

CRITICAL POLITICAL ECOLOGY

The politics of environmental science

“A truth is the kind of error without which a certain species of life could not live”

Frederick Nietzsche: *The Will to Power* (1901:493)

“Call it a lie, if you like, but a lie is a sort of myth and a myth is a sort of truth”

Cyrano de Bergerac, in Edmond Rostand: *Cyrano de Bergerac* (Act 2)

“Bullshit is a greater enemy of the truth than lies are”

Harry Frankfurt, Princeton University, *On the Importance of What We Care About*

(1978:132)

CHAPTER ONE

POLITICAL ECOLOGY AND THE POLITICS OF ENVIRONMENTAL SCIENCE

Abraham Lincoln once remarked that anyone who enjoys eating sausage and using the law should avoid seeing how either is made. The same can be said about many of the scientific “laws” and principles underlying environmental policy and debates today. This book is about why we should treat these apparent environmental “laws” with concern, and instead seek a more accurate and politically aware approach to environmental explanation. The book’s key purpose is to show how we need to see the evolution of environmental facts and knowledge as part of the political debate, rather than as a pre-prepared basis from which to start environmental debate.

The time has never been better for reevaluating the political basis of environmental explanations. Few days go by without media reports of environmental crisis. Unusual weather events are taken as evidence of irreversible and catastrophic climate change. Increasingly complex environmental policies and agreements are being agreed, with progressively more control over different aspects of our lives. Inexorably, we seem to slip towards the “Risk Society” of Ulrich Beck (1992), in which lives and politics are organized around the avoidance of risk. Yet, in environmental terms at least, the causal basis of environmental risk, and the implications of proposed solutions to risk, are far from clear.

This book seeks to provide this reevaluation of environmental science by considering the intricate ways in which science and politics are mutually related. This project does not refer to conventional political debates such as public access to scientific information, or the ability to communicate scientific findings to policy. Instead, the project is to develop a political philosophy of environmental science that indicates how social and political framings are woven into both the formulation of scientific explanations of environmental problems, and the solutions proposed to reduce them.

Thus, when Michael Zammit Cutajar, the Executive Secretary of the United Nations Framework Convention on Climate Change commented that:

The science has driven the politics... if the science is to continue guiding the politics, it is essential to keep the politics out of the science (Cutajar, 2001:1),

he adopted the classic position that environmental science is somehow disconnected from environmental values and politics. This book does not adopt an anti-climate change position, but seeks to indicate how different political actions and scientific methodologies have led to environmental explanations and solutions that are thoroughly embedded in social and political practices.

So, how does this book proceed? The key objective of this book is to integrate debates in so-called “political ecology” with debates concerning the constructions of science. It is important to note that this approach does not imply rejecting environmental “realism” – or the belief in a biophysically “real world out there.” Indeed, the book adopts debates within philosophy of science to indicate potential ways to integrate realist biophysical prediction with social and political constructions.

It is also important to note that this book is in no way a supporter of “brownlash,” or the criticism of environmental concerns in order to support polluting industries or weaken environmental regulation. Nevertheless, this book does criticize some assertions of environmentalists about the ability of orthodox science to describe environmental change and problems in ways that are politically neutral.

Yet, this book is also directed by two important and increasingly unavoidable anxieties. First, the adoption of environmental science without acknowledging how it is affected by social and political factors undermines its ability to address the underlying biophysical causes of perceived environmental problems. Secondly, the adoption of policies based on such unreconstructed science frequently produces environmental policies that unfairly penalize many land users – especially in developing countries – any may even increase environmental degradation and poverty by threatening livelihoods. This book seeks to address these two problems by exploring the links between science and society in order to avoid the replication of inadequate science, and to enable the production of more biophysically accurate, and socially relevant science.

This initial Chapter explains the rationale for this project. The Chapter looks specifically at debates in “political ecology” and so-called science studies or science-policy. Readers not familiar with these debates may prefer to turn immediately to Chapter 2.

THE SEPARATION OF SCIENCE AND POLITICS: SOME PAST TRENDS IN POLITICAL ECOLOGY

It is widely accepted that debates concerning “political ecology” refer to the social and political conditions surrounding the causes, experiences, and management of environmental problems (e.g. Blaikie and Brookfield, 1987; Bryant, 1992; Greenberg and Park, 1994; Zimmerer, 2000). It is, however, remarkable that much writing about political ecology does not define what is meant by “ecology.” A variety of authors over the years have revealed different approaches to the meaning of “ecology” in “political ecology.”

First, some authors have approached political ecology by explaining environmental problems as the phenomenological interaction of biophysical processes, human needs and wider political systems. Blaikie and Brookfield (1987) wrote:

The phrase “political ecology” combines the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land-based resources, and also within classes and groups within society itself (Blaikie and Brookfield, 1987:17).

Secondly, there is the “politics of ecology” in the sense of political activism in favor of Deep Green environmentalism and its critique of modernity and capitalism. Atkinson (1991) wrote:

Political Ecology is both a set of theoretical propositions and ideas on the one hand and on the other a social movement referred to as the “ecology movement” or, latterly, the Green movement (Atkinson, 1991:18).

Thirdly, there is the use of “ecology” as a metaphor for the interconnectedness of political relations. This metaphor was adopted by the first book with “political ecology” in its title, *International Regions and the International System: A Study in Political Ecology* by Bruce

M. Russett in 1967, even though the book itself had no discussion of biophysical environmental change or conservation. He wrote:

I have termed this volume “a study in political ecology.” As ecology is defined as *the relation of organisms or groups of organisms to their environment*, I have attempted to explore some of the relations between political systems and their social and physical environment (Russett, 1967:vii, emphasis in original).

Yet, although this original book did not discuss environmental conservation, later volumes on environment have adopted a similar usage of the term, political ecology. Anderson (1994), for example wrote:

Just as environmental ecology refers to interaction and interdependence among soil, air and water, the peasants’ political ecology also refers to the interactive interdependence among spheres – the individual, the community, the natural world, and the national society (Anderson, 1994:6).

Fourthly, political ecology has been defined as a more specific analysis of Marxist debates about materialism, justice, and nature in capitalist societies, with the view to achieving a fairer distribution of rights and resources.

Political ecology, like the Marxist-inspired workers’ movement, is based on a critique – and thus an analysis, a theorized understanding – of the “order of existing things.” More specifically, Marx and the greens focus on a very precise sector of the real world: the humanity-nature relationship, and, even more precisely, relations among people that pertain to nature (or what Marxists call the “productive forces”) (Lipietz, 2000:70).

Finally, there is the use of “political ecology” to refer in general terms to the politics of environmental problems without specific discussion of “ecology.” Bryant (1992:13) for example describes political ecology as an inquiry into “the political forces, conditions and ramifications of environmental change,” and may include studies of environmental impacts from different sources; location-specific aspects of ecological change; and the effects of environmental change on socio-economic and political relationships (see also Lowe and Rüdig, 1986). In a later publication, Bryant and Bailey (1997:190) suggest that “political ecology” as a debate focuses on interactions between the state, non-state actors, and the physical environment, whereas “environmental politics” as a debate concerns generally the role of the state.

This book differs from these approaches by seeking to establish the political forces behind different accounts of “ecology” as a representation of biophysical reality. In this sense, a “critical” political ecology may be seen to be the politics of ecology as a scientific legitimatization of environmental policy. The approach adopted in this book may be seen to differ with the historic approaches to political ecology listed above because these approaches either adopt *a priori* concepts of environmental science and explanation; or take insufficient steps to avoid the separation of environmental explanation and politics in the analysis of environmental politics. The following discussions describe some themes of these past approaches, and how this book may argue for different approaches. The following section then discusses how science and politics may be integrated.

Ecology, the subversive science

The first usages of the term “political ecology” in academic publications were made in the late 1960s and 1970s (see Russett, 1967; Wolf, 1972; Miller, 1978; Cockburn and Ridgeway, 1979). Yet, before then, the possibility to integrate political analysis with environmental explanation was widely discussed. The first discussions of ecology as a science with political content emerged in the 1960s during the growing concern about human impacts on the biophysical environment. “Ecology” was seen as both the study of those impacts, but also the new philosophical approach of looking at people–environment interactions as a whole. Indeed, the mood was well represented by Aldous Huxley’s 1963 paper, “The politics of ecology: the question of survival” (Huxley, 1963).

Rather than simply challenge existing economic development as damaging, the early political ecologists emphasized the philosophical and methodological challenges of “ecology” to existing forms of science. In a collection of paper in the journal, *Bioscience* in 1964, René Dobos – the future co-author of the companion book to the 1972 World Conference on the Human Environment, *Only One Earth* (Ward and Dubos, 1972) – rejected existing scientific approaches for being reductionist. Instead, Dobos sought a method of seeking “community” or “interrelationships” under ecology as a better basis for understanding environmental change (Dubos, 1964). Similarly, Eugene Odum, the author of *Fundamentals of Ecology* (1953), wrote,

The new ecology is thus a systems ecology ... [it] deals with the structure and function of levels of organization beyond that of the individual and species (Odum, 1964:15, his emphasis).

“Ecology,” therefore, was a new science aiming to illustrate the connectiveness of humans and other species. Yet the achievement of ecology, by definition, depended simultaneously

upon the development of a new scientific approach highlighting a level of “community” beyond simple individuals, and also the establishment of a new political agenda questioning the destructiveness of human behavior. “Ecology” was therefore inherently “political,” and this was expressed most forcefully by Paul Sears in a paper entitled *Ecology – a subversive subject* (1964:11-12):

Is ecology a phase of science of limited interest and utility? Or, if taken seriously as an instrument for the long-run welfare of mankind (sic), would it endanger the assumptions and practices accepted by modern societies, whatever their doctrinal commitments? ...By its very nature, ecology affords a continuing critique of man’s operations within the ecosystem.

This book shows how this early trend in the politics of ecology is still influential today. Yet, while this initial school is overtly political, the approach does not question how its statements about “community” and “mankind” (sic) might pose problems for establishing universal explanations of environmental problems. Instead, this book discusses newer approaches to less generalized explanation of environmental problems, and the localized and contextual nature of environmental threats.

The domination of nature

Another important theme underlying much debate within political ecology is the preoccupation with what writers have called the “domination” of nature. This theme is also closely linked to the discussion of capitalism as a primary cause of environmental degradation. Such debates have been particularly prevalent among writers influenced by the

Frankfurt School of Critical Theory, and particularly Marcuse and Habermas, who described how “human nature” was dominated by the instrumental rationality and exploitation of modern industrial society. The debates also fueled the growth of environmentalism as a “new” social movement in Europe and North America during the 1960s, which was partly premised on concerns about the instrumentality of capitalism, science and technology.

Marcuse (1964), in *One Dimensional Man*, famously wrote:

Science, by *virtue of its own methods* and concepts, has projected and promoted a universe in which the domination of nature has remained linked to the domination of man (sic) – a link which tends to be fatal to this universe as a whole (Marcuse, 1964:166, emphasis in original).

Such statements were also adopted by some of the original writers on ecology and politics. In *The Subversive Science: Essays Towards an Ecology of Man*, Shepard and McKinley (1969) wrote:

To a world which gives grudging admission of the “nature” in human nature, we say that the framework of human life is all life, and that anything adding to its understanding may be ecological. It is life, not man (sic), which is the main contour, and it ecology in general where human ecology is to be found. Ideas themselves are inseparable from nature and the study of man in nature (Shepard and McKinley, 1969:vii).

And in another early book on political ecology, Miller (1978) wrote:

A primary contribution of a “political ecology” movement should be to demythologize this idealist mystification of the human/nature relationship [as adopted by economic exploitation] and to begin the construction of a new, holistic ethic...

This new one-dimensionality of science and of technology, its utilitarianism and devotion to the end goals of the dominant economic class in American society, raises perhaps the ultimate question of environmental values. With nature and people increasingly viewed as having only commodity and exchange value, the acquiescence of science to that same perspective can only lead to a deepening dehumanization within society and to a further exploitation of nature (Miller, 1978:56,101).

This book seeks to question how far it is still possible to base explanations of environmental degradation upon such far-reaching criticisms of modernity industrial society (see also Castree, 1995; Vogel, 1996; Gandy, 1997). By so doing, this book does not question the need to consider the impacts of modernity on the human condition. But it seeks to explore how far the critique of modernity in the fashion of these critics and the early scholars of the Frankfurt School might also imply forms of environmental explanation that may not acknowledge how it approaches the complexities of ecological reality in the biophysical world. One important additional aspect of this debate is the link between the “domination of nature” and the ecological science dominated by notions of ecological equilibrium, or a “balance” of nature. André Gorz (in his 1975 polemic, *Ecologique et Politique*) wrote:

Science and technology have ended up making this central discovery: all productive activity depends on borrowing from the finite resources of the planet and on organizing a set of exchanges within a fragile system of multiple equilibriums (Gorz, 1975:12-13).

Such notions of ecological equilibrium are now being questioned among scientific researchers in a variety of disciplines. Instead, a new discourse of “non-equilibrium ecology” is emerging to reflect recent insights into chaos theory, and the problems of inferring

ecological explanation across indeterminate time and space scales (e.g. Botkin, 1990; Zimmerer, 2000). Exploring the political origins of different models of environmental explanation therefore requires seeking to integrate the new, non-equilibrium ecologies with social and political understandings of how the two are linked.

Furthermore, this approach also implies questioning how far environmental degradation, *per se* may be attributed simply to capitalism, or the exploitation of industry and the state. By questioning the essentialist link between capitalism and environmental degradation, this book challenges virtually all historic approaches to political ecology that have focused on political economy and environment (e.g. Cockburn and Ridgeway, 1979; Atkinson, 1991; Bryant, 1997b; Bryant and Bailey, 1997; Wells and Lynch, 2000). Yet, the aims of questioning the role of capitalism are not to suggest that political ecologists should not be concerned about exploitation of people and resources, but to ask how the opposition to capitalism may have influenced the production of environmental explanations. The aim of a “critical” political ecology is to refocus political ecology from the assessment of capitalism alone as a source of environmental degradation, towards a politicized understanding of environmental explanation beyond the epistemology offered by the critique of capitalism. Indeed, as later chapters describe, the shortcomings of such essential links between capitalism and degradation have been most exposed when they have been applied to societies and environmental problems outside Europe and North America.

Social justice and the developing world

Finally, much debate in political ecology has focused on the social justice of environmental disputes and resource struggles in developing countries (e.g. Watts, 1983; Blaikie, 1985; Escobar, 1995). In part, this is because such environmental conflicts involve the interaction of a variety of actors from state, society, and industry in locations considered to be of global environmental significance (for example, concerning the Amazon, see Bunker, 1985, and Hecht and Cockburn, 1989). Yet, in addition, much political ecology within developing countries may be seen to be an extension of so-called cultural ecology, or the research focusing on local environmental practices often in an anthropological fashion (e.g. Conklin, 1954; Geertz, 1963; Rappaport, 1967). The influential cultural ecologist, Robert Netting summarized cultural ecology as a focus on the “particular circumstances of geography, demography, technology, and history” that result in a “splendid variety of cultural values, religion, kinship systems, and political structures” in local environmental strategies (Netting, 1993:1). Indeed, the earliest published paper to include “political ecology” in its title (Eric Wolf’s 1972 paper, “Ownership and political ecology”) draws heavily on Netting’s work.

There is much debate concerning the difference between “cultural” and “political” ecology (e.g. see Batterbury and Bebbington, 1999). Generally, political ecology has been seen to focus more on underlying and widespread political explanations for environmental change and degradation, whereas cultural ecology has considered more local and culturally situated practices of land management. Yet within this focus, analysts have identified two broad themes within political ecology in relation to the developing world (see Peet and Watts, 1996; Watts and McCarthy, 1997). The first theme adopts a largely structuralist explanation of land degradation through reference to the forces of capitalism, or oppressive state policies and their impacts on local people and environment (e.g. Blaikie, 1985; Blaikie and Brookfield, 1987; Bryant and Bailey, 1997). The second theme is influenced by poststructuralist

approaches to social science that focus instead on the historical and cultural influences on the evolution of concepts of environmental change and degradation as linguistic and political forces in their own right (e.g. Rocheleau, 1995; Leach and Mearns, 1996; Escobar, 1995, 1996, 1998). Yet, both are premised upon a sense of social justice for environmental explanation and development.

As Peet and Watts (1996) note, much concern about political ecology in the developing world has reflected the belief that injustices are being committed against both local peoples, and against environmental resources that may be of value to these people or to the world at large. There is a lack of consensus among political ecologists, however, about how to express this concern. On one hand, some of the orthodox approaches to environmental politics have advocated intervening in environmental struggles in developing countries in order to protect threatened peoples and resources (e.g. Miller, 1978). On the other hand, other critics have suggested that there needs to be more concern about how such struggles are represented. This caution has also been extended to how “indigenous peoples,” “threatened ecosystems,” or “injustice” themselves are constructed (e.g. Leach and Mearns, 1996; Escobar, 1996). Indeed, according to Hecht and Cockburn (1989), the widespread concern about degradation of the Amazon rainforest has largely been conducted without a chance for the Amazon, or its peoples, to tell its own story. Or, as Yash Tandon (1995) rightly commented:

There is a tendency for movements in the Southern Hemisphere to assume, or to be given, Northern labels. ...Environmental movements have a certain “newness” about them, new for the North, not for Africa... in Africa, the respect (even religious veneration) for land and nature is as old as the hills (Tandon, 1995:172-3).

This book acknowledges these debates about representation of people and environmental problems, and seeks to incorporate them into its discussion of science as the underlying basis through which environmental change is understood. Yet an important challenge in this approach is to integrate the structural focus on state, society, and industry, and the poststructuralist attention to how interactions between such actors co-construct environmental discourses and narratives about environmental change, and who should be represented as victims and villains. This challenge is also important for the analysis of so-called “local” or indigenous knowledge, which is often considered to be eclipsed by more dominant forms of explanation. Instead of essentializing approaches to “local” knowledge or “local” people, it is more important to ask how, and by whom, each are defined as “local” (or “global”). A “critical” political ecology might contribute to new forms of environmental explanation by providing more inclusive means to acknowledge local environmental concerns, and how such concerns have been addressed under existing environmental science.

The separation of science and politics

A final underlying theme within most historic approaches to political ecology has been the assumption that environmental politics can be separated from the principles and laws of environmental science. This separation may also be observed in many other disciplines and political approaches to environment. In political ecology, it would seem the separation has emerged partly because some researchers have seen further work in biophysical explanation to be unnecessary in essential social-science applications.

For example, in a book entitled, *The International Politics of the Environment* (Hurrell and Kingsbury, 1992), List and Rittberger (1992) argued that social-scientific approaches to environment should not get embroiled in the difficulties of biophysical science. They wrote:

A more pertinent social scientific analysis, while not denying that ecological problems are at the root of international environmental issues, would have to take a closer look at the conflicts arising from, or linked to ecological problems. ...It is here, in the process of articulating and mediating diverging goals and interests, that the ecological problem gains its political dimension, i.e. that *ecology* becomes *political ecology* (List and Rittberger, 1992:88, emphasis in original).

Similarly, Bryant and Bailey (1997) wrote:

Political ecologists tend to favor consideration of the political over the ecological... It is true that political ecologists ought not to ignore advances in the understanding of ecological processes derived from the “new ecology,” since, in doing so, they might miss an important part of the explanation of human–environmental interaction... Yet greater attention by political ecologists to ecological processes does not alter the need for a basic focus on politics as part of the attempt to understand Third World environmental problems (Bryant and Bailey, 1997:6).

The problem of alleging such a clear separation of science and politics is to avoid the politics in the creation of the science itself. Instead of approaching environmental debates as though the science is already agreed, scholars of environment need to focus more on the mechanisms by which knowledge about environment is produced and labeled, then used to construct “laws,” and the practices by which such laws and lawmakers are identified as legitimate in political debate.

The objectives of this approach are multiple. Science is undoubtedly used to legitimize a variety of environmental policies, yet there is often little appreciation of the biophysical uncertainties or political conflicts behind many supposedly well-known problems. The production of scientific knowledge and expertise is also growing as a branch of international development, and financial services. Applying inappropriate environmental policies may lead to social and economic problems for people affected, and fail to address underlying biophysical causes of problems. Yet, as discussed above, many explanations of environmental degradation within political ecology have been constructed without the participation of affected peoples, and without acknowledging how explanations may reflect social framings.

The lack of clarity concerning the meaning of “ecology” in political ecology has only added to the separation of science and politics. Anderson (1994), for example, demonstrated this by using “ecology” as a metaphor for social connections in Africa, and even as a legitimization for military intervention:

If the awareness of individual/community interdependence found in the environmental movement becomes more generalized and spreads into the political arena, a political ecology founded on environmentalism may build on itself and spread more widely. For example, the United States and other world powers may become willing to use military might to serve purposes other than the immediate short-term interests of themselves alone. If this becomes true, then perhaps even the US intervention in Somalia could be seen as an example of an embryonic political ecology at work (Anderson, 1994:171).

The aim of this book is to avoid the presentation of “ecology” – a topic over which there is great biophysical uncertainty and political contestation – into predefined notions of fact, accuracy and political purpose. This book argues throughout that separating science and politics in environmental policy may result in two serious problems: first, many environmental policies will not address the underlying biophysical causes of environmental problems; secondly, many environmental policies will impose unnecessary and unfair restrictions on livelihoods of marginalized people. (Indeed, Vayda and Walters, 1999, and Mukta and Hardiman, 2000, have made similar arguments). This Chapter now summarizes some of the potential ways in which science and politics may be integrated in order to indicate that environmental causality should not be taken as politically neutral.

INTEGRATING ENVIRONMENTAL SCIENCE AND POLITICS

It is ironic, then, that so much discussion of “political ecology” has proceeded without considering the politics with which “ecology” has evolved as a scientific approach to explaining the biophysical world. This book seeks to achieve this analysis, by adopting a science-studies and science-policy approach to the evolution of environmental explanation.

The term, “science studies,” refers to an attempt to integrate a political analysis of environmental conflicts, with insights from philosophy and sociology of science concerning the nature in which environmental science is made. Science-policy refers more specifically to the co-evolution (or coproduction) of scientific and political norms within the policy process itself (see Jasanoff *et al*, 1995; Hess, 1997). As this section of the Chapter discusses more fully, these topics are emerging as disciplines within environmental politics, but both have

been criticized and misunderstood. Some criticisms of science studies have suggested that discussions of science imply the adoption of an *anti-science* position; or the belief in scientific relativism (the assumption that all truth claims are equally valid), and/or postmodernism (e.g. Gross and Levitt, 1994; Koertge, 1998; Levitt, 1999). All such statements are inaccurate. Instead, it is possible to criticize many statements made by science while still believing in environmental realism (or the existence of a “real world out there”). Similarly, the adoption of a critical stance to many environmental discourses does not imply an acceptance of postmodernism or cultural relativism. As this book makes clear, the criticisms of science contained within it are made within the frameworks of debates about science, and the book suggests ways of reforming scientific practice to acknowledge the institutional bases upon which it is conducted.

The following sections discuss different ways in which science and politics may be integrated in order to achieve a more transparent and accountable form of science, which may also be considered biophysically more accurate than many “orthodox” environmental explanations today. The first discussion summarizes the approaches within political ecology itself towards understanding the social influence on ecological science.

Political ecology and the social construction of science

While political ecology was developing in North America as an exploration of holistic links between humans and nature at large, a different approach was adopted in England that focused on the social influences on environmental science as a political tool. The Political Ecology Research Group (PERG) was formed in Oxford, England, in 1976 as an informal

association of research scientists and students, and which grew into a research organization focusing on the risks and analysis of new technologies such as nuclear power. Two original associates of the group were Brian Wynne and Peter J. Taylor, who have since published widely on social constructions of science. In a statement foreshadowing many later debates, the group wrote:

Science is dialectical in nature, i.e. the results of research depend upon the assumptions of the researchers, which depend upon all manner of social factors specific to that researcher or research institution. The current situation, where Government attempts to appoint “impartial” assessors, in a quasi-legal framework, will in our view lead to the increasing dissatisfaction with the inquiry procedure (PERG, 1979:20).

Although the group did not last long into the 1980s, the approach to political ecology as the politics of the application of ecological science continued within British scientific communities, most importantly through the work of Blaikie (1985) and Blaikie and Brookfield (1987). Writing about “ecology” as politics, in *Land Degradation and Society*, they wrote:

It therefore becomes necessary to examine critically the political, social and economic content of seemingly physical and “apolitical” measures such as the Universal Soil Loss Equation, the “T” factor and erodibility (Blaikie and Brookfield, 1987:xix).

Such work typified a new trend in social studies of environmental degradation: the analysis of the political and social construction of ecological science that previously had been presented as accurate and politically neutral in assessments of environmental problems. Early examples of this kind of work included the influential *Uncertainty on a Himalayan Scale* (Thompson,

Warburton and Hatley, 1986), and *The Himalayan Dilemma* (Ives and Messerli, 1989), although the trend has been continued more recently by volumes such as *Desertification: Exploding the Myth* (Thomas and Middleton, 1994), *People and Environment* (Morse and Stocking, 1995); *The Lie of the Land* (Leach and Mearns, 1996); and *Political Ecology: Science, Myth and Power* (Stott and Sullivan, 2000). Such work has looked into the origin and applicability of various so-called predictions of “crisis” in environmental change, often with reference to the variety of scientific evidence about the presumed ecological changes, and in relation to the political advantages to various parties of portraying an ecological crisis. The themes of such work form a large part of this current book, and will be discussed in more detail in chapters to come.

This body of work presents an important framework through which to analyze the political implications of different approaches to ecological explanation. Perhaps most significantly, it also provides a counterpoint to the definition of political ecology arising from Deep Green critiques of industrialization and modernity (e.g. Atkinson, 1991). But there are still important questions to be answered within the discussion of social constructions of science in political ecology. In particular, there is an underlying tension between so-called “realist” approaches to environmental explanation (relying on the mechanical and universal explanation of biophysical risks and impacts); and more poststructuralist accounts of explanations as historically and culturally situated “storylines” (e.g. Hajer, 1995). Much deconstruction of environmental explanation has referred to the debunking of so-called “myths” of environmental crisis and causality, and instead to acknowledge the existence of “plural rationalities” about environmental change in their wake (see Thompson *et al*, 1986; Thomas and Middleton, 1994; Leach and Mearns, 1996). Such statements have often been

met with frustration from researchers seeking a more uniform scientific explanation, and who fear that “pluralism” might imply relativism. For example, Blaikie (1995) wrote:

A counterweight to the deconstruction of science must also be provided. A case could be made that the bulk of what is styled as political ecology has been written by social scientists, who have paid little attention to what natural scientists have had to say about their environments, usually with embarrassing results (Blaikie, 1995:11).

This book seeks to contribute to these debates by asking how far it is possible to deconstruct scientific “laws” built on orthodox frameworks of science, yet still achieve a biophysically grounded form of explanation that is still socially relevant to the places where such science is applied. But before these themes are discussed further, it is worthwhile to review some basic themes concerning constructivism and realism.

Constructivism and realism

Much discussion about criticisms of science have tended to polarize debates between so-called “constructivists” and “realists,” where constructivists may be typified as relativist and postmodern, and realists are empirically grounded yet sociologically unaware. Such a stereotypical representation is, of course, inaccurate, and there are many potential middle positions that may incorporate elements of both constructivist and realist analysis.

One often-criticized aspect of constructivist analysis is a focus upon discourse as a primary tool in discussing environmental science and politics. Dryzek (1997) defines discourse as follows:

A discourse is a shared way of apprehending the world. Embedded in language, it enables those who subscribe to it to interpret bits of information and put them together into coherent studies or accounts. Each discourse rests on assumptions, judgments, and contentions that provide the basic terms for analysis, debates, agreements and disagreements, in the environmental area no less than elsewhere (Dryzek, 1997:8).

Yet the analysis of discourse has sometimes been accused incorrectly of adopting a relativist, or unempirical, focus on environmental policy. For example, Bryant and Bailey (1997) wrote:

The important role of discourse in conditioning political-ecological conflicts is not to be denied ... We are nonetheless concerned that a “turn to discourse” may result in a turn *away* from the material issues that, after all, prompted the birth of Third World political ecology in the first place (Bryant and Bailey, 1997:192, emphasis in original).

Such comments overlook the relationship between discourse, and the generation of so-called “facts” and “norms,” which underlies much philosophical analysis of political and scientific debate. A conventional approach to environmental science, as described above, adopts a separation of facts and norms on the basis that science can produce the facts, while politics can establish norms based upon such facts. Alternative approaches focus on the interdependency of facts and norms, and the manner in which “facts” may be identified as meaningful information only in relation to specific predefined discourses. Yet once such “facts” have been identified and recorded, they then support or create further discourses associated with them (see Rundle, 1993; Harré, 1993; Demeritt, 1998; Castree, 2001). “Facts” and “norms” may therefore be seen to be one aspect of the underlying debates concerning epistemology (or the study of knowledge) and ontology (the study of underlying

reality). The emergence of a dominant discourse about environmental explanation therefore may be based on historic facts and norms of one society, yet lead onto the construction of scientific knowledge about environment that may not be as “factual” as often assumed (see Box 1.1).

Box 1.1 : Epistemology and Ontology

Epistemology is the theory of knowledge. Debates in epistemology refer to establishing the so-called conditions of knowledge, or the social and philosophical requirements necessary to possess, need, and use knowledge. A crucial problem in epistemology is establishing criteria for defining when we know, and do not know something. For example, there is much evidence to suggest that anthropogenic climate change (“global warming”) is occurring. But accepting such evidence as “proof” requires answering questions about what sort of knowledge allows us to make that conclusion. The sort of criteria used to make that judgment might include philosophical concepts of how far we can make meaningfully predictions on the topic; ecological questions of gaining sufficient information to infer change for such time and space scales; and social themes of identifying the legitimacy of which organization or observer makes statements about the nature or meaning of that change. The debate concerning what sort of information is meaningful, who is recognized as speaking with accuracy, and who decides both of these questions, are central epistemological questions relating to the debate concerning anthropogenic climate change.

Ontology is the theory of underlying structures in biophysical or social entities. Ontology aims at discovering a framework for understanding the kinds of things that constitute the

world's structure. For example, an ontological approach to anthropogenic climate change would aim to understand the causal mechanisms of climate change, and the accurate apportioning of responsibility to different human causes according to their influence on the biophysical process of warming. Ontology is different to epistemology because it aims to focus on the underlying causes and structures of change. But questions of ontology will inevitably also have to consider questions of epistemology in seeking an explanation of physical changes. Concerning climate change, for instance, one difficult question might be to ask how far seeking the causes of "global warming" might actually lead to the creation of an entity known as "global warming" because of the framing of research in order to assess whether it is occurring (this problem is called reification). Ontology is also closely related to other philosophical debates about "realism," the belief in biophysical reality or important causal social structures, and "truth," the question of how far statements may be considered "true." Ontology, realism and truth, however, are all subtly different and should not be used interchangeably. (See also definitions of realism and constructivism in Box 3.5).

Source: Fetzer and Almeder, 1993

A focus on environmental discourse and constructivism, therefore, does not imply the belief that environmental knowledge is unreal or imagined, but instead indicates an interest in how statements about the real world have been made, and with which political impacts. As Maarten Hajer (1993), for example, commented:

The new environmental conflict should not be conceptualized as a conflict over a predefined unequivocal problem with competing actors pro and con, but is to be seen

as a complex and continuous struggle over the definition and the meaning of the environmental problem itself (Hajer, 1993:5).

In addition to this focus on discourse and constructivism alone, there are also, of course, different approaches that focus more specifically on environmental realism. Environmental realism in this context should not be confused with the debate in international political theory concerning the study of states' and individuals' political interests in competition with others (e.g. Wiesenthal, 1993), but instead refers to the search for epistemologies (or explanations) that allow an accurate and transferable understanding of underlying ontology (or reality).

One important approach to politicized understandings of scientific realism has come from the school of Critical Realism of Roy Bhaskar, and specifically his book: *A realist theory of science* (1975) in which a rapprochement is attempted between epistemological skepticism and ontological realism (Collier, 1994; Archer *et al*, 1998; Sayer, 2000). In more simple language, Critical Realism seeks to understand “real” structures of society and the world, while acknowledging that any model or understanding of such structures will reflect only partial experience of them, and social and political framings within the research process. Bhaskar in particular distinguishes between so-called “transitive” explanations (socially constructed and changeable), and “intransitive” knowledge (referring to underlying and unchanging reality). Knowledge may also be classified into three levels of knowledge: empiricism (simple experiences); actualism (experiences, and the events that give rise to experiences); and realism (the underlying ontology and structures that give rise to events and experiences). Under such classifications, much environmental knowledge may refer to short-term indications of long-term transitions; and environmental explanations and models are likely to be transitive structures that reflect partial experience and framings of such complex

biophysical events. Some initial writings on Critical Realism and environment have already been achieved in relation to supposed dichotomies between humans and animals (Benton, 1996), and men and women (Jackson, 1997).

Critical Realism, and associated debates such as semantic realism, offers much potential for integrating biophysically grounded explanations of environmental change with political analysis of the social framings of science. Yet, the term, Critical Realism, is also controversial. For example, Peter Dickens' (1996) study of Critical Realism and environment focused exclusively on social ontology, class, and social marginalization under capitalism, and did not engage in any deconstruction of *a priori* environmental explanations within science. Similarly Hannah (1999) and others have suggested that Critical Realism, as defined by Bhaskar, may be rather too optimistic in its ability to achieve realist explanations based on partial knowledge; and hence has suggested that the term "skeptical realism" may allow a more general approach for the muddied waters of environmental epistemology and ontology.

This book seeks to advance debates about integrating social and biophysical explanations of environment. It draws upon debates in Critical Realism, but also draws upon related debates such as semantic, referential, or institutional realism (e.g. Harré, 1986), in addition to pragmatic analyses of social institutions of science (Rorty, 1989; Proctor, 1998) and poststructuralist analysis of situated discourses and networks of environmental explanation. In particular, the book draws upon insights within science studies – or so-called science and technology studies (STS) – as means to analyze the drawing of social boundaries around the analysis of complex biophysical processes, and the social networks that support them.

STS and the “Science Wars”

It is worth referring to science studies itself as a new and evolving form of analysis. The kinds of debates summarized in this section are all relevant to so-called science and technology studies (STS), which is often assumed to include science studies and science-policy – the investigation of science and its relationship to policy formulation. Hess writes:

Science studies provides a conceptual tool kit for thinking about technical expertise in more sophisticated ways. Science studies tracks the history of disciplines, the dynamics of science as a social institution, and the philosophical basis for scientific knowledge... In short science studies provides a forum where people who are concerned with the place of science and technology in a democratic society can discuss complicated technical issues (Hess, 1997:1).

These objectives are similar to those of the Political Ecology Research Group in the late 1970s, and indeed Irwin and Wynne (one of the original associates of the PERG) wrote:

Science offers a framework which is unavoidably social as well as technical since in public domains scientific knowledge embodies implicit models or assumptions about the social world (Irwin and Wynne, 1996:2-3)

STS, or science studies in general, in brief, aims to question the perceived political neutrality and accurate representative of reality offered by “science,” and instead indicate how scientific statements and scientific institutions – such as research institutes, universities, government agencies and museums – may reflect social and political influences of relevance for how we perceive and manage environment and society.

This book illustrates the relationship of STS for political ecology. Two key themes of STS are worth noting at this stage. First, much STS is concerned with the drawing of boundaries in social discourse in order to indicate domains of explanation or causality. (Some well-known boundaries may exist between “nature” and “society;” “men” and “women;” or “scientists” and “lay” people). Secondly, there is also much attention in STS to “hybridity,” or the hybrid blending of “facts” and “norms” (e.g. Latour, 1993). Such hybridization may lay down the institutional factors that define many definitions of environmental problems such as desertification or deforestation, which are based on complex interactions of a variety of different biophysical events and processes. (Hybridity has also been used in a variety of other applications of social understandings of biophysical reality, see Braun and Castree, 1998).

Yet, the emergence of STS as an academic debate also triggered intense criticism of its objectives from defenders of positivist science, such as physicists and mathematicians. The launch of this criticism has since been called “the science wars,” which took place mainly in the USA in the mid 1990s. In particular, Gerald Holton’s (1993) *Science and Anti-Science* warned of the dangers of a new irrationalism in society. Paul Gross and Norman Levitt (1994), in *Higher Superstition: The Academic Left and its Quarrels with Science*, referred to STS as the “cultural left” and criticized a variety of academic themes that had been related to science such as social constructionism, postmodernism, feminism and environmentalism. (Although it is worth noting that some targets of such criticism, such as Bruno Latour, have commonly criticized postmodernism, see Latour, 1993).

The main concerns of the science wars critics were to reject what they saw as intellectually lazy, modish trends in social science that avoided the principles of accuracy, honesty and

hard work demonstrated over the centuries within conventional physical science. Perhaps this was illustrated when the physicist, Alan Sokal (1996), persuaded the journal, *Social Text* to publish a paper with the suitably deconstructivist title: “Transgressing the boundaries: toward a transformative hermeneutics of quantum gravity.” Sokal later revealed was a hoax intending to indicate sloppy standards in the social science (see Segerstråle, 2000, for a summary of the “Science Wars”). The science wars represented great bitterness and personal hostility perhaps best indicated by the following quotations from Levitt (1999):

I think that this current genus of academic nihilism [in STS] is vain, captious, and ultimately unavailing. ...To accede to the relativist demand (for that is what it amounts to) that science discard its privileged status as an especially accurate way of learning about reality is not only to defer to questionable philosophy but, as well, to yield the core assumption that drives scientists to endure the considerable pain and travail of learning their craft and practicing it with rigorous honesty. ...Academics who rail or snipe at science are rather like well-brought-up children who have made a deliberate decision to misbehave and outrage their elders on some solemn occasion. They are terribly self-conscious and jittery about the whole business, and gnawed by the suspicion that they might lose their nerve and fail to go through with the thing. When confronted with scientists’ hard stares, they fidget and prevaricate and look as though they would really prefer to be elsewhere (Levitt, 1999:10,23,302).

Such statements, of course, say more about the writer than the topic under consideration. Yet, many such statements miss the point of science studies, and reduce it – and its critics – to stereotypical positions that avoid many areas of potential overlap. It is hoped that this book will indicate that criticisms of orthodox scientific approaches to environmental problems does

not imply cultural relativism, a rejection of epistemological realism, or the rejection of science or scientists.

Some similar concerns to those of Gross and Levitt have also been made specifically in relation to science studies and environmental writing. In particular, concerns have come from defenders of orthodox science who have considered social analysis of environmental risks to be a step towards relativism; environmentalists who seek to defend concepts of an external “nature” against deconstruction; and scientists who see science studies as a tool of industries who would rather weaken environmental regulation. It is important to note that most researchers within STS would consider such criticisms inaccurate.

The resentment of social-science approaches to environmental risk was shown in an amusing way at a meeting in 1992 in Britain’s most historic research institute, the Royal Society, concerning the publication of a report on risk (Royal Society, 1992). The anthropologist Mary Douglas (1993):

Complete decorum reigned until near the end, when a psychologist got up from the floor and reproached the Royal Society report for giving undue space to radical views. When he asked that the term “social construction of risk” be eliminated from the discussion, shouting, clapping and hissing broke out and the meeting was adjourned (Douglas, 1993:122; also in Thompson and Rayner, 1998a:140).

Concerning the analysis of concepts of “nature,” Soulé (1995), for example, wrote:

Why are some social critics in denial about the existence or significance of nature?
...The nihilism and relativism of radically constructionist critiques of science and the materiality of nature, while popular in some academic circles, is sophomoric. Further,

it is harmful because... it undermines efforts to save wilderness and biodiversity (Soulé, 1995:151,154).

And in *Betrayal of Science and Reason: How Anti-Environmental Rhetoric Threatens our Future*, Paul and Anne Ehrlich (1996) declared:

Brownlash has produced what amounts to a body of anti-science – a twisting of the findings of empirical science – to bolster a predetermined worldview and to support a political agenda. By virtue of relentless repetition, this flood of anti-environmental sentiment has acquired an unfortunate aura of credibility (Ehrlich and Ehrlich, 1996:11).

Under a “critical” political ecology, all statements about ecology have to be assessed for their political construction. There is no agenda to legitimize destructive resource use, or to weaken care for environment where expressed. Yet it is also necessary to re-evaluate environmental statements coming from “science” that justify particular policies in preference to others. The overt defense of environmentalism in the statements above, for example, might be subject to criticism for the very reasons such writers use to justify their own positions. The Ehrlichs (1996:12), for example, suggest that anti-science rhetoric is a “denial of facts and circumstances” that do not fit beliefs, and which may lead to policies that “could lead our society into serious trouble.” Yet the same could also be said of their environmental science based on the critique of the domination of nature developed to resist exploitative economics and politics. As discussed in Chapter 2, such scientific explanations can cause immense problems for farmers in developing countries whose activities do not threaten landscape in the ways suggested, but whose livelihoods are restricted by the policies resulting from such science.

The development of an analytical approach that is biophysically grounded yet conscious of social and political constructions is one of the key aims of this book. “Critical Political Ecology” is the attempt to integrate STS into debates about political ecology, but it does not imply relativism, or “brownlash,” or the rejection of science altogether. Instead, the aim is to highlight as far as possible the implicit social and political models built into statements of supposedly neutral explanation in order to increase both the social equity of science, and its relevance to environmental problems experienced within diverse social settings.

BUILDING A “CRITICAL” POLITICAL ECOLOGY

So, how can we define the objectives of a “critical” political ecology? As the preceding discussions have shown, Critical Political Ecology aims to present debates within political ecology with an approach to environmental politics that allows the successful integration of political analysis with the formation and dissemination of understandings of ecological reality. A key ambition is to avoid the simplistic separation of science and politics (or facts and norms), and the use of *a priori* notions of ecological causality and meaning, and instead to adopt a more politically aware understanding of the contexts within which environmental explanations emerge, and are seen to be relevant.

This project may legitimately be called “critical” for various reasons. First, the objective to reach an emancipatory form of politics suppressed peoples is consistent with the long-term aim of Critical Theory, and its focus on knowledge and science as a product of oppressive regimes (Rasmussen, 1996). Important Frankfurt School scholars such as Marcuse and

Habermas discussed how a better, more socially relevant “science” might be developed (Alford, 1985). But such debates have not been integrated fully with new insights from philosophy of science or science studies. This book aims to develop such an approach. As Vogel (1996) wrote:

The truth is that, beyond generalized critiques of positivism, little serious consideration has been given to contemporary philosophy of science within the postwar tradition of Critical Theory, and this is a significant fault (Vogel, 1996:7).

This book’s focus upon environmental science, and contested approaches to explaining the causes of environmental degradation, also means that it discusses functional concepts such as “explanations” and “accuracy.” This discussion does not imply that such concepts can exist externally from social contexts (see MacKenzie, 1990; Harré, 1993). But these terms need to be examined in depth because so much environmental policy is based upon the belief that explanations and scientific accuracy have already been established.

Secondly, the emphasis on science as both a means of explanation, but also rooted in politics reflects the concerns of so-called “critical science,” or the reflexive attention of science to the political uses to which it may be put. As noted above, the original movement to link ecology with politics was made by concerned scientists who sought a new methodology for dealing with humans as a “community.” As this book shows, however, more recent research has indicated that such *a priori* decisions about who and what may be considered “community,” at both local and global levels, has significant political implications. Furthermore, other authors have acknowledged the apparent contradiction within much current environmentalism by using modern science in order to strengthen its critique of modernization and industrialization (Yearley, 1992, 1996).

In keeping with Critical Science, Critical Political Ecology seeks to engage constructively with the norms of professional science, and to seek influence by discussing possible alternative means to approach environmental explanation. As Nowotny (1979) commented:

Coming largely from within [the scientific world], critical science turns against those aspects which it regards as irresponsible on a variety of humanistic, moral and political grounds. Critics oppose a view of omnipotent science which claims legitimacy to indiscriminately bestow upon humanity whatever passes through the heads of scientists regardless of the consequences (Nowotny, 1979:21).

Thirdly, Critical Political Ecology also adopts and expands insights from Critical Realism, and associated debates such as semantic and so-called institutional approaches to explanation, that seek to blend epistemological skepticism with ontological realism. These approaches are called institutional because, unlike the frameworks of positivist or orthodox science, they acknowledge the institutional bases upon which explanation is contingent (Harré, 1993; Aronson *et al*, 1994). Yet, the book does not restrict itself only to these considerations of scientific practice and realism, and considers more poststructuralist accounts of historical and cultural shaping of environmental narratives and networks (Jasanoff, 1990; Hajer, 1995). Both institutional realism and poststructuralist analyses of environmental “truth” statements with environmental science allow the possibility to achieve a biophysically grounded yet socially relevant form of explanation. By so doing, this book also addresses the acknowledgement of various environmental writers that more attention needs to be given to biophysical agency within political ecology (Grossman, 1998; Woodgate and Redclift, 1998). As Watts and McCarthy (1997) commented:

A critical approach to nature has been one of political ecology's weaknesses, and there is surely need for a more social relational understanding of natural science itself (of the institutions of science and scientific regulation)... including a sensitivity to what one might call nature's agency or causal powers (Watts and McCarthy, 1997:85).

The attempt to address these questions, however, does not imply that it is possible to explain "reality" in some final, uniform manner. Moreover, this book – unlike *The Skeptical Environmentalist* of Björn Lomborg (2001) – does not dismiss environmental problems in general, but instead questions the manner in which environmental problems are defined, and with which transferability. Environmental problems do exist, and ecologically degrading practices need to be avoided. This book seeks to assist environmental debate and policy. But the book seeks to reform existing environmental debates to show the problems of current approaches to environmental explanation, and to propose means by which to diversify and localize environmental science, including greater local determination by people not currently represented in science.

Structure of the book

The book is divided into three main sections. Chapters 2–4 summarize the problems of many existing dominant environmental explanations and presents ways of criticizing them from the perspectives of debates in philosophy and sociology of science. One key theme in this section is the distinction commonly made between "science" and "myths," and the different approach to myths as either a falsehood, or a form of truth.

The second section, Chapters 5–7 then looks at the “coproduction” of environmental knowledge and political activism, specifically in relation to environmentalism as a social movement, the globalization of environmental discourse, and the evolution of environmental explanations through the interplay of different scientific, political and commercial actors. This section also provides some detailed descriptions of environmental problems, and analysis from the perspective of science studies and science-policy.

Finally, Chapters 8–10 look at potential solutions to the questions posed in the book. Chapter 8 presents a discussion of potential means of democratizing scientific explanations through scientific practice itself. Chapter 9 reviews debates concerning the political accountability and regulation of environmental science. Chapter 10 provides a conclusion, and a discussion of implications for political ecology in general.

Chapter 2 now starts the analysis by looking at conflicting truth claims about many environmental explanations.