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**BIODIVERSITY
AND
HUMAN WELFARE**

by Piers Blaikie and Sally Jeanrenaud

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February 1996

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**United Nations Research Institute
for Social Development
Palais des Nations
1211 Geneva 10
Switzerland**

**☎ (41.22) 798.84 00/798.58.50
Fax (41.22) 740.07.91
Telex 41.29.62 UNO CH**

**The School of Development Studies/
The Overseas Development Group
University of East Anglia
Norwich NR4 7TJ
United Kingdom**

**☎ (44.1603) 456161
Fax (44.1603) 451999**

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◆ Preface

The loss of biodiversity as a result of human activities has become a central preoccupation among natural scientists, and many social scientists as well. Although we do not know the exact scale of the problem, in particular the extent to which human beings have been responsible for the loss of biodiversity as compared to the natural evolution, the process of species extinction, green house effects and critical changes in the earth's biochemical cycle are now increasingly emphasized.

The concept of human welfare is equally tangled. In general terms, it relates to the provision of improved conditions of living. Human welfare is linked with the preservation of biodiversity in varieties of ways. Biodiversity forms the basis of a global-life support system. Human beings have fulfilled many of their needs by taking advantage of the existence of many genes, species, as well as a "balanced" ecosystem. For instance, many plant species have formed the basis of food, fibre, medicines and many other useful items. There are also many aesthetic and ethical values of plant and animal species.

This paper considers the complex relationships between biodiversity and human welfare. It shows how biodiversity and human welfare are perceived differently by a wide range of actors. These contested meanings constitute the problematique of biodiversity, an understanding of which has profound implications for conservation policy-making. The authors examine, in particular, how biodiversity has been seen by different groups of people and how they interact in the arena of biodiversity. It not only looks at the level of dependence that different sections of the rural poor have on biodiversity either as use values or for petty commodity production, but it also examines such groups as policy makers at the international level, state functionaries, entrepreneurs, corporations and timber traders which have frequently more influence on the discourses surrounding the protection and use of biodiversity. To illustrate this, the paper includes three detailed case studies involving Russian forests, tropical forests and wildlife in Cameroon and marine biodiversity in Greenland.

The paper suggests that international conservation policy and practice are undergoing rapid transformation from the previous predominately nature preservation orientation to sustainable use of natural resource for livelihoods. Many groups of policy makers and scholars at the international level perceive a synergy between biodiversity conservation and human welfare. However, few concrete policies and strategies have so far been developed to implement these ideas in practice. There have been formidable political problems in the way of negotiating biodiversity conservation at the international level. There have also been serious questioning of the capability and will of many states to implement conservation policies on the ground. At the local level, conservation efforts have led to the definition and appropriation of the biodiversity resources by outside forces, and this in turn has generated conflicts over these resources. The paper argues that while the contemporary debate about biodiversity appears to represent elements of a new moral dimension about "human-nature" relationships, it is also a testimony to familiar political-economic divisions. These involve divisions between international, national and local interests; between North and South; between science and politics; official and folk; and power relations at the local level deriving from differences of class, ethnicity and gender.

The central conclusion of the paper is that there are strong pragmatic and political grounds for paying detailed attention of the impact of biodiversity erosion and conservation upon human welfare, particularly in cases where conservation efforts may possibly affect local people directly. The pragmatic grounds are that coerced and enforced conservation tends to fail in the long run. The political grounds are that other considerations such as the abuse of human rights and the accentuation of inequalities are related to environmental degradation, and so conservation efforts must be seen to address these issues too, and not to exacerbate them.

Piers Blaikie is professor at the School of Development Studies, University of East Anglia, Norwich. Sally Jeanrenaud is an independent consultant on environment and rural development and a doctoral candidate at the same university.

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Dharam Ghai
Director

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1. THE MAJOR ISSUES

◆ Introduction

This paper examines the complex relationships between biodiversity and human welfare. It aims to show how biodiversity and human welfare are perceived differently by a wide range of actors. These contested meanings constitute the politics of biodiversity, an understanding of which has profound implications for conservation policy-making. The main questions addressed are:

- (i) How has biodiversity been understood by different groups of people?
- (ii) What aspects of human welfare are affected by biodiversity degradation and by conservation?
- (iii) Who bears the costs and reaps the benefits of biodiversity degradation and conservation?
- (iv) What are the practical mechanisms “on the ground” that will deliver such benefits?

While policy makers and writers at the international level perceive a synergy between biodiversity conservation and human welfare as an unproblematic “vision” of conservation, from the level of practice their supposed relationship more often appears as rhetoric. There have been formidable political problems in the way of negotiating biodiversity conservation at the international level. There has also been serious questioning of the capability and will of many states to formulate and implement conservation policies on the ground. At the local level, conservation efforts have led to the definition and appropriation of biodiversity resources, usually in the name of the state, and this in turn has precipitated struggles over those resources. Finally, there are crucial ambiguities and contradictions in the formulation and practice of biodiversity conservation, particularly in the role of science and “facts” in the biodiversity discourse. Thus, while the contemporary debate about biodiversity appears to represent elements of a new moral dimension of “human-nature” relationships, it is also a testimony to familiar political-economic divisions. These involve divisions between international, national and local interests; between North and South; between science and politics; official and folk; and power relations at the local level deriving from differences of class, ethnicity and gender.

Bearing these issues in mind, it is easy to see that analysis of the relationship between biodiversity and human welfare cannot be only a matter of scientific research. While scientific methods may be powerful ways to identify and present the problems of biodiversity erosion, they are not the only ones. Biodiversity is constituted as a range of resources, which are the focus of both commercial exploitation and livelihoods. The debate is thus highly politicized. Even within the academic and international policy-making environment, we need to be critically aware of the social forces that withdraw and confer credibility to various scientific ideas. A sociology of scientific knowledge indicates that scientific “facts” are used to support various intellectual projects, upon which reputation, promotion and consultancy fees depend. Therefore discourses take place at many different levels and by a wide cast of protagonists. This paper attempts to identify different actors and stakeholders in the biodiversity arena, their interests, how they are perceived and articulated, and then promoted in the face of other different and often competing ones.

An analysis of biodiversity and human welfare must not confine itself only to the economic concerns of the actors involved. It must also involve a critical review of the ideas and ideologies of biodiversity. In other words, it is naive to expect that one can “read off” notions about biodiversity from the structural position which actors hold, or that they will create and use ideas that somehow are explainable in terms of their being instrumental to their economic interests. Rather, different actors create their own ideas about biodiversity, appropriate and adapt others, and experience and use them in different ways in different

arenas. It is thus necessary to focus on the ideas themselves as well, and a section on different paradigms for biodiversity conservation is devoted to this task, bearing in mind that actors will use parts of these paradigms, sometimes in an eclectic and contradictory manner, in pursuit of their own “projects”. Actor-oriented approaches have recently been developed to analyse the “development interface” by Long and Long (1992) and others, with particular reference to how various actors pursue their “projects” within the context of their “life-worlds”. While a full treatment of the life-worlds of actors who appear in the arena of biodiversity would be too ambitious for our purposes here, it is useful to extend the analysis of biodiversity and human welfare beyond a mere representation of the interests of different stakeholders (e.g. biotechnology prospectors, wildlife protection groups, forest dwellers in the tropics, etc.). It is necessary also to understand how the ideas that different people have about nature are formed and articulated; how those arguments are used and supported by recourse to scientific “facts” or to natural justice and inalienable rights.

In this way we develop an approach in which people have specific interests in very particular natural resources or species for precise purposes. We argue that “nature” is not only perceived and valued from various cultural and ideological perspectives, but that powerful economic incentives are involved in shaping and conserving particular aspects or constituents of it. By no means all of these different interests and normative notions about biodiversity concern human welfare, although they may be invoked in its name.

The main objective of this paper is to contribute to a more consistent and effective strategy for the conservation of biodiversity, and to identify clearly how and who conservation will and should benefit. For a more effective policy to emerge, the vision must be deconstructed into its often contradictory parts, and deepened to accommodate social dynamics. As a first step, we argue, this requires changes both within and outside the conservation movement. The conservation movement itself must recognize and work with the political economy of biodiversity erosion and conservation. It is not only a matter, as Pimbert (1993) suggests, of a “new professionalism”, one which works closely with local groups and which integrates thinking from both the social and natural sciences. We support this initiative, but it also requires two others — a partial rapprochement to the political economic realities in the local and global political economy, and also the advocacy to change some of the most damaging of these realities in terms of biodiversity erosion and implications for the undermining of human welfare. This change mainly implies the development of effective policies at the international, state and local levels, but at the same time understanding the political and institutional obstacles which stand in its way. These obstacles must not be characterized simply as “lack of political will”, corruption or administrative inefficiency and somehow externalized from the policy-making process. They must be worked with and tackled in arenas other than biodiversity conservation alone — for example in trade and tariff agreements, the structure and volume of international aid to developing countries, human rights for indigenous peoples — in short a number of enduring political issues revolving around human welfare, which may be only indirectly related to biodiversity conservation.

◆ “Biodiversity”: Some Definitions

“Biological diversity” or “biodiversity” is still a relatively new concept which is not found in dictionaries published before mid-1980s (Dudley, 1992). The term “biodiversity” entered the scientific language as a result of a US National Academy of Sciences’ publication of the same name (Wilson, 1988). However it draws together concepts that had preoccupied ecologists and geneticists for some time prior to that date.

There have been a number of international conventions concerned with specific aspects of biodiversity — for example, the Convention on Wetlands of International Importance, especially Waterfowl Habitat (known as the Ramsar Convention, 1971), the Convention to Regulate International Trade in Endangered Species of Fauna and Flora (Washington,

1973), the Convention of Migratory Species of Wild Animals (Bonn, 1980), and the non-binding International Undertaking on Plant Genetic Resources. There have also been conventions concerning biodiversity in particular regions, for example the Convention on European Wildlife and Natural Habitats (Bern, 1979), the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (Washington, 1940) and the African Convention on Conservation of Nature and Natural Resources (Algiers, 1968). As the names of these conventions imply, the issues involved concerned species and landscape conservation. None of them were focused on biodiversity on a global scale, and on the full and integrated set of definitions of the word (which are discussed below). Nor did they explicitly consider the implications of conservation for development and human welfare, except in passing.

By 1987, there was growing scientific evidence of the erosion of biodiversity on a global scale. This also resonated with emerging problems with the control of genetic information, which emerged with the rapid development of biotechnology. Since the beginning of the 1990s the conservation of biodiversity had also become one of the central goals of international conservation organizations such as the World Wide Fund For Nature (WWF), the World Conservation Union (IUCN) and the United Nations Environment Programme (UNEP) (WWF, 1993a). Much of the scientific and commercial interest originated in the United States, and this country was the first to pressure for a global convention. UNEP was prompted to organize an Ad Hoc Working Group of Experts on Biological Diversity. After a number of meetings this was turned into an intergovernmental negotiating committee, which ran into some key political issues concerning sovereign rights over genetic resources. Nonetheless, it addressed the wider issues of all biodiversity protection on a global scale, and is used as a framework for the discussion by the present paper. It now has international recognition as a result of the Biodiversity Convention signed under the auspices of the United Nations Conference on Environment and Development (UNCED) in Rio in June 1992, and it has since become an increasingly prominent public policy issue, as governments seek to ratify the Convention.

The term biodiversity involves a complexity of meanings and levels. As used in the Convention, the term has the following definition (IUCN, 1994):

- “Biological diversity” means the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

•
Thus biodiversity is the variability of life in all forms levels, and combinations. It is not the sum of ecosystems, species and genetic material, but rather represents the variability within and among them (IUCN, 1994). Biologists usually consider it from three different perspectives:

- “Genetic diversity” refers to the frequency and diversity of different genes and/or genomes. It includes variation both within a population and between populations.
- “Species diversity” refers to the frequency and diversity of different species
- “Ecosystem diversity” refers to the variety and frequency of different ecosystems

It can be seen that these three perspectives form a hierarchy and are basically different ways at looking at the same thing (IUCN, 1990). All biodiversity is the result of natural selection working on the consequences of genetic variation (Lee, 1993). Much important diversity is invisible — such as microscopic life-forms in soil (Beard, 1991) — or not obvious — such as variation within a single species.

The scientific understanding of biodiversity is still at an early stage (as discussed below). The initial scientific focus was on estimating the diversity of life forms and the scale and rapidity of their decline (Wilson, 1988). Although an estimated 1.7 million species have

been described to date, we do not know the true number of species on Earth, even to the nearest order of magnitude. While counts for small groups, such as birds, are relatively well known, the biggest question mark lies over the number of insects and micro-organisms (WCMC, 1992).

◆ A Summary of the Biodiversity Problem

The proximate or direct causes of biodiversity loss are well documented. These include mechanisms such as habitat loss and fragmentation, over-exploitation of plant and animal species, introduced species, pollution, climate change, and agro-economic processes which have resulted in a concentration upon a short list of few heavily utilized species, at the expense of and extinction or threatened extinction of the remaining species. This process began with the emergence of settled agriculture and more sophisticated hunting and herding techniques. Until approximately 10,000 years ago, only natural processes of extinction had occurred, but were added to by spatially isolated cases of the extinction of wild animals which competed with humans, usually at sites of intensive settlement. It is estimated that in the present greatly accelerated phase of extinctions, current rates of extinction may be between 1000 and 10,000 times the historical rate (Wilson, 1988).

Once this short list of heavily utilized species is established, the forces for specialization become firmly established in which capital goods are applied to the production of these species and these species alone. "Sunk costs" such as technologies, along with adapted social and economic structures (e.g. irrigated paddy production), are important considerations acting against the diversification and extension of the short list of existing species (Swanson, 1992c). The result is that it becomes attractive to increase the quantities of these established specialized species, rather than to invest in the new technologies and socio-economic and political structures that would be necessary in order to begin to exploit other species not on the short list of the twenty or so which produce the great majority of the world's food (Plotkin, 1988). As specialization of agriculture deepens and diffuses (from early settled areas, and from the North to the South), the rates of conversion to specialized species and the associated conversion of wild (and biologically relatively diverse) habitats to settled agriculture or livestock production increases greatly. Table 1 indicates rates of conversion of natural habitat to agriculture between 1960 and 1980.

Table 1
Rates of conversion of natural habitat to agriculture (million hectares)

Developing countries	1960	1980	% change
Sub-Saharan Africa	161	222	37.8
Latin America	104	142	36.5
South Asia	153	210	37.2
South-East Asia	40	55	37.5
Developed Countries			
North America	205	203	0.1
Europe	151	137	-10.0
USSR	225	233	2.0

Source: Repetto and Gillis (eds.), 1988

From Table 1 it will be clear that conversion is far greater in developing countries, since the process is largely completed in the developed countries. In addition, population growth in developing countries is relatively rapid. It increased between 1950 and 1990 from 1.6 to 4.0 billion people; at least 85 per cent of the world's population will live in these countries by the year 2100 (Western, 1989). Other statistics (e.g. WRI, 1990) also show that the conversion rate to crop and pastureland from 1977-1987 in developing countries was extremely rapid (e.g. Paraguay 71.2 per cent and Niger 32 per cent to cropland; Ecuador 61.5 per cent and Thailand 32.1 per cent to pastureland). This process of conversion can be expressed in an alternative way (see Table 2)

Table 2
Loss of wildlife habitat

Source: WWF, 1993a:15

The implications of the conversion process, expressed in terms of area related to estimated rates and projections for extinction, are open to debate and the range of projected losses is quite large (see discussion below). Swanson (1992b) has collated a number of estimates of extinctions of global species per decade (see Table 3)

Table 3
Estimates of extinctions of species per decade

Rate*	Projection**	Basis	Source (cited in Swanson, 1992)
8%	33-50%	Forest loss	Lovejoy (1980)
5%	50%	Forest loss	Ehrlich and Ehrlich (1981)
—	33%	Forest loss	Simberloff (1986)
9%	25%	Forest loss	Raven (1988)
5%	15%	Forest loss	Reid and Miller (1989)

* Rates are percentage losses of total number of species per decade.

**Projections are based on the extrapolation of this trend at then-current rates through to the total conversion of the examined forest area.

Source: Swanson, 1992b:23

There are many global projections of the rates of extinction. For example Reid (1992) estimates that there will be a 1.5 per cent global loss of biodiversity per decade, while WWF states that “half the species alive today could be extinct by the end of the next century” (WWF, 1993a:14).

What is less well understood are the remote or fundamental causes of environmental change embedded within the global political economy. Analysis of these causes would need to address the impact of political and economic processes on biodiversity, at different levels (see Blaikie, 1994 for “the chain of explanation” model for land degradation). These might include:

- the global economic system (e.g. the foreign debt crisis, oil prices, restructuring, etc.);
- the nature of the state (e.g. land tenure laws, abilities of administration, government stance on transnational companies in forestry, etc.);

- the nature of agrarian society (e.g. distribution of rights to land, laws of inheritance, gender division, etc.);
- local land users' resources and practices, etc.

It is clear that most current biodiversity reduction is taking place in developing countries. It is perhaps for these reasons that initial attention has been given to tropical "hot spots" (Myers, 1988). These are usually forest areas characterized by exceptional concentration of species with high levels of endemism, and experiencing rapid rates of depletion, such as Madagascar, Cameroon, the Atlantic rainforest of Brazil, and peninsular Malaysia. However, since the early 1990s interest has broadened to include the world's temperate and boreal forest regions (Dudley, 1992). Biodiversity in some plant and animal groups, such as soil micro-flora and fauna, can approach that found in tropical forests (Lattin, 1990). Genetic diversity within species is also thought to be particularly important in temperate forests, making some local populations of great ecological importance (Dudley et al., 1995). However, in terms of species diversity, the aphorism that "the North has the technology but the South has the bio-" captures one of the central political economic issues of biodiversity conservation. This will be further discussed below.

Despite much biological and ecological literature, the theory behind biodiversity and the functioning of ecosystems remains nebulous, lacking in hard data and open to varying interpretations. It appears, for example, that there are no clear-cut relationships between biodiversity and ecosystem productivity or stability (Gadgil, 1993). Experimental reduction of ecosystem diversity has shown that it does not necessarily lead to loss of productivity. In fact, some simple man-made systems with low levels of biodiversity are the most productive of all. However, monocultures are less resilient in the face of perturbations such as pest outbreaks. Deep sea benthic ecosystems are very diverse, but maintain low levels of productivity; whereas highly diverse coral reef ecosystems appear to be very susceptible to disruption. However, despite (and also because of) the lack of any clear relationships, conservationists have been quick to promote the "precautionary principle" until further scientific evidence becomes available.

Estimates of biodiversity loss involve large degrees of uncertainty, and are derived from extrapolations of measured and predicted habitat loss, and estimates of species richness in different habitats. Some critics argue that the assumptions about extinctions have little scientific support and are wide open to question (Mann, 1991). For example, most predictions of species loss are based on using islands as a model, whereas on mainland territories species may escape into bordering areas. Data on habitat and species loss can therefore be misleading. Moreover, current models of the relation between species and geographic area imply that an infinite increase in area implies an infinite increase in the number of species. However, others argue that the species-area curve levels off at its upper reaches. Thus, habitats on the upper part of the species-area curve can be reduced without substantial species loss. Furthermore, the estimates of mass extinctions are largely based on species predicted to exist, rather than species actually identified (Mann, 1991). The problem of biodiversity policy resting on a questionable scientific basis can be summed up by a quotation from a prominent but anonymous conservationist who said: "they'll kill me for saying this ... but the lack of data worries me. I am absolutely sure we're right, but a gut feeling isn't much backup when you're asking people all over the world to change their lives completely" (cited in Mann, 1991).

According to some observers, conservation of biodiversity is merely a sophisticated expression of a well established pre-occupation with the conservation of a small number of extinction-prone animal species and their habitats. Despite the rhetoric, conservation policy is still aimed at key species (Dudley, 1992). However, Pimbert (1993) acknowledges that most of the species important for the maintenance of ecological processes (the inconspicuous organisms) are located in human-managed ecosystems such as agricultural and forestry land, which therefore lie outside protected areas, with (presumably) greater species diversity. For example, in West Germany only 35-40 per cent of the total of 30,000 species are found in protected areas; the remaining species live in human-managed

ecosystems (Pimbert, 1993). There is a strong case for conservation organizations to pay more attention to human-managed ecosystems to fulfil the goals of biodiversity conservation, rather than to concentrate efforts and data collection on unconverted habitats.

◆ Biodiversity and Human Welfare

The notion of “welfare” is also subject to multiple interpretations, and can be identified in the current context as ways in which different values of biodiversity are appropriated by different actors. Thus there is a growing recognition of the need to accommodate qualitative and indigenous concepts of the values of biodiversity with a particular emphasis on the ways in which these appropriated values are distributed. Also, the range of measures of welfare has been steadily extended, as illustrated by the increasing sophistication of the Human Development Index (HDI), published annually by UNDP. For example, in 1993 UNDP introduced the idea that the participation and empowerment of individuals and groups to shape their own lives are important dimensions of welfare.

Many of the methodological and scientific references which mention the connections between biodiversity and human welfare have done so in very general terms. The discourse usually focuses on the benefits of biodiversity to “mankind” over long time periods and on a global scale. Attempts are made to identify the value of biodiversity conservation, to demonstrate its constituent parts, and then go on to capture those values in decision-making criteria. It is, of course, in the latter that the question of how these benefits affect humans (and which humans) impinges upon our concern of human welfare. We believe there is an urgent need to analyse the social complexities of these generalized arguments. This is done first by identifying the different values of biodiversity in principle, and then by specifying who appropriates each of these values which contribute to their welfare.

◆ Biodiversity and Values

How have the values of biodiversity conservation been understood? Values have to be relevant to human beings, and implicitly values of a resource such as biodiversity, when they are realized, are a way of understanding human welfare. However, at the outset it is worth mentioning that the reasons for conserving biodiversity relate not only to human welfare and that there are other non-anthropocentric reasons for conservation. The section concludes with an illustration of the contested meanings and values of biodiversity.

Five general reasons have been given to explain the importance of maintaining biodiversity (summarized among others by Inskipp, 1992).

- (i) Ethical reasons: the belief that every life form warrants respect independent of its worth to people and human welfare.
- (ii) Maintaining ecosystems: a myriad of life forms are essential for keeping air clean; stabilizing weather; disposing of wastes; recycling nutrients; creating soils; controlling diseases; pollination, etc.
- (iii) Material and economic benefits to people: biodiversity contributes to agriculture; fisheries; medicines; industry, etc.
- (iv) Maintaining evolutionary processes: biodiversity is the raw material of further evolution. If the genetic resource base is drastically reduced, the result is likely to be a depletion of evolution’s capacities for speciation and adaptation persisting far into the future.
- (v) Aesthetics: many species inspire beauty and awe. Conservation literature is full of statements about the connection between biodiversity and human well-being in terms of these subjective criteria.

These general reasons for conserving biodiversity may be expressed in terms of the values which they represent, as described below.

Direct and instrumental/use values

These are concerned with the enjoyment and satisfaction derived from the use of biological resources. Thus they involve the consumption of those resources and their realization is a major factor in the possible depletion of those resources. Direct values can be decomposed into two types.

(a) Consumptive use values, which refer to the values that are placed on those products that are consumed directly without passing through a market, and clearly are of greatest importance to rural populations in developing countries, where biological resources are collected and used (often from the “wild”, or those areas not subject to the rights and obligations under private property). They include a vast array of wild animals, insects, fish, fibres, resins, medicinal plants, fuelwood, fruits, fungi, dyes, gourds, construction materials and so on. They also refer to cultural, religious and recreational values involved in the consumption of the resource (e.g. the importance of whale meat in Inuit cultures, or of hunting in initiation rites of many African pastoral peoples).

The loss of this value of biodiversity can come about for a number of different reasons. Population pressure on forest areas can convert them into privately held agricultural land, which may well result in increased aggregate food supplies, but a reduced variety of resources for subsistence. Also such encroachment on forests and common property or open access resources typically impacts on those who have least access to private property. It is important to note that the erosion of consumptive use values of biodiversity for the poor and politically weak usually arises for three main reasons. First, there occurs an alteration in the distribution of those resources at the expense of less powerful groups. Second, there is a widespread conversion of value from consumptive to productive use values through an extension and deepening of the market for many of these resources. Third, a decline in their aggregate supply on the remaining *de jure* common property and *de facto* open access resources tends to occur through overuse. As will be illustrated further by case study references, it is common that all three processes operate together in an agrarian political economy, and that the purely biological issue of diversity and supply of different resources is only part of the picture. These reasons for the loss of biodiversity and their implications are illustrated in section 3.

(b) Productive use values, which are assigned to resources which are harvested and sold in the market, and therefore appear in national income accounts. They are generally valued at the point of production and harvesting, and involve a similar overall range of resources used for direct consumption, although these may be very different at different locations. In some cases they may involve domesticated agriculture and a short slate of specialized crops or products (such as a few tree species which are recognized to be commercially useful), but in other cases the same products may be considered to have both consumptive and productive values (e.g. commercial and subsistence-based culling of the same wild animals).

Productive use values therefore contribute to welfare in the provision of monetary income to those who can appropriate this value through the effective realization of private property rights, which may already exist in their favour, or through the acquisition of these rights. It is often the case that entrepreneurs may secure agreements with the state which overlay or directly overturn existing customary rights to resources, which hitherto had been enjoyed by local groups in the agrarian political economy. These groups include forest dwellers, farmers and pastoralists who had previously been able to exploit these resources locally, both as productive use values through their sale as petty commodity producers and directly through consumptive use. Technological change has continually created new opportunities to develop productive use values, such as in the development of genetic material for new varieties of domestic crops and in medical research. Issues of the ownership of intellectual

property rights of these resources arise (e.g. landraces) as a result of these new market opportunities at the global scale.

Indirect instrumental/use values

(a) These mostly refer to the functions and services of eco-systems which have value for society in general rather limited to the specific user(s) and therefore support and have important social and economic implications for direct values. These are values which are not consumed or traded in the market place and are known as public goods. Conservation of biological resources have the following benefits:

- providing the support system for harvested species by photosynthetic fixation of solar energy and its transference into food chains which involve harvested species;
- providing ecosystem functions involving reproduction. There are a variety of ways in which wild biological resources may contribute to the productive use values of domesticated resources (Prescott-Allen, 1986). These include: wild species forming the genetic resource for the breeding of new domesticates; wild pollinators being essential for domestic crops; and wild enemies of pests controlling attacks on domestic crops;
- maintenance of hydrological régimes, including the recharging of water tables and the buffering of extreme hydrological conditions, which might otherwise precipitate drought or flood;
- soil and water conservation by the regulation of water flows, the provision of suitable environments for the creation and maintenance of soil and its fertility through storage and cycling of essential nutrients;
- absorption, breakdown and dispersal of harmful pollutants (air and water pollutants, organic wastes);
- the provision of the aesthetically and culturally preferred environment for human habitat;

It is clear that the contributions of these indirect use values to human welfare will be very substantial, even if their measurement is both practically and methodologically very difficult. They are also diffuse and distributed widely between populations, both at present and in the future. Also the erosion of these functions may not result from the reduction of biodiversity per se. For example, there are plenty of examples of adverse impacts of soil erosion and declines in productivity of primary and secondary production of rangelands, but the physical processes involved usually do not revolve around a local or regional reduction in biodiversity.

(b) Option values, which refer to the future uses of both direct and indirect values, described above. The future is uncertain but the fact of the extinction of a species is all too certain. The future paths of socio-economic (including technical) change are also uncertain, and unforeseen developments such as the implications of climatic change for natural resource use, and for biodiversity in particular can only be guessed at and their aggregate effects cannot be known at the present time. However there is a value in maintaining genetic diversity, even though we do not know its value, although we do know that there is a positive value for maintaining the option. There are also other options which society may be prepared to pay for, such as having future access to a given species or ecosystems, even though people cannot specify what these might be, or even contemplate ever visiting, reading about, or benefiting in any way from them.

Non-instrumental intrinsic value

Many, particularly but not exclusively from “deep ecology” movements, would argue that all species have an intrinsic value, that biodiversity is a moral condition, and its conservation a moral responsibility, since non-human species have rights too. Therefore this value is non- even anti-anthropocentric, and has no connection with human welfare

other than (and this will be important to Gaians and others in the ecology movement) that the act of discharging a moral responsibility contributes to human welfare.

While this list undoubtedly points to general categories of value, it hides a complexity of particular and contradictory interests. For example, while “charismatic” species such as elephant may inspire awe and wonder among the urban middle classes of the North, they may be regarded as a pest to agricultural communities in the South. While biodiversity clearly provides material benefits to commercial companies, new developments in the biotechnology industry may be at odds with the ethical or aesthetic values of other groups, and may even undermine the material subsistence of some. The point is that different actors appropriate different values from different aspects of biodiversity, and gain access to different functional benefits. How this and other values are understood and measured are discussed below. The task remains to identify these different values of biodiversity, at which level of biodiversity they may be realized and to whom they might typically accrue. This is complex because of the number of combinations of value, benefit, uses and levels of realization, and the hierarchical definitions of biodiversity. These different combinations are thematically illustrated by examining a brief case study taken from the Nepalese terai and are drawn from both authors’ professional experience there, and from Ghimire (1992) and Brown (1994).

◆ An Illustration of Social Differentiation and Biodiversity Values

The pressures for conversion to agricultural land in the Nepalese terai are formidable. Population densities are still about half those on the Indian side of the border (a few kilometres away), but the Middle Hills of Nepal are experiencing extreme pressure on land, and out-migration to the terai is rapidly gaining pace (Brown, 1994; Ghimire, 1992; Blaikie et al., 1980). It is mostly the very poor who encroach on the forest (*sukhumbasi*, “those without any place to go”), and their prevention by evictions, crop burning and other acts of violence is undoubtedly a cost for them. However, forest resources are being used, and biodiversity reduced, by other more powerful groups such as timber contractors, and their clients in the local political hierarchy (e.g. the *pradhan panch*, or village headman). Thus the issue of biodiversity is also a struggle over the classification of those resources (e.g. whether the land is demarcated as official state forest or agricultural land for settlement). The meaning of “biodiversity” is, at the local level, one of naked struggle over resources. The costs of conserving the forest are also borne, at least theoretically, by the Nepalese state, in terms of the opportunity costs of foregone timber and grain exports to India. But here again local specificities of the political economy of Nepal prevent all but the smallest proportion of those revenues from reaching the national accounts and being used to further human welfare in such ways as the provision of educational and health facilities in the area by the state. So it is with one of our case studies later in this paper, that of Cameroon, in which the costs of biodiversity conservation are borne in practice by local people who rely on wildlife for subsistence and the forest for shifting cultivation. In examining below the global responsibilities for conservation, who bears the real costs of conservation must also be considered, as does the question of whether local communities do in fact benefit at all from attempts to offset such costs. Table 4 indicates the variety of interests in biodiversity, the different values accruing to different people and the different meanings attached to “biodiversity”.

Table 4
Interest groups and stakeholders in grassland conservation in the Terai

Group	Scale of influence	Source of power	Interests/Aims	Means
Indigenous people	Local	Very limited	Livelihood maintenance; use protected areas for subsistence needs, minor trading of products; thatch, fodder, building materials,	Subsistence farming, minor marketing; legal and illegal extraction of resources from protected

			fuel, wild foods, plant medicines, hunting and fishing	areas
Migrant farmers	Local	Limited	Livelihood maintenance; use protected areas for subsistence needs; thatch, fodder, fuel, building material	Cash farming plus subsistence; legal and illegal extraction of products from protected areas
Local entrepreneurs	Local	Many hold official positions locally	Profit; commercial; range of small enterprises tourist and non-tourist-based	Small business enterprises, buying and selling to tourists
Tourist concessions	National/some international	Lobbying/may hold official positions	Profit, commercial expansion; some of revenue may be earned overseas; control tourists staying in protected areas overnight	Tourism revenues; concessions from government
Government conservation agencies	National	Administrative and supervisory	Conserving wildlife and facilitating tourist development	Enforcing park boundaries; imposing fines
Conservation pressure groups	Local/national some international links	Lobbying, may have personal contacts, international funding	Conserving biodiversity but with considerations for local livelihoods	Lobbying, publicity
International conservation groups	International	International funding "green conditionality"	Conserving biodiversity; limited interests in human welfare	International legislation, lobbying
Central government	National	Political and administrative	National development; economic growth?	Legislation, bureaucracy, budget allocation

Source: Brown, 1994

From this example, some of the complexity of biodiversity issues may be unravelled in more general terms which illustrate the different and competing notions of the values of biodiversity.

- (i) There are different actors who relate in different ways to the resources in question.
- (ii) They therefore define "biodiversity" in very different ways and at different levels or geographical scales.
- (iii) They bring to bear on these definitions their culture, their material circumstances and their experience of biodiversity.
- (iv) They engage in the issue often in contradictory ways, expressed in struggles over the meaning and control of biodiversity between themselves and with outside parties. Diverse activities such as "poaching", evictions, commercial negotiations and academic arguments at international workshops are examples of these struggles.

One of the implications of the competing meanings of biodiversity is that discussion of the subject outside the natural sciences tends to lack rigour, and sinks to the lowest common denominator of the meaning of "biodiversity". In some literature, the term is used as a synonym for "conservation", even "sustainable development", or as a goal of national parks. It also can be reduced to an issue of local struggles over a range of natural resources. Debates at the international academic level are thus usually very generalized, focusing on the benefits of biodiversity to "mankind" over long time periods and on a global scale. More recently conservation policy has directed greater attention to an assumed convergence of grassroots and global interests; "people oriented" conservation projects are becoming more important, and have tried to engage these struggles to provide feasible policies (Pimbert and Pretty, 1994).

A similar pattern of the distribution of the costs of biodiversity degradation emerges. The majority of rural populations, especially the poorest groups, lose livelihood opportunities and habitat through the depletion of the list of species used in local consumption and in petty commodity production. The indirect values of biodiversity — of underwriting the

regional ecological maintenance of natural systems, for example — will benefit a wider spectrum of local people, although compensatory adjustments to the loss of biodiversity can always be made more easily by the more wealthy. The case study in the Nepalese terai provides several examples of this. The wealthier can “buy their way out of trouble”, or offset the costs of biodiversity loss by such means as purchasing fertilizers where the provision of natural fertility fails, or tubewells where water from public sources for drinking and irrigation dry up or become polluted, and so on (Seddon et al., 1979). In other words, some are able to compensate for the failure of public goods by private purchase. It is thus inadequate to impute the impact of degradation on human welfare costs only in terms of those costs — it is necessary also to consider how those costs will be met in a given, and usually unequal political economy. The impact of biodiversity degradation upon human welfare must be set within the political economy as a whole.

Furthermore, this illustration brings into focus the disjunctures between different “cognitive maps” of biodiversity, which are held by different people. These maps are constructed at different scales — the scientific maps tending to be global and regional, and those of the local populations, local. The disappearance of forests may have a symbolic, political or aesthetic significance for some, while for local people it directly affects their livelihood opportunities. Therefore the cognitive map will consist of specific natural resources, and competitors and allies who have an interest in those resources.

2. APPROACHES

While the concept and science of biodiversity are largely biological in origin, many of their issues have been taken up by thinkers and writers from other disciplines, and then used by a variety of actors. Who is interested in biodiversity and why? How has biodiversity become incorporated into other agendas?

◆ An Overview of Biodiversity Issues

Before reviewing other disciplines, it is important to discuss a more general issue here. This concerns the use to which scientific facts are put, what ones are used, and what fails to create any significant agenda. The increasingly dated rationalist approach, with policy makers simply using the facts of objective science, is difficult to sustain, since it has been increasingly recognized that scientific information, as “authoritative knowledge”, is frequently used selectively to legitimate particular policies. Thus, the view of science in policy-making as “truth talking to power” (Carnegie Commission, 1992) must continue to be questioned. That science will, independently and in an apolitical world, uncover the environmental problems of biodiversity degradation and tell policy makers what to do, invites critical enquiry into how and why knowledge is created, promoted and used.

It is helpful to consider a continuum of cases in which at one end, there are comparatively simple scientific facts, where perceptions and definitions are widely shared, and normal “objective” science, at least for relatively tame and carefully bounded problem-solving areas, will continue to play a central role in understanding society-environment relationships. At the other end of the continuum, there are scientific ideas and research areas in which the social construction of the environment is more clearly contested. Here, they are culturally embedded and rest upon particular problem definitions and implicit ideologies, which are not necessarily shared by scientific definitions and understandings. For example, the issues of land degradation, pollution, or risk may imply straightforward concepts for natural scientists which can be measured in a socially and politically neutral manner, which are analysable by normal positivist natural science, and where the only problems are technical ones (e.g. of definition, data collection and experimental design). But all these issues are loaded with social significance and subject to a rich variety of meanings (for example see Douglas and Wildavsky, 1982 for a social analysis of risk). They simply cannot be captured by a single and authoritative scientific set of facts. In all

these cases, their natural science components are imbued with judgements about scientific agenda (what gets studied and what ignored), how scientists study these agendas (the institutions in which they study, and the reward structures for doing so), and the ideological assumptions about the terms themselves.

For example, the terms at the top of contemporary conservation agenda — such as sustainability, degradation or biodiversity — are at the same time technical issues, but the privileging of some over others, the ways in which they are defined measured and used in modelling are subject to alternative social constructions. The current debate in range ecology is a case in point. The notions of ecological succession and carrying capacity of the range have for many years been a topic of solely scientific and technical debate. But as Behnke and Scoones (1993) and Abel and Blaikie (1988, 1990) have shown, these notions rest upon a very particular interpretation of the human impact upon rangelands and of human decision-making. In the same way, the interpretations of the value of biodiversity rest upon partisan assumptions. Some of these derive from the discipline of the researcher — there is debate among economists, and even more so between economists and sociologists, as the discussion below shows. In such cases, the “scientific problem area” is extremely problematic, and scientific problem definition, method and interpretation cannot be made upon apolitical and objective grounds. One of the implications which derives from the fact that the “biodiversity problem” has been framed by the environmental scientific disciplines is that it has been framed as a scientific problem with scientific solutions. Redclift (1994:31) argues that this creates a process of disengagement and lack of responsibility for our behaviour, since the problem is seen scientifically and as being understood to lie in the physical and not in the social environment. Rather, biodiversity erosion is the scientifically defined problem with social and economic implications, which has scientific solutions.

We argue that there are three broad areas of intellectual interest in biodiversity, which are helping to incorporate it into wider social debates. The first is articulated mainly within the natural sciences; the second within the social sciences (particularly economics); and the third in more philosophical and ethical schools. The three areas of intellectual interest can be distinguished by their approach to “human-nature” relationships; the origins of environmental problems; and how to solve them. Their policy implications are analysed in section 5.

Natural sciences

Ideas formulated within the natural sciences tend to conceive environmental problems as products of unbalanced “human-nature” relationships. They tend to emphasize the physical and technical aspects of “sustainability”, which is often expressed in terms of not exceeding the earth’s carrying capacity. Publications such as **Caring for the Earth** (IUCN/UNEP/WWF, 1991) reflect the commonly held belief that the quality of human life depends primarily on the health of the earth, and sustaining the planet in a relatively unaltered state. Thus poverty must be addressed because it inhibits the right balance between humans and nature and not necessarily because of its intrinsic importance. Therefore solutions to environmental problems are focused on changing human attitudes, behaviour and technologies which negatively affect a harmonious balance with the environment. Wilson (1993) argues that the technical problems in achieving this balance are so formidable that they require a redirection of much of science and technology, and a reconsideration of our self-image as a species.

As ecological science and an understanding of global environmental systems theories have developed, conservation priorities have expanded beyond the traditional emphasis on single or endangered species, to concern for whole ecosystems and life support processes. These elements have simultaneously embraced humanistic concerns for indigenous people’s rights, cultural preservation and rural development, and have enriched all thinking on conservation, especially the neo-populist approach described in section 5. Conservation

now sees itself as a preserver of the principle of “diversity”: biological, ecological, and more recently cultural. An example of the latter type of diversity is provided in the following quote:

Even the diversity of human communities is at risk. It is thought that 92 Brazilian tribes have disappeared this century, taking all their traditional knowledge with them. As more and more habitats are destroyed, indigenous peoples all around the world are threatened with extinction. By the end of the twenty-first century, the number of languages spoken in the world could have fallen from 6,000 to 3,000 (WWF, 1993a:14).

It is argued that bio- or life-diversity underpins and enriches the material basis of human and non-human life. Until the last three years or so, development was seen as leading inevitably to an impoverishing monoculture, which threatened diversity and thus our ability to adapt and survive. Many are critical of those who fail to see humanity as a natural species dependent on the natural world, and who underestimate the consequences of “dismantling a support system that is too complex to understand let alone replace in the foreseeable future” (Wilson, 1993).

Social sciences

Ideas formulated within the social sciences take a number of paths, which tend to be defined in a disciplinary manner. First of all, political science, political economy and international relations tend to conceive environmental problems as products of inequitable “human — human” relationships, (e.g. North-South divisions; class; gender, etc.). Thus solutions to environmental problems are centred primarily on transforming social, economic and political relationships. Environmental problems are perceived and analysed within specific socio-economic and political contexts. The two main sub-divisions of social analyses are the liberal/reformist and radical traditions. The former conceives of the problems and solutions within the context of continued capitalist growth (Bauer, 1976). However, the latter, while not challenging growth, wishes to transform capitalist structures of production and distribution. The more radical analyses of the social dimensions of environmental problems are expounded by authors such as Blaikie (1985, in the case of land degradation). In more global and abstract terms Daly and Cobb (1990), point to the laws of capitalist growth, leading through competition to over-production and depletion of resources, to inequality on a global scale and enforced “eco-cide” by the South. The application of this kind of thinking has linked biodiversity issues to human rights issues, grassroots conservation and environmental entitlements (Horta, 1991; Lohmann, 1991; Colchester, 1991; 1992; 1993; and Shiva, 1989a; 1990,). More specifically, Shiva (1989a) identifies the social origins and consequences of genetic resource erosion, particularly for women, and identifies the gender implications of such issues as intellectual property rights and biosafety.

Sociology has not addressed issues of environmental management in the same comprehensive way as economics, and there is not a “sociology of the environment” as there is an environmental economics (see below). Machlis (1992) has suggested a possible role for sociology in biodiversity research and management. First, he suggests that sociology should be able to throw light on the social construction of biodiversity issues. For example, the choice of the measure of biodiversity (number of species, “richness”, abundance and distribution of populations, number of endangered species, centres of species richness with high endemism, degree of genetic variability) is crucial to the social construction of the problem. In fact, the whole project of the deconstruction of science, which in part derives from a post-modern strand in the social sciences, is invoked by Machlis, though many of the main writers are not sociologists (see above). Sociology can also lead to a better understanding and management of habitat change, through an analysis of perceptions and knowledge of biological resources, and struggles over them, although the enormous literature on the subject has been written by geographers, anthropologists,

ethno-botanists as well as sociologists (for example see Croll and Parkin, 1992; Milton, 1993).

Economics

A second strand of thinking in the social sciences has been developed by economists to study and provide more rational bases for environmental policy (Pearce, 1991; Pearce et al., 1992). The economic approach to the environment has been one of the most innovative applications of economics in recent years, and has provided a basis for a distinctive approach to environmental management — the neo-liberal approach, with a particular set of ideological and political assumptions (discussed in section 5).

Two related analytical tasks are (a) the demonstration and measurement of the value of biodiversity; and (b) the appropriation of that value, i.e., how are those values realized and who does and should realize them. Both of these have been briefly discussed above.

Turning to the first task, there are two largely contradictory paradigms (Brown and Moran, 1993, quoting Machlis). The first is a utilitarian one appropriate for industrial economies, where the cost of a lost species is defined as a lost commodity and the income streams that would have accrued, had it been conserved. Thus the value of conserving biodiversity in plants may be reduced to the potential pharmaceutical value of those plants, and biodiversity is redefined and reduced to a “pharmaceutical and industrial warehouse”. It has also led to other conclusions following the earlier work of Clark (1973), where for certain types of species which are not competitive as assets (because their natural growth rates are uncompetitive with other species), optimal management policies might lead to extinction, and investments made in other more useful species. Thus the blue whale or African elephant would (and should? — the normative aspect of neo-classical economics may not be as neutral as some economists would like to claim) be hunted to extinction in an “optimally” managed régime (Spence, 1975, Dasgupta and Heal, 1979). It is hardly necessary to add that many from all disciplines will find this conclusion unacceptable for the reason that other values for the conservation of biodiversity than productive use values (in very narrow terms) must be demonstrated and given more weight. The other paradigm is the argument that species have intrinsic value, which is immeasurable and unmeasurable. Between these two extremes, a number of economic analyses have developed which incorporate some of the other values as described above, particularly indirect use values such as the regulatory functions of the environment. Very little of this work addresses human welfare, except insofar as the less quantifiable consumptive use values and option values have sometimes been added as afterthoughts, although their importance and legitimacy may be granted in principle. It must also be said that economists have also tried to pursue these values in their computation of the “Total Value of an Environmental Asset”.

It should also be added that the basis of measuring the value of biodiversity is through measuring peoples’ revealed preferences or willingness to pay. Two general criticisms apply here. First, humans are the only species able to state their preferences either explicitly or implicitly in money terms. Therefore the valuation is anthropocentric and cannot accommodate intrinsic values except as they are interpreted by human beings. Second, revealed preferences are subject to our tastes for different states of nature but also to income endowments. Thus poor groups in the developing countries do not have the disposable income to underwrite their preferences, and therefore the states of nature and levels of biodiversity which they prefer would tend to be valued lower than those preferences of people with higher disposable incomes. Thus the total value of biodiversity will tend to be underestimated for a variety of reasons. Intrinsic value can be acknowledged but not incorporated easily into a total valuation.

The second issue concerns appropriation. Swanson (1992b) expresses it as a problem of a decentralized regulatory process, whereby countries independently at each point in time

consider the costs of conversion (e.g. of wilderness and high biodiversity to agricultural land and reduced biodiversity but increased food supplies from specialized food production called “agriculture”) without considering the global costs of biodiversity loss. Conceptually this is in part due to a lack of information — decision makers do not know of these costs — but also this is due to the lack of a global market which would capture the value of conservation at the margin. There are important externalities which are not considered in each conversion decision. Those that convert land in this way do not at the present time compensate those who suffer the consequences of that conversion. These costs can be local, regional, national and global. Typical local costs are the reduction in natural regulatory functions (e.g. soil and water conservation at the watershed or regional level) and losses of products consumed by rural populations in developing countries. At the national level, they may be rapid changes in the area-species relationship, where final conversions of undisturbed habitats (say, the last 10 per cent of the national territory) may have an extremely severe impact on species diversity within the national territory itself. At the global level the costs may be in a reduction in carbon sequestration and option values of various types discussed above. It follows therefore that an incentive structure should be put in place where these values of conservation should be reflected in marginal decisions by actors both within national governments and in civil society (e.g. forest contractors, land hungry farmers, national park operators and so forth). Attempts to create such a global market are now making their first appearance (in the Climate and Biodiversity conventions, discussed in the next section). Finally, economists have identified “perverse” incentives put in place by national governments which accelerate the conversion process. These are now well known and include examples such as the subsidies to forest conversion for livestock in Brazil up until the 1980s, subsidies for beef production in Botswana to take advantage of preferential tariffs by the European Union, subsidies and tenurial concessions to mechanized farmers in the clay plains of the Sudan, and hedgerow removal in the European Union itself encouraged by intensive farming under the Common Agricultural Policy.

In summary, the economic approach to the environment is providing a rationale for biodiversity loss and the institutional means at different levels to deal with it. However, virtually all economists would admit that there are unresolved and unresolvable problems with the demonstration and measurement of biodiversity, and that the practical and political realities of instituting properly functioning markets require other considerations more effectively understood and handled in other disciplines — particularly eco-philosophy, sociology, political science and anthropology.

Philosophy

Biodiversity has also been taken up by eco-philosophers who are using the issues to rethink culture-nature relationships and to formulate systems of bioethics. According to Simmons (1993) there are at least two basic environmental ethical questions: one concerning the ethic for the use of the environment, encapsulated by the term “wise use” of the environment; and the other concerning an ethic of the environment in which the moral standing of non-human species are given equal value to the human species. Many of the contemporary eco-philosophers have their origins in the radical tradition outlined above, but differ in that they have incorporated a strong ecological consciousness (e.g. Bahro, 1984; Bookchin, 1980; 1982; Friberg and Hettne, 1985). Many of the approaches stress both the ecological and social dimensions of their world view, and argue that survival depends on transcending the dichotomies of dualistic thinking which separates humans and nature. For example Eckersley (1992) argues powerfully for an ecologically informed philosophy (“ecocentrism”) which recognizes the internal relatedness of all organisms. Unlike conventional “anthropocentric” ethical and political theory which justifies the exclusive moral rights of humans on the basis of our separateness from the rest of the animal world, ecocentrism would be protective of the Earth’s life-support system, because of its orientation of inclusiveness of all beings. Therefore, the intrinsic value of biodiversity is privileged above narrower utilitarian and instrumentalist concerns which directly concern human welfare alone.

◆ Interdisciplinary Research Initiatives

This section summarizes the main elements of interdisciplinary research in the social sciences that have provided interpretations and approaches to the information provided by the natural sciences about biodiversity. This helps to explain the important place of biodiversity on the international agenda.

- (i) There has been a long history of wildlife conservation, especially in Africa. It involved single high-profile species such as elephant, rhinoceros and lion. Initiatives sought to preserve these “flagship” species and tended to ignore human welfare issues, such as the loss of grazing rights and access to forests by local people. Limited treatment of the biodiversity issue therefore had a long policy history, the defects of which had been well recognized by the 1970s.
- (ii) Scientific research on global warming which progressively emerged from the early 1970s and 1980s was undoubtedly a major catalyst both empirically and theoretically to biodiversity research. Some issues were shared by both (e.g. carbon sequestration), and the acknowledgement of global interdependence with systems-based research of global warming resonated with emerging research on biodiversity.
- (iii) International environmental agreements such as CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), but also the Vienna and Montreal Protocols (to phase out ozone damaging substances), the London Dumping Convention (now simply the Dumping Convention to limit marine pollution), the International Tropical Timber Agreement (the ITTA, which, although a trade agreement, has important conservationist clauses), and the World Heritage Convention (dealing with sites of world cultural, scenic and scientific value) had already provided an experience of international negotiation and political initiative to conserve different aspects of the environment. UNCED-sponsored Earth Summit agreements at Rio are also important in this context, of course; these are discussed below.
- (iv) The interdisciplinary research initiative by the Board of Science and Technology in Development (BOSTID) in Common Property Resource Management brought together a large number of social scientists to understand the nature of property régimes with a focus on environmental management. About twenty case studies, mostly in developing countries, were written within a mutually developed theoretical framework. The problems of externalities, rights, duties and expectations under different property régimes, and their implications for environmental management were discussed, and seminal works by Ostrom (1990), Bromley (1992) and Birkes (1989) followed. Many theoretical advances emerged from this initiative, as evidenced by their application and extension in the social science literature on biodiversity. This is especially so in responding to scientific research in (ii) above, in which the “management of the global commons” has become a catch-phrase of this fast-developing research field.

What is surprising is the scant attention paid by these converging academic approaches to the issue of human welfare in biodiversity. There are disciplinary and methodological reasons for this which have already been mentioned. The main impetus has come from other strands of thought and development paradigms, and as yet have made only a partial impact.

◆ UNCED and the Biodiversity Convention

The United Nations Conference on Environment and Development (UNCED) which took place in Rio de Janeiro, Brazil in June 1992 forced biodiversity onto the international political agenda. It represented the culmination of efforts and concern about the environment which have been around since the warnings of the Club of Rome about the “predicament of mankind”. For example, IUCN published its World Conservation Strategy in 1980. The United Nations created a World Commission on Environment and Development and published **Our Common Future** (WCED, 1987).

UNCED has been seen as especially significant because for the first time a process of democratization in international policy-making was set in motion. However, many considered this to have been limited to the “lowest common denominator” due to an unwieldy bureaucratic process of bargaining over the minute details of the text of the convention. It produced the Rio Declaration, a Framework Convention on Climate Change and a Convention on Biological Diversity and “Agenda 21”. (Agenda 21, which attempts to integrate development and environmental conservation, is strongly supportive of neo-populist “bottom-up” participatory approaches, but also develops a neo-liberal economic approach to the environment.) Finally, a set of Forest Principles emerged, which in effect was a set of compromises between the declared sovereign rights of nations to manage their forests, along with non-binding principles governing protection and management.

Negotiation of an international agreement on the conservation of biodiversity began in 1990, as a result of increasing concern that the world’s biological diversity was diminishing at an alarming rate. There was also a concern that developing countries, the biodiversity “hot spots”, needed increased assistance from developed countries to be able to conserve effectively their biodiversity. Furthermore, there has been a growing recognition that in return for access to genetic material, countries of origin should get a greater share of the benefits arising from the commercial use of the material (Inskipp, 1992)

The Biodiversity Convention contains the following significant points.

- It recognizes that biodiversity is essential to our planetary life-support systems.
- It commits countries to a series of national level obligations, including making inventories of biological resources, developing national conservation strategies and integrating conservation in development planning.
- It requires developed countries to assist developing countries in carrying out their conservation programmes.
- It recognizes the role of indigenous and local communities in protecting biodiversity.
- It promotes the fair and equitable sharing of the benefits arising from the use of genetic resources by way of appropriate access to genetic resources, transfer of relevant technologies to developing countries and sufficient funding to underwrite these activities.

The Biodiversity Convention was signed by 157 countries, with the United States being the only major non-signatory (it was signed later by President Clinton). The Convention has now been ratified.

The many lessons of the Rio Conference have been well documented (Grubb et al., 1993). Perhaps the most prominent lesson is that biodiversity, like all natural resources, has become a new focus of global politics. While the global vision of biodiversity loss would predictably face formidable political problems in the path of implementation, it struck a number of commentators how timid and rhetorical the convention turned out to be (Chatterjee and Finger, 1994). The political and institutional environment of the negotiations themselves go a long way to explain the outcome. Minute contestations of the text of the convention became the currency of deeper conflicts. The lowest common denominator of agreement is bound to produce a bland, conservative and non-committal product. However, optimists can rightly point to the first global meeting of its kind, and the firm establishment of global environmental issues on international and national agendas. The negotiations reflect familiar patterns of development discourse. Three are reviewed below.

(a) *The extension of North-South confrontation.* It has become increasingly clear that the central issue of global sustainable development is centred on the divisions between the developed and developing countries. Debates focused on economic issues such as financing, resource and technology transfer, population, poverty and patterns of unequal

consumption and control of natural resources. UNCED did force a renewed period of self reflection in both the North and South. Analysts from developing countries point out that the Convention is skewed in favour of the North, and in particular US corporations. Shiva (1993b), for example, draws attention to issues of intellectual property rights and biotechnology, and “biosafety”. She argues that the Convention does not recognize the sovereign rights of local communities to conserve and use biodiversity, and that biotechnology which uses the “raw materials” from the South does not aid conservation (because of the tendency of biotechnologies towards monocultures) and it exploits citizens from the South because they end up buying biotechnologies back. While there is a protocol concerning patenting genetic materials of living resources and transfer of biotechnologies between North and South, there is concern that the convention will open the floodgates towards patenting of genetic materials already in gene banks, which ignores sovereign rights issues.

(b) International responsibilities and perceived sovereign national interests. UNCED is one of the first and undoubtedly the biggest effort to forge a unified environmental ethic and sense of global responsibility. However, there are clear tensions between United Nations processes and interests of individual states, many of which asserted the principle of national sovereignty. Some argue that issues of sovereignty are often used to avoid discussions on uncomfortable topics: for example, in discussions about forest principles, Brazil argued that international intervention in its internal affairs was out of the question. The debate about global sustainability also reopens the debate about the proper limits to national sovereignty (Grubb et al., 1993). In other spheres too, such as human rights and even health, there are vigorous advocates for the limitation of the sovereign rights of nation states in the name of safeguarding human welfare as an international right and therefore a duty to uphold internationally.

(c) Guidelines to action. There has been a lack of detailed prescription about how to implement the convention. Instead there has been much in the way of exhortation, and statements of general commitment. Some economists (e.g. David Pearce) argue that the Convention does not touch upon the fundamental forces underlying biodiversity loss. He argues that losses are due to the ways that national economies and the world economy are organized, in addition to population pressure. He argues for an “economic theory of biodiversity loss”. Although regulations and agreements play their part, unless the economic incentives and disincentives are worked out so that a global market for natural resources, and particularly biodiversity can be created and operate efficiently, all the rhetoric in the world will not help to conserve biodiversity. However, global markets require international agreements as well as institutional strengthening of national policy-making capability, as well as heroic improvements in the effectiveness of national and local bureaucracies in developing countries (as discussed below). Critics of UNCED have pointed out these and other shortcomings. This paper reviews some of the ways in which these shortcomings are, and may be, bridged in the future.

◆ Conclusions about Conceptual Issues of Biodiversity

The initial identification of the biodiversity problem has come from the natural sciences and it stimulated and developed earlier more fragmented concerns of single species conservation, national parks, and Western concerns about “Edenism”, which refers to the vision of an untrammelled nature, a state to which it should be restored (see Colchester, 1994 for an excellent critique). This earlier notion of conservation was, of course, oblivious to its detrimental implications for human welfare.

Biodiversity has a complex scientific basis, much of which is still not understood, but some of the basic data on trends of species and genetic diversity are increasingly persuasive that there is a very serious problem in global terms. How this will impact and who will bear the costs of its prevention or palliation is still far from clear.

The contested nature of the social construction of “biodiversity”, and the related variety of interpretations by different actors has meant that the term has become a bandwagon, and means all things to all people. The result is that much of the analysis is being degraded and reduced to the status of a fetish, sometimes even an excuse for posturing and doing little. This difficulty is similar to that faced by other complex and imprecise notions at the environmental-social interface such as “sustainability” or “environmental degradation”

Therefore it may be helpful to (a) accept plurality of definitions, but define them carefully and attribute them to the stakeholders involved; (b) be prepared to link biodiversity with other issues too, but acknowledge that there are other issues involved which intersect with (some of) the aims of biodiversity, but which do not share the same final goals. Human rights, particularly of indigenous people, income distribution, rights to clean water, education, shelter, etc., and human welfare all are related to biodiversity and its different values, but have agendas and goals other than biodiversity conservation.

As with other systemic environmental changes on a global scale, the impact of biodiversity loss upon human welfare will be spatially and globally patchy and always mediated through patterns of wealth, access and power. Also, biodiversity loss is only one among a number of implications of habitat loss/land use conversion, modernization and commercialization of agriculture, etc., and so the implications of biodiversity loss will be complex. For example, loss of indigenous forests will be associated with both a contribution to global warming and biodiversity loss, some of the impacts of which will be felt locally (e.g. sea level rise at some coastal locations and loss of access to use values at other locations), and some globally.

Loss of biodiversity is irreversible (unlike climatic warming, holes in the ozone layer, soil erosion, etc.). Once genes (biochemical units of hereditary information) have been lost, they are gone forever. It is clear that the process of impoverishing the genetic basis of evolution and adaptation is accelerating. Some are currently drawing apocalyptic conclusions, such as the possibility that we are witnessing the “end of nature” (McKibben, 1990). While these conclusions may be overdrawn, there are very strong scientific arguments for taking action, even if this only amounts to holding operations or palliative action. The critical approach in this paper to the ways in which the concept of biodiversity has been used should in no way be seen to detract from this point.

3. ACTORS

One of the pervasive themes of the last section was the contested quality of the natural and social environment of biodiversity. There are conflicts of interest over natural resources, different interpretations of the term by scientists, different perspectives upon both means and ends, and struggles over the meaning of different terms and classifications of natural resources (e.g. whether a patch of land is designated a National Park or agricultural land for clearing and cultivation). In this section attention is turned to a brief introduction of the actors themselves who are involved in biodiversity issues. The differences in the way each perceives, understands, and experiences “biodiversity” derives from differences in their daily lives.

There are groups of actors who enjoy direct benefits from biodiversity and whose welfare is thus directly affected by biodiversity erosion or the loss of control and access to it. This group includes rural populations whose livelihoods are affected by the changes in habitats and in their access to a range of biological resources, primarily in developing countries. Especially important are those who are politically, economically and ecologically precarious within overall changes of the agrarian political economy. These include the poorest sections such as tribal groups, marginal farmers, forest dwellers, and women within these groups.

Also there are other groups of actors whose daily lives are affected by biodiversity issues in contingent and indirect ways. These are government servants who are involved in the conservation of biodiversity and those who control access to biological resources through official means. These include the police, forestry officers, district-level officials, chairmen of the village council, chambers of commerce at the local level and so on. In their daily lives they control access to resources, which collectively are “biodiverse”, however defined. So, for example, local customs officers responsible for monitoring the export of live species from a developing country at a remote airport experiences the “biodiversity issue” in a most contingent and indirect manner. At the same time, their performance in their duties is actually quite important to biodiversity conservation. Their daily life concerns managing on a meagre, post-structural adjustment government salary. They have to distinguish different species of parrot, for example, a task for which they do not have the training or the personal commitment. It is only by identifying their contingent relationship with biodiversity that the basis of an understanding of their actions can be constructed. To take the case of the hypothetical customs officers, their welfare may be served better by extracting bureaucratic rent (or bribes) and allowing through for export all manner of rare species threatened with extinction. It is very often the case that income earned at the margin by the disposal of (rather than the conservation of) rare and endangered species is more attractive to those who control these resources through the exercise of formal and informal political power.

There is an important general point to be made here concerning the relationship between biodiversity and welfare which many actors share. Conservation of forest resources, wildlife and sites of scientific importance often work against the short-term economic interests of virtually all sections of the rural populations of developing countries. In many tropical and sub-tropical regions, timber is used as fuelwood on a day-to-day basis; the land on which it stands is required for agriculture under present agricultural technologies and population growth; and certain species offer opportunities for immense and rapid enrichment for foreign firms as well as small-scale loggers. Wildlife provides meat for the majority of the population, both urban and rural; some species may fetch very high prices either as live specimens or as trophies, or may yield ivory. Simply, most people who are part of the state apparatus or in civil society make money from continuing to exploit these resources, or from selling access to them. Since the aggregate rate of exploitation is non-sustainable, any aim of either sustainable resource use or conservation will tend to be frustrated. The present and future values of biodiversity are diffuse, in both the senses of widely distributed amongst the present and future populations and ill-defined. These values of biodiversity also are usually unperceived altogether by most of the population, because they refer collectively to particular species as a whole, and not to the value of a particular animal or plant at the margin, where they offer an immediate and (for many) essential income or use value. This point questions any simplistic assumption that rural people will necessarily prefer to conserve biodiversity, or even to use resources in a sustainable way.

To understand the political dimensions of biodiversity it is necessary to understand how the groups of actors interact. Long and Long (1992) call this the “interface”, and typically this is the interface between bureaucrats and state or project officials on the one hand, and civil society (ordinary people) on the other. In the case of biodiversity, interaction between a broader range of actors is relevant — between scientists and policy makers, between members of the timber trade and activist groups, and so on. In this report four major groups are critically discussed in relation to contemporary biodiversity issues: international policy makers; officials and state functionaries; entrepreneurs and commercial corporations; and local resource users. There are many other actors involved in one way or another with biodiversity, such as eco-tourist and safari tour operators, conservation project managers, non-governmental organizations and local action and protest groups. Some of these appear in our case studies, but are not discussed in this section.

This section also develops a critique on how actors are assumed to interact in the arena of biodiversity. There are persuasive images of the behaviour of some actors which are often

central to policy-making, but which are frequently left unexamined. We take two — the image of the “community” as an assumption of social order in rural society in the South; and the image of rational policy discourse about conservation strategies. Here it is suggested that the “community” as a concept is needed by international conservation agencies, international NGOs and aid donors, and that it is frequently imagined rather than real. A more contingent and contested approach is put forward which has considerable implications for biodiversity conservation policy. In the section on policy makers the influence of institutional politics and professional rivalry on policy development is explored. While these insights are neither new nor confined to conservation, they are of great importance in understanding how global decision-making and opinion-forming about biodiversity take place. In section 4, a cast of actors in biodiversity is assembled and their interactions discussed in a series of case studies.

◆ Policy Makers at the International Level

International policy makers have a major influence upon discourses surrounding the environment and development, and more specifically the way natural resources (and thus biodiversity) are managed. Of course there are other actors at the national, regional and local levels who will also enter the discourse. There will be filters to the ideas of international policy makers, in terms of political bargaining in policy formulation, and issues of interpretation and implementation of the policy itself. It is important to make a distinction between the high level policy negotiations among a range of government representatives; international organizations and NGOs (e.g. the UNCED and post-UNCED process); and the particular policies of the international conservation organizations. The following discussion refers mainly to the policy-making practices of international conservation organizations.

International conservation policies are largely promoted by international agencies such as IUCN, UNEP and WWF. Their general policies are set out in documents such as the **World Conservation Strategy** (IUCN et al., 1980) and **Caring for the Earth** (IUCN/UNEP/WWF, 1991), and other papers such as **WWF’s Global Priorities to the Year 2000** (Martin, 1994). The last decade has seen a notable shift in their policies away from the classical emphasis on nature preservation towards ideas of sustainable development, which include the more populist and neo-liberal approaches to conservation (see section 5 for further discussion). Conservation activities have also evolved significantly over the last decade. For example, 30 years ago WWF was a grant-making organization, funding small conservation projects, or collaborating with national governments to set up national parks. Currently they devote a significant portion of funds and human resources to lobbying and advocacy work. The social history of WWF reveals strong strategic relations with Northern states and élites from the South, but at the same time a firm adherence to its independent NGO status. Because of these ties, WWF is well positioned to press for changes in government policy. For example, in 1985 WWF helped to bring about an international moratorium on whaling, and in 1990 another on the ivory trade. It has also pressured governments to sign the Biodiversity and Climate Conventions (elaborated in Rio in 1992). It has also played an influential role in the negotiations of the United Nations Commission on Sustainable Development (CSD), particularly on forestry, biodiversity and climate change issues. WWF is also actively involved in trying to influence business and trade practices (see the sub-section on entrepreneurs and corporations below). Its contacts with political élites in the South have enabled WWF to negotiate debt-for-nature swaps, whereby a portion of a nation’s debt is converted into conservation funds. These have been made in a number of countries including Ecuador, the Philippines, Poland and Zambia (Russell, 1993).

International and national conservation policy makers increasingly come from different social backgrounds. Much contemporary policy-making is characterized by inter-NGO networking and collaboration, and more emphasis on local and regional level participation. For example, at a national level WWF-UK frequently collaborates with other NGOs such

as Friends of the Earth, Greenpeace and Survival International, for particular campaigns. In 1991, an inter-NGO campaign was aimed at bringing a halt to World Bank funding of projects that exploited primary moist tropical forests. In 1992, an association of conservation NGOs established the Boreal Forest/Taiga Rescue Network in Sweden as a forum for exchanging information, and to run joint campaigns aimed at the protection of boreal forests. WWF also carries out its own field programme at the local level in the South, often in collaboration with southern NGOs, and may bypass state institutions altogether.

In the post-UNCED era, conservation policy-making at the international level has involved complex, time consuming and politically sensitive negotiations between a range of international organizations, government representatives and NGOs. The talks are often characterized by their lack of detail on specific issues, and deliberate strategies to block any initiative which may threaten sovereignty. Some observers suggest that governments have failed to meet the commitments made at UNCED and that things may be worse now (Dudley et al., 1995), and that the United Nations process “lacks the teeth” to make changes on the ground.

While environmental NGOs continue to struggle for representation at high-level negotiations, many at the same time have been disillusioned with the UNCED process and choose to develop or support independent initiatives. For example, the Forest Stewardship Council (FSC) was founded in Toronto in 1993 by a diverse group of representatives from environmental institutions, indigenous peoples’ organizations, community forestry groups, the timber trade, the forestry profession and forest product certification organizations from 25 countries. It is notable for its strong concern for forest ecosystems and for the welfare of local communities in both the North and South. The FSC has evolved in response to the growing public demand that purchases of wood and other forest products do not contribute to deforestation but rather help secure forests for the future. During the past few years there has been a proliferation of self-certification programmes of wood products on the market. The FSC seeks to guarantee the authenticity of their claims. The goal of the FSC is to promote environmentally responsible, socially beneficial and economically viable management of the world’s forests, by establishing an international set of respected “principles” of forest management which will apply to all tropical, temperate and boreal forests (FSC, 1994). At present the FSC has developed ten such principles including compliance of forestry management with national and international laws; tenure and use rights and responsibilities; indigenous peoples’ rights; community and forests worker’s rights; and other management principles concerning sustainable forest management. More than 4,000,000 hectares of forest have been independently certified in 17 countries, and a number of retailers in the United Kingdom and the United States are selling products from these forests (J.-P. Jeanrenaud, 1995).

While the FSC is still in its infancy, its inauguration marks a significant step in the development of international forest conservation policy. It has been able to transcend a number of professional, organizational and intellectual barriers, although it is too early to evaluate it in terms of progress on the ground. It has attempted from the outset to be multi-disciplinary in character, and has sought to integrate biological, social and commercial criteria in its principles. It articulates a strong ethical position in support of the rights of the rural poor. The development of the FSC has involved a systematic international consultative process, involving regional and local participation in decision-making in ten countries. All major stakeholders have been involved in the consultations involving environmentalists, representatives of indigenous peoples, industry, etc. This is regarded as one of its major strengths and lent it legitimacy. Unlike many other international policy efforts (e.g. the TFAP, ITTA) it addresses biodiversity issues in both North and South, bringing into focus the impact of forest management practices on biodiversity and forest quality in the North. Thus, for the first time many Northern forest management practices are experiencing the same scrutiny as those in the South. The FSC goes some way towards helping equalize power differences between North and South. Rather than relying on donor aid to influence forest management, the FSC is unique in that it is designed to use trade and

the market as instruments of influence. Through buying certified products, individual consumers have the potential to support well-managed forests worldwide. It currently receives funding from the Austrian government, the EEC, ODA, several American foundations and WWF.

These developments demonstrate that a different type of professional criterion is circulating at the international level. This reflects neo-populist and neo-liberal approaches to development and conservation (discussed further in section 5), as well as a change in how policy-making is actually done. The literature is full of references to the “new professionalism” and much of it comes from an understanding of the day-to-day lives of development professionals, their training, mindsets, and the institutions in which they work. Pimbert and Pretty (1994) summarize much of the earlier literature such as Chambers (1983; 1992). These authors attack “normal professionalism”, inappropriate science and professional and disciplinary biases. There are, of course, strong reasons why existing orthodoxies survive, since they derive from long-established reward and career structures and from the momentum of established paradigms of conservation and development thinking. However, such developments as the FSC and the circulation of new policy approaches in reports and journal articles show that a new approach among international policy makers and opinion formers is taking shape. Specifically, this has meant a widening network of international policy makers and other actors (e.g. the leaders of the timber trade, see below). Also it shows how the principal divide between the two cultures of natural and social science is being bridged both within individuals and between them. In turn, this may indicate that historic academic criteria of narrow disciplinary rigour and excellence may finally show signs of being eclipsed. Lastly, such developments demonstrate how social and political issues, particularly concerning the implications of conservation for human welfare, have been accorded a higher priority.

Policy practices

As suggested in the introduction to section 4, a persuasive image of policy development is that of the “rational” policy process, by which (non-problematic) objectives are set and resources are allocated. However, we question here whether interactions about concepts, ideologies and strategies follow an orderly cycle of hypothesis, testing and adaptation, in the same way as, for example, manuals outline the project cycle. This image of the policy process has long been criticized as a poor model of what actually happens (Clay and Schaffer, 1984). Instead, we suggest that the development and promotion of conservation policies can become the currency of politicking, manoeuvring and professional rivalry. A closer look at the policy process reveals how scientists, policy makers, academics and communicators tend to compete to establish their own interpretations and definitions of “biodiversity”. Here we look at two key influences on conservation policy and its interpretation: the struggle between different conservation ideologies and the tensions between communicators/fund raisers and policy makers.

Populist approaches to biodiversity conservation have become firmly established. They appear in many international policy documents such as **Caring for the Earth** (IUCN/UNEP/WWF, 1991), the **Global Biodiversity Strategy** (WRI/IUCN/UNEP, 1992), **Parks for Life** (CNPPA, 1993) and Agenda 21. However, it appears that despite the UNCED mandate for such approaches, the institutional climate is less favourable towards neo-populist policies now than it was three years ago. For example, WWF-International established a Biodiversity, Protected Areas and Species Conservation Programme in 1991 to promote a community-based conservation approach. To many outsiders, the work of this group represented a more socially-oriented approach to conservation, and led many people to believe that WWF was transforming itself in this direction. This programme was eliminated in 1995 during a “downscaling” exercise at the organization, however, amid widespread protest. Critics have claimed that the restructuring in fact reveals an ideological struggle between the classical and populist approaches to conservation at the international level (Ehringhaus cited in Tickell, 1995). For example, Tickell (1995) reported that WWF is divided into two contending schools of thought: the traditionists who believe that conservation encompasses only animals, plants and protected areas; and a group that subscribes to more holistic people-oriented philosophy. The recent changes at WWF may be interpreted as a reaffirmation of the traditionists’ power, although there may be several other dimensions to this policy discourse.

While undoubtedly many senior conservationists fail to recognize the full implications of the populist’s model, and a few traditionists do remain, the central management of WWF-International has made it absolutely clear that the organization remains firmly committed to community-based conservation. Very few international conservationists would now dare voice the “fortress mentality” of a couple of decades ago. WWF has long supported people-focused conservation and has every intention of continuing to promote it, according to the central management (Martin, 1995). The official reason for this downscaling at headquarters was decentralization, and the rationale of re-allocating resources to build up this approach in the field, rather than at the international secretariat which needed to be streamlined.

However, despite the above rationale, a further explanation may be the growing influence of the neo-liberal approach on international conservation policy. The proponents of this approach tend to perceive the emphasis on grassroots work as naive. There are some powerful internal and external forces pushing to bring economics closer to conservation, and a desire to address the perceived economic causes of biodiversity loss (and this approach is discussed in more detail in section 5). For example, WWF has recently made some of its work on various macro-economic themes special policy issues (e.g. “green accounting”). The growing economic emphasis resonates too with the approach of the World Bank’s Global Environmental Facility (GEF) which has a leading role in financing biodiversity conservation projects. According to Chatterjee and Finger (1994), there have

been various confrontations between the neo-populist and neo-liberal approaches to conservation. Those who promote the latter tend to have increasing political power, and are either alienating or partly co-opting the former.

This brief example illustrates how ideologies, personalities and institutional practices are mutually constituted in a context of constantly shifting conflicts and alliances. The successful development of certain policies appears to be related to the degree of “empire” or constituency building within organizations. This involves various tactics and strategies, including deliberate internal consensus building and special modes of institutional discourse.

While the UNCED process has apparently supported the rise of neo-populism within conservation, the trend has acquired a distinctive technocratic flavour. Organizations like WWF and IUCN are being asked to manage some GEF projects, and to submit proposals for projects on biodiversity that they promise to fund. Both organizations are positively responding to these opportunities. However, populists fear that a more technocratic approach will not be concerned with empowerment and capacity building, nor be sensitive to local problems or issues, but instead will be based on neo-classical economic theory (discussed in section 5). Despite the neo-populist jargon, the recent GEF guidelines for community-based biodiversity conservation clearly view communities as “resources” to achieve conservation as defined by the outside experts (GEF, 1993). There is also concern that this approach will lend support to a new class of technocratic global environmental managers (Sachs, 1994).

The recent debate on people-focused policies has also pushed conservation organizations to reassess and reinforce their identities as “nature conservation”, and not “social development” organizations. While many agreed about the unproblematic concept of integrated conservation and development in the 1980s, many conservationists now realize that it may entail unacceptable costs and trade-offs.

Conservation ideologies alone are not the sole forces shaping policy. Organizations consist of many intersecting struggles, and disjunctures of knowledge and interests between actors, which play their part in shaping strategies and agendas. Another dynamic within WWF is the tension between its “conservation” and its “fund raising” cultures. Some policy staff have voiced the fear that policy is not driven by field issues, but rather by donors concern for the charismatic and extinction-prone mega-vertebrates (e.g. panda, tiger, rhino, whale, etc.). These have become the symbols of the international conservation movement, and many organizations find it easier to raise money through manipulating the images rather than promoting its actual policy or field work. Indeed, institutional survival may depend on these public relations exercises.

While fund raisers and communicators may argue that emotive appeals to save “flagship” species or the undifferentiated rain forest enrols public opinion of the North by providing a powerful image and entry point to more complex (and important) “projects”, their objectives and criteria of success are different to those of policy and field staff. The business side of the organization values donations, number of members, perceived (rather than actual) effectiveness, target fulfilment, quotes in newspapers, and maintaining a high international public profile. A pervasive informal rule is “don’t upset the donors”. In this sense it can be argued that policy development is in part constrained by its relationship with the donors, and conservation becomes a construct of the fund raisers. The outcome may have quite serious implications for the human welfare of local rural actors in developing countries.

The two examples above give some insights into the dynamics of policy practice, and reveal some of the contested meanings of conservation at the international level. The socially constructed nature of “conservation” will now be examined in other arenas.

◆ State Functionaries in Biodiversity Conservation

State functionaries are involved in the regulation of the use of natural resources and in the formulation and implementation of policy. They do not form a homogenous group, since they occupy different places in the administration (from first secretary to forest ranger), and their role and effectiveness in implementing biodiversity conservation will depend on the degree of technical and administrative competence of the civil service. Also, some environmental protection agencies are not adequately staffed (including those in many developed countries), with legal work, routine monitoring and basic administration becoming bogged down in delays.

An important consideration in biodiversity conservation, as with other environmental policies, is that for many government servants, particularly in developing countries, the issue of biodiversity is probably of little direct interest, and impinges on their lives only as a series of regulations or bureaucratic procedures. For many, their main preoccupation is to keep their jobs, as the following case study of Cameroon illustrates. There are opportunities for the collection “bureaucratic rents” (bribes) on the part of strategically placed officials in biodiversity conservation projects and programmes. For example, the issuing of hunting licences, the inspection and monitoring of CITES, and customs inspections where live species, ivory and trophies may be exported. The monitoring and reporting systems for many developing countries are often also hopelessly inadequate. For example, forestry officials in Cameroon have very few vehicles to visit forest sites, and are sometimes transported by foreign timber companies. Many officials are in a contractually inferior position in negotiations with foreign firms which may not be too concerned about keeping to conservation guidelines. There are too many cases of large-scale illegal smuggling, either overlooked or run by official bodies. Most instances are highly sensitive and are not officially documented (or the documentation is suppressed), but there are enough notorious cases to support the claim that biodiversity conservation is seriously compromised in many countries — especially but not exclusively in the South.

For example, Ellis (1994) reports that South Africa’s policy of destabilization of neighbouring countries was closely associated with the rise of South Africa as a key transit country in the international ivory trade. South African traders, acting in partnership or with protection from officers of the South African Military Directorate, imported raw ivory from Angola, Mozambique and elsewhere and exported it to markets in the Far East. This was a source of income both for the South African secret services and for the individuals associated with them. There is evidence that counter-insurgency specialists are using Mozambique as a base for operations inside South Africa, and that they continue to have an interest in ivory and rhino horn. Former officers of counter-insurgency units have also found employment as game wardens in national parks. Ellis shows how the South African conservation lobby has been used by some of the specialist counter insurgency units of the South African Defence Force, and how proposals for the large game parks along the South-African Mozambique border have important implications for politics and national security, as well as biodiversity conservation (1994).

The implementation of CITES and the environmental clauses of ITTA are markers for the future implementation of the UNCED Biodiversity Convention, and current research being undertaken by the American Social Research Council on the implementation and compliance with international accord shows how signing of these accords may be no indication of a country intending or undertaking to implement them. It is clear that biodiversity conservation may not be of much professional and personal concern to many state functionaries at all — and this applies even to personnel in wildlife protection and forestry agencies in many developing countries.

◆ Entrepreneurs and Corporations

The relationship between commercial interests and biodiversity is a vast subject and can only be touched upon in this paper. In general terms, commercial actors usually exploit a narrow range of natural resources in any one location or sector, which may have implications for genetic, species and ecosystem biodiversity. Their profits are linked to using biodiversity, which is seen as a raw material. The actions and views of entrepreneurs with regard to biodiversity may be considered to lie along a continuum. At one end there are distinctly “anti-nature” views of some multinational corporations, while others have developed distinctly “green” objectives and are seeking mutually beneficial relationships with local communities. For example, a Cargill executive claimed that they have succeeded in “stopping bees from usurping the pollen” (cited in Shiva, 1993b). The latter may use a “green” image as a marketing asset, but be careful that earning it does not reduce their competitiveness. The recent controversy during mid-1994 over the Body Shop has focused attention upon the degree of substantive change towards conservationist practice, as opposed to window dressing. There are undoubtedly examples, in the retail sector particularly, where the notions of biodiversity and conservation are being used in misleading ways to sell products without any change in the way the constituent natural resources are obtained or purchased.

Within this commercial context, much of the contemporary debate is focused on the contribution of the new biotechnologies and intellectual property régimes to genetic erosion and conservation; and the impact of the timber trade on biodiversity.

Biotechnology and intellectual property

Historically, Northern countries have had easy access to the biological resources of developing countries. The colonial relationship underwrote this access. Indeed, over the past few centuries it was (and still is) access to and control of commercially important tropical resources which has given Western powers economic advantage in the world economy. Brockway (1979) illustrates how the acquisition and monopoly of scientific knowledge played a key role in the development of several highly profitable and strategically important plant based industries during the colonial era (e.g. rubber, cinchona, sisal). The acquisition and control of knowledge and resources has taken on a new dimension with the development of modern biotechnologies and intellectual property (IP) systems. According to the Crucible Group (1994) access to genetic diversity will be the key to human survival.

While on the one hand the world is experiencing a decline in the resource base, on the other there is a proliferation of new biotechnologies which can use genetic resources in new ways. The growing interest in new biological compounds means that the genes of many plants, animals and micro-organisms are becoming commercially more valuable and biotechnology companies are making large investments in screening genetic resources. For example, gorgonian corals from tropical reefs are being assessed for anti-inflammatory compounds; traditional medicinal plants are being screened for anti-HIV properties; soils from tropical rain forests are being studied to find new pesticides and antibiotics. In agriculture germplasm specialists are screening traditional strains and their wild relatives for plant and animal breeding programmes (Pimbert, 1993). The vital contribution of genetic diversity to crop production and medicines is impossible to predict. In industrial manufacturing it has been estimated that plant resources will recapture the share of the total industrial materials they enjoyed in the 1920s (Morris and Ahmed, 1992); while in medicine it is estimated that over 7,000 medical compounds in Western medicine are drawn from plants (Mshigenio, 1990).

In order to safeguard the time and capital that they have invested in screening and developing new resources, commercial companies and some governments have pressed for the extension of Intellectual Property Rights (IPRs) to biological products, and for a global “harmonization” of patent systems (i.e., for all countries to adopt the types of IPR system currently operating in industrialized countries). The most recent GATT agreement obliges

all signatories to adopt either a patent or some form of *sui generis* protection for plant varieties and micro-organisms. Governments can include IPRs for animals if they wish. The intellectual property debate is highly controversial, and is seen by many to represent a new phase in the debate on which genes will (and should) become privatized (Vogel, 1994). On the other hand, the debate has drawn attention to the relationship between science, business and power in global terms and the impact of IP on local livelihoods, and the ethical implications of patenting “life forms”. Many believe that IP systems need to be reshaped to accommodate social concerns (ODI, 1993).

There is concern that the development of modern biotechnologies and IP systems will have a profound influence on biodiversity and rural communities in the South, and may even accelerate genetic erosion. During this century a large proportion of the genetic variability of the world’s major food crops has become extinct, and the conservation and development of the remaining crop diversity has become an urgent task (Cooper et al., 1992). Four major reasons are discussed below.

First, it is feared that biotechnologies and IPRs are likely to accelerate genetic erosion by facilitating the breeding of modern varieties. The genetic base of the modern varieties of commercial agriculture is very narrow, which is typical of conventional plant breeding where cycles of selection tend to reduce the level of variation within a plant population. Intellectual property enhances the incentives towards the development of varieties with the largest market potential (i.e., widely adapted over large areas) and which suit the needs of commercial farmers and the marketing and processing industries. Crops that are preferred by small-scale farmers are usually neglected or abandoned as their relative profitability suffers. The exercise of intellectual property rights means that seed companies obtain a higher return on protected varieties than on unprotected varieties. It also establishes a bias in favour of the newest varieties which emphasize uniformity rather than genetic variability (Crucible Group, 1994). Since the 1950s the spread of “Green Revolution” varieties of corn, wheat, rice and other crops has squeezed out native varieties, as farmers replace traditional varieties with only a few introduced ones. In Indonesia, 1,500 local paddy varieties have become extinct in the last 15 years (Pimbert, 1993). In Zimbabwe, 2 hybrid varieties account for 90 per cent of all maize seed planted, and have displaced many traditional varieties of millet and sorghum (ODI, 1993). Shiva (1993b) illustrates this global trend in her book **Monocultures of the Mind**.

Second, it is widely agreed that current IPRs do not accommodate the contributions made by local farmers to the maintenance of diversity, through their strategies of growing a wide range of cultivars, and centuries of indigenous experimentation. For example, *Azadirachta indica* (the *neem* tree) has been used for centuries by Indian doctors and farmers. Its chemical properties have made it suitable for many types of medicines and effective insecticides. These properties have been known to Indians for millennia, and over the last seventy years there has been considerable research carried out by scientific institutes in India itself, but its chemical properties have never been patented. Indeed, under Indian law agricultural and medicinal products are not patentable. However, since 1985 over a dozen US patents have been taken out by United States and Japanese firms on formulae for neem-based solutions and emulsions, and one patent holding company (W.R. Grace) has set up a plant in India which will process *neem* seed for export to the United States. They are also developing a network of seed suppliers, to ensure a constant supply of seeds and a reliable price. The appeal of the *neem* tree to these multinational companies is clearly commercial. There has been a mounting chorus of objections from Indian scientists, farmers and political activists, who argue that multinationals have no right “to expropriate the fruit of centuries of indigenous experimentation and several decades of scientific research” (Shiva and Holla-Bhar, 1993). The debate has stimulated a bitter controversy about the ethics of IP and what is believed to be “intellectual piracy”. Monopoly control of genetic resources makes it illegal for local communities to renew biologically their stock without payment, and it is feared that the seed and breeding stock of vulnerable farmers may gradually become the intellectual property of national and multinational companies. This has strong implications for the welfare of farmers and consumers in developing countries since they

could be forced to pay high prices for products that they would have formerly provided for themselves. IP is also seen to undermine biodiversity associated with traditional and low input agriculture. Brockway (1979) points out that royalty payments on patents, copyrights, franchises and licences constitute monopoly rent on technology and knowledge, and thus act as a drain on poor countries.

The commercialization and privatization of biodiversity through IPR can be seen as the growing power of global capital, which currently has free global access to the products of traditional knowledge. Discussion on alternative *sui generis* patent systems and new forms of co-operation with local communities are slowly growing. For example, the Crucible Group (1994) review various IP options and alternatives for biological resources within the global trading system. It argues strongly in favour of protecting farmers' and community rights, and suggests that biotechnology may warrant its own *sui generis* IP system. Some countries are developing their own response to the IP challenge. For example, in India an alliance of farmers and scientists is developing an alternative form of intellectual property, the *Gaon Samaj* or a collective at the village level which would hold intellectual property rights (CIPRs — Collective intellectual property rights). These recognize knowledge to be a social product, subject to local common rights, and give the community the right to benefit commercially from traditional knowledge (Shiva and Holla-Bhar, 1993).

There are also a growing number of commercial initiatives which seek to co-operate with indigenous communities. For example, in Latin America, the drug company Shaman Pharmaceuticals has outlined its intention to return a percentage of profits to all communities it has worked with. It intends to funnel compensation through a non-profit organization for the protection of indigenous knowledge and conservation of biodiversity. The Merk-InBio agreement in Costa Rica is another example of a new model of co-operation between commercial companies and countries (Reid et al., 1993). It is clear that there are early signs that countervailing forces, although politically still weak, are making some headway in defending the rights of vulnerable groups in the face of strong international commercial pressures.

Third, there is also evidence that the sheer quantity of some biomaterials required from so-called "wild" collections will contribute to the decline of forest species, coral reefs, wetlands, etc. For example, medicinal plant material exported from Cameroon to France between 1985-1991 includes 900 tonnes of *Voacanga africana* seed; 11,537 tonnes of *Prunus africana* bark for an extract to treat prostatitis in Europe; and 286 tonnes of *Pausinystalia johimbe* bark to be sold as an aphrodisiac in sex shops (Cunningham, 1993). These products are not harvested on a sustainable basis. The total value of imports of medicinal plants to the OECD countries, Japan and the United States increased from US\$ 335 million in 1976 to US\$ 551 million in 1980.

Finally, the testing of new biotechnologies is considered to be a potential threat to biodiversity because it alters the wider ecosystem. Biosafety issues are a major concern of some observers as some new products are known to have adverse ecological and epidemiological consequences. For example, in the North biotechnologists are trying to make some commercial plants more tolerant to frost. A gene which triggers ice nucleation in plant cells has been isolated and eliminated from certain bacteria. When the ice-minus bacteria is sprayed on a crop, it is meant to displace the naturally occurring ice-forming bacteria, and the plants do not freeze when they normally would (Shiva, 1993b). There was a public outcry when the researcher was allowed to conduct a field test, and a group of citizens and environmental interest groups filed a suit against the United States National Institutes of Health for approving the project. There is a strong possibility that the frost-preventing bacteria might be swept up into the upper atmosphere and disrupt the natural formation of ice crystals, which could affect the local climate if not the global climate. As Shiva points out, many Northern governments and companies are taking their trials to countries in the South with little or no regulation, in order to avoid public protest and court injunctions. This charge parallels that of the dumping of hazardous waste and marketing of

hazardous chemicals by companies of the North in developing countries, where regulations are not in place or not implemented.

◆ The Timber Trade

Threats to forests are among the most serious environmental problems of the late twentieth century (Myers, 1979; WRI, 1985). Not only do forest destruction and degradation have major implications for local and global climate patterns, but loss of forest also threatens global biodiversity. Various studies have identified the role of the timber trade in the degradation of tropical, temperate and boreal forests (Marshall, 1990; Hurst, 1990; Horta, 1991; Marx, 1994; Dudley et al., 1995).

In the 1980s the European Timber Trade stated that no tropical timber was traded in Europe, and that forest loss was due to problems of “overpopulation” and the collection of fuelwood in the South. However, Friends of the Earth challenged these claims by revealing that about one third of the world’s international tropical timber did in fact come to Europe (cited Dudley et al., 1995).

Much of the world’s timber continues to come from primary, natural or old growth forests, which is leading to loss of habitats and biodiversity. Logging can cause enormous damage to remaining stands of trees, particularly if recommended techniques of “treading lightly on the forest” are ignored. The technologies of environmentally sound logging are known, but are very often totally ignored. Logging roads also act as migration routes for settlers leading to further destruction of forests (Witte, 1992). Case studies of Russia and Cameroon in this paper amply illustrate these points. Other recent studies have focused on the intensification of management in secondary forests (e.g. plantations). Modern management systems and greater mechanization often result in simplified biodiversity and other detrimental ecological effects (Dudley, 1992).

Over the past few years ownership of forest enterprises has become concentrated in the hands of a few transnational companies, which have enormous economic power and political influence, both formally and informally. For example Marx (1994) reveals how the Japanese Mitsubishi Corporation, Mitsubishi Bank, and Mitsubishi Heavy Industries (along with their numerous subsidiaries) have become the largest corporate family in the world, and are all involved in the timber trade. The Corporation structures the timber deals; their Bank finances them, and their Heavy Industries supplies equipment for logging, processing and shipping.

Due to their political and economic power, some multinationals are known to be logging in national parks and other protected areas, and to operate outside the framework of international law. Much of the mahogany sold in the United Kingdom and United States comes illegally from Indian reserves in Rondônia (Brazil) and elsewhere (Dudley et al., 1995). Logging companies usually have short-term logging leases, and demonstrate little if no concern for good forest management, or indigenous peoples’ rights (Horta, 1991). Much forested land, which was previously under state control, has recently been privatized (particularly in Central and Eastern Europe). Large tracts of forests are quickly being converted to cash with serious implications for biodiversity in the North. (The case of Russian forests is discussed further below.)

The global demand for timber has also greatly increased, with particular implications for deforestation pressures in South-East Asia (particularly Japan, South Korea, Taiwan, Malaysia and Indonesia). Demand for wood and wood products has rapidly increased in the newly developing countries, and has become the motor for deforestation in the Asia-Pacific area and elsewhere. Some logging companies based in these countries, having exhausted their home supplies, have moved to countries as far away as Canada. Mitsubishi, for example, is behind the giant ALPAC project that controls some 70,000 square kilometres of boreal forest in Alberta, Canada. It also owns Crestbrook Forest Industries, which is

being sued by Revenue Canada for transfer pricing. Mitsubishi continues to be a major buyer of old growth logs from McMillan-Bloedel, and has frequently played a role in the exploitation of natural forests (Marx, 1994).

Further studies have exposed widespread illegal felling operations; intra-firm trade and transfer pricing are often characteristic features of transnational corporations involved in the timber trade (see Marshall, 1990 for a discussion of corruption in the timber trade in Papua New Guinea). Among other things, such trade is known to involve an under-measuring of timber volumes, misclassification of species, under-declaration of profits, payment of tax in low tax countries, underestimation of timber values, violations of native land claims, violation of pollution standards, etc. Not only do such procedures allow timber companies to make quick and large profits, without paying for any of the environmental and social costs of their operations, but forest-exporting countries are losing legitimate revenues. It has been estimated that only 10 per cent of timber logged in Brazil is exported legally (Dudley et al., 1995).

Finally, there have been profound changes in forestry and timber technology. Recent technological changes in the forestry sector allow previously uncommercial stands of trees to be converted to woodchip, which further encourages clear felling. Previously untouched stands of trees are now being harvested by their virtual physical removal, with the most drastic implications for biodiversity.

However, despite ample evidence of these negative impacts of the timber trade on biodiversity, there are also signs of new forms of co-operation between environmental NGOs and some companies within the timber trade. Dwindling tropical timber resources are beginning to threaten commercial interests, and according to one environmental spokesman many companies are beginning to see the “writing on the wall” and privately admit to it (J.-P. Jeanrenaud, 1993). In 1991 WWF-UK established a “1995 Group” of wood-using companies committed to phasing out by December 1995 the sale and use of all wood and wood products that do not come from well-managed forests as defined by the Forest Stewardship Council’s “Principles and Criteria”. There are currently twenty-three companies, ranging from large retailers, major purchasers such as British Rail, to smaller companies which are committed to reaching this target. They are required to write an action programme detailing how the company will reach its 1995 target, and to phase out immediately all labels claiming sustainability until a credible independent certification system for timber is established (Jeanrenaud and Sullivan, 1993). The 1995 Group trades over £ one thousand million worth of wood products, almost 10 per cent of total wood consumption in the UK, and more than 35 million customers shop in their stores each week (J.-P. Jeanrenaud, 1995).

Martin Laing, Chairman of John Laing plc, wrote in March 1994:

I implore all wood using companies to...be bold and join WWF’s 1995 Group, which is committed to phasing out the sale of wood and wood products that do not come from well-managed forests by December 1995 — as Laing Homes already has. We should see environmental achievement as a welcome business opportunity — not as a threat (cited in Dudley et al., 1995).

However, this collaboration must not be over-emphasized, since it is recent and is still dwarfed by the prevailing contradictory nature of the relationship between the timber trade and biodiversity conservation. Indeed there is currently an industry backlash against conservation in many developed countries. In January 1995 the Financial Times reported that a leading North American publisher was planning to join forces with the forest products industry to “blunt environmental protests against forest practices in the US and Canada”. In Australia, loggers have violently clashed with environmentalists to bring a halt to further logging in many areas of old-growth forest. The executive director of the New South Wales Forest Products Association was filmed saying:

If we have to physically confront those people who've opposed us for so long then so be it; maybe the time has come. And I'd say to the people in industry, if you are going to do that, use your common sense and make sure it's not being filmed when you do it (cited in J.-P. Jeanrenaud, 1995).

The Prime Minister, Mr. Keating, condemned the loggers for their "intolerable violence", and censored the director on television and in the press forcing him to make a public apology (J.-P. Jeanrenaud, 1995). In Japan, Mitsubishi sent out hundreds of thousands of letters defending logging activities, and blaming poverty as the real cause of forest destruction. The company produced a comic book for Japanese high schools refuting the environmentalists' claim. The Japanese Minister of Education subsequently recalled it as "propaganda for a single company" (Marx, 1994).

Thus the evidence for a growing mutuality of certain commercial and environmentalist interests is mixed. It appears that commercial interests can be aligned with concerns for biodiversity conservation if intensive advocacy work and networking are undertaken, as WWF-UK has done. However, some cautious observers are concerned that, by working with industry, conservation objectives may get lost or watered down. In the case outlined above, WWF-UK is confident that negative publicity and public pressure will lead timber traders and retailers to align themselves with the more reformist conservation lobby. However, it is clear that the timber trade has the incentives and the resources to be a strong countervailing force.

◆ Local Agrarian Groups

Local agrarian groups are those who use a range of natural resources either as use values or for petty commodity production. Access to this range of natural resources is therefore crucial to livelihoods. There has been much recent interest in the role of biodiversity in the livelihoods of local agrarian communities (see Scoones, 1992 for a comprehensive bibliography). This research has lent support to the argument that local communities can potentially play an important role in biodiversity conservation (Pimbert, 1993). There are numerous case studies which show how local communities rely on an enormous variety of products: fuelwood, fibre, bush meat, medicines, vegetables, craft materials, etc. It has been estimated that three quarters of the world's population relies on wild foods for its livelihood security, and that 80 per cent relies on traditional medicine for primary health care (Pimbert, 1993).

Some of the best known examples come from studies of tropical rainforest communities, particularly in West Africa and Latin America. For example, the report of an ethnobotanical study in twelve villages around the Korup National Park in Cameroon, contains a 35 page appendix of local medicinal species, seeds, vegetables, fruits, spices, roots, mushrooms, and other species used by local people (Thomas, 1989). Falconer and Koppell (1990) review the major significance of so called "minor" forest products to local communities in West Africa.

Other communities in less diverse environments also use a wide variety of species for food and medicine. For example, the Pokot pastoralists are known to use some 61 plant species for food and 118 for medicine. They are known to have an exceptionally detailed understanding of fodder species. They can identify species to promote milk or meat production, and for wet- or dry- season fodder (Barrow, 1991). Similarly, in Nepal, surveys have shown that Nepalese farmers use between 70 and 130 species of fodder trees, (Robinson and Thompson, 1989). Local knowledge of species and varieties is of course not isolated to so-called wild foods. There are well known examples of diversity in cultivated crops. For example women rice growers in India are reported to recognize and use over 100, mostly indigenous, varieties of paddy (Shiva and Dankelman, 1992).

Gender

A number of case studies reveal the varying importance of species variety to different categories of rural people — primarily on the basis of gender and class, and especially in times of crisis, food shortage or outright famine. There are three major reasons why a gender perspective in biodiversity erosion and conservation is important:

- (i) Women may be key actors in biodiversity conservation since their knowledge of natural resources may be differentiated from men's, and in some instances greater than men's;
- (ii) The value of biodiversity to women in rural areas in the South may be particularly important on account of their patterns of access to a wide variety of plants for food, medicine, and other household uses;
- (iii) Therefore, the effect of agro-ecological change and biodiversity erosion may impact women in different ways than men.

Let us examine each of these hypotheses in turn.

Shiva and Dankelman argue that women have traditionally played a silent yet central role in management and sustainable use of biological resources and life support systems. Their relationship with the environment is holistic, multi-dimensional and productive. Western research and technology are undermining the control women have over these systems and breaking down linkages that made evolution possible. Successful management of biological resources depends on women's control over environmental systems. This role of women must be respected and reinforced if conservation of genetic diversity is to succeed (Shiva and Dankelman, 1992).

In general terms there are cautionary comments from Jackson (1994), who argues that we should beware of linking gender issues too tightly with biodiversity conservation. It is possible to produce counter-evidence that shows that women resist conservation. There should be no *a priori* grounds, she says, for assuming an affinity between women's interests and those of environmental protection and conservation in the Third World. She argues that environmental conservation frequently seems to be based upon coercive social relations, and that the emancipation of women, or other dominated groups, may not necessarily create a breakthrough for conservation; rather there are possibilities for break-downs of eco-order. Also, Fairhead and Leach (1992) warn that "the importance of differences of agro-ecological knowledge can be over-stressed as a basis for assessing people's differential capabilities, adaptability and flexibility in agriculture".

Against these cautionary remarks about the specificity of women's knowledge of natural resources and therefore of biodiversity, there are arguments that since women are major users of the natural environment they have a wide knowledge of natural resources, based upon the exclusive or dominant use of many species of wild and cultivated plants, animals, fuel, fibres, fodder and medicines. Their work and knowledge are based on linkages within production systems (i.e., ecological systems), which are crucial to maintaining ecological stability.

For example, it is argued that women's knowledge can make a potentially important contribution towards international genetic resource conservation with regard to fuelwood scarcities, since women predominantly collect fuelwood in many different countries (Agarwal, 1986; Ki-Zerbo, 1981; Nagrobahman and Sambrani, 1983). However, it is only occasionally that diversity of fuelwood species is the major problem, rather than the increasing scarcity of biomass overall, although both problems probably co-exist widely (see the case study on Tamil Nadu, below). Also, it does not necessarily follow that women's knowledge of fuelwood species is separate from and superior to that of men, just because women usually do most of the work in collecting fuelwood. Bakweri women in south-west Cameroon are involved in gathering a vast range of diverse products from the tropical forest: wild foods, spices, medicines, various fuelwood species, leaves used for plates and wrapping, and products for income generating activities such as basket-making.

Although men are also involved in gathering a range of products, they tend to specialize in wood products, hunting and honey collection (S. Jeanrenaud 1991).

Women hill farmers in Dehra Dun in India know and use over 145 species of forest plants. However, knowledge is declining as indigenous forest declines. In Kenya, women use 65 indigenous species of plants for food and 99 for medicine. Factors affecting selection of indigenous species include abundance, ease of access, preparation requirements and palatability (Rocheleau et al., 1989). Women are also involved in wildlife utilization in South Africa, where they hunt birds and rodents and collect insects. They spot large game when gathering, and stop activities to tell men. Large game management has negative impacts on women, because such animals destroy crops and may make travel dangerous (Hunter et al., 1990). Evidence from Kenya demonstrates the importance of wild foods and medicinal plants for supplementing diets and increasing their variety. In the rainy season when cultivated foods are not available, there are many wild foods collected by women which are rich in protein and minerals. Wild foods also substitute for meals when away from home and during times of famine, and for preventing illness (Wanjohi, 1987). Hoffmann-Kuehnel (1989) termed this women's knowledge of the "survival economy" because of their identifying, growing, conserving and processing wild and indigenously cultivated plants in Africa. In conclusion, the application of knowledge differentiation of species diversity in livelihood strategies along gender lines is highly variable and site specific.

The next hypothesis is that local biodiversity may be more valued by women and contribute more to their welfare than to men's. A number of examples support this view. It might be expected that use and knowledge of local species are highly correlated, but the point made above that use of may imply knowledge of, but does not necessarily imply control of those resources. Sometimes, a higher value of species diversity to women is a result of them being excluded from the control of and consumption of a narrower range of the most important (and if marketed, most lucrative) sources of income. Women then become marginalized to common property and wild foods.

Evidence from the Tukanoan Amerindians of Colombia shows that, in the rainy season, insects (beetle larvae, ants, termites, and caterpillars) can contribute up to 26 per cent of the crude protein in women's diets (12 per cent for men). Women do not have the same access to game and fish as men and so consume more insects. On some days insects are the only source of animal food for women. Insects have a very rich energy value per 100 grams, providing an essential contribution to dietary diversity and daily consumption needs (Dafour, 1987). In Ghana, women depend heavily on forest based gathering and processing for income. The roots of *Parkia bicolor* are gathered by women and beaten into sponges and sold in rural and urban markets. The gathering of food wrapping leaves (of the *Marantaceae* family) is the main source of income for many women. In Kumasi market in Ghana hundreds of traders and leaf gatherers sell their bales of food wrapping leaves. Women are also involved in the processing of logs into chew sticks. Also, 90 per cent of the traders of non-timber forest products in Kumasi market are women. Trade of such products provides a source of cash income for family food, clothing, school fees, and farm investment (Falconer, 1990).

Studies in Kenya illustrate that gathered plants are more important to the poor than to the rich. The collection of wild products tends to be gender and age differentiated: women prefer wild vegetables (they appear during the rainy season and provide an inexpensive food source during a time when food supplies are decreasing); children prefer fruit; men prefer fibre and medicinal plants. Two species of fruits are sold in markets: *Tamarindus indica* and *Ximenia caffra*. Wild resources are gradually decreasing (Maundu, 1987). To take an example from India, in Uttar Pradesh it was found that women were responsible for the management of tree resources for food, fodder, fuel and household items. 33 per cent of women's income was derived from forest and common land (for poor women it was 45 per cent), while men, on the other hand, rely on off-farm employment, and only obtain 13 per cent of income from forest common land (FAO, 1987). A final example comes from Kenya,

where in times of drought, survival strategies may be gender specific. Wild foods became more important in the diet, resulting in greater collection activity, largely by women. "One man's field becomes another woman's commons during drought" (Rocheleau, 1991). Wild foods are often collected from private fields, but with communal access to wild foods found in the bush and from boundaries and paths.

Finally, it may be argued that biodiversity erosion — a reduction in the local availability of a range of species — will affect the welfare of women more than that of men. Women are often affected more immediately than men by environmental degradation because they are usually involved on a day-to-day basis with household food security, fuelwood collection, water collection and water quality. Therefore their workload may be increased in the fulfilment of these gender-defined tasks. Shiva and Dankelman (1992) argue that the shift from subsistence to commercial agriculture has led to reduction in women's sphere of influence, and an increasing dependence of women on men for extension services, seeds and the handling of tools and money. The loss of control over natural resource management is thought to lead to loss of women's knowledge and intellectual integrity with regard to forestry, plant and animal genetic resources. It results in the de-skilling of women. Shiva and Dankelman further argue that the effects of the introduction of new agro-technologies results in the loss of biodiversity and replacement of local varieties (1992). This in turn is thought to lead to the increased vulnerability of women due to loss of sources of food, fodder and minor forest products. Also, natural evolutionary and local breeding mechanisms will be undermined by new biotechnologies, thus threatening life-support systems.

The rural poor

Species variety may be important to those with limited income and access to private resources, especially land, and particularly in times of environmental stress such as drought. Coping strategies of poor rural people in times of food shortage often include use of wild foods. In particular, those who do not have access to adequate private resources (e.g. agricultural land) rely upon common property resources where wild foods are found (see de Waal, 1989; McGlathlon et al., 1986; Agarwal, 1990 for examples in Africa and India respectively, and Blaikie et al., 1994 for a review). Conversion of forests and uncultivated land may reduce biodiversity in the sense that the variety of species used as dietary supplements, and as scarcity foods at certain seasons and during times of food shortage, will be reduced. It is reasonable to assume that this process will have detrimental impacts on poorer sections of rural populations.

One of the few detailed case studies of this process has analysed the reduction of common land in Tamil Nadu, India and its impact on species diversity and the users of common land (Blaikie et al., 1985; 1992). The local situation was governed by such factors as population density, farming system and other local ecological variables. However, it was clear from all sample sites that a process of social and economic differentiation was taking place, and that weaker sections of the population (e.g. tribals and scheduled castes) were being economically and spatially marginalized onto a shrinking and degraded commons. Common land and forest land itself was being encroached upon both legally and illegally. The volume and diversity of products from the different categories of land are shown in Table 5. For each of the categories of resource an inventory was made of the most important plant species (not listed here for lack of space, but see Blaikie et al., 1985:28). It is clear from this list that local livelihoods relied upon a very considerable range of species. For example, 10 species were identified as sources of green manure, six as edible fruits (almost certain to be an underestimate), ten as construction timber, and five as condiments and spices. This case study focuses on an important general point regarding the relationship between biodiversity and the welfare of the rural poor. It is that the impact of biodiversity erosion on the rural poor must be considered in the wider context of economic and social marginalization. Many have inadequate access to agricultural land and other privately-held resources and are pushed into waste land, common land, or into squatting illegally in state

forests. Decline in the availability of diverse resources from uncultivated, wild or semi-wild habitats thus impacts particularly on the rural poor (Agarwal, 1990; Jodha, 1991).

Table 5
Common property resources and land classification in Tamil Nadu, India

Source: Blaikie et al., 1985:27

The notion of “the community”

As we have already emphasized, it is important to take an overall view of the actors concerned in biodiversity within an agrarian political economy. One of the main themes of this paper is that the biodiversity issue in agrarian societies in the South revolves around competition for scarce resources, strategies for gaining access and struggles which sometimes involve direct physical confrontation as well as the creation, use and manipulation of legal means. There is a comforting and misleading notion of “community” which is used in many conservation documents. It has become a social construction which policy makers and foreign donors need and upon which they base assumptions about local management of resources. Anderson (1983) talks of “imagined communities” which meet policy objectives. In reality, “communities” are often highly differentiated — along lines of gender, age and wealth, for example — and therefore their members may have very different perceptions and definitions about biodiversity. Also, the implications of biodiversity loss — as well as the costs of conserving biodiversity — must be differentiated according to wealth, gender and age. There is a need to “deconstruct” the notion of community. This issue will be discussed in more general terms below.

There are other problematic conceptual areas at the interface between agrarian groups and policy makers’ images of them. The notion of the conservation of the natural resource base and of the community’s existing use patterns may constitute a form of “enforced primitivism”. Even where local people use a wide variety of species which may be crucial to their livelihoods, they may want different lifestyles. Jeanrenaud (1991) showed that even in the same community there was a wide range of views about the rainforest — some valued its products, while others wished to see it converted to other uses. Linking biodiversity and cultural preservation may require a kind of enforced primitivism unacceptable to local people.

There may be further divergences of values put on different species, where use value in the short-term may identify different species than those identified on biodiversity conservation grounds. Whereas conservationists value high forest, some case studies show that most of the locally valued species are within secondary forest. For example Thomas et al. (1989) show that only 18 per cent of the most valued medicinal plants were found in high forest, the rest came from secondary forest and cultivated areas. Leach and Fairhead (1994) draw attention to the importance of bush fallow to local subsistence rather than high forest.

In summary, biodiversity conservation, as with other conservation policy in general, demands that the whole “cast of actors” concerned is identified, along with actor’s interests in the elements that comprise collectively the notion of biodiversity, how they go about pursuing their objectives and their source of power to reach them. In biodiversity conservation, social mapping is just as important as ecological mapping. An example of this approach has already been given for the Nepalese terai (Brown, 1994).

A case study concerning a national park in Zambia (Abel and Blaikie, 1986) illustrates the ideas of competition, different identifications and meanings of natural resources, and the strategies of different actors. The Lwangwa Valley is a national park, which can be viewed as an assemblage of resources, together constituting an ecosystem and containing valuable biodiversity. There are a number of groups interested in components of this system or, in the case of scientists in the system as a whole and its contribution to biodiversity. Table 6 identifies these groups, their interests and how they pursue them. The outcome of this configuration of interests since this paper was written is instructive. The authors came to the conclusion that most of the actors could get most of what they currently required from the park at the same time as most of the conservation criteria were being fulfilled. This required a “deal” between the local actors and the outside agency which had its own conservationist criteria. What the authors did not consider at the time of writing the paper was the prevailing unequal distribution of power. An appeal to democratic negotiation towards an environmentally friendly outcome may be attractive to donors, but it was essentially an optimistic one. A number of IUCN reports have noted that the participatory design of the subsequent project failed, and local “communities” did not secure the benefits of conservation or project resources. Instead it was the chiefs (the leaders of the local communities) and project personnel themselves who benefited. Here actors pursued their own “projects” with the political resources available to them. The methodological point is well illustrated — that peoples’ involvement with biodiversity is often contingent and unwitting, and will involve competition with others.

Table 6
Interest groups, a national park and wildlife policy in Zambia

Group	Position in political economy	Source of power	Interest aims with regard to national parks and wildlife	Direct means to reach aims
Hunter-cultivators	Incorporated and marginalized; labour extracted; hampered by hunting laws; excluded from most valuable parts of trophy trade.	Limited, but chiefs retain some influence. In direct opposition to National Parks and Wildlife Service bureaucrats and guards, except in crop protection and predator control.	Source of meat; land for cultivation; ivory; rhino horn; honey; etc. A little employment with National Parks and Wildlife Service Safari firms, tourist organizations.	Stealth; “poaching”; firearms (some modern).
Safari hunters	Small companies controlled by expatriates with support from Zambian shareholders, a few politicians and Zambian bureaucrats. <i>Ad hoc</i> links with Wildlife Conservation society and Save the Rhino Trust.	Astute informal negotiations; profitability — funds for lobbying, etc.; ability to earn foreign exchange.	Right to hunt in best areas and obtain high-quality trophies with very high rate of success.	Vehicles and modern firearms; use of local trackers and local knowledge; areas close to national park boundaries are excellent hunting areas due to higher densities there.
Conservation	Connected to top Zambian	Lack of informed opinion in	Conservation of species,	Lobbying; publicity;

pressure groups	politicians; <i>ad hoc</i> alliances with safari hunters; most members are expatriates, many with influential posts.	Zambia; individuals also have other skills essential to Zambian economy; opinion formers and “national conscience” on conservation.	with individuals using wildlife for recreation and sport hunting.	publications; conservation education; fund anti-poaching efforts; many members are Honorary Rangers.
Bureaucratic bourgeoisie	Includes politicians as well as senior career bureaucrats. Control state apparatus to secure access to capital (loans, etc.) to manipulate prices. Because of this control, senior bureaucrats must be part of any executive decisions concerning national parks.	Political, administrative and thorough control of product (directly and indirectly); form major part of the dominant urban alliance of mineworkers, urban entrepreneurs, big business interests, politicians, bureaucrats.	Individuals benefit from <i>ad hoc</i> informal agreements; as opinion enhancement in international arena; as earner of foreign exchange in line with urban interests.	Legislation; budget allocation; policy-making; patrimony. Backed by powers of the state (police, army, national Parks and Wildlife Service, etc.); establishment of parastatal tourist organization.
Scientists	Direct and indirect access to foreign aid for Zambia. Access to highest positions of political power, often on individual basis, but very unevenly. Allied to local conservation forces to promote some of their aims.	Science as legitimation; Zambia (particularly urban élites) dependent on international aid and therefore indirectly on international opinion; little formed scientific opinion in Zambia to question and refute various scientific theories.	Development of “rational” policies based on “knowledge”; pursue individual careers (recognition, esteem, research funds, etc.).	Publications; individual access to decision makers, both national (bureaucratic bourgeoisie) and international (various aid agencies).

Source: Abel and Blaikie, 1986

4. INSTANCES

The three case studies that follow illustrate the actors and processes involved in biodiversity issues. They have been chosen partly to provide information on lesser known areas and themes, and partly to draw out more general links between welfare and biodiversity and lessons for policy. The case studies consider contemporary examples of temperate forests with special reference to Russia, tropical forests and wildlife in Cameroon, and marine biodiversity issues with special reference to whales.

◆ Russian Forests

For many years the environmental spotlight has focused on the threats to the biodiversity of the world’s tropical forests. However, in the last few years it has become apparent that threats to the biodiversity of temperate forests have been, and are becoming, increasingly severe. The debate about temperate forest issues is relatively new, promoted in part by the WWF publication **Forests in Trouble: A Review of the Status of Temperate Forests Worldwide** (Dudley, 1992), which throws light on the worldwide state of temperate forests.

Temperate forests account for about half the earth’s forest cover, and are found for the most part in Russia, Canada and the United States. While temperate forests have fewer species compared to tropical rainforests, they often support a huge diversity of organisms. For example, the leaf litter of the Pacific north-west forests is very rich in arthropods, and a single Douglas fir has been found to support more than 150 species of mycorrhizal fungi (Barnett, 1992).

Temperate forests are also home to significant groups of indigenous people who rely on forests for their livelihoods, including the Sami people of Lapland; the Yakut, Khants, Mansis, Udege and Altai of Siberia; the Inuit of the boreal regions; Maoris of New

Zealand; aboriginal people in Australasia, tribal groups in northern India, etc. (Dudley, 1992).

While statistics show that the area of temperate forests has remained stable, or even increased, over the past fifty years, the figures mask regional losses and a worldwide loss in forest quality. As Dudley (1992) points out, primary forests have been cleared and replaced with plantations which do not support the same range of species or ecological functions. The expansion of plantations and clear felling of pristine forest have also had negative impacts on indigenous people, who are usually pushed aside for commercial interests, and lose valuable aspects of their livelihoods. The main threats to the biodiversity of temperate forests are considered to be continued logging of old-growth temperate forest intensification of forest management as a fibre crop for producing pulp; and deterioration of forests through air and water pollution.

Russia contains 25 per cent of the world's known wood reserves, almost double those of the Amazonian forest (Scott and Gordon, 1992). It contains 70 per cent of the world's boreal forests, of which an estimated 40 per cent are old-growth types. The *taiga* or coniferous forests consist mainly of spruce, larch and fir, with some pine, cedar, birch, aspen and ash (Petrof, 1992). They are home to bears, elk, foxes, martens, ermine, the rare Siberian tiger; and a variety of birds including the threatened red-crowned crane species. Russian forests are also home to around 26 ethno-cultural groups, including the Buriat, Mansi, Khant, Yakut and Udege (Greenpeace, 1993).

It is estimated that 130 billion tons of carbon are stored in the boreal forests of Russia (compared to an estimated 80 billion tons in the vegetation of the Amazon) thus making Russian forests a globally important store of sequestered carbon. It is feared that clear felling of Russian forests will have potentially important consequences for the environment, such as increased CO₂ emissions, soil erosion and transformation of once-forested areas into swampland (Greenpeace, 1993).

Under Communist rule, timber was felled for the USSR's domestic market and for export. The latter was an important source of revenue, amounting to US\$ 3.75 billion in 1989 (FAO, 1991), but was considered small compared to the size of the resource (Barr, 1988). Under the Soviet régime, forests were undoubtedly mismanaged and over-cut (Komarov, 1981:14). With the disintegration of the USSR and consequent social and economic upheavals, tree felling declined by state-owned companies by between 30 and 50 per cent. However, the political changes have introduced new actors, foreign and national, to the Russian forestry scene, and unleashed new social and economic forces which have important implications for Russian biodiversity. In the case of Russian forests many of the actors already discussed appear.

Central authorities

With the drive to establish a free market economy and to generate foreign exchange in the new Russian Republic, plans are underway to exploit forest resources by large-scale harvesting and export of minimally processed timber. New economic reforms are increasingly linking Russia to the global economy, and transnational timber companies are either already present, or are "lining up to loot Russia's pristine boreal expanse" (Greenpeace, 1993). Stringent economic demands from the World Bank are also encouraging rapid resource utilization and a consequent increase in the rate of tree felling (Grigoryev, 1992). According to the deputy chairman of the Federal Forest Service:

Over-exploitation of forest resources, violations of ecological and forestry regulations and poor forest management during the last decades have drastically depleted forest resources; if timber continues to be logged at the present rate, assuming there is no waste in timber processing methods, climax forests will be completely destroyed in 40-60 years (Pisarenko, 1990).

The new Forest Act, which was adopted by the Russian Federation in March 1993, was intended to be a significant step towards the conservation of the forest and was an example of the “new thinking” (*novoe myshlenie*) which was being called for in policy-making at the time. However, there are serious concerns about the Act. There is less opportunity for public participation in the decision-making process, and although powers have been devolved to local authorities, there are fears that they are influenced by corruption.

The disintegration of the former Soviet Union and resulting loss of centralized control has led to an institutional and regulatory vacuum. There is currently much uncertainty about ownership and control of forest resources, generating conflicts between federal, regional and local administrations. The new Forest Act does not resolve the ambiguities, and has left the door wide open for regions to write their own forestry laws, which may conflict with federal forest management goals and priorities (Grigoryev, 1993).

There is concern that some foreign companies are taking advantage of this lack of clarity, and gaining access to Russia’s rich forest resources. For example, there is currently much controversy over attempts of the South Korean Hyundai Corporation to log the upper Bikin River basin. The Corporation wants access to more than 300,000 hectares of the Bikin River watershed to cut one million cubic metres of wood each year for thirty years (Petrof, 1992). The environmental impact assessment conducted for this watershed forbids cutting, and the Russian Ministry of Ecology has recommended that the lands be protected and transferred to the control of the 2,000-3,000 Udege people, who live in and depend on the forests. However, despite a Russian Supreme Court decision supporting the veto of logging rights, the regional administration is continuing to take steps which would allow logging (Gordon, 1993).

There are new conservation policies for forests, such as the plan to increase special forests where cutting is restricted from 24 to 27 per cent of the total, and legislation to increase designated ecologically fragile areas (Rosencratz, 1991). However, environmentalists are concerned that not enough forest is being preserved, and that planned clear felling operations could have negative ecological side effects. It is often reported that the legally required environmental impact assessments are overridden or ignored by local or regional administrators wishing to earn hard currency, revealing the weakness of Russian environmental protection legislation.

Local authorities

While Russian forestry officials are virtually powerless to control the activities of either national or foreign logging companies, it has become apparent that local administrative bodies often stand to gain from the institutional upheavals. For example, the new Forestry Act proposes to give local authorities the right to carry out sales of forest resources. Under the old régime long-term concessions of forestry land were given to a number of government entities. Given the low salaries paid to local officials, and the fact that they will control large forest resources easily converted into hard currency, it is feared that the situation will create an enormous potential for corruption, and attract the Russian criminal structures (Grigoryev, 1993). Greenpeace (1993) reports that local and regional administrators are actively seeking foreign investments, and promoting joint ventures, often on very poor terms. It is not hard to imagine that as these actors seek to safeguard their own livelihoods (often through corruption) the biodiversity of Russia’s forests will be further threatened. Indeed it has been suggested that some people in Russia have an economic interest in easing regulatory standards and their enforcement (Petrof, 1992).

Multinational companies

The Russian case also sheds light on the political and economic power of the transnational timber companies, attracted by the absence of effective environmental regulations, cheap concessions and huge timber reserves. In the Russian Far East and Siberia they include the

South Korean conglomerate Hyundai, the Japanese C. Itoh and Company, the US timber giant Weyerhaeuser, and Norwegian companies. Finnish companies are also co-operating in the Karelia region of Russia. As pressure mounts to stop the destruction of tropical rainforests, international companies are looking elsewhere for cheap sources of wood. For countries like Korea and Japan, Siberia provides a cheap and reliable source of timber close to home. For example, in 1991 a group of 10 Japanese trading firms signed a five-year US\$ 1.4 billion agreement with the Russian Federation to harvest timber in the Siberian region. Japanese firms will provide US\$ 700 million worth of construction and lumber processing equipment in exchange for a total of 6 million cubic metres of raw lumber and 400,000 cubic metres of processed wood (Dudley and Stolton, 1994). It is clear that there are enormous profits to be made by all sides.

It has been suggested that foreign timber import companies have more impact on forests than companies operating within Russia (Dudley and Stolton, 1994). Large amounts of timber are starting to appear on the international market, and are being offered to firms in the West. Much of this timber is thought to have been illegally felled, and although foreign companies are often not directly involved in operations, they provide lucrative markets to keep the trade alive.

Environmentalists

Environmental groups in Russia and abroad are alarmed at the potentially disastrous implications for forestry of these social and economic forces. There is concern about threats to old-growth forests and protected areas, increasing pressure on endangered species such as the Siberian tiger and brown bear, and land degradation and pollution through poor forestry practices. International environmental organizations such as Greenpeace and WWF have become increasingly involved in investigating Russia's environmental problems. For example, WWF-US (1993) published a major report on the biodiversity of Russia, and identified problems in a range of bioregions and sub-regions. WWF-UK has also been involved in looking at the environmental impact of the global timber trade in economies in transition (Dudley and Stolton, 1994), and has identified many urgent environmental problems facing Russia. The Taiga Rescue Network (currently based in Sweden) is concerned with environmental problems of boreal forests and frequently draws attention to the plight of Russian forests. The Russian environmental movement is relatively new, and has only recently started to collaborate with outside environmental organizations to protect its forests.

A major environmental concern is that clear cutting (the main technique used to exploit the forests) is extremely destructive. Of the 4 million hectares of Taiga land harvested each year, 90 per cent are clear-cutting — a technique which engenders loss of top soil, siltation of streams, damage to fish breeding sites, lowered tree regeneration and reduced biological diversity. When exposed to the sun after logging, the frozen peat-rich soils thaw and tend to become weed infested swamps (Petrof, 1992). There is also a tendency for multiple-species forests to be replaced by forests dominated by a single tree species. The large-scale river transport of logs has also damaged river systems (Dudley and Stolton, 1994).

Another environmental issue is that protected areas and natural forests are coming under increasing pressure from the forest industry. For example Weyerhaeuser is negotiating a joint venture with Russia along the coast of Khabarovsk in the Russian far east, which would open up one million hectares of forest land for exploitation. This area, with extensive tracts of old-growth forest, is ecologically important and is home to the indigenous Orochi people (Barnett, 1992). Weyerhaeuser has already built a loading dock near Khabarovsk and hopes to go into Siberia before the end of the century. Local environmentalists are opposed to Weyerhaeuser's proposed clear cutting methods of the Botcha River basin, and the Russian Ministry of Ecology has recommended that it be protected as a nature reserve because of its high level of biodiversity.

Regulations designed to protect reserve areas are also often abused. For example, when North Korean loggers encroached upon a legally protected nature preserve in Siberia, the Soviet authorities gave precedence to the logging agreement over state law (Petrof, 1992).

Indigenous peoples

Indigenous people often find themselves caught between the state and foreign timber companies. Over the past few years there has been a resurgence of political activity, and independent political structures have begun to appear throughout the Russian north (Petrof, 1992). Some indigenous peoples are clearly aware of the threat from outsiders to their way of life and natural resources. The *Spasenie Yugri* (Save the Yugra), an association formed in 1989, is a collection of the Khants, Mansis and Nenets peoples. They declared their forests off-limits to logging and mineral prospectors in 1989. Despite laws banning resource exploitation without the permission of local inhabitants, legislation is often not upheld, and local people have been arrested when they have tried to prevent trees being cut down on their lands. However, throughout Russia, local citizens' groups are beginning to demand an economic base to develop their own livelihoods and the right to determine how Russian forests should be used. The rights of local people to land and their livelihoods are supported by national and international environmental groups (see, e.g., Greenpeace, 1993).

This case study reveals some key political and economic processes which contribute to biodiversity erosion: the globalization of capital in general and the role of transnational timber companies in particular. The unstable and rapidly changing political context of the former Soviet Union is clearly serving the interests of many national and international actors as they reap the financial benefits of logging; these same actors seem to have little if any interest in conservation. Their activities may be undermining links between biodiversity and the welfare of indigenous groups. This context raises questions about the relevance and effectiveness of international and national conservation policies. Formidable political obstacles stand in the way of conservation, making it not much more than a dream. It suggests that biodiversity and human welfare may be better served by tackling other areas of the political economy, in particular the need to control the activities of transnational corporations.

◆ A Case Study of Biodiversity in Cameroon

Cameroon is a tropical country endowed with outstanding natural resources of global significance. Within its national territory, it has 188,000 km² of dense humid evergreen forest, and therefore possesses highly valuable timber resources as well as great biodiversity which is a characteristic of this type of forest. A wide range of other ecological zones are also found, some of which are of limited extent and rare on the African continent. These resources (timber, biodiversity, areas of outstanding natural beauty and scientific interest) must be managed in an integrated way (Alpert, 1993).

Cameroon is the only West African country that still possesses large reserves of tropical and sub-tropical forests. They cover over 70 per cent of the national territory, and rank third in area in Africa after those of Zaire and Gabon. The moist dense evergreen and semi-deciduous forests have important commercial value, and are the main subject of relevance to the International Tropical Timber Agreement (ITTA). These areas also have a high degree of endemism and species diversity.

The commercially important areas lie in the humid zones in the south of the country, and particularly in the south-east; the central and western parts have already been heavily logged for commercially exploitable species. However, the savannah forests of the central and north of the country also fulfil important roles in providing fuelwood for the local and urban population, a habitat for wildlife, and soil and water conservation functions. Dense

forest in the more humid south also provides soil nutrients and land for cultivation by slash and burn techniques for the majority of the rural population.

Therefore, although ITTA only concerns itself with the commercial value of the moist tropical evergreen and semi-deciduous forests in the south and east of the country, the other functions of forests in Cameroon are much wider and are relevant to conservation issues in general and specifically to biodiversity conservation. Forests provide a variety of habitats for endangered species and therefore forest destruction is an issue for the Biodiversity Convention itself, and the livelihoods of the majority of rural people. In the medium term population growth (from approximately 12.5 million in 1994 to an estimated 17 million by the year 2000) is likely to affect substantially the demand for forest in terms of both land to cultivate and fuelwood. In the main commercial areas in the semi-deciduous and evergreen areas, population densities are lower than in the north and west, and commercial sustainability is likely to be the dominant issue there. In the north, sustainability is threatened by a fuelwood shortage where use is currently well over the rate of maximum sustainable cut in most areas (Ndjatsana, 1993). Overall it is estimated that in the next fifteen years fuelwood will become the major forest product of Cameroon (FAO/UNDP, 1988:3).

It is estimated that 80,000-150,000 hectares are deforested every year in Cameroon (UNEP, 1992:18) mainly as a result of shifting cultivation (often following the partial clearance by logging). UNEP also states that 200,000 hectares of forest are being cleared per year by agriculturalists alone (1992:6). FAO has estimated that one million hectares of forest were cleared between 1976 and 1986 (1988). Estimates vary widely but the rate of forest loss is undoubtedly rapid. Commercial exploitation has increased over the last ten years, but harvesting methods are frequently wasteful and primitive, rates of extraction being often less than 5 cubic metres per hectare. Many species are felled and left on the ground, since the research and marketing has not been carried out to exploit more than a small proportion of species. In addition, other vegetation and the topsoil are frequently damaged so that natural regeneration of the forest is slow. Only 15 per cent of logging is carried out by national companies, and the greater proportion by foreign-owned companies. Levels of processing in country also remain low.

Moving now onto biodiversity specifically, the humid tropics in general are the principal global repository of biodiversity, and it has been estimated that over half the number of species on earth exist in rain forests (Wilson, 1988). Cameroon is one of the most important countries in the world in terms of all the three components of biodiversity. Recording to date has identified 297 species of mammals, 848 species of birds, 300 species of anurans, 9000 species of plants, with at least 156 endemic species, and 45 on Mt. Cameroon alone (Gartlan, 1989). Therefore the Biodiversity Convention and the CITES accord are of utmost relevance to conserving biodiversity in Cameroon.

Policy history

Timber in Cameroon's forests has been exploited for many years, especially the last thirty. Currently, Cameroon is the sixth world exporter of tropical timber, and the third largest in Africa. Illegal production is estimated to be on the order of half official production. Approximately 150 timber exploitation licences have been delivered, of which only 23 were to Cameroon nationals (who were responsible for 10 per cent of total production). Fifteen of the seventeen international companies active in the country each produce more than 40,000 m³ per year and dominate production. Trends over the last four years have shown a marked increase in the share of total annual area licensed to Cameroon nationals, however. (Ndjatsana, 1993:36).

The history of forest policy in Cameroon is marked by the absence of effective legislation and regulation to ensure a sustainable forest estate in the way envisaged in general terms by the Biodiversity Convention and by the environmental clauses of the ITTA. Until their

suspension in February 1992, licenses for felling were granted without any consideration for land use planning. Since then, licensing has been replaced with concessions awarded to the highest bidder; such concessions are subject to land use planning. However, the national management of forests is beset by problems, as outlined in the FAO/UNDP Tropical Forestry Action Plan (1988). The verdict of this report on the current sixth National Plan is that "... reading the Plan, one sees it has not accorded a very high priority to the forestry sector....[and] the part of the plan concerned with the forestry sector is not integrated into an overall policy for environmental protection and the development of rural areas nor within a co-ordinated framework along with plans for agricultural and livestock development" (FAO/UNDP, 1988:6). Thus the policy and planning context into which ITTA and the Biodiversity Convention will be inserted is one which lacks efficient planning, monitoring and control in the field and is characterized by disorganization among a multiplicity of different organizations.

The protection of wildlife and special sites

Most of Cameroon's nine national parks are located in the savannah and Sahel regions. Virtually, all reserves besides the Kimbi River and Mbi Crater Game Reserves were created by the French between 1932 to 1950. The two others were created in 1963, following independence. Also after independence, the five northernmost and largest reserves were transformed into national parks by order of the Secretary of State for Rural Development, and were provided with basic tourism facilities.

By 1971, Cameroon, responding to international pressure, designated the Douala-Edea Reserve in the central coastal area and Korup Reserve on the border with Nigeria as wildlife parks for scientific purposes. Wildlife exploitation was prohibited, timber exploiters evicted, and local residents economically dependent upon exploiters "re-educated". By 1974, the Douala-Edea Reserve had an appointed Conservator and guard post. Full park status has, however, been frustrated by discovery of oil in Cameroon's coastal areas and the possibility that the Douala-Edea area may hold important oil reserves.

The Korup Reserve became a national park in 1982. Two tropical parks were also established: the Dja National Park, which sits astride the transition zone from the coastal forest to the Congo forest proper, and the Pangar-Djerem Park which extends from the Guinea Savannah into tropical high forests, thus transecting the floristically interesting and scientifically important savannah-forest transition. At present, however, this park is isolated, undeveloped and full of poachers.

Conservation efforts

In similar circumstances to the setting up of the Ministry of Environment and Forests (MINEF), the Office Nationale de Développement des Forêts (ONADEF) was established as a result of the IMF structural adjustment programme in February 1990 (ONADEF, 1990). ONADEF is intended to give logging concessions on a more rational basis, taking into account overall land use planning criteria. However, it is widely reported that concessions are still being given in contravention of the government's own land use criteria (e.g. they are given inside national parks and forest reserves such as in the Campo Reserve). ONADEF is also charged with making larger concessions to fewer and better capitalized entrepreneurs, in view of the fact that a huge number of smaller concessions (under 25,000 hectares), reserved for Cameroon nationals, have been made (between 60 and 230 over the past two to three years), and these do the most environmental damage. The concessionaries are local people and are under-capitalized; often, logs are sold to larger (and foreign-owned) companies. There are rumours (repeated by USAID officials on national television during April 1993) that an immense concession (800,000 hectares) has recently been granted to a French company (Société Forestière Industrielle de DIMAKO) in the south-east. This and other foreign-controlled companies have frequently been cited both publicly on television and privately by Cameroonian forestry officials as paying little attention to

good forestry practice and maintaining a sustainable forest estate, such as conserving the uneven age characteristics of the forest, minimizing the damage to remaining stands, protecting key species, employing dry-skid techniques, replanting quality species, etc. The Ministry and ONADEF simply do not have the personnel or transport to monitor the activities of concessionaries, and often rely on the data of the latter for monitoring purposes. Given the political connections of the biggest companies mentioned elsewhere in this report, it is highly unlikely that infringements, even if they were discovered, would prompt any action on the part of the government.

Turning now to actions of direct concern to biodiversity conservation, during the period between signing and ratification of the CITES treaty, the management of wildlife was divided among at least four ministries, which tended to dissipate and fragment any policy initiative. Overall administration of wildlife in general, and the overview of implementation of the CITES convention in particular, received very little concerted attention. Except for a handful of senior wildlife officers, knowledge of CITES and the Biodiversity Convention in the four ministries concerned is severely limited. For example, the absence of a report about the outcome of the Washington Convention was scarcely noticed for a period of years. This delay between signing and ratification was also noted for other environmental accords by UNEP (1992:40). Most recently, the administration of CITES under the Directorate of Wildlife was moved from the Ministry of Tourism to MINEF in 1992. No one was specifically given overall responsibility for the implementation of CITES, and it was only at the prompting and uphill efforts of one or two senior civil servants that any official action was taken. As UNEP has noted:

Cameroon's adherence to these various [international environmental] conventions has not necessarily translated into domestic implementation measures. Therefore it is not surprising that these conventions, once they are signed, go unheeded. This is due to the small number of national intermediaries who are responsible for transforming the international obligations into domestic laws, which eventually need to be translated into concrete measures... (1992:40)

CITES is relevant in Cameroon because of the ivory smuggling, trophy hunting and lucrative traffic in exotic birds that take place. For example, one grey African parrot fetches US\$ 2,500 in the United States; there have been well-attested instances of cases of airline officials being forced to load crates of parrots onto aircraft for illegal export. The most notorious ivory smugglers are currently Korean and Chinese road workers, who buy tusks from local poachers, saw them up and smuggle them out in containers by sea. Smuggling across the open border with Nigeria also occurs.

Changes in actors' behaviour

There is little evidence that the performance of ONADEF has been significantly different from its predecessors. Three pilot projects have been started since 1990, and most of the training, research, inventory and mapping work are being undertaken by international and bilateral aid organizations. Environmental awareness amongst the forest administration is generally low, except for a few senior people. This has started to change recently, however, with the reorganization of MINEF and the UNEP initiative in publishing its multi-disciplinary and multi-institutional mission report on the environment in Cameroon.

Nature is generally considered a free and non-scarce good rural people — until its resources are at the point of disappearing. Only then have grassroots organizations come into being to protect what remains. In the Kilum Mountain area, for example, where the soil erosion and drinking water problem has become acute after two decades of continuous logging, local people are becoming increasingly aware of the degradation of their environment and have created institutions to express their views. Clearly, the issue of property rights is central here, and the lack of effective state action, in terms of encouraging responsibility for forest and wildlife resources through the development of clear property rights, has resulted in a failure to bring about a change in behaviour of local people —

insofar as it is they, rather than timber companies, who are responsible for forest clearance. Also, the limited environmental education of the public (through schools, for example), has been confined to small numbers of forest dwellers who live inside designated parks and reserves. In these cases, more sustainable alternative agricultural technologies, which minimize the use of shifting cultivation and wildlife hunting, are being promoted — although on paper rather than in practice. In more general terms, the structural conditions which incite rural populations to expand agricultural land into the forest are still in place outside forestry and national park project areas.

Overall, it is difficult to identify any clear modifications of behaviour which have improved the conservation of the forest and its biodiversity. Many donors, for example, are doing similar things in various parts of the country simultaneously. As a Canadian diplomat told the authors: “Cameroon says yes to everybody. But this creates a lot of problems when it comes to implementation of its policies, or for that matter international environmental laws. It also leads to confusion and contradiction because different donors all have the permission to do the same thing”. For different reasons, Cameroonian forestry officials also accede to requests for special concessions and tax free exploitation permits to French lumbering companies and other foreign firms involved in the lucrative timber industry.

The most significant internal actors are high ranking politicians, civil servants, entrepreneurs, local authorities and/or chiefs and members of the public. As one official in the Ministry of Equipment and Forests remarked, “It is not necessarily the man who owns the chain-saw who plunders the forests, but those who do business with him”, implying that despite the legal exploiters with licenses there are also numerous actors engaged in illegal trade. The key internal actors are those senior officials who organize logging concessions.

In the context of wildlife conservation and CITES, and the circumstances of its signing and ratification by Cameroon, it can be seen that the Biodiversity Convention will probably face problems of implementation similar to those raised above. Cameroon signed the Washington Convention in 1973. There had been prior discussion of Cameroon’s position before the convention among a number of senior administrators and scientists, but there were no funds for a delegation to attend, and the protocol was signed by the Cameroonian ambassador to the United States. Apparently, the ambassador failed to write a report to the sub-department of wildlife, or it was lost (accounts differ) and ratification was not made until eight years later. Very little action was taken after the Washington Convention, and Cameroon was not party to, and did not attend the Bonn Convention in 1979. The CITES Secretariat wrote a report in late 1977 regarding large exports of endangered species, and a CITES official visited Cameroon when it was discovered that a member of the Wildlife Department had been forging the signatures of the Minister and the Director of the department on a large scale and enriching himself in the process, and also that a considerable proportion of export of specimens from Cameroon did not originate there but from neighbouring countries, especially the Central African Republic. It was only then that an enterprising senior member of the department felt he had to make the case for ratification to the government, which did so in June 1981.

On paper, there is considerable evidence of policy initiatives to conserve wildlife and their habitats. The central objectives of CITES and the Biodiversity Convention are shared by many of the current wildlife projects, but means to reach them are restricted. CITES is meant to restrict trade in these animals, while projects and the Biodiversity Convention seek to conserve through protection, education and alternative resource use. Therefore, attention should be confined to enforcement officials and those who hunt endangered species.

Implementation of wildlife regulations has always been problematic, and those of CITES are no exception. Certificates of origin and export permits are used as means of surveillance, and there are Wildlife Officers at Yaoundé and Douala airports. But Obam (1992:215) states that Cameroon’s forests and savannah are being exploited in such a chaotic and disorganized manner as to threaten their very existence, and cites evidence of

massive poaching which has become increasingly commercialized and promoted with sophisticated weapons on a large scale. Also, there is a long history of venality on the part of officials, with guns hired out to poachers by the very enforcement officials who are supposed to police wildlife. Permits are sold for large sums for the export of 5000 kg of ivory at a time when the standard *Permis Speciale de Grande Chasse* allowed a maximum of 25 kg of “found” ivory — as opposed to ivory from a hunted elephant.

In the period between signing and ratification of CITES, there were a few significant instances of attempts to enforce regulations. The case of Lepère versus the State is one. In September 1977, the chief of Service for Wildlife and Forests, the Conservator of Forests for the Central South Province and the Provincial Judicial police for the Central South discovered three and a half tonnes of ivory in a store in Yaoundé belonging to a French businessman, Mr. Lepère. The tusks were seized and Lepère taken to court. However, the Magistrate Court and the Court of Appeal retained judgement in his favour and he was eventually acquitted. Nonetheless, the Ministry of Agriculture then petitioned to the Minister of Justice against the decision of the two courts, citing the signing of the Washington Convention by Cameroon and the country’s subsequent adherence to that convention. The matter has since been referred to the Supreme Court and remains unsettled. The Minister of Justice at the time wrote to the Conservator of Forests (who had originally made the seizure and had insisted upon the application of the law), to say that “a higher authority” had dissuaded him from settling the case according to the law. When the Conservator persisted, he was advised that his position was not safe and that he should take a year’s absence from his post for some further training in Europe. In the same year, the head of the Wildlife sub-department, who was never informed of the time and place of the hearings, appealed to the Head of State with a copy of the letter sent to the Ministry of Justice — no further action was taken. Six months later, all the ivory had disappeared from the Yaoundé store. To the best of the knowledge of the then sub-department head, Lepère never got the tusks back. Besides, the tusks were not and could not have been auctioned as stipulated in Section 65 of the law, since they were court exhibits. This would have required a court clearance which was never requested or granted. What happened to the ivory remains a complete mystery. In 1982, all the officers who were in Forestry at the time of the Lepère case were called to testify to the police about the disappearance of the tusks. Since then nothing has been said to any of them. There are many other examples of this nature, all of which illustrate the profound problem.

Is biodiversity being conserved in Cameroon?

The question is difficult to answer in a rigorous way, since it is not the government but a disparate group of bilateral and multilateral agencies who are planning and initiating action. Also, these various activities are not dedicated specifically to biodiversity but share some of the same objectives. However, these other multifarious activities may, in a cumulative and sometimes haphazard manner, help to assist biodiversity conservation.

Evidence of efforts to conserve forests and utilize them in a sustainable manner may be found in the following areas: natural forest development, reforestation, logging infrastructure, training of personnel and sustainable and improved forest management. The last involves the sustained planting of quality commercial timber, the maintenance of all (or almost all) the biodiversity and protection functions of the forest, controlled logging to restrict damage to other trees, and careful monitoring with accurate and truthful submission of information to the ITTA secretariat. Evidence for the promotion of a sustainable forest estate is meagre in practice, since the degradation of commercial reserves and the clearing of forest by agriculturalists go on unabated. There are too many persistent rumours, some of which are reported here, of some flagrant as well as multiple minor infringements of the regulations that do exist.

On the other hand, a less pessimistic view is that sustainable forestry in the West African context is a difficult objective, given the many technical and political obstacles that exist.

According to this view, it is more reasonable to expect and emphasize learning and institution building, rather than quick results. This view is not shared by the present authors, for reasons discussed in below.

It is unlikely that the signing and ratification of CITES caused any decrease in the rate of poaching, or any increase in the resources made available to the Department of Wildlife. The budget of the department amounts to 1 million FCFA (US\$ 1,949), and the director of the department does not have a vehicle. The low density of wildlife and protection officers on the ground (one for every 1,000 km²) and local rent-seeking behaviour at all levels of the service have also made enforcement ineffective. Reports of hunting in protected areas point to increasing trapping, on both commercial and subsistence bases. The rate of wildlife taking is judged to be non-sustainable in the areas studied. Large-scale ivory smuggling continues, and the behaviour of target groups remains virtually unchanged.

Elephant populations continue to fall. Forest clearance has limited elephant to remaining forest areas (particularly in the south-east and in protected areas such as forest reserves). It is probably true to say that the pressures to hunt elephant for ivory and to eliminate what is considered a feared pest have risen in the past fifteen years, but there has been no concomitant increase in resources allocated for their protection (Government of Cameroon, 1991; Tchamba et al., 1991).

Hunting for bush meat has also remained at a high level. More sophisticated firearms are now being used (sometimes by soldiers and *gendarmes* or lent by them to others). Frequently, non-local hunters pay the village chief a small fee to poach on a commercial scale. Cross-border smuggling of both ivory and bush meat to Nigeria and the Central African Republic are growing problems.

Recent studies of the distribution of a wide range of other endangered species in CITES Schedule A (e.g. the African elephant, Preuss' monkey, chimpanzee, drill, red-eared monkey) around Mt. Cameroon (Gadsby and Jenkins, 1992) indicate serious depletion of many, and the danger of extirpation of a smaller number. (For studies of particular species or reserves in Cameroon, see Infield, 1988). Data on present populations as well as figures are non-existent; it is thus impossible to make a credible quantitative estimate of the changes in populations of endangered species before and after signing and ratification of CITES. All that can be said is that many experienced ecologists consider that most of the species on Schedules A and B continue to decline, but with considerable variation depending on species and area.

Most attempts to promote wildlife conservation and enforce CITES have taken the form of bi- and multilateral projects, as is also the case of sustainable forestry. The objectives of most of these projects tend to concern the institutional and scientific preconditions of wildlife protection (inventories, mapping, research, training, awareness creation, socio-economic studies, further project preparation). There are, for example, currently 17 elephant projects, of which only four are partially or wholly funded, including the Nyassoso Project, the Mount Kilum Forest Project and Korup National Park.

Factors explaining the degree of biodiversity conservation

Cameroon has experienced a deepening economic crisis since the mid-1980s, the reasons for which are multiple and open to varying interpretations. First, there has been a precipitous decline in the real value of exports: while the quantity of agricultural exports (cocoa, coffee, cotton, rubber, etc.) rose by 25 per cent between 1983/4 and 1992, its value fell by 47 per cent (UNEP, 1992:5). The combined decrease in oil prices and the FCFA/US\$ exchange rate has meant that the price of oil lost 42 per cent of its value between 1984 and 1985, and the decline has continued ever since. Timber is the only exception to this trend, with a production peak of 625,000 tonnes being reached in 1983/4,

and more or less maintained to date. Prices rose from 49,000FF/t to 73,000FF/t in the same period, resulting in an increase in export earnings of 42 per cent. However, this was not enough to offset an overall decline in the value of exports in the natural resources sector from 265,000 million FCFA in 1984/5 to 178,000 million FCFA in 1989/90 (a decline of 33 per cent). (As of September 1995, US\$ 1=FCFA 513, but was de-valued massively in 1994/5).

Second, and partly related to decline in the terms of trade, state revenues declined by 45 per cent in the period from 1984/5 to 1991/2. Cameroon has experienced acute difficulties in repaying foreign loans, and faces a rapidly mounting foreign debt. By June 1991, its external debt stood at 1,300,000 million FCFA, practically 2.5 times the present national budget. In September 1992, France provided a bilateral loan of 30 million FCFA, three months before the World Bank required repayment of its own loan in a situation where it was obvious that Cameroon would default. The political implications for Cameroon's abilities to insist upon compliance of the largest (French) logging companies with ITTA and national regulations are discussed below. However, Cameroon withheld 4.3 million FCFA and paid the World Bank only 25.7 million FCFA, with the result that all loans were suspended in April 1993, and, if Cameroon were still unable to pay by July, it would then be asked to repay all arrears without exception.

Third, there are longer term reasons for the pronounced economic decline. Poor economic management, institutional structures of government which discourage market-efficient and competitive behaviour, excessive government expenditure and poor state revenue generation are some of the reasons given by the World Bank (1992b). The first Structural Adjustment policies were imposed by the IMF and the World Bank in 1988. The short-term impacts of this policy were a sharp reduction in government expenditure especially for "unproductive purposes" and a contraction in state employment.

The implications of the economic crisis for implementation of ITTA and CITES and compliance with the environmental conventions discussed above are not difficult to identify. First, there has arisen an acute difficulty in paying the salaries of public servants even after the massive salary reductions of between 20 and 37 per cent in January 1993. Sometimes they are suspended for three months at a time, and particularly in more remote areas for even longer periods. For other entire units of the civil service, payments have been suspended altogether, amounting in effect to an unofficial retrenchment of the civil service. It is reported that during late 1993, growing unrest and lawlessness by civil servants, particularly in the north, occurred. This retrenchment has further squeezed investment and development expenditure. Equipment, particularly for transport, remains poorly maintained, which curtails local monitoring of environmental accords (e.g. forest protection, anti-poaching). Also, civil servants themselves frequently mentioned that morale at all levels has been seriously affected. It is a reasonable hypothesis that very low salaries which do not permit an acceptable standard of living encourage rent-seeking behaviour. This applies to the local *gendarmes* which police the traffic of logs on the roads, to wildlife officers issuing certificates and permits for the export of specimens, as it does to senior officials. There is a Cameroonian saying "*Le salaire c'est pour respirer et les indemnités c'est pour travailler*", meaning that the salary is just enough to survive and to induce the employee turn up at the office, but it is the allowances and other pecuniary advantages which provide the incentives to work in most government agencies.

Another important implication of Cameroon's economic problems is that it finds itself beholden to particular foreign interests. The government has been unable to compel foreign logging companies to comply with either the spirit of ITTA or with its own regulations. External actors — in this case foreign, especially French-controlled, logging companies — are widely reputed to pay little heed to guidelines for sustainable forestry. Of the 17 international logging companies operating in Cameroon, nine are French. France is by far Cameroon's most important trading partner, and maintains close personal and cultural relations with its former colony. Therefore French companies enjoy a considerable degree of political protection at the embassy level, and at least two of the biggest logging

companies have high-level family connections in France. Any desire by Cameroonian officials that international or national guidelines be adhered to or local taxes be paid simply cannot be enforced. (These assertions are difficult to substantiate, since the communications on which they are based are by their nature informal, confidential and often delivered verbally or implicitly.)

Fourth, the undermining of the capabilities of the state to provide good governance is both a cause and effect of increasing dominance of foreign finance, expertise and implementation in many aspects of government. This dominance is exercised through a large number of different institutions. While bilateral aid program staff like to think that they maintain good relations of co-operation or at least co-ordination between themselves, their diverse political and developmental objectives do not make for coherent national policy. It also means that there are many foreign institutions which provide their aid within the project framework. Their outputs are therefore dispersed, often uncoordinated, and do little to strengthen the institutional capacity of the government. They also may, or may not, serve to fulfil the objectives of signed treaties, with which the nation state is expected to assume responsibility for implementing and complying with.

Finally, economic crisis has led to falling incomes in the countryside and thus to increased pressures to pursue the commercial exploitation of wildlife, to cut timber illegally and to clear land for agriculture. The closing down of the Palmol oil palm plantations near the Korup National Park has led the plantation workers to cut timber for sale in the forest, to clear land for agricultural subsistence, to poach wildlife and thereby put increasing pressures on the habitats in the park. While the illegal export of specimens and trophies is carried out by wealthy entrepreneurs, they rely upon large numbers of poor people to trap or hunt animals.

This case study of Cameroon is unfortunately not an extreme case and illustrates widespread problems of biodiversity conservation. The first problem is that implementation of policies to conserve forests, wildlife and areas of special scientific interest is at a profoundly depressing level. Policies, paper plans, project workshops abound — but simply no effective practice. There is virtually no basis for institutions to conserve biodiversity, since plundering it provides profits or a means of livelihood for very large numbers of the rural population, entrepreneurs (both national and foreign) and for officials themselves. The way in which foreign firms can circumvent most national environmental regulations, as is the case with Cameroon, is widespread throughout West Africa as Colchester (1993) amply documents. This is one of the most severe challenges for biodiversity conservation, and one which international conservation policy-making finds itself largely unable to tackle.

◆ **Marine Biodiversity: A Case Study of Whaling in Greenland**

The following case study of marine biodiversity illustrates some of the distinctive problems of conserving biodiversity in aquatic systems. There is a wide body of literature on the value of terrestrial biodiversity, and a relative lack of understanding of the importance of marine systems.

Over two thirds of the globe's surface is covered by oceans, and the marine realm is generally considered more diverse than the terrestrial. It contains thirty-one of the thirty-two animal phyla, fourteen of which are exclusively marine (WRI/IUCN/UNEP, 1992). Scientists believe that the deep sea floor may contain as many as a million undescribed species (WRI/IUCN/UNEP, 1992). Tropical coral reefs contain an enormous variety of species, similar to the variety of species found in tropical forests (Carlton-Ray, 1988). The array of open oceans and coastal zones reveals a remarkable diversity of environments, including the recently discovered thermal vents. Although the loss of marine biodiversity is

less well publicized and understood than is the loss of terrestrial biodiversity, it is considered a serious problem in its own right.

Marine ecosystems have many special features compared to terrestrial systems, making them more complex to understand and to manage. Some of these include fluid boundaries which shift in time and space, three dimensionality, buoyancy, planktonic dispersal, and vastly larger size than terrestrial systems (Norse, 1993).

Marine ecosystems are of enormous value to humans, providing many important products and services. Seafoods provide much of our protein supply; marine photosynthesis ties up carbon dioxide that would otherwise exacerbate global warming; coral reefs and mangroves help protect coastal communities; seas have aesthetic value and provide places for recreation. Marine resources are also proving an exciting source of new anti-viral and anti-tumour medicines (Norse, 1993).

Unlike terrestrial systems, marine biodiversity is largely an open-access resource, outside the jurisdiction of states, and competitive exploitation is the norm (WRI/IUCN/UNEP, 1992). Whereas protected areas have existed on land for more than a century, there is no tradition of conserving marine ecosystems. Apart from specific international agreements and conventions on the management of fisheries, whales and seals, there is a paucity of international legal agreements for protecting seas. The United Nations Convention on the Law of the Sea still lacks ratification to bring it into force, and may remain stalled for the foreseeable future.

The case of whaling in Greenland reveals some of the tensions between indigenous Arctic groups, and animal rights and conservation bodies. As the other case studies, it thus challenges the dogma that human welfare and biodiversity conservation are always harmoniously linked. It illustrates the political power of conservation and animal rights actors, and the political marginalization of indigenous groups fighting for economic and cultural survival. It also illustrates how some groups define biodiversity and use uncertain scientific data to reach their political objectives successfully, at the expense of others — not because they had at their command a monopoly of scientific facts and a superior logic, but because their means of promotion and presentation at the global level were more effective.

Whales have been part of the marine-based economy in Greenland for over 4,000 years. Prior to Danish-Norwegian colonization in 1721, Greenlanders caught bowhead whales (*Balaena mysticetus*). The spiritual beliefs of the Inuit governed the hunters' relationship with whales. There was no formalized system of property rights, and the small and dispersed population had little impact on whale resources.

In the seventeenth and eighteenth centuries European whaling began to dominate the whaling industry, and by the twentieth century the numbers of some species of whale (e.g. bowhead) were very much reduced. In the 1940s and 1950s Denmark introduced European-style whaling to the Greenlanders, using ships with harpoon cannons. Ruthless commercial exploitation of whales led Denmark to sign the International Convention for the Regulation of Whaling in 1946. This permits aborigines to catch whales for local consumption, even when commercial whaling is prohibited.

Denmark formally ended colonial rule in 1953, and in 1979 Greenland achieved Home Rule and political autonomy from Denmark. As Greenland has become more and more involved with wider economic and political systems, indigenous customs have been undermined, and the traditional culturally based mechanisms for regulating and distributing whale catches have been disrupted.

Greenlanders currently participate in a “co-management régime “ for aboriginal subsistence whaling, which is set up under the International Whaling Commission (IWC). The IWC sets quotas for sustainable whaling but leaves the day-to-day management to Greenland.

Environmental groups

Environmental groups such as WWF, IUCN and Greenpeace stress the maintenance of essential marine ecological processes and life-support systems and the importance of marine genetic diversity. In general they support the sustainable utilization of species and ecosystems. According to these sources, most of the world's whale populations have been hunted. Today only the minke whale, the smallest species, survives in commercial numbers. For example, the blue whale was slaughtered in tens of thousands each year, peaking at over 30,000 animals in a single season in the 1930s. The population has never recovered from the onslaught. It remains critically endangered with less than 1 per cent of its original numbers despite 25 years of protection. After the most profitable blue whale, species after species has been targeted and hunted including the fin, humpback, sei, sperm and minke whales (Greenpeace, 1992a; 1992b).

In addition to hunting, whales are threatened by habitat destruction, over-fishing of prey species and general threats to the food chain due to changing climate and currents, ozone depletion, reduction of phytoplankton and zooplankton and, in certain regions, the accumulation of toxins.

According to some observers, the animal rights perspective is used increasingly in environmental campaigns, which constrains the activities of indigenous people. IWGIA maintains that animal welfare and animal rights attitudes have been increasingly incorporated into the politics of environmental organizations (1991).

Several groups of environmentalists, especially animal rights groups, are strongly opposed to whaling because they believe that it is inherently immoral. Besides being a symbol of all the wildlife that mankind is challenged to protect, many regard whales as unique. The main justification for recent arguments for "cetacean rights" is their intelligence and other human attributes. Einarsson argues that whales have become such potent symbols because their image has been anthropomorphized. The author points out that moralizing the natural world through human metaphors has become a major rhetorical device in environmental campaigns in Western culture:

In the whale mythology of contemporary environmental discourse, whales straddle the Cartesian divide between animals and humans, occupying a Pan-like role in these relations. The moral consequence of humanising whales is great as it transforms them from being potential natural resources into a very different category of animals; they become uniquely special. Within this axiom there is no possibility of allowing the hunting of whales, regardless of the humaneness of killing methods (1993).

While the philosophical issue remains controversial, there is widespread agreement about the inherent cruelty involved in whaling. Despite advances in explosive harpoon technology, it is widely believed that there is currently no humane way of killing whales. To be as effective as possible, harpoons need to detonate close to the brain or central nervous system. Given that the whale is a moving target and shows little of its body surface for the gunner to aim at, such accuracy to minimize suffering on the part of the whale is impossible. Harpoons are also known to inflict terrible but not instantly fatal injuries if they pass through the smaller bodies of minke whales. The Royal Society for the Prevention of Cruelty to Animals (RSPCA cited in Greenpeace, 1992) has urged a complete cessation of all commercial whaling (irrespective of conservation arguments) upon the grounds of the inhumane methods of killing.

Animal rights and environmental organizations often depict people who whale as cruel, barbaric eco-criminals. Whaling has even been compared to slavery and cannibalism (Barstow, 1991). Many in the animal rights movement have also accused indigenous hunters of being primitive and uncivilized.

Indigenous people

Local people do not regard harvesting of animals as unacceptable, and regard whales as a natural resource. According to IWGIA (1991), local fisherfolk have a traditional ethical code which “reconciles subsistence with co-existence”, recognizing that people too are an integral part of nature. The ethics attached to hunting and gathering, and to sharing and manufacturing products is of great local concern. The symbolic relationship to the land and sea together with their resources governs all aspects of aboriginal life, including social, cultural and economic spheres. According to their traditions they do not see themselves superior to animals. Their relationship is characterized by exchange, reciprocity, mutual respect and friendship. People have to obey certain rules and regulations in their treatment of animals (Caulfield, 1993).

While the environmental movement and indigenous organizations may be working towards common goals, their motivations are different. Indigenous people work towards the maintenance of cultural integrity and survival, while the environmental movement is more concerned with damage to the environment. The latter often tends to neglect local human welfare and the possible positive effects of sustainable resource harvesting.

Greenland has had no appreciable political impact upon the international treaty on the regulation of whaling. Although the treaty was signed primarily to address issues of commercial whaling, the “aboriginal subsistence whaling” (ASW) part of the Convention has had a significant impact on whaling in Greenland. When the International Whaling Commission (IWC) was formed in 1985, it reduced the allotment of minke whales by half (down to 130 whales per year), and eliminated the catch of humpback whales. The ban has been seen as very unfair to Inuit hunters and, for some, it has meant a drastic loss of livelihood, particularly for collective hunters.

Various anti-whaling groups have challenged the ASW régime because it is not considered “traditional” because hunters use modern technology and markets exist for whale products. Some groups complain that an indigenous peoples’ harvest will only be allowed if they continue to live a life which corresponds to an idealized Western concept of an indigenous lifestyle, and there are concerns about the implications of the implied “enforced primitivism” for aboriginal subsistence whaling.

Some hunters see the IWC, EEC and environmental groups as foreign powers whose policies are based on ethno-centric ideas about the relationship between people and animals. They question why animal rights groups assume that their own views of animals are right and are accepted by the international decision-making institutions, while theirs are considered wrong and are ignored. Indeed, even among commentators at the international level, the pressures of the animal rights and more fundamental environmental groups have been described as ethno-centric cultural imperialism (Wenzel, 1991). Some hunters feel that the IWC is dominated by forces bent on halting all whaling altogether and having Greenland withdraw from the co-management régime. Greenlanders have had to insist on their rights to the sustainable use of marine mammals under international law. Doubleday (1992) argues that indigenous whalers are constantly required to justify their actions, by being subjected to the “inquisitorial” review of their past actions, their present needs and their probable future. He questions whether “indigenous peoples [are] to be satisfied with platitudes while neo-colonial attitudes are practiced that exclude them from real involvement in the negotiations determining the fate of their subsistence hunting and of the people themselves?”

There is widespread feeling that indigenous groups are fighting for cultural and economic survival. According to some indigenous perspectives, “sustainable development” means development in which local people are regulated or even excluded from rights to utilize renewable resources of their lands.

International actors

An international convention on the regulation of whaling was signed in 1950. It was set up primarily to address issues of commercial whaling, but it enabled “aborigines” to catch whales for local consumption, even when commercial whaling was prohibited. The International Convention on the Regulation of Whaling (ICRW) created the IWC in 1985. The aim was to conserve whale stocks, and thus make possible the orderly development of the whaling industry (Lyster, 1985). Membership of the IWC is open to any country adhering to ICRW principles. It has three committees which provide recommendations: Scientific, Technical, and Finance and Administration. Changes to quotas for whale catches require a three quarters majority vote.

As the whale has become an increasingly important symbol for the environmental movement, the IWC has moved away from being primarily a forum of whaling nations. More and more nations without economic interests in whaling have become members. In 1986 an indefinite commercial whaling moratorium was introduced, but five nations have continued to hunt.

Doubleday (1992) has criticized the politicization of IWC by whale preservation interests, arguing that:

...a coalition of anti-whaling nations operating in a clandestine fashion has circumvented the letter and spirit of the Working Group recommendation that full participation and involvement of the indigenous peoples are essential for effective whale management....this coalition of anti-whaling nations which hold the majority in the IWC meet in private to make deals that ultimately become the “decisions” of the IWC. Indigenous peoples are not welcomed at these like-minded sessions. In this way, the advances made by indigenous peoples in the IWC itself are undermined by the anti-whaling interests.

The IWC is currently the principal international forum for the management of whaling. However, it is generally believed that the IWC has failed to attain its goal. It suffers from several weaknesses. There are inherent operational problems, e.g. lack of enforcement mechanisms (no observer scheme to monitor whaling operations to ensure adherence to quotas) and the existence of the “objection” procedure which allows governments to opt out (e.g. Japan, Norway both of which hunt whales in great numbers).

The role of the IWC in Greenland has been very controversial and it has had a significant impact on subsistence whaling. One of the central problems is that of scientific uncertainty about the size and boundaries of Greenland’s whale stocks. The conflicting interpretations of data about stock size, identity and productivity make effective oversight of whaling difficult (Caulfield, 1993). The scientific committee of the IWC is responsible for producing data about stock boundaries and size which are used as a basis for setting management quotas. However, over the years it has become apparent that west Greenland’s stock of minke whales is in fact part of a larger stock. Given a larger stock, Greenland’s quota of whales could be higher. It is estimated that 670 tons of whale meat are necessary to meet nutritional needs. However, quotas allow only 400 tons (Caulfield, 1993). Although the scientific committee accepts the argument about the whale stocks, it is unable to change the management boundaries because it is unable to say where the boundary of the stock “should” be.

The IWC has helped establish the co-management régime for aboriginal subsistence whaling in Greenland. The Committee is made up of representatives of the hunters, the Home Rule State (which is responsible for internal regulations, monitoring and enforcement), the Danish Government and the IWC (which sets the quotas for the minke and fin whales). While this power sharing régime provides many advantages, Caulfield (1993) argues that successful co-management is closely linked to the achievement of meaningful political and economic self-determination. Without this, co-management

becomes “co-operation” — indigenous people “co-operating” with the substantive decisions of external forces. Caulfield thus cautions against viewing co-management as a panacea for resource conflicts.

This study illustrates many of the themes raised in sections 1 and 2. It shows how various actors perceive and value a particular species in different ways, and is thus a window on the contested meanings of biodiversity and the underlying power struggle between actors shaping resource use. Second, it indicates how scientific investigation and data are moulded around the interests of a particular group of actors. It is quite legitimate to ask whether Western science, with all its uncertainties regarding the whale stock and boundaries, has been superior to local knowledge as a basis for conservation policy in this case. It thus challenges the platitude concerning the synergy of biodiversity conservation and human welfare, and on the contrary suggests that indigenous groups have suffered as a result of conservation. Lastly, the study indicates how the image of the whale has become a potent symbol for environmental groups, and has been used to mobilize widespread public support for their practices, and how this overrides the struggle for livelihood at the local level.

5. POLICIES

Here we review three distinct intellectual paradigms which frame the general approach to conservation and to biodiversity conservation specifically. Each paradigm has profound and pervasive effects both on the international discourse about conservation and on policies themselves in different countries. These paradigms also have fundamentally different approaches to human welfare, and assume different sets of relations between civil society, the market and the state.

It is apparent that international conservation policy and practice are undergoing rapid transformation. Contemporary conservation ideology, at least on paper, represents an evolution away from predominantly nature preservation to sustainable use of natural resources, with stronger emphasis on livelihoods and, in more general terms, on human welfare. Policies which once viewed people as a threat to nature now regard people as potential partners in sustainable development. However, it must be emphasized that the role of theory in policy-making (and in conservation policy-making in particular) is one of persuasion and legitimization through the demonstrable (rather than actual) force of reason. Thus most institutions appropriate and use theories, or more usually parts of theories, to persuade others and enrol them in their particular “projects”. This has already been illustrated by the review of international policy-making by WWF-International in section 2. It is not surprising therefore that policy and strategy statements are eclectic in their theoretical exposition. To take an example, the World Bank’s **World Development Report** (1992a), while taking a neo-liberal economic approach to the environment and conservation, also weaves strongly neo-populist strands of thought throughout (e.g. the links between poverty and environmental degradation). It is thus to be expected that, while the genealogy of conservation paradigms may be traced to a relatively pure set of mutually consistent principles, policy and strategy documents can be hybrid.

Conservation has a complex heritage; both the “classic” and “neo-populist” approaches can be traced back to historical themes within early conservation. While the “classic model” was always predominant, its history also includes popular environmental movements resistant to colonial régimes and destructive “development”, and conflicting views about conservation within many colonial régimes (Grove, 1987). Much of the contemporary interest in “people-oriented” conservation has its roots in the historical struggles and strategies of local groups to protect their environments and livelihood interests, and the more populist conservation thinking in the nineteenth century. The reasons for the early predominance of the classic model and subsequent growth of the neo-populist and neo-liberal approaches are complex, but are deeply embedded within world political-economic

change (especially decolonization in the South) and the social dynamics of conservation in particular countries.

However, the somewhat contradictory mixture of classical and contemporary ideas within the conservation movement is causing some discomfort for two main reasons. First, it creates new practical dilemmas of how to integrate conservation and development on the ground with local communities. Second, it creates the potential for new and unknown political alignments and allies, particularly with grass-roots political organizations and campaigners for indigenous people's rights. Third, the two different paradigms have implications for who designs and controls conservation programmes, and whose agenda prevails. These approaches are discussed below.

◆ The “Classic” Approach

This approach focuses on environmental solutions to perceived environmental problems. It is best exemplified by the traditional (exclusionary) national parks and protected area systems. It promotes conservation “technologies” which are assumed to be known by and accessible to resource users, which address the apparently physical problems of environmental degradation.

The wider objective of the protected areas system is to conserve and manage entire ecosystems and to prevent loss of wild species. Parks and nature reserves are seen as the key instruments in conservation. The IUCN describes a comprehensive system of protected areas, which includes ten main management categories. These basically represent a continuum from no human intervention to increasing emphasis on human use and resource development. There is a growing science of protected area design and management, and numerous publications which specify conservation techniques and special practices for buffer zones. With increasing emphasis on biodiversity conservation, the international conservation movement is calling for more protected areas (IUCN/UNEP/WWF, 1991; CNPPA, 1992; Keating, 1993). It is widely agreed that each country should aim to protect a minimum of 10 per cent of each biome under its care (e.g. forests, wetlands, oceans, tundra, grasslands, etc.). During the 1970s the total area under protection increased by 80 per cent (MacKinnon, 1986). Most of the growth of protected areas has taken place in economically poor, but species-rich tropical countries where the world's biodiversity occurs and is most threatened (Myers, 1979). By 1993, there were some 7,000 protected areas throughout the world, covering 4.8 million km², which represents 5 per cent of the world's surface (Pimbert, 1993).

The expansion of protected areas, particularly of national parks, is highly controversial. There is also much debate about the appropriateness of protected area categories in diverse socio-economic settings. As West and Brechin (1991) point out, the categories remain ideal, while management practice is often muddled and ineffective on the ground.

Origins

Many writers (including Nash, 1970; Runte, 1979) have examined the inappropriate and widespread export of the concept of the national park which evolved in the United States to many countries in the South. (It is widely agreed that the international parks movement began with the creation of Yellowstone National Park in 1872). The goal of the traditional park system was to set aside and preserve areas of natural beauty and phenomena from human exploitation, for the enjoyment of visitors. Boundaries were drawn around special places, so that they could be set aside from the “ravages” of ordinary use (Hales, 1989). However, analysis shows that this model of a national park is the product of an affluent culture, emerging in the context of boundless wealth, and usually in sparsely populated areas, with urban populations no longer subsisting directly from the land (Nash, 1970). This original conceptualization of the national park, now embodied within IUCN's framework, tends to exclude resident people and use of resources from parks. As a model

for countries with entirely different circumstances, it has caused enormous social deprivation and suffering.

A central critique of the classic approach to conservation refers to its colonial origins in developing countries. Several authors draw attention to the mythical dimensions of colonial conservation, suggesting that protected area policies may reveal more about Western eco-cosmologies and subliminal notions about “human-nature” relationships than “objective” ecological science. For example, Anderson and Grove (1987) examine the wider psychological function of the African environment in the European mind. To understand how and why European ideas have shaped conservation policies in the past and present we have to understand how nature’s eternity was seen to be symbolized in Africa, and how man has sought to rediscover his lost harmony with nature. Further, it is suggested that European-shaped preservationist policies hold vast acreages of land hostage to its romantic and arcadian myths (Marks, 1984).

Perhaps an important lesson for contemporary ecologists and conservationists is to be aware of the deep and reiterative relationship between science and the values of society. Conservation policies will inevitably symbolize the views and values of their authors and cultures and in this context may be analysed as social constructions. International policy needs to be open to other eco-cosmologies which may have different views about the relationships of the human and natural worlds.

In many cases the establishment of national parks has been (and continues to be) closely tied to élitist interests. For example, in the words of Colonel Mervyn Cowie, an early preservationist instrumental in the establishment of the Serengeti Park in East Africa, protected areas were designed to provide “...a cultured persons’ playground”. He believed that the natives had very little interest in the parks; in fact the main purpose of the parks was to “protect nature from the natives” (Cowie cited in Gilges, 1992). Some parks also served important economic functions. For example, Mackenzie (1987) examines the essential role of wildlife (particularly ivory) and subsidies provided by the “Hunt” in the economic survival of colonial régimes. He illustrates how the “hunting ethos” and ideas about conservation became intimately connected to the structures of privilege and power of the new rulers of Africa.

Impact on local people

Many national parks displace people from their traditional lands and undermine their common property institutions. Access to resources such as food, fodder, medicinal herbs, fuelwood and timber, which are crucial to livelihoods, is often restricted. A contemporary example is the proposed eviction of over 7,000 people from 19 villages from the core areas of the Kuno area in Madhya Pradesh, India (from March to July 1995) to create a lion sanctuary. About 90 per cent of the people in the area are Sahariya tribals, forest-gatherers who make their living by collecting and selling medicinal herbs (Jain, 1995). According to Parashar (cited in Jain, 1995) “breaking the Sahriyas’ bond with the forest to accommodate the lions is a perpetuation of the tribals’ growing alienation from the land, caused by official conservation strategies”.

Without access to traditional land, the land surrounding protected areas is often degraded due to increasing pressure from local people, and a free-for-all open access situation may arise. In the long-term this puts pressure on protected areas themselves. Denying access to traditional lands without providing sustainable land use alternatives can lead to perpetual land use conflicts between park authorities and local communities which are rarely resolved. Indeed, open protests, attacks on park guards, poisoning of animals, and deliberate burning of forests have become common in some developing countries (Ghimire, 1991; 1994 with an example of panda sanctuaries in China, and Pimbert, 1993).

Historically the protection of parks and reserves has been based on policing and patrolling methods, using forest guards in attempts to prevent illegal activities and agricultural encroachment and to enforce park and reserve regulations. Local people are often subject to fines or imprisonment if they are caught breaking regulations. These methods have been notoriously unsympathetic towards local communities, and have encouraged antagonistic attitudes towards conservation. Also, it has encouraged the appropriation of “bureaucratic rent” by local officials, such as forest guards, wildlife officers and project personnel. There is increasing recognition that this “preservationist approach...requires an essentially militaristic defence strategy and will almost always heighten conflict” (Machlis and Tichnell, 1985). Furthermore, the logistics and costs of protecting reserve areas in this manner are often beyond the capability of many governments. Guards rarely have adequate technical or financial resources for effective management. They tend to be poorly paid and trained, and have low morale (as the Cameroon case study illustrates). It is widely agreed that most lack the inclination or capability to identify or address local park-people conflicts (Wells et al., 1992; Hough, 1988).

Partly in response to these conflicts, the idea of buffer zones is often incorporated into protected area models. These seek to combine socio-economic development with protected area management. However, they are notorious for not providing enough land for sustainable livelihood alternatives; they are often located in risk-prone environments; are under-funded, “top down” or “blueprint” oriented and of a short-term nature (Pimbert, 1993). The term “buffer” zone clearly expresses a defensive posture, beyond which nature needs to be protected from people.

The discourse of fortress conservation mentality also changes the way we think about people living in the vicinity of reserves. “Hunters” become “poachers”; “settlers” become “squatters” and “land clearing for agriculture” becomes “deforestation” (Brown and Singer, 1991). Local people are acutely aware of these changes in their perceived status. For example, the Bakweri people from the Etinde forest reserve in Cameroon say that “protected area legislation turns the locals into thieves” (S. Jeanrenaud, 1991).

Ecological models

People have often been excluded from parks even where there is no proof of resource degradation. The fact that humans may be instrumental in shaping ecosystems or enriching biodiversity through management practices has, until recently, rarely been considered (Rabinovitch-Vin, 1991). Pimbert (1993) argues that a “paradigm shift” is occurring in ecological thinking and that past management of ecosystems has been based on a far too static concept. Much recent ecological research points to the importance of understanding historical information (including human activity) and disturbance processes as important components of ecosystems. For example, Gomez-Pompa and Kaus (1992) argue that until we understand that tropical forests are “both artifact and habitat”, we will be advocating policies for a mythical pristine environment that exists only in the neo-colonial imagination. (See Behnke and Scoones, 1993 and Abel, 1993 for a review of these models in rangelands management).

Policies and politics

In the classic approach to conservation, the state (often in alliance with an international conservation organization) plays a major and leading role in defining the conservation problem, formulating policy, then implementing it. It promotes “its own” science, appeals to a (particular) scientific interpretation of the problem, and attempts to use state power and the institution of state property to impose its policy on civil society. The issues of human welfare hardly appear on the agenda at all, and conflicts which arise with the imposition of state appropriation of biological resources are resolved by coercion. Other parallel critiques of soil and water conservation may be found in Blaikie (1985) and Baker (1981).

Why, then, has the national park model of conservation been so widely adopted in developing countries in the post-colonial era? The answers are embedded within the political economy and in alliances between political élites. As in the colonial era, national parks often become the “political tools” or instruments of certain dominant groups, may be considered symbols of affluence, or ways to attract tourists and foreign exchange. For example, the Malagasy government is known to be keen to expand its network of national parks in order to generate foreign exchange through tourism (Ghimire, 1991). It is not alone, as the Lwangwa National Park in Zambia discussed in section 3 showed. In order to encourage tourism, the legal status of some forest reserves has been changed to national park status. Moreover, some foreign aid donors encourage alteration of the status of many other protected areas into national parks, in order to increase earnings from tourism. Peluso (1993) argues that many state agencies are interested in linking up with international conservation interests in order to use the ideology and technology of conservation as a means of gaining control over valuable resources and recalcitrant populations.

It is also feared that the classic model of parks and reserves is well suited to serve the economic and political interests of governments and local élites as they seek to benefit from biodiversity prospecting and the so-called “gene rush”. As genetic materials acquire market value, protected areas in the biologically-rich developing countries are becoming commercially significant. All the major pharmaceutical firms are already screening the genetic resources of Brazil, Costa Rica, China, Micronesia, and other countries. Many governments are making agreements with multinational corporations for the exploitation of useful genes in the fauna and flora of protected areas. For example, Mercks — pharmaceutical company has recently signed a five year bilateral agreement with Costa Rica’s National Biodiversity Institute (INBio). They pay US\$ 1 million for prospecting rights and have agreed to share royalties on sales of products derived from useful genes (Reid et al., 1993). There is much concern that these and similar deals will have negative consequences on local communities. Not only will they fail to receive compensation for their knowledge and role in enhancing genetic diversity, but locals will be further marginalized from resources crucial to livelihoods as élites capture the benefits of gene prospecting in protected areas (Pimbert, 1993).

Summary

It has become increasingly apparent that the classic model of conservation is being seen as ineffective in reaching the objectives it has set itself, and is being questioned on ideological, ecological and political grounds. Communities adjacent to protected areas frequently lose access to those areas and consequently bear substantial costs, while receiving few benefits in return. As FAO pointed out in 1985, the “profits” of genetic resource conservation often accrue to people in other countries and regions, and do not provide benefits to local people. Although benefits are increasingly recognized as global, significant costs of conserving biological diversity are being borne by those least able to pay (Wells et al., 1992). Thus while the expansion of national parks and other protected areas may be seen to be potentially beneficial for biodiversity conservation, conservationists need to ask whether the means justify the ends.

The history of protected area policy represents a shift in thinking away from the “fortress” mentality of national parks to more emphasis on sustainable use of natural resources. Today many forms of protected areas co-exist. McNeely (1988) argues that while national parks are as important as ever and “as carefully protected as ever”, they must be supplemented by other kinds of protected areas to meet the broader needs of social and economic development. Some of these new developments are examined in the following sections.

◆ The “Neo-Populist” Approach

This has re-emerged within the last fifteen years as a response to the failures of the “classic” approach. It seeks to integrate biodiversity conservation with the needs of local communities. It is exemplified by the more “people-oriented” conservation programmes, such as the integrated conservation and development projects (ICDPs), and joint or co-management schemes which attempt more participatory modes of project formulation and implementation. The neo-populist approach can be seen to embrace two broad streams of thinking about conservation. One is conceptually derived from environmentalists and the other from the social sciences.

Origins

Elements of the populist approach to conservation can be traced back to earlier experiences within colonial régimes. For example, Grove (1987; 1990) argues that the ideas of the early conservationists (the “surgeon-botanists”) in South Africa and of the East India Company were essentially a humanitarian response to the environmental consequences of colonialism and were relatively holistic ideologies. Many of these ideas were difficult to reconcile with the driving interests of European capital and posed a threat to the unregulated activities of the settlers, particularly those whose capital-intensive activities depended on deforestation. Indeed, in 1880, the Natal Forest Commission published comments on the process of land alienation and consequent psychological impact on African farmers. Grove (1987) suggests that contemporary conservation ideologies which identify with the basic needs of peasant populations have much in common with the ideas of the colonial botanists and much less in common with the land-alienation strategies of some colonial policies.

The contemporary neo-populist debate has gained strength since the mid-1970s, particularly since the publication of the **World Conservation Strategy** (IUCN et al., 1980), **Our Common Future** (WCED, 1987), and **Caring for the Earth** (IUCN/UNEP/WWF, 1991). There has been a growing awareness of the links between the environment, development and poverty, and a rebirth of earlier concerns now embodied in the concept of “sustainable development”. The controversy over national parks has led to a new wave of thinking about conservation, particularly over the fate of people affected by protected area policies. That the poorest sections of the community should bear the costs of conservation is increasingly questioned on ethical and practical grounds. The key message to planners is that conservation is an economic and social as well as a biological decision. Decisions should not be made on biological grounds alone, in isolation from the needs of local people.

Contributions from other disciplines

Developments within other disciplines (e.g. politics, anthropology, agriculture, forestry) have also lent support to a new wave of populist thinking within conservation. For example, a significant impetus comes from work of human rights activists and the so-called “red-greens” (Adams, 1990). Unlike environmentalists, who tend to conceive of sustainability in ecological terms, this group takes up the social and political dimensions of sustainability. Indeed, conservation itself is understood as a central political issue in the lives of affected communities, because it involves the very basis of their subsistence: their right to land (Horta, 1991). In the past, traditional conservationists and radicals have had very different agendas and interests, but today many are converging to form (potentially) new alliances and a more radical approach to conservation.

For many, the concept of “sustainability” has been stripped of the social and political issues implicit in the notion as originally acknowledged by the Bruntland Report (WCED, 1987). Colchester (1992), and Redclift and Sage (1995), among others argue that the promotion of sustainability is by definition political. It is fundamentally linked to concepts of social justice and equity, both within generations and between generations, as well as both within and between nations, but it has been taken over by more technical (ecological) definitions. According to the WCED (1987) the pursuit of sustainability requires a political system that

allows effective participation in decision-making, which is best secured by decentralizing the management of resources upon which local communities depend, and giving communities an effective say over the use of resources. It requires promoting citizen's initiatives, empowering peoples' organizations, and strengthening local democracy.

These themes are central to the welfare of marginalized, tribal and indigenous peoples, particularly forest communities. For example, Colchester (1994) argues that indigenous peoples across South and South-East Asia are making similar claims: the right to the ownership and control of their territories, the right to self-determination, and the right to represent themselves through their own institutions, all of which have their basis in international law. In the context of human rights, sustainability for forest people throughout the world means maintaining supplies of natural produce essential to their livelihoods. Lohmann (1991) claims that community-based management can secure biodiversity far more effectively than imposed conservation plans. He suggests that the political leadership provided by grassroots groups might be central to conservation movements, although it currently it seems too "exotic" even to mention; and that the political rights of villages, societies and movements should be represented in discussions of conservation programmes. Without secure land tenure, control of resources, popular decision making and basic needs provisioning, conservation of natural resources will be unsustainable.

Over the last 15 years a further contribution to community-based conservation has come in the form of a growing interest in indigenous knowledge, local management institutions and indigenous technologies. Kiss (1991) argues that there are many examples of where community management of common-property resources is sustainable and has been historically common, though Brown and Wycoff-Baird (1992) point out that many traditional structures are losing their viability in the face of pressures both within their own societies (population growth) and from without (in-migration of other resource users, penetration of market forces, political instability). The theoretical insights of the Common Property Resource Management workshop in 1985 and subsequent publications by Ostrom (1990) Bromley (1992) and others noted in section 1, have all been central to this rapprochement with resource users in the South.

An expanding interest in participatory approaches and the development of new associations such as "user groups" in natural resource management, co-management, and conflict resolution techniques are key contributions to the populist approach. An enormous literature on participatory techniques has grown up over the past ten years (see, for example, Chambers, 1992; Pimbert and Pretty, 1994). However, there is a growing number of caveats and revisions to the realism of participatory conservation. West and Brechin (1991), for example, argue that the state of the art in testing and evaluating the new innovations is simply not advanced enough. They suggest that the international conservation movement is in for a second major revolution based on shock therapy in the face of harsh reality and warn against assuming that things are working out better than they really are.

It is worth discussing some of these concerns here, not so much to counter the neo-populist paradigm as a whole, but to throw light on some of its more comfortable rhetoric and insufficiently challenged assumptions.

An emerging critique of the neo-populist approach

First, participatory conservation requires a high degree of skilled inputs, sensitive handling of the political issues and a long planning horizon. Non-governmental organizations have been seen as the appropriate institutions — indeed there is a high degree of reflexive advocacy between the participatory approach, techniques of data collection and planning and the institutional needs and image of NGOs. While NGOs may be able to provide this sort of input, the issue of replicability must be raised. Can NGOs expand to provide these inputs on more than a small, even token, scale? If NGOs expand in size, will their

flexibility and capacity for face-to-face dialoguing with local people be compromised? Thus the “scaling up” debate concerning the future of NGOs in developing countries is very relevant to the future realism of the participatory approach to conservation. Moreover, issues of co-option by local élites and government, bureaucratization and corruption have all taken their toll on the view of NGOs as the ideal vehicle of the neo-populist approach. It is an open question whether large international organizations can institutionally adapt to the local specificities which the new paradigm demands. At the present time many of them are experimenting with decentralizing control of their operations, and attempting to link international headquarters more closely with their operational divisions.

Second, there is usually competition for resources which comprise biodiversity at the regional and local level (see the discussion on the “community” in section 3). Therefore, participatory conservation must not only focus on brokering a compromise between the outside agency and local people, but also between different local people themselves. Any political economy is unequal where power will be exercised by certain groups to gain and maintain access to resources. The experience of the Swedish Development Agency (SIDA) in its Community Forestry Programme in India is a case in point: forestry planting and regeneration projects on common lands faced the greatest difficulty in preventing local landowners and contractors from appropriating most of the timber; the poor, who hitherto had used the common land, had been excluded from it. Jackson (1994) also points out the limitations of the participatory approach from a gender perspective. After making sure that women are represented in decision-making, it assumes that communication is unproblematic and ungendered. It fails to recognize the extent to which expressed views reflect dominant/dominated ideologies, “mutedness”, and the unwillingness to express alternative views where these may generate conflict. Policing of conservation programmes should be done by consent, along democratic (accountable and fair) rules. Whether this can be achieved, when the outside agency’s back is turned, or after external funding ceases, remains an open question. These discomfiting thoughts contradict the assumptions of community and consensus which are crucial to the participatory approach.

Third, participation between local people and outside agencies takes place because there is a perceived need for conservation, usually on the part of the latter. If the objective of the project is primarily conservationist, the agenda will usually be based on scientific information. If the project has an integrated objective of enhancing human welfare through the promotion of sustainable development, it will be based on socio-economic and natural science analysis. These dual concerns have resulted in a new generation of projects which attempt to link the conservation of biological diversity in protected areas with local social and economic development, called integrated conservation and development projects (ICDPs) by Wells et al. (1992). Although many of these projects are of recent origin, various concerns are already emerging. Some observers comment that rural development aspects have been merely “tacked-on” to conservation projects; or that programmes do not offer sustainable livelihood alternatives (Ghimire, 1991). In many cases there is a lack of consultation with local people during the planning process and the benefits from conservation are not directed to the advantage of local people. (See Brandon and Wells (1992) for a review of some of the conceptual dilemmas inherent in their design). In most cases project personnel bring their pre-set agenda to a range of local people for discussion. The degree to which local people move along the “participation continuum” (from passive participation through to self-mobilization, Pretty, 1994) depends on the extent to which the outside agency can get its own way, and how flexible it is in jettisoning parts of its own agenda in the face of opposition.

Finally, what should happen if local people (or the most powerful groups) want to use and thereby extirpate natural resources thought important for biodiversity conservation? What happens if they want to substitute imported materials and non-sustainable technology? The usual outcome is less participation, a coerced set of priorities, and the familiar outcome of failure. This means that the outsiders’ scientific agenda may be significantly undermined or altered, depending on the pattern of local interests and power. Land security and local control of resources demanded by indigenous groups and their supporters do not

themselves guarantee prudent resource use. Colchester (1992) cites a case from Papua New Guinea where collective land rights are strongly protected by law, but where New Guinean communities have frequently negotiated away rights over their lands by leasing them to logging or mining companies in exchange for royalties. Indigenous élites may make land use decisions for personal gain rather than in the interests of the communities that they are meant to represent. For example, the indigenous élites in Sarawak very often side with loggers against local people. But many societies are radically transforming their political institutions to take account of this problem. Communities have begun to evolve “Longhouse Associations” run under much more democratic principles than the traditional institutions, to provide themselves with truly representative leadership (Colchester, 1992).

These points may be taken as a caveat to the uncritical promotion of participatory conservation. There are many cases of self-mobilized local groups conserving their environments, and where etic (outside) and emic (inside) agendas coincide. Success stories in the promotional literature are meant to illustrate and promote a progressive and exciting paradigm of development and conservation. Yet for every highlighted success (often reified and selectively reported itself), there are countless stories, accounts and reports of the problems of the participatory approach. It is simply very difficult to implement — and at the same time to fulfil externally created agendas for conservation.

Beyond participation to environmental brokerage?

It may be more realistic to talk about negotiation and brokerage, rather than (unproblematic) biodiversity conservation. In this sense, real participation in the formulation and implementation of conservation can be viewed as the “best case”, but one which rarely is achieved, and is certainly not replicable on a large scale. This perspective prompts two further considerations:

- (i) Outside conservation agencies, with their scientific ideological and institutional characteristics, have to be brought into the analysis. Outside agencies therefore become part of the solution and the problem, actors in the cast of players as any others.
- (ii) The outcomes of conservation projects (e.g. national parks) will only fulfil part of external agendas. This must be expected, since projects can go against political economic structures which promote unsustainable use of natural resources only to a limited extent, without attention being given to other policy instruments at the national and international levels (which tend to lie outside the focus of enthusiasm of the neo-populist approach). Second-best policies, if well implemented, are better than “perfect” policies that are poorly implemented.

Summary

The neo-populist approach derives out of a political reaction and opposition to big business, the authoritarian state, and dispossession through capitalist expansion and technological change. In policy terms, the approach seeks to remould the interface between the majority of society (small farmers, pastoralists, petty traders, artisans, etc.) and the state. This is done by acknowledging their own agendas and their own technical knowledge, adapting plans to local conditions, and facilitating conservation through dialogue and participatory action. This paradigm has become the new conventional wisdom, particularly in international discourse, although there are still important lags in the succession from the state-led authoritarian “classic” predecessor. The profound reorientation of scientists and other development professionals, which is necessary following the purely intellectual change in approach, takes time. However, this paradigm too has to be explored and thought through “on the ground” where, as the commentary above indicates, there are emerging contradictions and problems in converting a new idea into successful conservation practice. Also, it is being challenged by the resurrection of the neo-liberal approach, outlined next.

◆ The “Neo-Liberal Economic” Approach

This focuses on economic benefits and costs of biodiversity erosion and management. It emphasizes the central role of the market in regulating the use of natural resources and a more limited role for the state, which retreats from intervention to fulfil the roles of standard setting and “refereeing” the proper functioning of markets. The state should remove “perverse” incentives which encourage non-sustainable use of resources, and encourage instead the internalization of environmental costs. Partly this approach has come about from a deeper understanding of the limitations of real-world bureaucracies and the degree of control which the state and its functionaries have over its citizens; and partly from the resurrection of a pricist counter-revolution and the dominance of economics in policy-making.

Theories

The economic approach to environmental management as set out by such writers as Pearce et al. (1992) is based upon two economic theories — the Meade-Pigou approach to externalities through regulation (standard setting, command and control) and through taxes and subsidies, and Coase-based approach on the internalization of externalities through the establishment of property rights. These may occur at both the local level (e.g. village forests or ranges with implications for local biodiversity) and at the international level (with implications for global biodiversity and global warming). Both are developed in the economic literature on biodiversity. There are also other economic theories regarding institutional development of property rights (after Hayarin and Ruttan, 1985) where resource degradation occurs from the under-valuation of those resources because they are shared. According to these and other writers of the neo-liberal approach, private property rights will be developed in the case of divisible and definable resources, collective property for indivisible resources, and state property for those not readily privatizable (e.g. air and some water bodies). Incentives hold the key to all these developments:

The main priority world-wide is to establish incentives, regulations and safeguards that lead to proper allocation of resources for environmental maintenance and energy conservation (World Bank, 1991:151).

Critical questions

It is beyond the scope of this paper to provide a critique of this approach (see Jacobs, 1994; Redclift and Sage, 1995; and Brown and Moran, 1993 for a discussion), but a number of questions about policy can nevertheless be raised. First, as with any mono-disciplinary approach, other considerations which have been analysed by political science and anthropology are not well integrated (although there are economic approaches to “political” issues, such as the consideration of transaction costs, game theory and collective action, to name a few). There are many reasons, however, more usually captured by other social sciences, which may inhibit market-efficient behaviour. There may be rent seeking, regulatory capture on the part of governments, and a range of structurally conditioned agendas of consultants, international agencies and NGOs which all produce second-best outcomes. Illustrations of all these behaviours are provided in the case studies. It is a huge assumption that institutional development will necessarily evolve in a benign and environmentally friendly manner. In so many cases, market-led competition does not lead to efficient outcomes. Also, there may be collusion between state employees, and policy makers, business, NGO and élite interests.

Second, in conditions of great scientific uncertainty and insufficient information about the future actions of other parties, it has proved difficult to broker the preconditions for a global market for biodiversity. Negotiations have also implied the transfer of very large sums of money, and the size of the Global Environmental Facility (GEF) bears witness to

national political pressures acting upon country negotiators. There are also similar institutional and political difficulties in the fair regulation of markets at the state and local level (see the Russia and Cameroon case studies).

Third, there are formidable practical and technical problems in executing the preconditions for a proper valuation of biodiversity and the satisfactory operation of a market that reflects those values (as discussed in section 1). These steps are, first, to estimate the benefits of biodiversity, and although a start has been made conceptually, there is a growing awareness that pricing captures only some values (for a variety of conceptual and data-related reasons) (see WWF, 1993 for a review). The second task is actually to capture these benefits. It is all very well for economists to calculate what the benefits should be — if the markets existed and people responded to them. It is quite another for resources to be created from these hypothetical values which few can grasp and recognize, let alone pay for. Education at all levels, international pressure and pump-priming funds are some of the perennial suggestions for the creation of a properly functioning market made at international seminars. The third task is the distribution of benefits. These comprise simple compensatory benefits for resettlement, alternative livelihoods, rents, and the much more important and complex issue of markets for environmental benefits of biodiversity and conservation in general. Clearly, this task is one of the most problematic due to a lack of institutional capacity for implementation. While there are neo-liberal theories concerning the conditions of appropriate institutional innovations for environmental management, there are important questions remaining about the past record for the formation of such institutions, as well as the grounds for optimism for future ones. The fourth task is to identify who the beneficiaries of conservation should be. The fifth and final task is to see that benefits (through whatever institutional delivery mechanism) actually get to the owners of the resources which represent biodiversity.

Table 7
Three conservation paradigms

Variable	Classic	Populist	Neo-liberal
Peasant Behaviour	ignorant, irrational, traditional	virtuous, rational community-minded	rational, egocentric
Diagnosis of environmental problem	environmental solutions	socio-political solutions	economic solutions
Immediate causes of environmental problems	mismanagement by users	mismanagement by state, capitalists, transnational corporations, big business	poor government policies and bureaucratic rules and regulations
Structural causes of degradation	over-population, backwardness, lack of foresight, ignorance	resource distribution, inappropriate technologies	inappropriate property rights, institutions, prices, and rapid population growth
Institutional prescription	top-down centralized decision-making	bottom-up participation	“market” policies, property rights, resource pricing, self-targeting safety nets
Academic discipline; profession	science; bureaucrat	sociology; activist, NGOs	economics; development professional
Gender orientation	gender blind	virtuous but victimized women	gender myopia
Research framework	systematic empiricism	Rapid/Participant Rural Appraisal, community as unit of analysis	methodological individualism
Orientation to market	not considered	exploitation	Pareto optimality and externalities
Model of peasant society	conservative, paternalistic	egalitarian	democratic/liberal
View of collective action	deficient	essential and unproblematic	conditional rationality; political entrepreneurs
Technology	“fortress conservation”	agronomic techniques of conservation	not specified

Source: Biot et al., 1995

6. CONCLUSION

The initial identification and definition of the biodiversity problem came from natural scientists in the North. The problem has a complex scientific basis, and definition, measurement and understanding of processes are marked by lack of empirical data, and are subject to the individual discretion of scientists themselves. This is not specific to scientific research on biodiversity, although the degree of disagreement and “talking past each other” is related to the complexity of the research field and the variety of understandings about the subject. Other issues such as sustainability suffer from similar problems.

Unfortunately, it is easier to add up ways in which the concept of biodiversity can be misused than it is to present a simple solution to the extremely complex problem of measuring and maintaining biological diversity. The public is unclear on the concept and scientists cannot give a simple answer (Rodda, 1993).

The privileging of certain species, ecosystems and habitats for conservation over others is not, and cannot, be expected to be done on scientific grounds alone. Biodiversity is interpreted in different ways by different actors outside scientific professions as well. Many actors have a fragmentary and contingent interest in the issue of biodiversity (e.g. a specific ecosystem or a short list of species of plant or fish). Others are involved in biodiversity through promoting symbols of conservation (e.g. single issue campaigns in the North),

while others may campaign for the preservation of their livelihoods in the face of forest clearance, dam construction and flooding, or (ironically) the creation of a national park.

Therefore it may be useful for policy makers, international opinion-formers and decision makers to:

- (i) Accept that biodiversity is the stuff of politics. It is an arena of competing interests and ideas of actors with which any conservation has to deal.
- (ii) Accept a plurality of definitions, but define them carefully and understand where they are coming from by attributing them to those involved.
- (iii) Be prepared to link biodiversity with other issues, while at the same time acknowledging that there are other issues involved which intersect with (some of) the aims of biodiversity conservation, but which may not share the same final goals. Human rights, particularly of indigenous people, income distribution, rights to clean water, education, shelter, etc., and human welfare all are related to biodiversity and its various values, but these other pressing issues have agendas and goals other than those of biodiversity conservation.

The issue of biodiversity comprises a number of discourses at the global, regional, national and local levels. At each, different but intersecting definitions and meanings of biodiversity circulate, and are linked to the “projects” of other actors. At the global level, the main policy issue from the scientific view is thus the conservation of global biodiversity and the governorship of the global commons. However, in the negotiation of international agreements, persistent inequalities in wealth and the control and use of biodiversity resources between the North and South invade the scientific agenda with political concerns. At the local level, the discourse may consist of a struggle between agriculturalists squatting illegally in the forest, forest dwellers and the state with interests in foreign exchange from timber exports — each of which values and uses differently the resources that collectively contribute to biodiversity. These discourses, although referring to the same physical resources, attach very different meanings to those resources, and are understood in a unique way by the different actors. There are two main implications. First, since “biodiversity” means many things to many people, it has become a bandwagon, and the rigour and precision of debates have been eroded. Some policy makers may believe that they are conserving biodiversity, while others would not recognize that they were doing that at all. Some see a national park, a warden sees theft, the displaced see dispossession — the point is that biodiversity conservation may be all of these.

Second, although to some degree the local levels of biodiversity conservation contribute to conservation at higher levels (regional and global) in an additive manner, they involve different actors and concerns. Partly, this has to be accepted, and advocacy for conservation pursued at a variety of different levels. Also however, this disjuncture also causes serious problems of implementation (conceived at the international level but implemented on the ground). Some of these problems can be eased by adopting decentralized, flexible, locally politically negotiated programmes. However, the call for participatory conservation has to be realistically appraised.

There are currently three main paradigms for environmental conservation — the classic/authoritarian, the neo-populist and the neo-liberal. Strategy and policy statements usually tend to use the language of more than one, although one will dominate. At present the debate at the international conservation level reflects a shift away from the classic to the neo-liberal and populist approaches. In terms of biodiversity conservation the two most opposed and mutually exclusionary are the classic and neo-populist. There is presently a strong call for a new professionalism and a new approach to conservation, which takes more account of the distribution of the costs of conservation. It is also recommended that local knowledge and expertise (both technical and political) to manage natural resources must be accessed and harnessed through participatory programmes. This new conventional wisdom has gained credence even against vested personal, institutional and professional interests among international policy makers and development professionals worldwide. But

the full implications of the populist approach are becoming increasingly evident, leading to detectable backlash against it. The assumptions of community and consensus in the practice of participatory conservation are far from being problem-free. A plurality of understandings along with a variety of competing interests (some of them decidedly anti-conservationist) begs the question of whether negotiations between outside agencies and local people can be equal. The former have their scientific agendas, and the latter have all sorts of contingent interests in biodiversity conservation. The usual case is that there is disagreement between the two parties and also between local people themselves. How far can, or should, the outside agency push its own agenda? It is helpful for conservation agencies to consider “advanced” participation as a best case situation, but also own up to their own agenda and become environmental brokers between actors who are well understood by the agency.

The economic approach to environmental conservation takes a very different perspective from that summarized above. The conceptual problems of measuring the value of biodiversity, and the political reality of appropriating it, still remain formidable obstacles to the realization of efficiently functioning markets for biodiversity. While the removal of “perverse” incentives to degrade the environment may be possible at the national level, the operation of market signals which reflect the true value of conserving biodiversity at the local level may be a distant reality (as illustrated by the case studies of Russia and Cameroon).

There are strong pragmatic and political grounds for paying detailed attention to the impacts of biodiversity erosion and conservation upon human welfare, particularly in cases where conservation efforts affect local people directly. Pragmatically, coerced and enforced conservation tends to fail in the long-run. Politically, the abuse of human rights and the accentuation of inequalities are related to environmental degradation, and conservation efforts must address these issues too, not exacerbate them.

◆ Bibliography

- Abel, N.O.J. (1993)
What's in a number? The carrying capacity controversy on the communal rangelands of southern Africa, Monograph No. 14 (parts I and II), School of Development Studies, University of East Anglia, Norwich.
- Abel, N.O.J. and P.M. Blaikie (1986)
"Elephants, people, parks and development: The case of the Luangwa Valley, Zambia", **Environmental Management** 10(6), pp. 735-751.
- _____ (1988)
Managing Common Property Resources in Rural Development: The Case of Zimbabwe and Botswana, A Report to the Overseas Development Administration, mimeo, Overseas Development Group, University of East Anglia, Norwich.
- _____ (1990)
Land Degradation, Stocking Rates and Conservation Policies in the Communal Rangelands of Botswana and Zimbabwe, Paper 29a, Overseas Development Institute Pastoral Development Network, London, May.
- Adams, W.M. (1990)
Green Development: Environment and Sustainability in the Third World, Routledge, London.
- Agarwal, B. (1986)
Cold Hearths and Barren Slopes: The Woodfuel Crisis in the Third World, Allied Publishers and Zed Press, New Delhi and London.
- _____ (1990)
"Social security and the family: Coping with seasonality and calamity in rural India", **Journal of Peasant Studies** 17(3), pp. 341-412.
- Alpert, P. (1993)
"Conserving biodiversity in Cameroon", **Ambio** 22(1), pp. 44-53.
- Anderson, B. (1983)
Imagined Communities: Reflections on the Origin and Spread of Nationalism, Verso, London.
- Anderson, D. and R. Grove (eds.) (1987)
Conservation in Africa: People, Policies and Practice, Cambridge University Press, Cambridge.
- Bahro, R. (1984)
From Red to Green: Interviews with New Left Review, Verso, London.
- Baker, P.R. (1981)
Environmental Degradation in Kenya: Social Crisis or Environmental Crisis? Discussion Paper No. 82, School of Development Studies, University of East Anglia, Norwich.
- Barnett, A. (1992)
"Vanishing worlds of temperate forests", **New Scientist**, 7 November.
- Barr, B.M. (1988)
"Perspectives on deforestation in the USSR", in J.F. Richards and R.P. Tucker (eds.), **World Deforestation in the Twentieth Century**, Duke University Press, Durham, North Carolina.
- Barrow, E. (1991)
"Building on local knowledge: The challenge of agroforestry for pastoral areas", **Agroforestry Today** 3(4), (Kenya).
- Barstow, R. (1991)
"Whales are uniquely special", in **Why Whales?**, Whale and Dolphin Conservation Society, Bath.
- Bauer, P.T. (1976)
Dissent on Development, Weidenfield and Nicolson, London.
- Behnke, R. and I. Scoones (1993)
Rethinking Range Ecology: Implications for Rangeland Management in Africa, Dryland Networks Programme, International Institute for Environment and Development, London.
- Biot, Y., P.M. Blaikie, C. Jackson, and R. Palmer-Jones (1995)

- Rethinking Research on Land Degradation in Developing Countries**, World Bank Discussion Paper No. 289, The World Bank, Washington, D.C.
- Birkes, F. (ed.) (1989)
Common Property Resources: Ecology and Community-Based Sustainable Development, Bellhaven, London.
- Blaikie, P.M. (1985)
The Political Economy of Soil Erosion in Developing Countries, Longman Scientific and Technical Publishers, Harlow, United Kingdom.
- Blaikie, P.M. (1994)
Political Ecology in the 1990s: An Evolving View of Nature and Society, CASID Distinguished Speaker Series No. 13, Center for Advanced Study of International Development, Michigan State University.
- Blaikie, P.M., J. Cameron and D. Seddon (1980)
Nepal in Crisis: Growth and Stagnation at the Periphery, Clarendon Press, Oxford.
- Blaikie, P.M., J.C. Harriss and A. Pain (1985)
Public Policy and the Utilisation of Common Property Resources in Tamil Nadu, India, A Report to the Overseas Development Administration, mimeo, Overseas Development Administration, London.
- _____ (1992)
"The management and use of common property resources in Tamil Nadu, India", in D.W. Bromley (ed.), op. cit.
- Blaikie, P.M., T. Cannon, I. Davis and B. Wisner (1994)
At Risk: Natural Hazards, People's Vulnerability, and Disasters, Routledge, London.
- Bookchin, M. (1980)
Toward an Ecological Society, Black Rose Books, Montreal.
- _____ (1982)
The Ecology of Freedom: The Emergence and Dissolution of Hierarchy, Cheshire Books, Palo Alto, California.
- Brandon, K.E. and M. Wells (1992)
"Planning for people and parks", **World Development**, 20(4), pp. 557-570.
- Brockway, L.H. (1979)
Science and Colonial Expansion: The Role of the British Royal Botanic Gardens, Academic Press.
- Bromley, D.W. (ed.) (1992)
Making the Commons Work: Theory, Practice and Policy, San Francisco, ICS Press, San Francisco.
- Brown, K. (1994)
Conservation or Development in Nepal's Terai? Resolving Land Use Conflicts in Asia's Last Land Frontier, CSERGE Working Paper GEC 94-23, University of East Anglia and University College, Norwich and London.
- Brown, K. and D. Moran (1993)
Valuing Biodiversity: The Scope and Limitations of Economic Analysis, CSERGE Working Paper GEC 93-09, University of East Anglia and University College, Norwich and London.
- Brown, M. and A. Singer (eds.) (1991)
Buffer Zone Management in Africa, Proceedings of a Workshop organized by the PVO-NGO/NRMS Project (Washington D.C.), (Queen Elizabeth National Park, Uganda, 5-11 October).
- Brown, M. and B. Wyckoff-Baird (1992)
Designing Integrated Conservation and Development Projects, WWF (Biodiversity Support Programme)/The Nature Conservancy/WRI, Washington, D.C.
- Carlton-Ray, G. (1988)
"Ecological diversity in coastal zones and oceans", in E.O. Wilson (ed.), op. cit.

- Carnegie Commission (1992)
International Research and Assessment: Proposals for Better Organisation and Decision-Making, Carnegie Commission on Science, Technology and Government, London.
- Caulfield, R.A. (1993)
Greenlanders, Whales and Whaling: Conflict and Marginalization in an Arctic Resource Régime, School of Development Studies, University of East Anglia, Norwich, United Kingdom.
- Chambers, R. (1983)
Rural Development: Putting the Last First, Longman, Harlow, United Kingdom.
- _____ (1992)
Rural Appraisal: Rapid, Relaxed and Participatory, Discussion Paper No. 331, Institute of Development Studies, University of Sussex, Brighton.
- _____ (1993)
Challenging the Professions: Frontiers for Rural Development, Intermediate Technology Publications, London.
- Chatterjee, P. and M. Finger (1994)
The Earth Brokers, Routledge, London.
- Clark, C. (1973)
“Profit maximisation and the extinction of animal species”, **Journal of Political Economy** 81(4), pp. 950-961.
- Clay, E.J. and B.P. Schaffer (eds.) (1984)
Room for Manoeuvre: An Exploration of Public Policy Planning and Agricultural and Rural Development, Heinemann, London.
- CNPPA (1992)
Parks for Life: Report of the IVth World Congress on National Parks and Protected Areas, IUCN/WWF-International, Gland, Switzerland.
- Colchester, M. (1991)
“Guatemala: The clamour for land and the fate of the forests”, **The Ecologist** 21(4).
- _____ (1992)
Sustaining the Forests: The Community-Based Approach in South and South-East Asia, Discussion Paper No. 35, UNRISD, Geneva.
- _____ (1993)
“Slave and enclave: Towards a political ecology of equatorial Africa”, **The Ecologist** 23(25).
- _____ (1994)
Salvaging Nature: Indigenous Peoples, Protected Areas and Biodiversity Conservation, Discussion Paper No. 55, UNRISD, Geneva.
- Cooper, D., R. Vellve and H. Hobbelin (eds.) (1992)
Growing Biodiversity. Genetic Resources and Local Food Security, Intermediate Technology Publications, London.
- Croll, E. and D. Parkin (eds.) (1992)
Bush Base, Forest Farm: Culture, Environment and Development, Routledge, London.
- Crucible Group (1994)
People, Plants and Patents: The Impact of Intellectual Property on Trade, Plant Biodiversity, and Rural Society, International Development Research Centre, Ottawa.
- Cunningham, A.B (1993)
Ethics, Ethnobiological Research and Biodiversity, WWF-International, Gland, Switzerland.
- Dafour, D.L. (1987)
“Insects as food: A case study from the Northwest Amazon”, **American Anthropologist**, No. 89, pp. 383-397.
- Daly, H. and J.B. Cobb (1990)
For the Common Good: Redirecting the Economy toward Community, the Environment and a sustainable future, Green Print, London.

- Dasgupta, P. and G. Heal (1979)
Economic Theory and Exhaustible Resources, Cambridge University Press, Cambridge.
- de Waal, A. (1989)
Famine that Kills: Darfur, Sudan, 1984-1985, Clarendon Press, Oxford.
- Doubleday, N.C (1992)
“Indigenous subsistence whaling in Canada” in the **Report of the Symposium on the Utilization of Marine Living Resources for Subsistence**, (Taij, Japan, 21-23 January).
- Douglas, M. and A. Wildavsky (1982)
Risk and Culture, University of California Press, Berkeley.
- Dudley, N. (1992)
Forests in Trouble: A Review of the Status of Forests Worldwide, WWF-International, Gland, Switzerland.
- _____ (1995)
Targets for Forest Conservation, mimeo, WWF-International, Gland, Switzerland.
- Dudley, N., J.-P. Jeanrenaud and F. Sullivan (1995)
Bad Harvest, London, Earthscan.
- Dudley, N. and S. Stolton (1994)
The Timber Trade in Russia, Equilibrium, Bristol, United Kingdom.
- Eckersley, R. (1992)
Environmentalism and Political Theory: Towards an Ecocentric Approach, State University of Albany Press, Albany, New York.
- Einarsson, N. (1993)
“All Animals are Equal but some are cetaceans: Conservation and culture conflict”, in K. Milton, op. cit.
- Ellis, S. (1994)
“Of elephants and men: Politics and nature conservation in South Africa”, **Journal of Southern African Studies** 20(1).
- Fairhead, J. and M. Leach (1992)
Declarations of Difference, paper for the IIED/IDS “Beyond Farmer First: Rural People’s Knowledge, Agricultural Research and extension Practice Workshop”, (Institute of Development Studies, University of Sussex, Brighton, 27-29 October).
- Falconer, J. (1990)
Non-Timber Forest Products in Ghana’s Forest Zone: A Pilot Study, Paper presented to the “Conférence sur la conservation et l’utilisation rationnelle de la forêt dense d’Afrique Centrale et de l’Ouest”, African Development Bank, IUCN and The World Bank, (Abidjan, 5-9 November).
- Falconer, J. and C.R.S. Koppell (1990)
The Major Significance of Minor Forest Products: The Local Use and Value of Forests in the West Africa Humid Forest Zone, Community Forest Note 6, FAO, Rome.
- FAO (1987)
Restoring the Balance: Women and Forest Resources, FAO, Rome.
- _____ (1991)
Forest Products Yearbook, 1989, FAO, Rome.
- FAO/UNDP (1988)
Tropical Forestry Action Plan: Joint Inter-agency Planning and Review Mission for the Forestry Sector, Cameroon, 3 volumes, FAO, Rome.
- FSC (Forest Stewardship Council) (1994)
Forest Stewardship Principles and Criteria for Natural Forest Management, FSC, Oaxaca, Mexico, June.
- Friberg, M. and B. Hettne (1985)
“The greening of the world: Towards a non-deterministic model of global processes,” in H. Addo et al., **Development as Social Transformation: Reflections on the Global Problematique**, Westview Press/United Nations University, Boulder, Colorado.
- Gadgil, M. (1993)

Significance of Biodiversity for Ecosystems and Human Existence, in proceedings of the Norway/UNEP Expert Conference on Biodiversity, (University of Trondheim, Norway, 24-28 May).

- Gadsby, E.L. and P.D. Jenkins (1992)
Report on Wildlife and Hunting in the Proposed Etinde Forest Reserve, Limbe Botanic Garden and Rainforest Conservation Project Consultants for the Government of Cameroon, Yaoundé.
- GEF (Global Environment Facility) (1993)
Socio-Cultural Analysis of Biodiversity Conservation: Interim Guidelines for Design of Participation Plans Using Socio-Cultural Profiles, mimeo, Global Environment Facility/The World Bank, Washington, D.C., June.
- Ghimire, K. (1991)
Parks and People: Livelihood Issues in National Parks Management in Thailand and Madagascar, Discussion Paper No. 29, UNRISD, Geneva.
- _____ (1992)
Forest or Farm? The Politics of Poverty and Land Hunger in Nepal, Oxford University Press, New Delhi.
- Gilges, K. (1992)
Bioreerves: Land-Use Surrounding National Parks in Savannah Africa, unpublished MSc Thesis, Oxford Forestry Institute, Oxford.
- Gomez-Pompa, A. and A. Kaus (1992)
"Taming the wilderness myth", **Bioscience**, 42(4), pp. 271-279.
- Gordon, D. (1993)
"Russia Far East update", **Taiga News: Newsletter on Boreal Forests**, No. 5, Taiga Rescue Network, Jokkmokk, Sweden.
- Government of Cameroon (1991)
Elephant Conservation Plan, Cameroon, mimeo, Ministry of Tourism, Yaoundé.
- Greenpeace (1992a)
So Remorseless a Havoc: The Case for a Permanent Commercial Whaling Ban, Greenpeace, London.
- _____ (1992b)
The Whale Killers, Greenpeace, London.
- _____ (1993)
Quick Cash for Old-Growth: The Looting of Russia's Forests, Greenpeace International Forests Campaign, Amsterdam.
- Grigoryev, A. (1992)
"Status report of the forest situation in Russia", **Taiga News: Newsletter on Boreal Forests**, No. 2, Taiga Rescue Network, Jokkmokk, Sweden.
- _____ (1993)
"Russia's new Forestry Act: Leaving the door wide-open for ruthless exploitation", **Taiga News: Newsletter on Boreal Forests**, No. 5, Taiga Rescue Network, Jokkmokk, Sweden.
- Grove, R. (1987)
"Early themes in African conservation: the Cape in the nineteenth century", in Anderson and Grove (eds.), op. cit.
- _____ (1990)
"Threatened islands, threatened earth: Early professional science and the historical origins of global environmental concerns", in D.J.R. Angell (ed.), **Sustaining Earth: Response to Environmental Threats**, Macmillan, London.
- Grubb, M. et al. (1993)
The Earth Summit Agreements: A Guide and Assessment, Earthscan, London.
- Hales, D. (1989)
"Changing concepts of national parks", in D. Western and M. Pearl (eds.), **Conservation for the Twenty-First Century**, Oxford University Press, Oxford.

- Hayarin, Y and V.W. Ruttan (1985)
Agricultural Development: An International Perspective, Johns Hopkins University Press, Baltimore.
- Hoffmann-Kuehnle, M. (1989)
"Africa's women farmers utilize local knowledge", **ILEIA Newsletter**, December.
- Horta, K. (1991)
"The last big rush for the green gold", **The Ecologist** 21(3).
- Hough, J. (1988)
"Obstacles to effective management of conflicts between national parks and surrounding communities in developing countries", **Environmental Conservation** 15(2), pp. 129-136.
- Hunter, M.L.; Hitchcock, R.K. and Wyckoff-Baird, B. (1990)
"Women and wildlife in Southern Africa" **Conservation Biology** 4(4) , pp. 448-451.
- Hurst, P. (1990)
Rainforest Politics. Ecological Destruction in South-East Asia, Zed Books, London.
- Infield, M. (1988)
Hunting, Trapping and Fishing in Villages with and on the Periphery of the Korup National Park, Report to WWF-UK, Godalming, England.
- Inskipp, C. (1992)
Biodiversity, Data Support for Education Sheet No. 25, WWF-UK, Godalming, Surrey, United Kingdom.
- IUCN (1990)
Biodiversity in Sub-Saharan Africa and its Islands: Conservation, Management and Sustainable Use, Occasional Papers of the IUCN Species Survival Commission No. 6, IUCN, Gland, Switzerland.
- _____ (1994)
A Guide to the Convention on Biological Diversity, IUCN, Gland, Switzerland.
- IUCN, UNEP, WWF, FAO and UNESCO (1980)
World Conservation Strategy: Living Resource Conservation for Sustainable Development, IUCN, Gland, Switzerland.
- IUCN/UNEP/WWF (1991)
Caring for the Earth, IUCN/UNEP/WWF, Gland, Switzerland.
- IWGIA (The International Work Group for Indigenous Affairs) (1991)
Arctic Environment: Indigenous Perspectives, Document 69, IWGIA, Copenhagen.
- Jackson, C. (1994)
"Gender analysis and environmentalisms", in M. Redclift and T. Benton (eds.), **Social Theory and the Global Environment**, Routledge, London.
- Jacobs, M., (1994)
"The limits of neo-classicism: Towards an institutional economics", in M. Redclift and T. Benton (eds.), **Social Theory and the Global Environment**, Routledge, London.
- Jain, R. (1995)
"Analysis", **Down to Earth**, 28 February.
- Jeanrenaud, J-P. (1995)
Pulp and Paper: A threat to Sustainable Forest Management?, paper presented at the Third Global Conference on Paper and the Environment, (London 26-28 March), WWF-International, Gland, Switzerland.
- Jeanrenaud, J.-P. and F. Sullivan (1993)
The Inevitability of Timber Certification, WWF-UK, Godalming, United Kingdom.
- Jeanrenaud, S. (1991)
A Study of Forest Use, Agricultural Practices, and Perceptions of the Rainforest: Etinde Rainforest, S.W. Cameroon, report submitted to the Overseas Development Administration, London.

- _____ (1992)
The Conservation Development Face: A Background Paper, Paper submitted to WWF-UK, Godalming, United Kingdom, March.
- _____ (1993)
Community-Based Conservation: Some Background Themes, mimeo, School of Development Studies, University of East Anglia, Norwich, United Kingdom.
- Jodha, N.S. (1991)
Rural Common Property Resources: A Growing Crisis, IIED Gatekeeper Series No. 24, International Institute for Environment and Development, London.
- Keating, M. (1993)
The Earth Summit's Agenda for Change: A Plain Language Version of Agenda 21 and the Other Rio Agreements, Centre for our Common Future, Geneva.
- Kiss, A. (ed.) (1991)
Living with Wildlife: Wildlife Resource Management with Local Participation in Africa, The World Bank, Washington D.C.
- Ki-Zerbo, J. (1981)
"Women and the energy crisis in the Sahel", *Unasyiva* No. 33, pp. 5-10.
- Komarov, B. (1981)
The Destruction of Nature in the Soviet Union, Pluto Press, London.
- Lattin, J.D. (1990)
"Arthropod diversity in Northwest old growth forests", **Wings: Essays in Insect Conservation**, Xerxes Society, Summer.
- Leach, M. and J. Fairhead (1994)
The Forest Islands of Kissidougou: Social Dynamics Environmental Change in West Africa's Forest-Savannah Mosaic, report to ESCOR of the Overseas Development Administration, London.
- Lee, S. (1993)
Biodiversity, Shell/WWF Tree Plantation Review Study No. 6, Shell International Petroleum Company Ltd. and WWF-UK, Godalming, United Kingdom.
- Lohmann, L. (1991)
"Who defends biological diversity?", **The Ecologist**, 21(1).
- Long, N. and A. Long (1992)
Battlefields of Knowledge. The Interlocking of Theory and Practice in Social Science Research and Development, Routledge, London.
- Lyster, S. (1985)
International Whaling Law, Grotius Publications Ltd., Cambridge.
- Machlis, G.E. (1992)
"The contribution of sociology to biodiversity research and management", **Biological Conservation**, 62(3), pp. 161-171.
- Machlis, G.E. and Tichnell D.L. (1985)
The State of the World's Parks: an International Assessment of Resource Management, Policy and Research, Westview Press, Boulder, Colorado.
- Mackenzie, J.M. (1987)
"Chivalry, social Darwinism, and ritualised killing: The hunting ethos in Central Africa up to 1914", in Anderson and Grove (eds.) op. cit.
- MacKinnon, J.M. (1986)
Managing Protected Areas in the Tropics, IUCN, Gland, Switzerland.
- Mann, C. (1991)
"Extinction: Are ecologists crying wolf?", **Science**, No. 253, August, pp. 736-738.
- Marks, S. (1984)
The Imperial Lion: Human Dimensions of Wildlife Management in Africa, Bowker, Epping, United Kingdom.

- Marshall, G. (1990)
“The political economy of logging: A case study of corruption”, **The Ecologist** 20(5).
- Martin, C. (1994)
WWF’s Global Priorities to the Year 2000, WWF-International, Gland, Switzerland.
- _____ (1995)
Restructuring and Community Participation, memorandum to all WWF national offices and chief executive officers, WWF-International, Gland, Switzerland, 2 March.
- Marx, M. (1994)
“Mitsubishi — Giant of the Timber Trade”, **Tiaga News: Newsletter on Boreal Forests**, No. 9, Tiaga Rescue Network, Jokkmok, Sweden.
- Maundu, P. (1987)
“The importance of gathered fruits and medicinal plants in Kakuyuni and Kathama Areas of Machakos”, in K.K. Wachiira (ed.), **Women’s Use of Off-Farm and Boundary Lands: Agroforestry Potentials**, final report, International Centre for Research in Agroforestry, Nairobi.
- McGlathlon, M.E., P. Goldsmith and C. Fox (1986)
“Undomesticated animals and plants”, in A. Hansen and D.E. McMillan (eds.), **Food in Sub-Saharan Africa**, Lynne Rienner Publishers, Boulder, Colorado.
- McKibben, B. (1990)
The End of Nature, Viking, London.
- McNeely, J.A. (1988)
Economics and Biological Diversity: Developing and Using Incentives to Conserve Biological Resources, IUCN, Gland, Switzerland.
- Milton, K. (ed.) (1993)
Environmentalism: The View from Anthropology, ASA Monographs 32, Routledge, London.
- Beard, J. (1991)
“Woodland soil yields a multitude of insect species”, **New Scientist** 131(1784).
- Morris, D. and I. Ahmed (1992)
The Carbohydrate Economy, Institute for Local Self-Reliance, Washington, D.C.
- Mshigenio, K.E. (1990)
“Foreword” in **Proceedings of the International Conference on Traditional Medicinal Plants**, (Arusha, Tanzania, 18-23 February), Ministry of Health, Dar es Salaam.
- Myers, N. (1979)
The Sinking Ark: A Look at the Problem of Disappearing Species, Pergamon, New York.
- _____ (1988)
“Threatened biotas: ‘Hot spots’ in tropical forests”, **The Environmentalist**, 8(3), pp. 187-208.
- Nagrobahman, G.D. and S. Sambrani (1983)
“Women’s drudgery in firewood collection”, **Economic and Political Weekly** XVIII(1 and 2), pp. 33-38.
- Nash, R. (1970)
“The American invention of national parks”, **American Quarterly** 22(3).
- Ndjatsana, M.M. (1993)
Analyse de la situation du secteur forestier du Cameroun: La politique forestière, mimeo.
- Norse, E. (1993)
“Global marine biodiversity”, in **Proceedings of the Norway/UNEP Conference on Biodiversity**, (Trondheim, Norway 24-28 May).
- Obam, A. (1992)
Conservation et mise en valeur des forêts au Cameroun, National Printing Press, Yaoundé, Cameroon.
- ODI (Overseas Development Institute) (1993)
Patenting Plants: The Implications for Developing Countries, ODI Briefing Paper, London, November.
- ONADEF (1990)

- Introductory Public Relations Document**, ONADEF (National Forestry Development Agency), Yaoundé.
- Ostrom, E. (1990)
Governing the Commons: The Evolution of Institutions for Collective Action, Cambridge University Press, Cambridge.
- Pearce, D. W. (1991)
“Economics and the environment”, **Economics**, XXVII, Part 1, No. 3, pp. 4-8.
- _____ (1993)
Measuring Sustainable Development, Blueprint 3, Earthscan, London.
- Pearce, D. W., D. Moran and E. Fripp (1992)
The Economic Value of Biological and Cultural Diversity, IUCN, Gland, Switzerland.
- Peluso, N.L. (1993)
“Coercing conservation? The politics of state resource control”, **Global Environmental Change**, June.
- Petrof, D. (1992)
“Siberian forests under threat”, **The Ecologist**, 22(6).
- Pimbert, M. (1993)
Protected Areas, Species of Special Concern, and WWF, WWF-International, Gland, Switzerland.
- Pimbert, M.P. and J.N. Pretty (1994)
Parks, People and Professionals: Putting “Participation into Protected Area Management, Discussion Paper No. 57, UNRISD/IIED/WWF, Geneva.
- Plotkin, M. (1988)
“The outlook for new agricultural and industrial products from the tropics”, in E.O. Wilson (ed.), op. cit.
- Prescott-Allen, R. (1986)
National Conservation Strategies and Biological Diversity, report to IUCN, Gland, Switzerland.
- Rabinovitch-Vin, (1991)
“Continuous human use as a tool for species richness in protected areas of Israel, in West and Brechin (eds.), op. cit.
- Redclift, M., and C. Sage (eds.) (1994)
Strategies for Sustainable Development, John Wiley and Son, Chichester, United Kingdom.
- Reid, W.V. (1992)
“How many species will there be?”, in T.C. Whitmore and J.A. Sayer (eds.) **Tropical Deforestation and Species Extinction**, Chapman and Hall, London.
- _____ (1993)
Biodiversity Prospecting: Using Genetic Resources for Sustainable Development, World Resources Institute, Washington, D.C.
- Repetto, R. and Gillis, M. (eds.) (1988)
Public Policies and the Misuse of Forest Resources, Cambridge University Press, Cambridge.
- Robinson, P. and I. Thompson (1989)
Fodder Trees, Nurseries and their Central Role in the Hill-Farming Systems of Nepal, Social Forestry Network Paper 9a, Overseas Development Institute, London.
- Rocheleau, D. et al. (1989)
“Local knowledge for agroforestry and native plants”, in R. Chambers, A. Pacey and L. Thrupp (eds.), **Farmer First**, Intermediate Technology Publications, London.
- Rocheleau, D.E. (1991)
“Gender, ecology, and the science of survival: Stories and lessons from Kenya”, **Agriculture and Human Values** 8(1), pp. 156-165.
- Rodda, A. (ed.) (1994)
Women and the Environment, Zed Books, London.
- Rodda, G.H. (1993)
“How to lie with biodiversity”, **Conservation Biology** 7(4), pp. 1959-1960

- Rosencratz, A. (1991)
“..And cutting down Siberia”, **Washington Post**, 18 August.
- Runte, A. (1979)
National Parks: The American Experience, University of Nebraska Press, Lincoln, Nebraska.
- Russell, S. (1993)
A History of WWF, WWF-International, Gland, Switzerland.
- Sachs, W. (1994)
“The blue planet: An ambiguous modern icon”, **The Ecologist**, 24(5).
- Scoones, I. (1992)
The Hidden Harvest: Wild Foods and Agricultural Systems, International Institute for Environment and Development, London.
- Scott, A. and D. Gordon (1992)
“The Russian timber rush”, **The Amicus Journal**, 14(3).
- Seddon, D., P. Blaikie and J. Cameron (1979)
Peasants and Workers in Nepal, Aris and Philip, Warminster, United Kingdom.
- Shiva, V. (1989a)
Staying Alive: Women, Ecology, and Development, Zed Books, London.
- _____ (1989b)
“The myth of miracle seeds”, **ILEIA Newsletter**, December, pp. 7-8.
- _____ (1990)
“Biodiversity: A people’s plan”, **The Ecologist** 20(2).
- _____ (1993a)
Cultivating Biodiversity: From Reports to Action, in proceedings of the Norway/UNEP Expert Conference on Biodiversity, (University of Trondheim, Norway, 24-28 May).
- _____ (1993b)
Monocultures of the Mind: Perspectives on Biodiversity and Biotechnology, Zed Books, London
- Shiva, V. and Dankelman, I. (1992)
“Women and biological diversity: Lessons from the Indian Himalaya”, in D. Cooper et al. (eds.) op. cit.
- Shiva, V. and Holla-Bhar, R. (1993)
“Intellectual piracy and the neem tree”, **The Ecologist** 23(6).
- Simmons, I.G. (1993)
Interpreting Nature. Cultural Constructions of the Environment, Routledge, London.
- Spence, M. (1975)
“Blue whales and applied control theory”, in H. Gottinger (ed.) **System Approaches and Environmental Problems**, Vandenhoeck, Göttingen.
- Swanson, T.M. (1992a)
The Economics of a Biodiversity Convention, CSERGE Working Paper GEC 92-08, University of East Anglia and University College, Norwich and London.
- _____ (1992b)
The Global Conversion Process: The Fundamental Forces Underlying Losses of Biological Diversity, CSERGE Working Paper GEC 92-41, University of East Anglia and University College, Norwich and London.
- _____ (1992c)
The Global Biodiversity Problem: Optimal Policy and the Global Conversion Process, CSERGE Working Paper GEC 92-42, University of East Anglia and University College, Norwich and London.
- Tchamba, M., C.S. Wanzie, Y. Bello and S. Gartlam (1991)
Elephant Conservation Plan, Cameroon, Ministère de Tourisme, Directeur de la Faune et des Parcs, Yaoundé, Cameroon.
- Tickell, O (1995)
“Animal passions”, **The Guardian**, 1 February, p. 5.
- Thomas, D.W. (1989)

- Korup Ethnobotany Survey**, final report to WWF-UK, Godalming, United Kingdom.
- UNDP (1993)
Human Development Report, Oxford University Press, New York.
- UNEP (1992)
Environment and Sustainable Development for Cameroon, report of the multidisciplinary and multi-institutional mission on the environment, mimeo, Yaoundé.
- UNESCO (1991)
Gestion des ressources et des réserves de la biosphère et éducation relative à l'environnement, Paris.
- Vogel, J.H. (1994)
Genes for Sale: Privatisation as a Conservation Policy, Oxford University Press, Oxford.
- Wanjohi, B. (1987)
"Women's groups, gathered plants and their agroforestry potentials in the Kathama Area", in K.K. Wachiira (ed.), **Women's Use of Off-Farm and Boundary Lands: Agroforestry Potentials**, final report, International Centre for Research in Agroforestry, Nairobi.
- WCED (1987)
Our Common Future. Oxford University Press, Oxford.
- WCMC (1992)
Global Biodiversity. Status of the Earth's Living Resources, Chapman and Hall, London.
- Wells, M., K. Brandon and L. Hannah (1992)
People and Parks: Linking Protected Area Management with Local Communities, World Bank/WWF-US/USAID, Washington, D.C.
- Wenzel, G. (1991)
Animal Rights, Human Rights: Ecology, Economy and Ideology in the Canadian Arctic, Belhaven Press, London.
- West, W.P. and S.R. Brechin (eds.) (1991)
Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation, University of Arizona Press, Tucson, Arizona.
- Western, D. (1989)
"Population, resources and environment in the twenty-first century", in D. Western and M. Pearl (eds.), **Conservation for the Twenty-First Century**, Oxford University Press, Oxford.
- Wilson, E.O. (ed.) (1988)
Biodiversity, National Academy Press, Washington D.C.
- _____ (1993)
"Planet dearth", **The Guardian**, 3 September.
- Witte, J. (1992)
"Deforestation in Zaire", **The Ecologist**, 22(6).
- World Bank (1991, 1992a)
World Development Report, Oxford University Press, New York.
- _____ (1992b)
Trends in Developing Economies, The World Bank, Washington, D.C.
- WRI (World Resources Institute) (1985)
Tropical Forests: A Call for Action, WRI, Washington D.C.
- _____ (1990)
World Resources 1990-1991, Oxford University Press, New York.

WRI/IUCN/UNEP (1992)

Global Biodiversity Strategy. Guidelines for Action to Save, Study, and Use Earth's Biotic Wealth Sustainably and Equitably, WRI/IUCN/UNEP, Washington, D.C.

WWF-US (1993)

Conserving Russia's Biological Diversity: An Analytical Framework and Initial Investment Portfolio, WWF-US, Washington, D.C.

WWF (1993a)

The Diversity of Life, Banson, London.

_____ (1993b)

Economic Analysis of Conservation Initiatives, WWF-International, Gland, Switzerland.