change, development discontent, the 'debt connection', and the road to and from Rio de Janeiro

It is increasingly widely recognized that the popularization of the global warming notion was accompanied by, if not substantially based on, giving disproportionate stress to Third World sources of greenhouse gases, particularly tropical rain-forest destruction. Tropical rain-forest destruction, however, probably accounts for less than 15 per cent of global greenhouse gases (Norgaard 1991b), and is a relatively minor source compared to industrial, transport, and other greenhouse gas emissions from the developed countries.¹⁵ It is, of course, likely that if the ambitious energy and overall development plans of developing countries (particularly China) are implemented, there will be a very considerable expansion of their greenhouse gas emissions over the next few decades. None the less, the arguably disproportionate stress given to the rain-forest component of global climate change has been among the major catalysts of developing-country opposition to a global climate treaty that was prepared for ratification at the Earth Summit (Pearce 1991a).

Another source of North-South friction over the global climate and other conventions prepared for ratification at the Earth Summit is more long-standing. International development policy has long been conflictual, involving struggles between official development agencies and external groups critical of the performance and consequences of development projects and policies. One of the most important, yet largely invisible, concomitants of the conservative drift of Western politics has been the implementation of 'structural adjustment' doctrine within international development finance and assistance institutions, most notably the World Bank and IMF. The main impetus for the structural adjustment policies that have been imposed on

developing countries has been the global debt crisis, and the resulting international monetary instability, which while nearly 10 years old is no closer to resolution than when Mexico first defaulted on its loan payments in the early 1980s (Canak 1989). The political economy of debt has become the principal parameter affecting Third World development prospects. Most important for present purposes, the debt crisis – and the structural adjustment policies imposed on the Third World in order to extract as much interest and principal as possible and to sustain the belief that the Third World debt will ultimately be repaid – has been accompanied by the undermining of the traditional means by which opposition to official development policies had been articulated by many developing-country governments and most development activists. Social-justice-based opposition to development policies – on the grounds that these policies are unwarranted because they aggravate inequality or fail to improve the lot of the poor – has increasingly lost its standing and the influence it once wielded in institutional forums such as the World Bank/IMF, the US Agency for International Development, and the UN system. Increasingly, in this era of debt crisis and structural adjustment, environmental criticism of development policies and projects now serves as the predominant discourse for expressing opposition to official development policy.

The process of substituting environmental for social justice discourse, however, is contradictory. It has largely been through the 'debt regime' that environmental agendas have been grafted on to Third World development planning. Only heavily indebted countries, for example, have debt that is sufficiently discounted on the secondary debt market to be attractive to environmental groups for purchase in debt-for-nature swaps. Likewise, heavily indebted countries are most subject to joint environmental and development agency pressures to protect the environment. But as much as external debt has facilitated the implementation of environmental conservation policies, debt also serves to exacerbate environmental degradation. Third World countries that are most 'debt-stressed', and thus who are most in need of hard-currency export revenues, are most likely to see little alternative but aggressively to 'develop' their tropical rain forests and other sensitive habitats in order to maintain their balance of payments and service their debts.

It is therefore not surprising that there has emerged a growing Third World reaction to 'environmental colonialism'. This reaction is surprisingly broadly based within the developing world. Much of its intellectual rationale has been articulated by left-leaning groups such as the Centre for Science and the Environment in India. These groups have stressed that international environmental organizations have exaggerated the Third World contribution to global warming, and

that Western calculations of developing country contributions to greenhouse gas emissions have failed to note a fundamental First World/Third World difference in the nature of these emissions: that between the 'survival emissions' of the 'South' and the 'luxury emissions' of the 'North' (see Agarwal and Narain 1991). But Third World criticism of global environmental policies' environmental colonialism also includes increasingly forceful opposition to proposed global change conventions by Third World politicians and business leaders - not only on grounds of 'national sovereignty', but also through demands that these conventions include binding commitments by the North to subsidize the South's transition to environmental protection through massive expansion of foreign aid (Pearce 1991a). The Earth Summit was accordingly dominated more by the saga of North-South acrimony than by environmental science.

The experiences of the 1970s UN conferences on population and environment as well as that of 1992 Earth Summit suggest that environmental sociology, particularly that which seeks to understand global environmental change, should be reconstructed by giving more attention to international political economy. For example, the two most fundamental institutions of global society today - the inter-state system, based on the principle of state sovereignty; and the world economy, based on GATT and related rules and on international monetary deregulation that sanctions international competition through world trade and through internationalization of finance via floating exchange rates - are largely adverse for environmental protection. As we have seen at the Earth Summit, national-state sovereignty can be and is construed to include the national right to exploit resources at the discretion of their regimes. Also, as seen at Rio de Janeiro, the international competition dynamic may - in ideology, if not reality - compel states to compete effectively with one another by degrading the environment. Another possible lesson from the Earth Summit was the potent reminder of the fact that foreign aid was essentially a product of the Cold War, in which East and West vied for the hearts, minds, and security allegiance of Third World nation-states. Now that the Cold War is over, the impulse to assist the Third World (either through development grants - rather than through the World Bank/IMF loan apparatus and extension of the 'debt trap'; see Canak 1989 - or through major foreign aid programmes to subsidize Third World environmental responsibility) is weak. This fundamental reality - that the bulk of the industrial states now see little geopolitical reason for restoring foreign aid programmes to their 1970s levels, let alone for undertaking major infusions of 'fresh money' for environmental assistance that confers little geopolitical benefit - none the less came as a shock to international environmental activists

and Third World officialdoms at Rio de Janeiro. It should be stressed, however, that as crucial as these two principles of global society are in shaping the international political economy of the environment, each was largely laid down during the post-Second World War period and neither is necessarily permanent. Globalization of international finance and of commodity markets is beginning to erode state sovereignty, particularly the ability of states to implement fiscal and monetary policies to achieve national goals without risking national decline in a competitive international economic environment. For many countries, even rich ones with world-market advantages, protectionism and reassertion of the integrity of national economies may in the future be seen as preferable to depending on the vagaries of national economic competition in international markets in money and goods to improve their living standards (Gilpin 1987). The reluctance of world states in coming to agreement on the liberalization initiatives of the long Uruguay round of the GATT negotiations, along with the rising share of world trade that is 'administered', attests to the reversibility of the key post-war institutions of global society. As these dynamics unfold, they will have enormous implications for the environment and for how these problems can and must be dealt with.

CONCLUSION

Neither an environmental sociology which fails to attend to the social construction of environmental knowledge nor a sociology of science that ignores the material-productive realities of environmental knowledge can understand the significance of global environmental change in the world today. We have sought to chart some new directions to this end. Our suggestions have stressed the causes and consequences of the fact that global environmental change serves simultaneously as scientific concept and social ideology, and the utility of identifying the mobilizational and political continuities between global change and previous (global) conceptualizations of environmental issues. We believe that further progress requires more attention to be paid to understanding both the social and political-economic forces that affect the construction of environmentally related scientific knowledge, and the 'scientization' and 'scientific deconstruction' dynamics within environmentalism. We also need to recognize that the internationalization of environmentalism has involved it being shifted towards and grafted on to a set of geopolitical institutions - particularly those of inter-state relations, the world economy and rules of world trade, the development assistance establishment, and implicitly those of the world monetary order - that both decisively shape environmentalism and define its limits in the late twentieth century.

NOTES

- 1 An earlier version of this chapter was presented at the seminar series of the Program on Social Analysis of Environmental Change, Cornell University, April 1991, and published in *Society and Natural Resources* 5: 211-30, 1992. The senior author's research was supported by funds from a grant from the Environmental Protection Agency to the Ecosystems Research Center, Cornell University.
- 2 It is by no means the case that all or most environmental sociologists explicitly embrace theories of new social movements. These theories, however, may be seen to be consistent with or to subsume a number of other perspectives (for example, of the rise of postmaterial values, the new ecological paradigm). See Cotgrove (1982) for a noteworthy early attempt to demonstrate how a variety of strands of research in environmental sociology could be subsumed within the (then) emerging European traditions of NSM research, and Buttel (1992) for suggestions as to how NSM theory can be extended to be relevant to global environmental phenomena.
- 3 It should be stressed, of course, that just as the post-Second World War trajectory of social democratic modernity' and 'Fordism' were manifest differentially and unevenly among the advanced countries (Lash and Urry 1987, Esping-Andersen 1990), the demise of the post-war order has equally diverse manifestations. The portrait as painted above - of the decline of party politics, the shaky coexistence of left parties' working class and 'new class' constituencies, the search among the left to social movement alternatives to parties - *pertains most clearly* to the Anglo *laissez-faire* regime types (Esping-Andersen 1990). But even in the Nordic nations where the welfare state is largely intact, slow growth, state fiscal crises, and Social Democratic Party disarray have led to Christian Democratic rule and/or moves to neoliberal policies. The rise of NSMs as an alternative to party politics has also been a general concomitant of the disintegration of the post-war order. Also note that there is a disagreement within the NSM literature on whether the predominant thrust of these movements is to serve as a vehicle for expression of 'identity', or whether these movements should be seen mainly as a more clearly instrumentally rational pursuit of the policies deriving from movement ideology (see, for example, Scott 1990; Ch. 6). The former ('culturalist') position is most closely associated with Alain Touraine (1981), and the latter ('realist') position with Claus Offe (1987).
- 4 This does not mean that modern environmental movements whose ideologies are rooted in science will not put their own gloss on the scientific data used to buttress their claims. For example, while much of the 'sustainable development' agenda, *for example, as set forth in the Brundtland Report* (WCED 1987), was premised on ecological science, Timberlake (1989) notes that the ideas that underlay the concept of sustainable development were more matters of opinion than scientifically based ones. We note below (see pp. 242-4) how this process has occurred in the popular construction of global climate knowledge.
- 5 But see Norgaard's (1991) useful discussion of the fragmentation of the environmental sciences and of the implications of the lack of 'a meta-model to link the individual environmental sciences into a coherent whole'.

- 6 In addition to the preoccupation of the now-dominant wing of the sociology of science with challenging the Mertonian view, many in this wing were as (or more) motivated to challenge Mannheim's sociology of knowledge. Mannheim claimed that his sociology of knowledge was applicable only to the social sciences, since knowledge in the natural sciences would be determined mainly by the laws of nature that they would inevitably uncover. The constructivist wing in the sociology of science, by contrast, emerged, contra-Mannheim, with a conviction that natural science knowledge, no less than that in the social sciences, is socially constructed.
- 7 The major exceptions to this generalization are several historians of science conversant with the sociology of science (see, for example, Bird 1987). Bramell's (1989) history of twentieth-century ecology, in both the scientific and movement senses, is a particularly notable exception.
- 8 Note that while there has been criticism of the stylized world view of greenhouse effect proponents over the past year or so, the criticisms by economists (for example, Nordhaus 1990a, 1990b; the work of the Adaptation panel of the NRC/NAS study on global climate change) have been more influential than those of critics within the atmospheric/planetary science research community. Interestingly, these criticisms by economists and other 'adaptationists' typically take the received parameters of greenhouse warming as their point of departure, while arguing that incremental economic, migration, technological, and other adaptive mechanisms will be sufficient to deal with very slow increases in global mean temperature.
- 9 As noted earlier, sociologists as a whole have difficulty conceptualizing the 'global' in a distinctly sociological sense. Sklair's (1991) theory of economic, political, and cultural-ideological 'transnational practices', however, is a promising means of treating global dynamics without world-economic or geopolitical reductionism.
- 10 As important as the modern sociology of science's emphasis on the social construction of scientific knowledge at the laboratory level is (or can be) to understanding environmental data, the rise of global change/warming also demands attention to the processes of social construction of popular knowledge (see Buttel *et al.* 1990).
- 11 An earlier publication (Buttel *et al.* 1990) has explored the many similarities of these two frameworks (for example, that both are globally and computer-modelling based, neo-Malthusian, critical of industrial civilization) as well as their differences (for example, that while the LTG saw fossil-fuel scarcity as a major problem, the abundance of fossil fuels is seen as problematic from a global change point of view). See Taylor and Buttel (1992).
- 12 These substitutes, however, will be highly profitable and can achieve global market penetration only if there is effective global regulation - for example, global phaseouts of the use of (cheaper) CFCs, an effective international convention on climate change. Thus, many of the business opportunities that will be afforded by responding to global climate change are not only consistent with, but will require, international environmental regulation.

- 13 In particular, the popularization of global warming tended to stress the need to shift to alternative energy sources over the need for strict energy-use reduction, and also gave disproportionate stress to Third World sources of greenhouse gases.
- 14 We have undoubtedly overgeneralized here. In the early autumn of 1992, as we completed revisions on this manuscript, an international meeting of environmentalists in Washington discussed issues relating to structural adjustment and the environment. The resistance of the Bush Administration of the United States to the treaties prepared for signing at the Rio Earth Summit, together with the influence on the treaty formulation of corporate NGOs such as the Business Council for Sustainable Development, indicates that the contradictions are being brought into sharper relief. See Hecht and Cockburn (1992), Bidwai (1992), and the July/August edition of the journal *Multinational Monitor*, 'Report from Rio', for a more complex account of the conflicts and alliances among environmentalists, business, and First and Third World States.
- 15 Thrupp (1991) stresses that the pre-climate-change preoccupations of environmental groups (preserving primary rain forests and other 'sensitive' zones, protection of wildlife species) were instrumental in the formulation of environmentalist doctrine on global change. See also Buttel *et al.* (1991) for a discussion of the role of rising consciousness about global climate change in galvanizing the sustainable development movement in the late 1980s and of the tendency to 'rainforest fundamentalism' in sustainable development practice.

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