

**POVERTY AND ENVIRONMENT: PRIORITIES FOR  
RESEARCH AND POLICY**

**AN OVERVIEW STUDY**

Prepared for the  
United Nations Development Programme and European Commission

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## Summary

### Introduction

- This study was jointly commissioned by the United Nations Development Programme (UNDP) and European Commission (EC) to provide an overview of current understandings of linkages between poverty and environment in developing countries, with a view to identifying necessary research and policy objectives.
- The objectives of this study are: (a) to provide an analytical overview of existing research and approaches adopted to address interlinkages between poverty and environment; (b) to identify gaps in understanding and potential conflicts between adopted approaches and priorities identified by research; and (c) to highlight policy and research priorities for future action by donors, development agencies, and policymakers in general.

### Arguments

- The key argument of the report is to challenge the existing orthodox view that poverty and environmental degradation are inextricably linked, and are self enforcing. This orthodox view suggests that poverty and environmental damage occur in a 'downward spiral', in which it is assumed that the only way to avoid environmental degradation is to alleviate poverty. It also suggests that poor people are forced to degrade landscapes in response to population growth, economic marginalization and existing environmental degradation.
- Instead, the report argues that many poor people are able to adopt protective mechanisms through collective action which reduce the impacts of demographic, economic and environmental change. In addition, it is argued that many current conceptions of environmental degradation are based on misinformed linkages of human activity on landscape change, and also avoid many current pressing environmental problems which currently affect poor people.
- The report presents evidence from a variety of case studies in which expected patterns of poverty and environmental degradation occurring in a downward spiral were actually found to be misplaced. In addition, it is also shown that the continued belief in a downward spiral may also led to land use and

resettlement policies that may contribute to poverty and environmental degradation, and also avoid many environmental problems experienced by poor people.

- The study presents a brief introduction to orthodox conceptions of poverty and environment in both academic debates and within international policies for environmental protection, and as an alternative approach to understanding their linkages, based on 'environmental entitlements'. The study then proceeds to criticize orthodox approaches on the basis of new thinking concerning the identification and measurement of poverty, and then of environmental change. The themes of poverty and gender, health and income are assessed, before discussions of environment priorities in rural and urban areas, oceans and rivers, and a consideration of wilderness areas.
- It is argued that the environmental entitlements approach offers a way for a local determination of environmental problems and access to resources. Local negotiation between different actors within communities may enable access to agriculture, food, forest and other forms of local subsistence which may reduce poverty and decrease environmental degradation. In urban and industrial locations, the role of interventionary organizations may be greater because of the newer nature of some environmental risks encountered. The political implications of these arrangements are discussed at a local, national and international scales.

### **Recommendations**

- The study proposes that the assumption since the Brundtland Commission, that poverty eradication has to come before environmental protection, may encourage the adoption of policies that do not acknowledge the different meaning of environment to poor people, and macroeconomic responses that may increase both poverty and environmental degradation. Instead, it is important to acknowledge the local rather than universal experience of poverty and environmental degradation and to provide enabling circumstances for poor people to create their own institutional responses to economic, demographic and environmental changes.
- The particular approach of 'environmental entitlements' is proposed as a way to address these concerns. This approach stresses the interactions of different institutional responses to environmental degradation at a variety of scales and by a variety of actors. Immediate research priorities include better understandings of techniques to strengthen local institutional responses to change; ways to integrate these into increasingly international markets; and methods to make international environmental policy objectives more representative of local, poor people's concerns.

# 1. Introduction

## 1.1 LINKAGES BETWEEN POVERTY AND ENVIRONMENT

This study was jointly commissioned by the United Nations Development Programme (UNDP) and European Commission (EC) in order to provide an overview of current debates and uncertainties concerning the relationship of poverty and environmental degradation in developing countries. The objectives of the study are:

- To provide an analytical overview of existing research and academic approaches to the interlinkages of poverty and environment in developing countries;
- To identify gaps in knowledge and understanding concerning poverty and environment, and potential conflicts or contradictions between approaches;
- To highlight priorities for research and policy by donors and development agencies based on these reviews.

However, these are ambitious objectives for a wide and controversial topic of debate. The study has therefore focused on issues currently dominant in ‘mainstream’ social science and policy, and those new approaches within poverty and environment thinking which may challenge such themes.

The study takes as a point of departure the growing attention to ‘sustainable livelihoods’ as a focus for research and policy. In this study, sustainable livelihoods are taken to mean:

The capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base (Chamber and Conway, 1992).

The particular view adopted in this study is to question the orthodox view in much discussion of the sustainability or otherwise of livelihoods that poverty and environmental degradation are linked in a downward and mutually enforcing cycle. Instead, it seeks to illustrate how local responses to change are socially and environmentally specific and shaped by institutions, and that depending on these conditions, may actually lessen impacts and promote sustainable livelihoods. This does not imply a decreased role for intervention by states and development agencies, but a redefined role.

Since the 1970s it has been almost universally agreed that poverty and environmental degradation are inextricably linked. The World Commission on Environment and Development (Brundtland Commission) wrote (1987):

Poverty is a major cause and effect of global environmental problems. It is therefore futile to attempt to deal with environmental problems without a broader perspective that encompasses the factors underlying world poverty and international inequality.

The links between poverty and environment were also seen to be self-enforcing. The Commission also wrote:

Many parts of the world are caught in a vicious downwards spiral: poor people are forced to overuse environmental resources to survive from day to day, and their impoverishment of their environment further impoverishes them, making their survival ever more difficult and uncertain.

Today, the dominant viewpoint on poverty and environment reflects this image of a vicious downward spiral of need. Population growth and economic change are also seen to contribute to this process (see Brown *et al*, 1998). When rapid change occurs in ecologically vulnerable urban or rural areas ('poverty reserves'), then the environmental implications are greatest. Such views are generally pessimistic about managing environmental degradation and poverty. They are also associated with solutions directed at macroeconomic poverty eradication measures plus short-term land management or protection schemes excluding certain land uses which seek to protect fragile ecosystems from encroachment by poor people.

Such top-down approaches to poverty reduction and environmental protection have themselves come under critique both for their failure to meet local livelihood needs, and because exclusionary measures alone generally fail to protect environmental resources when people's livelihoods depend on them. Hence many donors and policy-makers – especially since UNCED - have embraced more localized, community-based approaches to natural resource management and sustainable development. However, all too often these approaches reiterate flawed assumptions about 'community', 'environment' and their relationships, leading to disappointing results in operational terms.

The study puts forward and illustrates an alternative, 'environmental entitlements' approach to understanding poverty-environment linkages (Leach *et al* 1997 a and b). Adapted from Sen's work on entitlements in the context of famine (e.g. Sen 1981), the approach shifts the emphasis from questions of resource availability to those of access, control and management. It emphasizes that both environments and societies are diverse, differentiated and dynamic – even within communities and local settings.

Central to the approach is the role of formal and informal institutions in shaping people's resource endowments and entitlements, and hence mediating people-environment relations, so that any relationship between poverty and environment is indirect. Institutions have been ignored or misrepresented in many discussions of people-environment relations. Yet diverse local institutions are crucial in managing environmental conditions and risk, influencing who has access to and control over resources, and arbitrating contested resource claims. Local institutional arrangements are underpinned by power relations, and are shaped, in turn, by interaction with regional, national and global-level processes, both environmental and political-economic.

At the same time as approaches such as this shed new light the intricate relationships between people and resources in fragile ecosystems, both the terms 'environmental change' and 'poverty' are under review as researchers identify new ways to clarify these concepts and to increase the meaning to the people most affected in developing countries. In particular, many current policy concerns about environmental degradation are based on understandings of environmental change which are now recognized as misconceived, or reflective of social concerns of more relevance to developed, richer nations, rather than poorer societies (see Leach and Mearns, 1991, 1996; Davidson and Myers, 1992; Martínez-Alier, 1995; Adger and Brown, 1998). Equally, the study emphasizes the importance of conceptualizing livelihoods and well-being in terms which extend well beyond conventional income-based definitions of poverty.

This study outlines new thinking on both of these themes, and seeks to demonstrate how the forces driving poverty and environmental degradation may be mediated through local practices. In other words, it focuses attention on the ways, and institutions through which, specific groups of people access, control and manage specific environmental resources or services which are important to their wellbeing. The implications of this approach are firstly, to expand the policy field from questions of resource availability and sustainability, to encompass a dynamic approach to institutions, access and control. Second, it questions generalized solutions, whether to poverty or environmental degradation, instead highlighting how policy might support locally-specific, positive trajectories of change.

## **1.2 INTERNATIONAL FRAMEWORKS FOR SUSTAINABLE DEVELOPMENT**

Since the United Nations Conference on the Human Environment in 1972, the role of poverty in both causing and being caused by environmental degradation was acknowledged. This was confirmed in the Brundtland Commission, which reiterated the 'right to development' for poor nations to gain prosperity and hence avoid environmental degradation. 'Sustainable development' was defined in such terms by WCED as:

development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Since the 1980s, international agreements on environmental protection have reiterated the right to development for developing countries in order to increase their ability to protect environment, and also to prevent such countries being penalized for being poor. On this basis, Chapter 3 of Agenda 21 made poverty alleviation a matter of urgency, stating that policy should 'enable the poor to achieve a sustainable livelihood', with attention also to women and children, health (Chapter 6), and within human settlements (Chapter 7) (Grubb, 1993).

Furthermore, under the United Nations Framework Convention for Climate Change (FCCC) of 1992, the distinction between poverty eradication and environmental protection was also reflected in the selection of countries eligible for greenhouse gas emissions reduction targets to be those countries where GDP growth had exceeded growth in energy use. When these targets were finally agreed under the Kyoto Protocol of 1997, countries with emissions reduction targets were also allowed to achieve some of these targets through investing in the Clean Development Mechanism (CDM), which was created to provide 'sustainable development' projects in the South.

Yet while these initiatives have focused on addressing poverty as a means to combat environmental degradation, many other international frameworks for environment have focused on specific 'global' environmental problems which have arguably not always addressed the environmental concerns of poor people in fragile zones (Leonard *et al*, 1989; Mink, 1993; Jalal, 1993; Bartelmus, 1994). The Global Environment Facility (GEF), in particular, was created in 1990 by the UNDP, UNEP and World Bank as a funding mechanism to assist with the transaction costs of accelerating investment or technology transfer in projects to protect the ozone layer and biodiversity, and the prevention of climate change and the pollution of the world's waterways, options which have been criticized for being of greater significance to Northern rather than Southern countries (Gupta, 1995).

Similarly, many concerns within developed nations concerning the conservation of wildlife and fragile ecosystems against encroachment by shifting cultivators, trappers and hunter gatherers from poorer communities have also been criticized for imposing Northern conceptions of environment onto Southern, without adequate attention to the causes of poverty (Ghimire, 1994). Indeed, much Southern criticism of the concept of Joint Implementation (and the associated Activities Implemented Jointly) – or the achievement of greenhouse gas reduction targets through investment in other countries – was based on its general support for forestry projects rather than industrial technology. It is still a source of debate as to



whether the CDM will enforce technology rather than forestry based projects, and whether the latter will be compatible with support to local livelihoods.

There is consequently concern among some developing countries that the global agreements on environmental protection are in general more dominated by the concerns of the richer developed countries than by the pressing environmental resource and health problems faced by poor people in developing countries. Put simply, such concerns stress that diarrhea and inadequate water supplies are more urgent and soluble environmental problems than such topics as conservation of wildlife (Alberini *et al*, 1996; Satterthwaite *et al*, 1996). Yet for many environmentalists in developed countries, the emphasis on allowing developing countries to eradicate poverty before dealing with environmental issues such as greenhouse gas abatement is itself a threat to global environmental protection.

In part to overcome such contradictions, the UN created the Commission on Sustainable Development (CSD) in 1992 as part of the Economic and Social Council and as the organization's primary body for implementing the agreements of the UN Conference on Environment and Development (UNCED), and as an addition to the UN Environment Programme (UNEP), located in Nairobi. The CSD reiterated poverty alleviation as a key requirement of sustainable development at the 1994 International Conference on Population; 1995 World Summit for Social Development; and 1996 Human Settlements (Habitat II) and World Food Summits. The year 1996 was nominated "International Year for the Eradication of Poverty" by the UN Commission on Social Development (established 1946) (DPCSD, 1995, 1997; World Bank, 1995a). Current evidence on the success of poverty alleviation at a macro scale suggests much progress has been made. For example, in East Asia between the mid-1970s and mid-1990s, the proportion of people living on less than US\$1 a day fell from 6 out of 10 to just 2 out of 10 (World Bank, 1998). Furthermore, there have been increases in administrative and political attention given to implementing Agenda 21 in developing countries. However, the CSD has done little to challenge possible Northern assumptions within the UNCED agreements on topics such as biodiversity on one hand, yet has been criticized by Northern environmentalists for not pursuing environmental protection far enough on the other. It is too early to tell its overall success.

This study does not have sufficient space to review all developments in poverty and environment, or the full political implications of international efforts to eradicate problems. The aim of the study is to illustrate current thinking on poverty and environment within the academic and policy communities in order to show potential conflicts and apparent research and policy objectives. However, its key argument is that much current political concern about poverty and environment places too much emphasis on pessimistic concerns about damage to resources envisaged in the North during the 1970s, rather than on a more nuanced understanding of biophysical environmental change and the ability of poor people to adapt

to certain pressures which have been revealed by research since. The rest of this study illustrates this argument.

## **2. Orthodox frameworks for poverty and environment**

That there are important linkages between environmental change and the wellbeing of populations who depend on natural resources or environmental services is now widely appreciated. Yet the precise nature of the relationships remains unclear, and clouded by misleading assumptions. This section identifies current orthodox thinking on environment and poverty, and potential problems that may emerge from this. It goes on to outline how an environmental entitlements approach can help overcome some of these problems. The discussion will provide a basis for sections 3 and 4, which illustrate the connections between this type of analysis and new thinking respectively on poverty and the environment.

Two questions are central to a consideration of linkages between poverty and the environment (see Leach and Mearns, 1991):

- do different sorts of poor people (varying by level of poverty; location; age; gender or occupational group) degrade or improve various components of the environment to different degrees, or in different ways?
- do particular environmental shocks and stresses impose different kinds of cost, or different levels of cost, on different sorts of poor people (varying by level of poverty; location; age; gender or occupational group)?

Several different – although in important respects related – frameworks have dominated the ways these questions have been framed in research and policy debates, outlined here in the briefest terms.

### **2.1 POPULATION GROWTH AND TECHNOLOGICAL CHANGE**

Since the 1970s, these questions have commonly been framed within a context in which population and economic growth were seen to increase environmental degradation. One equation,  $I=PAT$  summarized this position and inferred that I (environmental impacts) were equal to P (population growth), related to A (growth in affluence, or GDP), related to T (changes in technology). In other words environmental problems are framed in terms of aggregate population pressure on a limited natural resource base, with technology perhaps altering the degree and type of resource impact.

Population growth has long been associated with environmental degradation and collapse following Malthus' essay on population in 1798. This belief became popular again in the 1970s following the publication of books such as *The Limits to Growth* by the Club of Rome in 1972, and more recently (see Ehrlich and Ehrlich, 1991; UNFPA, 1991). Some environmental NGOs, such as the *Worldwatch Institute*, remind us that the Chinese population has doubled in size every eight year since 1980, and will require vast amounts of grain production to remain stable at a time when existing grain production areas are already under stress (Brown *et al*, 1998). At a more local scale, growing population is predicted, conventionally, to lead to overcultivation and exhaustion of soil fertility (e.g. Taylor, 1992)

A common response to the pessimistic Malthusian scenario follows the reasoning of Boserup (1981) to stress that the limits to agricultural production or population growth may be mitigated by technological advances. Indeed, at a local and global scale evidence suggests that this may have some benefit (see for example Tiffen *et al*, 1994).

## **2.2 ECONOMIC MARGINALISATION AND 'BREAKDOWN OF HARMONY'**

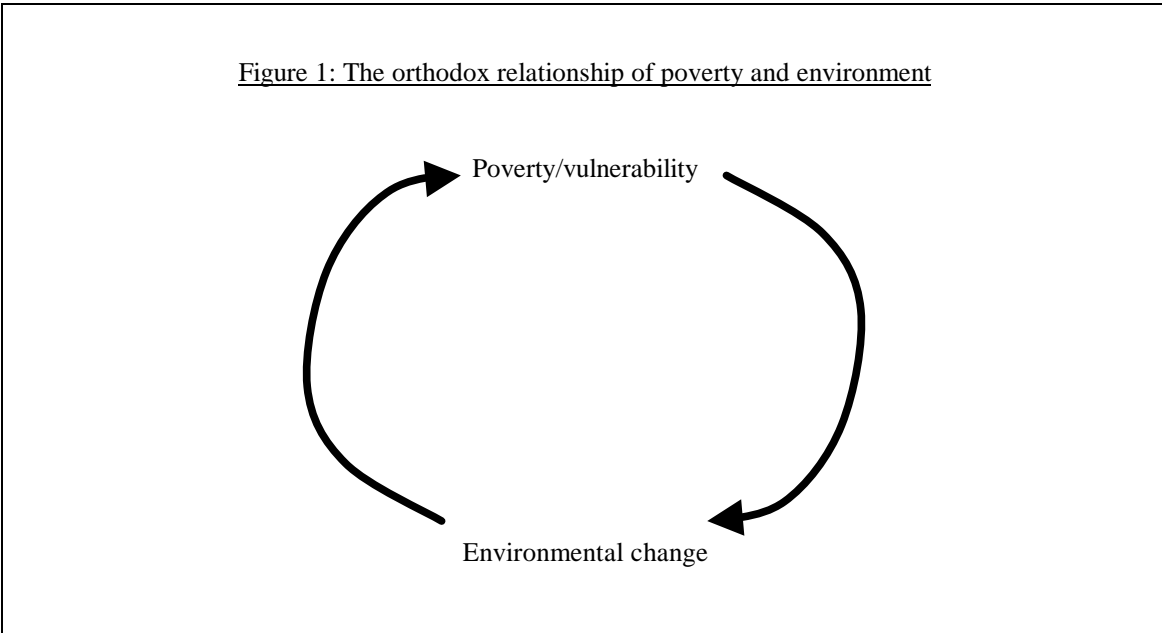
Other theorists have argued that the economic growth leading to technological advance may create differences in economic prosperity; some groups benefit from increasing wealth and environmental improvement, while others are excluded, and left more vulnerable to increasing poverty and environmental destruction. For instance, such research has focused on the implications of industrialization and economic growth for poor workers in urban or rural areas who may be excluded from its benefits, while also suffering the impacts of new environmental hazards such as waste disposal or pollution (e.g. Blaikie and Brookfield, 1987).

With the focus on the national or international political economy of growth and environmental change, poor people's relations with environments are more often inferred from such supposed marginalization processes than subjected to analysis. Yet complementary arguments are posed at a more micro-scale by analyses which highlight the resource-depleting practices of local populations, whose poverty gives them 'short time horizons' and an inability to invest in the future. Another version of this position holds that harmonious relationships may once have prevailed between people (communities) and their local environments, and that environmental degradation reflects the breakdown of traditional management arrangements under the twin forces of population pressure and economic marginalization. This reflects arguments made by common property theorists. Refuting Hardin's original 'tragedy of the commons' thesis, it is now well-recognised that institutions have emerged to regulate the use and management of

common property resources. Yet growing poverty and inequality among users can result in the breakdown of such arrangements.

### 2.3 DOWNWARD SPIRALS OF IMPOVERISHMENT AND ENVIRONMENTAL DEGRADATION – AND CHALLENGES

The overlapping implications of population growth and economic marginalization for poverty and environmental degradation have led to a belief in a negative downward spiral for poor communities in the face of economic and demographic change (see Durning, 1989; Simonis, 1992; Mink, 1993; Grepperud, 1997). To this may be added the additional impacts of environmental decay. Figure 1 illustrates this orthodox approach. It assumes that (a) there is an aggregate ‘population’ or ‘community’ which interacts with an aggregate ‘environment’; (b) people’s livelihoods are based more or less exclusively on the use and management of environmental resources; (c) poverty and environmental change have a direct causal relationship, and can feed each other in some kind of cumulative causation process, and that (d) poverty is the principal or only cause of environmental change, and vice versa. This mutual relationship therefore leads to a ‘downward spiral’ of poverty and environmental degradation.



However, this conventional approach and its underlying assumptions are increasingly challenged by research that focuses on the interactions of biophysical environmental change; diverse local perceptions

and valuations of environment, and local institutional responses to resource changes, tracking these relationships over time. There is now a solid empirical base of longitudinal studies of this kind, exemplified by those in Box 1.

**Box 1: Empirical examples challenging the downward spiral of poverty-environmental degradation:**

**The Middle Hills of Nepal:**

A classic example of revision to the I=PAT equation lies in the alleged cycle of population growth leading to deforestation and erosion in the Middle Hills of Nepal. In 1976, Eckholm wrote:

Population growth in the context of a traditional agrarian technology is forcing farmers onto even steeper slopes, slopes unfit for sustained farming even with the astonishingly elaborate terracing practiced there. Meanwhile, villagers must roam further and further from their houses to gather fodder and firewood, thus surrounding villages with a widening circle of denuded hillsides.

This quotation, which in many ways summarizes the downward spiral of poverty and environment, has been criticized in relation to Nepal by a variety of researchers. Criticisms point out, for example, that the underlying forces of environmental change are the result of long-term and complex biophysical changes such as tectonic uplift, and that farmers adapt organizational and land management practices to reduce the impact of population growth and environmental change, such as by using local landslides to increase soil fertility (Ives and Messerli, 1989).

**The Hills of Northern Thailand:**

Further research has also challenged the Himalayan crisis model in other locations. In Northern Thailand, for example research of long-term agricultural land use on steep slopes, and farmers' perceptions of environmental degradation has revealed that increasing population pressure *has not* led to the increased use of steeper slopes. Instead, farmers realize that increased cultivation of steep slopes leads to erosion and as a result avoid cultivating these. Research also suggests that much sedimentation from the hills to the lowlands may result from naturally-occurring gullies which are characteristic of granite landscapes. As a result, the orthodox approach to environmental policy in this location – that erosion is caused by upland agriculture – has been overturned, and instead environmental problems may be redefined as firstly in lessening the exposure of lowland farmers to sedimentation that occurs naturally, and secondly in reducing the declining soil fertility experienced by upland farmers on flat slopes which they now use more frequently (Forsyth, 1996).

**The inland valleys of Papua New Guinea:**

Much orthodox thinking assumes that shifting cultivation is an exhaustive form of using soil and forest resources, leading to rapid decline in soil fertility, particularly when growing populations mean that the fallow period in-between land use gets shorter. Research in Papua New Guinea among the Wola people of the central highlands, however, has indicated that soils are kept fertile for long periods after initial clearance of secondary vegetation by the use of indigenous soil conservation techniques. In particular, the farmers create soil mounds which incorporate compost from the cleared vegetation, and combine this local soil management with the selection of crops – such as sweet potato – that can prosper on the nutrient supply the mounds provide. The result of this approach is a continued soil fertility under conditions of intensive land use and growing population (Sillitoe, 1998).

**Southern Bolivia and the Andes:**

Common beliefs state that increasing population and gradual economic marginalization following the collapse of local mining exports have led to a downward spiral of poverty and environmental degradation in the mountain valleys and highlands of Bolivia. Research of local sustainable livelihoods and environmental management however has revealed that households may diversify economically and increase the variety of income options available to people. In particular, the use of grazing has been noted to be a valuable addition to income. Also, biophysical research of long-term sedimentation rates in Peru indicates that much erosion predates current agriculture (Preston, 1997, 1998; Chepstow Lusty *et al*, 1998).

**The forest-savanna transition zone of Guinea:**

The landscape of Kissidougou prefecture in the West African Republic of Guinea has conventionally been interpreted as degraded and degrading, with forest patches the surviving relics of once extensive forest cover, under progressive conversion to savanna by farmers forced into destructive, short-term practices by economic marginalization and population pressure.

However research into farmers' own perceptions, coupled to analysis of historical sources (archives, air photographs) counters this picture of environmental change, showing forest cover to have increased, not declined over the past century. By challenging the prevailing view of environmental degradation, this revision undermines its supposed links with poverty. Instead, a variety of local land and vegetation management practices come into view which, in interaction with wider political and economic changes, have been responsible for increasing forest cover. While the changes have generally increased local resource availability and enhanced rural livelihoods, experiences of forest cover increase have been socially differentiated: while women experience increased fuelwood availability for example, cattle-owners have lost pasture (Fairhead and Leach, 1996).

**Machakos District of Kenya:**

Studies of the effects of five-fold population increase between 1930 and 1990 in Kenya's semi-arid Machakos District illustrate population growth linked to environmental improvement, including less soil erosion and greater tree cover (Tiffen *et al*, 1994). Yet the case does not simply illustrate a Boserupian response to population pressure. Crucial interacting factors included the influence of local and national institutions (e.g. property rights regimes and product markets). These enabled farmers not only to intensify production, but also to diversify income by entering a variety of new economic activities, often involving short-term migration. Yet ability to enter this upward spiral of capital generation and agricultural investment was socially differentiated: while some farmers adapted successfully and became wealthy, others were inhibited by local institutions around gender and property rights, for instance (Rocheleau *et al*, 1995; Murton 1997).

**The Northern Nigerian Sahel:**

Similarly, research in the Kano region of Northern Nigeria has shown that farmers may maintain high agricultural yields despite population densities in excess of 200 people per square kilometer through adopting a combination of different crops, livestock and trees. Farmers also protect their access to food by keeping distinct seed crops suited to different climatic conditions, and supplement incomes during drier years by increasing ownership of goats and sheep, and migrating to cities for short-term paid employment. Indeed, many farmers have also returned to the practice of collecting wild seeds for food crops in addition to gaining supply from commercial sources (Adams and Mortimore, 1997)

**Desertification in the Sahel:**

In addition to these studies of forest change and agricultural intensification, it is also worthwhile to note the debates concerning the word ‘desertification’. Desertification is commonly used to denote a gradual increase in the size of deserts, or the transition of fertile soil to desert-like conditions as a result of overgrazing, overcultivation, and similar activities resulting from population increase or breakdown of community (indeed the original ‘tragedy of the commons’ may be seen to be an example of desertification). More recent research, however, has indicated that the perceived growth in deserts is connected to a variety of complex factors such as the influence of drought, the timing of observation of desert conditions, and the intended land uses on desert margins. Indeed, the desert margin is now increasingly seen as biophysically mobile yet identified in cultural terms by different groups. ‘Drought’ rather than ‘desertification’ is increasingly being seen as the most relevant way to categorize the kinds of problems experienced in desert margins, as this relates more directly to the needs and hardships experienced by poor people in such zones, rather than a fixed belief in the fragility of soils and vegetation under human use (Thomas and Middleton, 1994; Leach and Mearns, 1996).

Examples such as these challenge conventional ‘crisis narratives’ of poverty and environmental degradation, and show the direct relationship between poverty and environment described in Figure 1 to be too simple. Downward spirals may be the exception rather than the rule; at the least, it is necessary to ask under what circumstances may the orthodox link between poverty and environment be found to operate, rather than assume this operates without question at all times. To ascertain this, greater attention needs to be paid to:

- Defining environment: Attention to actual, varied processes of environmental change, and the diverse ways these may be valued by different people;
- Defining poverty: An understanding of poverty based on the varied constitution of livelihoods, including among different members of local populations;
- The ways that institutional factors may influence the relationship of poor people to environmental goods and services.

However, the impacts of such research identified in Box 1 have yet to be acknowledged in all debates concerning environment and poverty. Some strong differences still exist in the understanding of environmental change and the perceived policy objectives of many organizations who either reject the downward spiral model, or who still cling to this as a guiding principle in environmental policy. It is therefore incorrect to see the orthodox downward spiral as an ‘old’ paradigm because it is still adopted by some policy actors. Instead it has become a topic of debate as to why this paradigm still continues to exist in policy debates despite the evidence against it (see discussion in section 5).

Another potentially helpful debate is the ability to devise new institutional settings to avoid the coincidence of poverty and environmental degradation. A useful set of analytical tools for the third points above is found in the environmental entitlements approach. We outline its key features below, before

going on to illustrate aspects of the approach and its implications in relation to new thinking on poverty and environment.

## 2.4 ENVIRONMENTAL ENTITLEMENTS

Figure 2 outlines the environmental entitlements approach in diagrammatic form (Leach *et al*, 1997a). The framework elucidates how particular components of the environment become endowments and entitlements for different people, affecting their wellbeing.

**Figure 2: The environmental entitlements framework**

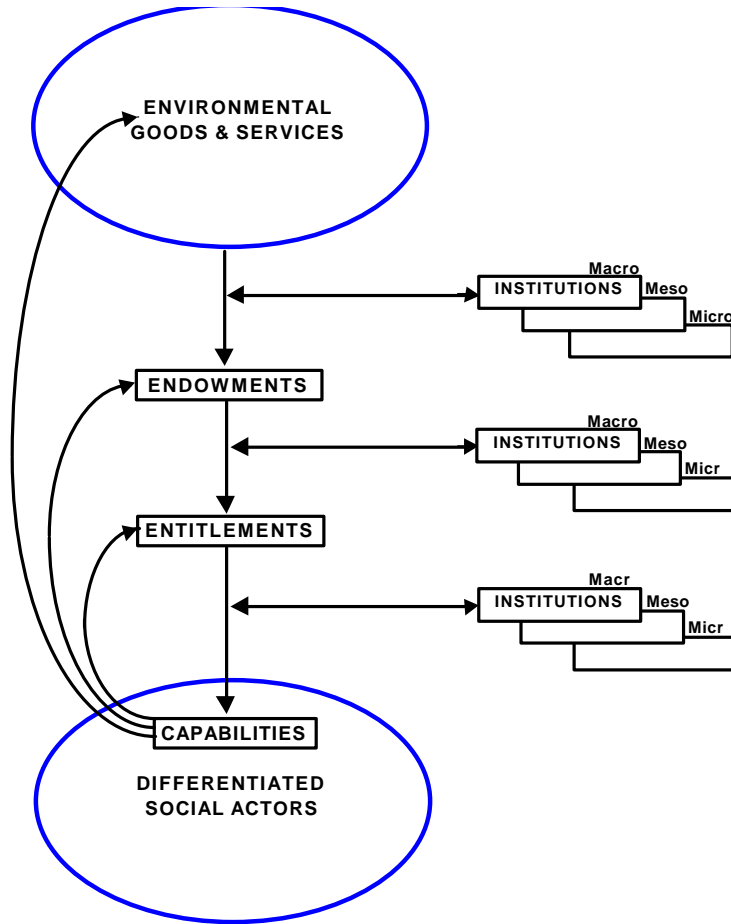


Figure 2 shows how the natural resource management activities of diverse groups of people in turn help produce and shape particular kinds of environment. The concept of environmental entitlements is a descriptive one, referring to the alternative sets of benefits derived from environmental goods and services over which people have legitimate effective command and which are instrumental in achieving well-



being. These benefits may include direct uses in the form of commodities, such as food, water or fuel; the market value of such resources, or of rights to them; and the benefits derived from environmental services, such as pollution sinks or the properties of the hydrological cycle. Importantly, different people – even within a given community, such as women and men or people with different occupations – may rely for contributions to their wellbeing on entitlements derived from different components of the environment.

The processes by which particular people derive benefit from particular components of the environment are structured by institutions, which can be defined as ‘regularized patterns of behavior between individuals and groups in society’. Those relevant to people-environment relations may be formal (e.g. a statutory tenure regime) or informal (e.g. customary norms regarding labor use). Institutions at multiple scale levels may interact to shape the benefits people derive from environmental goods and services and the ways they manage them, and thus the trajectories of livelihood-environment relations over time. While institutions which manage common property resources may be among these, it is important to recognize that people’s livelihoods may be comprised of multiple resources held under different property arrangements.

Box 2 illustrates an example of environmental entitlements by way of illustration. The example comes from recent research undertaken under the theme of sustainable livelihoods, poverty and micro-environmental management (see Leach *et al*, 1997b). However, by definition the nature of the approach implies that similar entitlements may be identified in virtually all occasions of local resource use and management.

**Box 2: Example of environmental entitlements**

**Forest use in Southern Ghana:**

In Southern Ghana, the leaves of *Marantaceae* plants are commonly collected by women and used and sold widely for wrapping food, kola nuts and other products. The leaves are associated with particular sites and times within dynamic, variable forest and forest-savanna ecology. Such conditions include disturbed forest sites, moderately burnt forest, swamps, and abandoned cocoa farms and fallows, especially during the rainy season.

The leaves become endowments – people gain rights over them – in different ways depending on whether they lie inside or outside government-reserved forest. Off reserve, the leaves are usually the common property of a village, with each individual’s ownership determined by village membership. Where they occur on farmland, collection rights are acquired through membership of, or negotiation with, the appropriate landholding family or farm household. On reserve, the distribution of endowments depends on the permits offered by the Forest Department. Without permits, leaf gathering is illegitimate from the state’s perspective, although it may be sanctioned by customary tenure arrangements grounded in different definitions of reserved land as ancestral farmland.

The set of entitlements derived from *Marantaceae* leaves may include direct use of the leaves or their sale for cash income. In practice, most women involved in gathering leaves prefer to sell them as an important source of personal income. Both labor and marketing issues are important in defining the distribution of entitlements. The utilities derived from the cash sale of *Marantaceae* leaves contribute to a woman's capability to ensure that she and her children are well-fed and to satisfy other cash-dependent needs. But whether a woman can keep control of the income, and how it is used, depends on intra household bargaining arrangements, such as negotiations with husbands and co-wives over expenditure priorities and responsibilities for making food. Asking which combination of institutions make the most difference to resource access and control for a set of social actors, or for the dynamics of resource use and management surrounding the leaves, represents an environmental entitlements approach.

### **3. New thinking: poverty**

This section now builds up the revision to orthodox approaches to poverty and environment by considering, succinctly, how the emphases of the environmental entitlements approach intersect with re-evaluations of what is meant by 'poverty'.

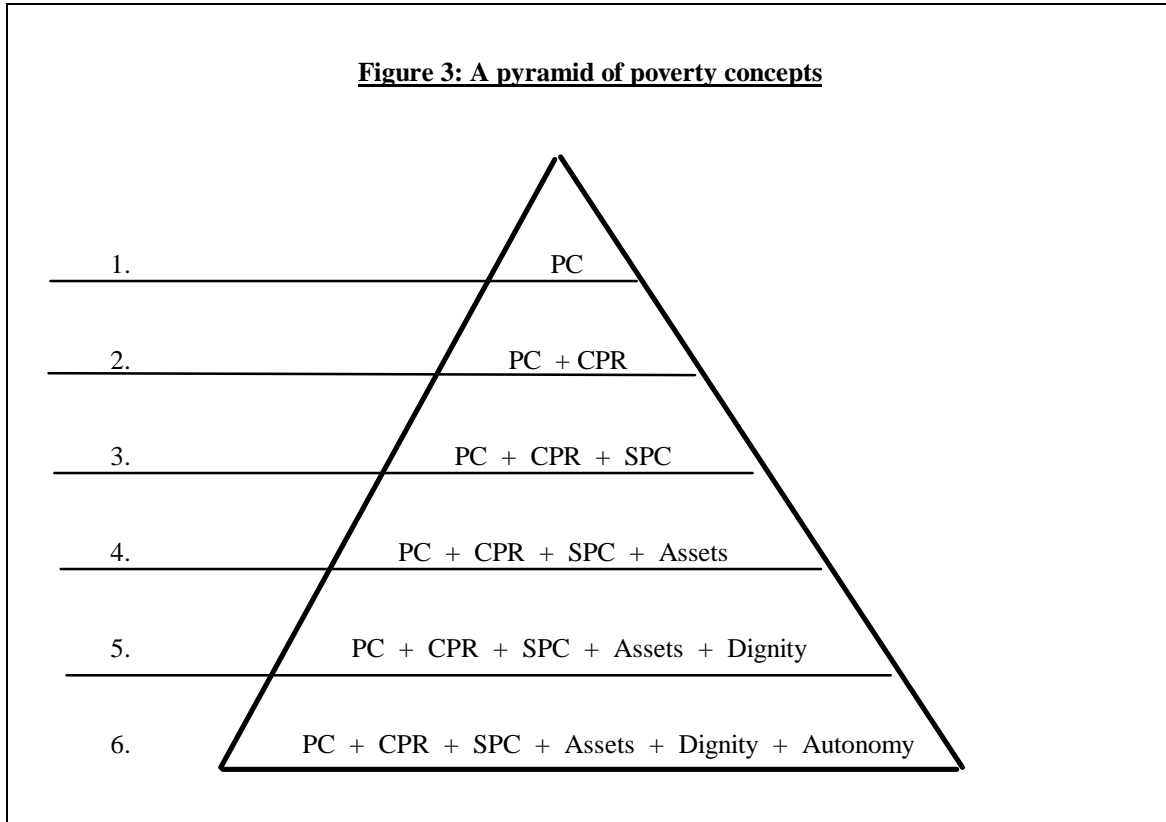
#### **3.1 DEFINING POVERTY**

According to Sen (1981), there are two essential questions regarding poverty: who are the poor? And at what level is poverty defined? Conventional definitions of poverty refer to a notional poverty line (Greeley, 1994). This is measured either as a minimum flow of real income per capita, or as a bundle of 'basic needs', which may be quantified. Often this approach is also related to an indicator of 'quality of life'.

Income has been the most consistent factor to be included in measurements of poverty, yet approaches to this are consistently under review. One key question is the assessment of income in terms of flows (such as sales from agricultural crops) or stocks (such as agricultural land that may be rented to others or used as collateral on loans) (Lipton, 1977, 1991; Dasgupta, 1998; Baulch 1996 a and b; Ravallion, 1992; Reardon and Vosti, 1995).

Income-based definitions of poverty have been widely criticized as being too narrow, especially in the developing country context. The Human Development Index (HDI) is an important attempt to broaden the range of indicators while retaining the advantages of quantification and international comparability; it draws on a bundle of indicators referring to general standards of health, education, and wealth which may be used to indicate general levels of development (Ravallion, 1992; Reardon and Vosti, 1995). Figure 3 indicates the so-called 'pyramid' of poverty concepts which may be adopted to indicate deprivation. The simplest, and crudest, definition is private consumption (PC) at the top of the pyramid. Below this comes

concepts of common property resources (CPR) and state provided commodities (SPC), and then afterwards personal assets and the subjective assessments of 'dignity' and 'autonomy' (Baulch, 1996a).



Recent research has pointed to weaknesses in approaches based on aggregate indices. In regard to these problems, various researchers have developed indices of poverty in relation to specific subjects (see Greeley, 1994; Baulch, 1996b). First, problems have been highlighted in the selection and weighting given to indices: the components and weighting of statistical bundles are arbitrary, and aggregate statistics may hide small-scale variations that may have significant implications for certain social groups.

Aggregating may therefore not provide policymakers with sufficient guidance for specific local problems (Lipton, 1991). A related argument concerns the need to disaggregate definitions and indices of poverty in order to reveal ways in which it may be socially or geographically concentrated. As the environmental entitlements approach emphasizes, poverty is experienced differently according to social, gender, age and occupational groups. Processes of impoverishment need to be disaggregated to show such differences (World Bank, 1995a), as well as those linked to particular ecological conditions or diminished access to key environmental goods or services.

Second, discussions have emphasized that poverty as so defined is just one aspect of deprivation. Other factors include vulnerability, physical weakness and powerlessness, which may be interlinked and mutually enforcing. In particular, an emphasis on vulnerability raises the importance of net asset position rather than flows of income, and of shocks (short-term impacts) rather than stresses (longer-term threats to income) (Chambers, 1983); concepts which gain central importance in notions of livelihood, and where environmental resources may take on particular importance as savings or security. It is such broader conceptions of livelihood and well-being – albeit in the specific forms defined and experienced by particular people – that tend to emerge from ‘self-assessments’, such as the ‘participatory poverty assessments’ undertaken by the World Bank and other agencies in recent years. The degree to which poor people draw on different criteria from so-called ‘objective’ measurements can be striking (e.g. Jodha, 1991). For example, people’s private gains from public assets (e.g. schools, health facilities) are often left out of income-focused measurements. Equally, subjective assessments of well-being can highlight the significance of key environmental endowments and entitlements which conventional definitions of poverty might have overlooked.

Third, much recent research attention has focused on impoverishment as a process, rather than poverty as a state. Entitlements-based approaches have figured large in this work, whether with specific reference to food security and the processes by which people’s food entitlements (through exchange, production or other means) may decline or fail (e.g. Devereux 1993, Sen 1981, Dreze and Sen 1989), or with reference to other notions of vulnerability, and the experiences of particular social groups (e.g. Kabeer 1994). With poverty conceptualized as a process, differences between groups may appear as thresholds. At a general level there are important differences between the moderately poor and the ultra poor in terms of demographic, nutritional, labor market and asset holding characteristics (Lipton 1977; Dasgupta 1998). Process-based conceptualizations also emphasize the roles of institutions in shaping outcomes. Much work on food security, following Sen, has focused attention on formal legal institutions and the role of the market in shaping well-being. In contrast, others have emphasized the importance of informal institutions such as kinship networks in guaranteeing well-being (e.g. Swift 1989).

### **3.2 SPECIFIC ASPECTS OF POVERTY**

Various specific themes of poverty have been identified and concerning, gender, health, food security and income. This section details – briefly – how recent research on poverty has incorporated these themes and the problems encountered in indicating them, and how these measurements relate to research on environment and poverty.

Research on **gender and poverty**, has focused particular attention on the household as an institutional site where prevailing norms and bargaining over needs, rights and responsibilities shape experiences of impoverishment which are differentiated by gender and age/generation (Kabeer, 1991, 1994). While such research has served to highlight the particular, contextual vulnerabilities of women, it has also undermined generalized images of women as the ‘poorest of the poor’, and of poorly-resourced female-headed households. While there is some evidence for growing numbers of the latter, their circumstances are diverse and this trend need not imply that female-headed households cannot be better off than male-headed households; indeed there is plenty of evidence to the contrary (Kabeer, 1991; Chant, 1997). Furthermore, it is important to note that women are not a homogenous category: significant intra-sex differences exist in regard to age, kinship, caste, and socio-economic status (Clisby, 1995). One recent approach (Agarwal, 1997) developed an index for gender–poverty–environment by integrating regional sex ratios with indices for wealth and regional rainfall and forest cover. While this usefully indicated regional differences in poverty, the indices of income and forest and rainfall were simplistic in indicating either poverty or environmental degradation.

Definitions of **health and poverty** may be divided into two broad categories referring to either the chronic level of health and nutrition of individuals, or the institutional access to health services and emergency provisions that may influence chances of survival following shocks such as famine and disease. In this sense, discussions of health and poverty are closely linked to debates about **food security**. There are strong links between ill health and the exposure of poor people to pathogens and industrial or air pollution. However, in addition to this, research over the last 10-15 years has also indicated that mortality is not directly associated with material differences between richer and poorer classes and neighborhoods but with the psychosocial effects of differences – or the subjective experience of living in polluted and damp surroundings (Wilkinson, 1998).

Personal **income** has also been long associated with poverty measurement, but the uses and definition of this term are controversial. Firstly, income may be defined simply as a flow of money – or similarly liquid trading commodity – or as a stock of assets such as land. Secondly, the nature of income, in terms of cash or less liquid flows such as food stocks, or credit, will also influence the ability of individuals to withstand stresses and shocks to flows, where cash is more flexible and a better entitlement. Income may indicate levels of wealth at – for example – stages when total income allows individuals to cover all nutritional needs, or when saving become possible. Assets may represent wealth by creating a buffer between production, exchange and consumption which may be called upon during times of crisis (Swift, 1989). However, while income is clearly an essential component of defining poverty the overt conclusion of research is not to reduce indications of poverty merely to the measurable aspects of cash income and

assets, but to the mechanisms and social structures that allow individuals access to generate various types of income. Increasingly, then, 'poverty' is being linked to debates concerning 'social exclusion', both in North and South (de Haan, 1998b).

In general, studies of processes of impoverishment and wealth creation allow attention to the significance of particular environmental endowments and entitlements, and the institutions which shape access to and use of them. Studies of the dynamics of impoverishment and well-being over the long term (e.g. Moore and Vaughan 1994), moreover, highlight how livelihood strategies may shift over time (e.g. variously incorporating such processes as diversification, intensification and migration – Scoones, 1998). In this, the significance of particular environmental resources in livelihoods may increase or wane, and the significance of environmental resources and services in general may shift relative to sources of livelihood not derived from the environment.

#### **4. New thinking: environment**

Just as there are various approaches to defining poverty, so the word 'environment' has emerged to mean several things yet in the context of poverty and environmental degradation, such meanings may now be misplaced. This section discusses recent research and debates concerning the conceptualization of environment and environmental change, contrasting the assumptions which have generally underlain orthodox thinking on poverty-environment linkages with a range of recent 'new' approaches. In this light, the section moves on to consider environmental change in the context of poverty.

##### **4.1 DEFINING ENVIRONMENT**

Research approaches to environmental change in developing countries have, in recent years, undergone some fundamental changes as a result of inquiries into the genuine nature and extent of supposed problems. In short, many of the environmental problems which have been central to conventional 'downward spiral' framing of poverty-environment linkages are currently undergoing new analyses on account of a variety of biophysical and social concerns.

The main elements of this new thinking – which has emerged in disparate fields, and in complex, vibrant debates – are summarized in a highly simplified form in table 1. While the first three lines of the table refer to challenges which have emerged in natural science and 'new ecology' (e.g. Botkin, 1990; Allen and Hoekstra, 1991), those further down relate more to questions of method, and to recent social science thinking about environmental value and 'whose knowledge counts' (Leach and Mearns, 1996). Clearly

these are not simple dichotomies. Empirical studies of environmental change vary considerably in the extent to which they embody elements of what we have labeled here as ‘old’ and ‘new’ approaches, and they frequently take the form of implicit assumptions rather than explicit statements of position.

**Table 1: Main contrasts between ‘old’ and ‘new’ thinking about environment**

<b>Old approach</b>	<b>New approach</b>
Stability and equilibrium; a ‘balance of nature’ which could be disrupted by human activities (e.g. natural vegetation climax, carrying capacity)	Non-equilibrium perspectives; importance of variability over space and time, and of scaling on environmental processes
Gradual, linear change	Punctuated changes and contingencies; importance of historical influences on current dynamics; ‘path-dependency’
Homeostatic regulation of systems	Open, ‘chaotic’ systems
Environmental change (degradation) inferred from ‘snapshots’ or short-term processes	Attention to historical sources and the reconstruction of actual change using time-series data
Assessments and statistics produced and cited by major agencies – national and global – assumed to be authoritative; left unquestioned	Critique of influential statistics and ‘scientific’ method on the basis of other data sources, including local knowledges and ‘citizen science’
Science and its methods in assessing environmental change assumed to be neutral and value-free	A number of perspectives on a particular environmental issue can coexist, upheld by different people and representing different social or political values or positions
There is an aggregate environment to which the ‘population’ or ‘society’ relates	Socially-differentiated people use and value elements/aspects of environment in different ways, and may define differently what is meant by degradation.

Many well-established, ‘orthodox’ problematics that have been taken for granted in policy and poverty-environment debates, such as desertification, the Himalayan theory of deforestation and soil erosion, or deforestation, are firmly grounded in elements of ‘old’ thinking. Research from new perspectives has proved to challenge these problematics in fundamental ways. In general, the implications of this kind of research are that ‘orthodox’ conceptions of environmental degradation (and the poor’s role in causing it)

may need to be redefined. Research does not imply that there are no environmental problems in developing countries. But orthodox conceptions of environmental degradation have generally overlooked the ability of local groups to lessen these impacts, or exaggerated the significance of these so-called problems to local poor people. In response, researchers are now re-evaluating conceptions of environmental change and degradation according to the groups who experience them, and in regard to a greater variety of sampling techniques and research methodology.

For this reason, there are significant problems with using concepts such as **wilderness areas** or **'ecoregions'**. 'Ecoregions' are defined by some agencies as areas such as mountain regions, drylands, or savanna, where environmental problems may be characterized as fitting a certain pattern, or similar problems assumed to occur in each zone regardless of local human experience or different histories and activities of land use (Garcia *et al*, 1994; World Bank, 1995b). The focus instead moves inwards to 'people in places'. Similarly, the concept of 'wilderness' suggests abandoned land, or land of recreational value to city dwellers or inhabitants in richer countries or regions, yet in reality may also be classified as 'rural' or under use by minorities for whom such land is their primary resource base. Historical research frequently reveals the long-term use and shaping by people of landscapes which had been imaged as 'pristine' or 'natural' by older approaches. Indeed, simply labeling such land as wilderness may encourage policies which represent groups who use the land for recreation rather than those who may live there.

New approaches thus undermine these top-down approaches both aimed at classifying territory and the I=PAT framing of population-poverty-environmental change which has dominated conventional debates and policy approaches. The approaches force new questions to be asked, concerning which people see which components of variable and dynamic environments as valuable or useful at different times? How do different people gain access to and control over such environmental resources and services? And how does environmental use by different people transform different components of the environment? The next two sub-sections explore these questions further, adopting for heuristic purposes a division between rural areas (including wilderness areas and oceans and rivers) and urban areas.

#### **4.2 ENVIRONMENTAL CHANGE AND THE POOR – RURAL AREAS**

Some of the most influential research re-evaluating poverty–environment linkages has been conducted in rural areas. However, it has to be noted there are huge differences in rural areas between humid and dryland environments, mountainous, coastal, and other differences in terms of vegetation, climate and ecological dynamics (UNSO, 1994; Cleaver, 1997).



The orthodox model of environment and poverty suggests that rural poverty increases the forces behind degradation of resources. This was argued to be a key part of the explanation behind crisis models of environmental pressure such as the Himalayan theory of deforestation and soil erosion, the fuelwood crisis; desertification, and the negative impacts of shifting cultivation (Eckholm, 1976; Kasperson *et al*, 1996; Brown *et al*, 1998). However, research has illustrated first, how new approaches to understanding environmental change may redefine current conceptions about degradation, and secondly how organization and land management practices and skills of rural populations have frequently served to maintain and even enhance landscape productivity. Examples are given in Box 1.

Examples such as these indicate that local practices, shaped by a range of both formal and informal institutions, may mitigate the impacts of environmental degradation. In addition, they also indicate that perceived environmental degradation by the international community may refer to changes to landscapes that human societies have themselves shaped over centuries of activity, and therefore are less easily defined as degradation (Berry 1989; Baland and Platteau, 1996). However, this argument does not suggest that degradation does not occur, as indeed the disruption of local adaptive practices may lead to the abandonment of conservation practices.

Tenure arrangements are a critical element of rural institutions with implications for people's ability to access and manage environmental resources. Tenure can be secured in a variety of ways, including membership in local social and political institutions, participation in markets, and interaction with statutory legal frameworks. Evidence suggests that increasing poverty can weaken people's claims on land, meaning that alternative, and less effective, tenure structures are used.

Research demonstrates how groups of farmers, workers or others may act collectively to overcome general threats to tenure or access to resources (Berry, 1989; Ostrom, 1990). The ability for groups to act collectively has largely discredited the 'tragedy of the commons' argument that competition between individuals for common property resources will result in degradation. However, increasingly debate is moving towards identifying how so-called 'communities' may in fact hide strong and marginalizing divisions among members along lines of gender, age, caste etc. (Leach *et al*, 1997a).

Indeed, research within new approaches to environment – and taking an environmental entitlements approach – shows how environmental change may impact differently on the wellbeing of different members of local populations. Indeed, what may appear to be a successful local adaptation to population growth or collective solution to a 'community' resource problem may prove to support some members of society while excluding others. Box 3 illustrates two examples of environmental entitlements for environmental management in rural areas.

### **Box 3. Environmental entitlements: examples from rural areas**

#### **Game management in the Mkambati Reserve, South Africa:**

Hunting in South Africa is now largely carried out by two groups: urban people who conduct it as a pastime, and the rural poor, who use it as another way to diversify livelihoods. The endowments are the rights over animals such as wildebeest and blesbok. The institutional factors influencing these are the national legal framework – including conservation laws – and micro-level institutions such as traditional authorities established by chiefs and headmen. The entitlements are the venison, hides, and horns resulting from hunting, which may be influenced by gun legislation, or the local networks of borrowing, hunting and mutual aid that enable small rural groups to hunt game. The final capabilities resulting from the hunting include contributions to livelihoods, which may themselves be affected by micro-scale intra-household arrangements (Kepe, 1997).

#### **Soil and water conservation in Rajasthan, India:**

In the semi-arid Indian province of Rajasthan, water management is crucial for irrigation and for urban sanitation. The underlying biophysical variation in groundwater leads to variable supplies of water for either boreholes or local surface supplies. The endowments for water include the private arable and pasture lands occupied by farmers, and the water rights that enable access to communal water supplies. These are influenced by micro institutions such as inheritance of land, and labor contributions to agriculture. Macro-scale institutions include interactions between the Governments of India and Rajasthan concerning watershed development policy, and land laws. The entitlements for water supply include irrigation water, crops, and income from marketed products, and these are influenced by collective action among owners of contiguous plots, or communal repair work on gullies and canals. At the meso scale, entitlements are influenced by market forces and credit institutions. The result of these interactions is a supply of water to large farmers, marginal farmers and livestock rearers (Ahluwalia, 1997).

The ways local institutions intersect to shape the environmental entitlements and environmental management capabilities in socially-differentiated ways is well illustrated by research on gender-environment relations in rural areas (Joeke *et al*, 1998). In gender divisions of labor and responsibility, women of childbearing age are commonly assigned a disproportionate share of environmental management tasks, whether related to production, resource conservation, or the collection and use of fuel and water. In terms of labor and time, women's multiple roles commonly combined with social arrangements which restrict control over their own time. For example, a woman who must combine food production with work on a husband's cash crops may have little time to invest in land conservation or independent cash generating activities. The workings of gendered institutions governing natural resource tenure and decision-making mean that women's natural resource tenure rights and control over decisions rarely match their extensive environmental responsibilities and experience (Leach, 1992; Rocheleau *et al*,

1996). This may restrict their incentives and abilities to invest in sustainable management activities such as soil conservation or tree planting, or mean that they do not derive direct benefit from investing their labor in such activities.

Research may therefore be usefully directed on the one hand, to identifying institutions and practices that mitigate damage to resources and enable successful adaptations to environmental and socio-economic change. On the other hand, it needs to look to how existing adaptations may be made more representative of all groups within communities, or to which institutions might support the livelihood needs of particular groups (Berkes, 1995; Leach *et al*, 1997b). Increasingly, too institutions need to consider economic diversification into markets of increasing size and with greater diversity of members, and also the greater influence of international standards and environmental agreements on rural institutions. These topics, and the related implications of rural industrialization and political representation of rural peoples, are discussed in regard to policy and institutional responses in section 5.

#### **4.3 ENVIRONMENTAL CHANGE AND THE POOR – URBAN AREAS**

Some of the most important current challenges to orthodox conceptions of environmental degradation come from urban areas. There are important differences between poverty–environment linkages in urban and in rural areas. Firstly, in the rural context livelihoods depend more directly on natural resources than in the urban context where cash-based income streams and assets are more significant. Thus, and secondly, poor people impact less on the forces causing environmental degradation in urban areas. Thirdly, urban environmental degradation is primarily associated with health impacts. As a result, the causes, consequences and distributional costs of urban deprivation are commonly more adequately addressed via political and economic policies rather than through direct intervention into environmental processes.

As with rural areas, environmental problems in urban areas are perceived and experienced differently by various social groupings, and are also subject to a number of potential misconceptions and errors in measurement and management. Rural trends in environment or social wellbeing are not always good guides for urban areas. Age and sex specific mortality in developing countries is lower in urban than in rural areas. Rates are also significantly different to the patterns experienced in European cities during the nineteenth century (Gilbert, 1994; Rogerson, 1996; Gaye and Diallo, 1997). Urban environmental problems in developing countries are also commonly associated with the world's largest cities – such as Sao Paulo, Cairo and Mexico City. Yet the majority of urban inhabitants in developing countries are actually found in smaller settlements, particularly those considered to be small and intermediate, of less than 20,000 or between 20,000–250,000 people.

Researchers have identified that urban environmental problems may undergo a variety of transformations which some have represented as a series of stages (see Hardoy *et al*, 1992; Main and Williams, 1994; Hill and Upchurch, 1995; Satterthwaite *et al*, 1996; McGranahan *et al*, 1996). The initial phase is the dominance of biological pathogens or micro-organisms which may result from inadequate sanitation, poor clean water supplies and waste disposal. In particular, the inadequate treatment of excreta is a significant problem. Later stages of pollution include industrial hazards such as smoke and solvent pollution. This transition has also been associated with the 'epidemiological transition' – or movement from infectious illnesses in cities (such as cholera) to chronic diseases and conditions (such as lead poisoning or malnutrition).

In theory, it may be expected that cities undergo a smooth transition from one phase to another. However, experience has shown that the emergence of later stages of transition occur for some sections of society, and for some cities, before it occurs throughout a country (Auty, 1997). Poor people in cities may therefore continue to find themselves subject to biological pathogens after more affluent parts of a city have adopted better sanitation. In some cases both pathogens and industrial hazards may exist at the same time. It is also common for the initial pollution stages to be passed on to neighboring cities or regions where environmental regulations or demand for environmental protection are less stringent.

Institutions linked to land tenure and housing of course influence the exposure of poor people to environmental risks. Short-term migrants facing the threat of eviction have few incentives to adopt protective mechanisms or investment in water and sanitation. Poor people also often develop housing in places that are unduly prone to environmental stresses and shocks, for example on land subject to landslides or floods, or close to municipal dumps. Environmental shocks such as floods can not only cause short-term destruction but also distribute raw sewage.

Poor people in urban areas have shown willingness to organize in order to ensure access to water and sanitation (e.g. Beall, 1997a), and particularly in the case of shanty-towns (Chant, 1997). But in comparison with rural areas, local institutions in cities have a number of additional problems that make adaptation difficult. Most importantly, urban environmental problems are almost universally defined in terms of impacts on health rather than impacts on land productivity, forest and soil resources. In addition, many environmental risks to be relatively new or beyond the experience of poor people, and therefore are more difficult to respond to. Also, some risks – such as solvent or lead poisoning – are also difficult to detect or identify as the cause of symptoms. Some researchers have also argued that certain risks such as scalding of children by hot food and water may also be considered environmental problems because of the

high mortality this causes, and because it may be avoided by the existence of local emergency care and training (Satterthwaite *et al*, 1996).

As a result of these factors, local institutional responses to environmental health problems and risks in urban and industrial areas may depend more on the provision of institutional support by the state, international agencies and investors rather than local communities. However, these too are subject to problems of access. Evidence has suggested that there are poverty thresholds effects where, for example, the poorest 20 percent may be unable to participate in such schemes. However, such institutional provision for the urban poor may take second priority for national and local governments with the emergence of prosperity and local élites as the 'green' environmental agenda (concerning conservation aspects of environment) take precedence over 'brown' agendas (concerning housing, pollution, sanitation etc.) (van Horen *et al*, 1993; Auty, 1997; Satterthwaite, 1997).

Research into urban environmental problems and the poor is still developing but is gaining significance. In the 1980s, some 40 percent of the human population was classified as urban. By 2025 this may rise to 80 percent. Some researchers have argued that current approaches to measuring urban environmental problems, such as from traditional epidemiology, may be insufficiently sensitive to the political factors underlying change and the creation of problems (Stephens, 1995). Others have argued for a more socially informed scientific inquiry and identification of which problems should be the focus of environmental policy (Irwin, 1995). Box 4 provides some succinct examples of environmental entitlements and urban/industrial risks, including the emerging topics of waste collection and recycling and new industrial risks such as solvent poisoning which is often difficult to identify or prove.

#### **Box 4 Examples of environmental entitlements from urban areas**

##### **Waste collection in Bangalore, India and Faisalabad, Pakistan:**

As in many cities in Asia, there is a vast informal economy based on waste recovery and recycling of waste in Bangalore. The usual participants in recycling include householders and domestic servants who identify reusable materials and then resell them. The endowments in this example are the rights of access to urban dumps, and the access to the markets where reusable items can be sold. Institutional factors influencing these endowments include, at a macro scale, the regulations and government plans that lead to the establishment of dumps and the selection of waste to store there; and then more locally the local supplies of labor; and access to dumps. Entitlements of waste include the individual items salvaged, which may then be influenced at a micro scale by household knowledge of different types of waste, and the networks that allow people to distribute reusable items. The potential beneficiaries of the waste recycling include the people who undertake the collection and distribution. However, research has indicated that the action of some local NGOs in connection with the waste collectors may reinforce the current power of those people closest to waste-dump resources at present. The conclusion has been that simply having

organizations to assist collectors may not actually contribute to a more comprehensive form of development unless there are also attempts to introduce new users to the resource (Beall, 1997b).

### **Industrial poisoning risks in Thailand:**

In new electronics factories in industrial estates surrounding Bangkok and the Eastern Seaboard of Thailand, there have been numerous cases of unexplained deaths of factory workers, apparently from industrial poisons such as solvents. The problem has been aggravated by the uncertainty surrounding the causes of deaths, and also by the poorly developed status of local health services for such new industrial risks associated with electronics factories or other high technology developments. In these circumstances risks have been decreased through the increased access of workers to environmental health standards and treatment (endowments). The institutional factors of influence here include the macro-scale policy of the Thai government in providing services and passing regulations to enforce investors to contribute to such services or provide centralized waste treatment plants. The entitlements of risk reduction include the medical staff and facilities which may be provided locally in the form of clinics or hospital services, or in a mobile form in the shape of medical officers who train workers or visit people in homes. The key political conflicts between different institutions are in the fight for effective regulation which does not repel new investors in Thailand at the macro scale; and at the meso scale in allowing the existence of unexplained deaths to lead to thorough enquiries by local authorities occasionally in collaboration with national or international experts. While some progress has been made in relation to providing these entitlements, much work remains to be achieved, particularly in areas concerning indigenous factories (Forsyth, 1998).

## **5. Policy and institutional responses**

So, what lessons may be learnt from this comparison of orthodox and newer approaches to poverty and environment? This section now assesses practical policy and institutional action that may be taken to enhance both poverty alleviation and environmental management. It focuses on the implications of the environmental entitlements approach, with its emphasis on 'people in places', on stressing differentiation in definitions of poverty and environment, and on the role of institutions – both local and otherwise – on poverty-environment linkages for policy approaches.

### **5.1 LESSONS FROM THE NEW THINKING ON POVERTY AND ENVIRONMENT**

The most strident conclusion drawn from new thinking on both poverty and environment is the need to move away from macro scale approaches and policies and towards a greater appreciation of people in places. This change can be justified on the basis that all macro scale change is experienced at the local level (Mearns, 1991; Chambers, 1997), or simply that the experience of poverty and environmental problems is differentiated spatially and within society. As a result, macro scale responses – such as ecoregions – are unlikely to address the multitude of different experiences of environmental problems, or

the needs of different groups that a more locally determined approach such as environmental entitlements may provide.

Without such local differentiation, macro scale environmental policy may have significant and damaging impacts for both poverty alleviation and environmental protection. For example, in Nepal during the 1980s, the Lake Rara national park was established with the forced resettlement of some several hundred of the Chhetri ethnic minority (Ives and Messerli, 1989). Such an action was undertaken in order to protect forest and watershed resources and to encourage wildlife tourism to Nepal's rural west. However, the action was later agreed to have increased the factors underlying the poverty of the Chhetri people by lessening the land tenure links available to farmers, and as a result of this, also increasing the causes of local deforestation as the farmers sought new land for agriculture. Similarly, in West Africa, state-controlled approaches to natural resource management have denied local institutional control over resources. In Guinea, national forest departments claim ownership of on-farm trees because of a continued and widespread belief that they represent old fragments of forest rather than that they were planted there by successive generations of villagers (Fairhead and Leach, 1998). This control has meant that the forest departments have been able to generate revenue and justify their continued existence as government institutions. However, it has also implied that farmers lack incentives to invest in tree protection and further planting, or to benefit themselves from harvesting timber or other forest products.

Such macro scale impacts may also occur from emerging global environmental agreements. After the Kyoto Protocol, developed countries with greenhouse gas emissions reduction targets may achieve some of their obligations through investing in sustainable development projects in developing countries via the CDM (see section 1.1). Much investment may take place in new forest plantations partly as a result of the belief that such plantation may help local biodiversity or development, rather than support local industrialization. Furthermore, if CDM investment is conducted in new climate technologies such as renewable energy, it is possible that this effective subsidization may undermine the competitiveness of indigenous industries in renewable energy (Hurst and Barnett, 1990; Ranganathan, 1992; Forsyth, 1999). As a result, addressing global environmental problems such as climate change through local investment or activities in developing countries may actually bring many unseen negative impacts in those countries that may actually reduce the ability of countries to reduce poverty.

In part these problems reflect the political weakness of poor states in international negotiations, and poor people in contact with national states. In particular, international agreements over oceans or land often considered to be wilderness by developed countries or national élites has generally not represented poor, or occasionally stateless people living in these areas such as sea gypsy communities; shifting cultivators and forest people. Yet the problem is not simply correcting political negotiations in favor of previously

underrepresented groups, but instead also correcting the approach taken towards environmental explanation during the policy process.

## **5.2 IMPLICATIONS FOR POVERTY AND ENVIRONMENT POLICY**

Current approaches to poverty alleviation by organizations such as the World Bank include encouraging labor-intensive industrial growth and investment in human resources. A third approach is to invest in so-called ‘safety nets’, or mechanisms that allow the poor to be targeted by social welfare schemes or food subsidies (Baulch, 1996a; Mamingi, 1996). Similarly, in environmental policy, approaches commonly include attempts to restore degraded landscapes, or to protect certain fragile landscapes from damage from poor people whom may be seen to be causing damage because of the influence of population increase or economic change (see section 2).

The immediate problems with both approaches is that they adopt a macro, uniform approach to alleviating poverty and environmental degradation. The approaches reflect a largely income-dominated view of poverty, and a regional based perspective on environment. As consistent with the statements in the WCED (see section 1.1), poverty and environment are often seen as inextricably linked, with the need to eradicate poverty as an initial step to protecting environment. This study has argued against this belief, and instead urged that environmental problems and poverty need to be seen as highly differentiated and experienced differently by varied groups. As a consequence, poor people may experience their own variety of environmental problems, which need to be addressed separately from environmental policies seeking to satisfy less poor sections of society.

Attempts to ‘restore’ environments need to be sure what may actually constitute restoration regarding what existed beforehand, and what may be best for local inhabitants. As demonstrated with the I=PAT equation (section 2), much theoretical justification of environmental policy has been justified on the basis of assumptions about interlinkages of poverty and environment that are not borne out empirically, or indeed in the best interests of poor people. There is a need, therefore, for policymakers to ask themselves how far their objectives are based on the needs and experiences of poor people facing environmental problems, or instead the environmental wishes and assumptions of other communities, such as in developed countries. Policy to protect ‘wilderness’, or to reforest agricultural land in order to mitigate climate change may reflect such developed-world perspectives rather than local poor people. If implemented, such policy would be unlikely to reduce either poverty, or environmental degradation unless the needs of the local inhabitants are addressed.



There is also evidence that such globalizing assumptions exist in agricultural policy. It is important to break the image of such regions as being homogeneous and beyond the remit of mainstream programmes to increase agricultural productivity, and instead to demonstrate that there are different categories of 'low potential' areas which may allow immediate progress to be made (such as in ill-drained but well watered land) (Scoones and Thompson, 1994). There is also a need to link agricultural productivity research to underlying political issues such as land tenure, and access to additional livelihoods and support facilities (such as banking and credit) from minorities such as hill farmers.

In addition to assessing macro policy for universalizing assumptions, there is also a need to increase the perceived importance of local institutions and poor people in environmental policy. This may be achieved by increasing the role for local institutions, the support made available to institutions (including expert knowledge in the case of new industrial risks), and enabling local people to form institutional structures. In general, there is growing consensus since UNCED in the role of community-based natural resource management. Agenda 21 and the Desertification Convention strongly advocate as solutions the combination of community initiatives, decentralization, and devolution to local communities responsibility for natural resources held as commons. Although the details vary, most arrangements include some form of 'co-management' between national and local governments, civic organization, and local communities. Such initiatives and new approaches to the governance of common property resources are important and to be welcomed. However, it has to be stressed that communities are not heterogeneous, and include a multitude of differences along the lines of gender, age, caste and wealth, and that building such community based management may also imply an evolution of local political processes and representation (Leach *et al*, 1997a).

### **5.3 BUILDING ENVIRONMENTAL ENTITLEMENTS**

Environmental entitlements are therefore potential benefits from the environment over which people have legitimate effective command. They focus on the social structures and networks that allow poor people in developing countries access to resources in order to achieve sustainable livelihoods and minimize poverty. An important aspect of environmental entitlements is that they are shaped by a variety of institutions operating at a number of scales, which potentially integrate local, national and even international influences on poverty and environment. Key aspects include:

- Multiple institutions: convention approaches to community-based natural resource management are frequently centered on 'community' organizations. However, these may be a very poor reflection of how resources are locally used, managed and contested. It is therefore important not to assume that new formal organizations should either replicate such institutions, or may have more success. Instead,

it is better to assume that multiple institutions operate in natural resource management, and that different people rely on different institutions for access to resources. Many institutions are informal – or reflect shared practices rather than organized behavior, and may change quickly (see figure 2).

- Strategic support to local institutions: policymakers may wish to identify and then prioritize support to particular institutions and institutional combinations which support positive trajectories of livelihood change for particular groups of people, or paths of environmental change with positive implications for poor people's wellbeing. However, the selection of some options over others is likely to be controversial.
- Local conflict mediation and negotiation: multiple institutions, and differentiated communities will inevitably include a variety of conflicts. Development agencies should encourage resolution of debates by local people in arenas that are locally created and attended.
- Technological and expert interventions: at times it may be useful for development agencies to supply technologies (including practices and organizational forms) to communities in order to facilitate resource management. However, this has to be undertaken with care in order to avoid damaging the role of existing local technologies, and also to ensure that such technology transfer succeeds. In many ways this is similar to the role of expert knowledge and advice, particularly on the role of new industrial or urban hazards where local inhabitants may require medical or working practice training.

Such policy support to local institutional practices have to be conducted under circumstances of ecological and social uncertainty. The problems include anticipating changes in biophysical processes (such as rainfall), and in evaluating changes according to different intended land uses. Unexpected changes in landscape may occur rapidly as a result of the coincidence of land use practices and contingent ecological events. In this context, management needs to influence processes rather than to define current ecological states, and in a manner that is adaptive and negotiated between different groups rather than pre-planned. In urban or industrial contexts this may also mean reacting rapidly to the emergence of new risks even if the ultimate cause or nature of such risks is not initially known.

It is also important to establish more effective micro–macro links of environment and poverty policies. As stated above, this is not just in terms of greater political representation of local institutions in the macro policy arena, but also in questioning how scientific assumptions such as the I=PAT equation have become the guiding principle for much environmental policy, and still continues to be. This spells out a need to integrate political and institutional approaches to environmental policy formulation and implementation with an analysis of science policy processes. Such analysis would include research into why certain

policymaking institutions support orthodox downward-spiral approaches to poverty–environment linkages and how these are related to NGOs and donors who sponsor practical work. It also implies adjusting such scientific assumptions to include more reference to local understandings of environmental change and which problems should be the priority of policy.

The aim of the environmental entitlements approach is therefore to increase the ability of poor people – variously defined – in developing countries to achieve greater access to resources. This also includes empowerment – or increasing the claims-making capacity – of subordinate groups. Indeed, entitlement failure frequently result less from people’s lack of institutionally grounded claims, but their incapacity to communicate these claims effectively against more powerful actors. Using the analytical tools of the environmental entitlements framework, claims-making capacity could even be seen as an endowment which may be combined with other endowments such as land and labor to increase command over environmental goods and services. However, this requires an approach to participation which takes the dynamics of power relations between social actors involved in the development process very seriously (see Leach *et al*, 1997 a and b).

## **6. Concluding remarks and recommendations**

This study has reviewed recent research and debates about poverty–environment linkages in developing countries. It has not been able to summarize all findings and uncertainties in this vast topic, but has argued that orthodox beliefs in a downward spiral of poverty and environment degradation need to be replaced by a greater appreciation of the role of local institutions in mitigating both poverty and degradation, as summarized in the environmental entitlements approach. This section states the study’s findings in succinct form, and summarizes key debates for research and policy directions.

- Conventional approaches to poverty and environment are dominated by two main concerns in international environmental negotiations. These are, firstly that poverty needs to be eradicated in developing countries before they can participate in environmental protection (as stated at the UNCHE and WCED); and secondly that currently identified pressing environmental problems in the international arena are not those that most affect poor people. Diarrhea and lack of clean water are arguably the world’s largest environmental problems from a poverty perspective rather than more popularly discussed topics such as deforestation.
- In addition, most conventional approaches to environment and poverty assumed that they are linked in a downward spiral, which does not acknowledge how local institutions may lessen both poverty or

environmental degradation, or that environmental problems experienced by poor people may be different to those identified by international policy concerns.

- As an alternative, this study has argued that such universalizing conceptions of environmental degradation are increasingly criticized for three main reasons: (a) they often do not match growing evidence for what actually constitutes environmental change in recent years either as a result of human activity or from biophysical processes not related to humans; and (b) the international concerns about environment often do not hold meaning or relevance for poor people in developing countries; and (c) poor people are often able to adopt many local organizational and land management practices which lessen impacts of population growth, environmental degradation or economic change.
- A key part of this argument is that attempts to address problems of poverty and environment at the macro level or through universalizing descriptions of environmental problems (for example via 'ecoregions') may avoid the fact that environmental problems and poverty are experienced locally, and that much research on poverty has indicated that poverty exists when people are not included in such large-scale schemes. It also has to be acknowledged that both poverty and communities are heterogeneous, and may be differentiated on the grounds of gender, ethnicity, caste, age and other factors as well as wealth.
- Local people may reduce the impact of demographic, economic and environmental change, and direct these processes in a positive way through local institutions that allow access to and management of environmental resources and services. The environmental entitlements so generated contribute and contribute towards so-called sustainable livelihoods. They may be generated through a variety of means which in rural areas include traditional farming practices, and also new off-farm activities which allow farmers to diversify income sources.
- Yet in urban and industrial regions, the protection of poor people against environmental hazards may also imply increasing local access to emergency and other health services, and sanitation, which may be best supplied by national or international experts.
- As a consequence, international frameworks for poverty and environment need to question the assumptions of the Brundtland Commission (1997) in asserting that poverty alleviation is an essential part of avoiding environmental problems. This assumption might imply an acceptance of orthodox conceptions of environmental degradation, and therefore overlook potential environmental threats that currently affect poor people. Also, the macroeconomic drive for prosperity may also increase

environmental hazards affecting poor people (in addition to other global concerns such as increasing greenhouse gas emissions) unless there is a more nuanced understanding of the different conceptions of environmental problems that may occur under poverty.

- This is not, of course, to overlook the importance of poverty reduction for its own sake. Advances in understanding of policies to address poverty are crucial, and poverty reduction should rightly remain the overarching goal of development agencies. Indeed, we argue that there are risks of watering down research and policy efforts in poverty by hitching it too closely to environmental agendas through dubiously-conceived links.
- Similarly, current international environmental agreements and policies seeking to address ‘global’ environmental problems in developing countries (such as the CDM) may create negative impacts in the South unless there are strong attempts to integrate such investment or policy into local concerns. The international investment in renewable energy technology is one such example where the precedence of global environmental concerns may result in reduced competitiveness of domestic companies in developing countries, and the potential lost opportunity to integrate new energy policies into local agricultural and environmental schemes.
- Approaches centered on the role of the environmental entitlements are proposed as one way to integrate concerns about both poverty and environment at a variety of scales in developing countries, and to show the potential for integrating local autonomous action with interventions by national and international institutions.

## **7. Emerging issues and policy questions**

This final section identifies some emerging issues for research and policy that follow from this report. However, it is important to stress that the topics vary from some relatively short-term actions and some larger political dilemmas that have yet to be translated into simple policy options. The emerging issues therefore include some topics for which there are no clear solutions yet.

1. Incorporating science–policy–institutional debates. This paper has argued that much poverty and environment research and policy has been dominated by the downward spiral paradigm for which there is little evidence and which can also make the lives of poor people in marginal environments harder when translated into land use and economic policies. Why is this occurring? Why do some institutions still accept the downward spiral as a guiding principle in environmental policy when there is some much evidence against it? These questions are generally addressed by science-policy

research, and the growing dominance of certain environmental ‘narratives’ within some powerful institutions but not within others. There is consequently a need to understand how and why these narratives become dominant within the environmental policy community, and what steps can be undertaken to ensure they can be changed, or that similar institutionalization of narratives does not occur again.

In turn, this may mean the following practical questions:

- What access is there in environmental policy institutions to new findings and debates coming from the research community? How may such formal institutions become more self aware of the adopted agendas? What institutional factors may be introduced to introduce new knowledge sources both to development agencies and the expert bodies that advise them?

2. Acknowledging the differentiation of ‘communities’. It is extremely common to hear the word ‘community’ used to denote both citizens within a locality and also a form of unified beliefs and livelihoods. Instead, these so-called communities actually contain a number of differences such as gender, caste, wealth, and age that mean there are a variety of differences which can be suppressed by assuming ‘communities’ are uniform. Furthermore, this leads on to a greater acknowledgement of the difference in environmental perception and objectives in local, national and international terms.

Practically this implies the following questions:

- How can local citizens act communally while also acknowledging these differences? How can agencies increase the representation of different groups within communities?

3. Increasing the negotiating power of marginal groups. The environmental entitlements approach depends on the ability for communities to overcome internal divisions through negotiation and the development of political systems that win members’ trust. There is consequently a need to enhance the claims-making capacity of poor people in relation to the institutions that influence resource access and control, including addressing the power relations by which certain elite groups are able to dominate legal and institutional frameworks to their advantage.

In turn, this may mean the following practical questions:

- What steps can development agencies take to avoid excluding the marginal groups who are rarely represented? Which forms of local political structures enable people to voice opinions and gain trust in the representation achieved? However, the agencies must avoid influencing the process too overtly, and must also have some form of check on themselves to ensure their influence increases local representation rather than imposes more dominant agendas.

4. Evolving political governance for common property resources. In addition to the evolution of local political infrastructure and national capacity, it is also important to address the general problem of common property resources. The environmental entitlements approach incorporates the common property debate within the negotiation and evolution of different institutions. However, the concept of communal resources and the creation of locally supported institutions which genuinely reflect local concerns is something that requires more general attention.

Practical questions may therefore include:

- What steps may be made for building communal organizations and institutions that allow common resource management? How may arbitration between different resource users be made more effective and equitable, in a political system that gains trust among its participants? How far may these institutions evolve indigenously or through the assistance of development agencies?

5. Building national environmental policy capacity and accessibility. Building national capacity is a common requirement for implementing environmental policy. However, it is also important for building local resistance to the potentially negative impacts of international (or 'global') environmental agreements. National environmental policy offices which simply reinforce the downward spiral and therefore lead to land use controls or resettlement of villages may be avoiding the ability of those villages to avoid poverty and environmental degradation. Furthermore, the encouragement of new investment for environmental agreements such as the Framework Convention on Climate Change may also lead to a weakening of local industrial competitiveness and the avoidance of local forms of climate-friendly energy which are established already. However, these national offices have to be accessible to alternative narratives and economic concerns from local groups.

Practical questions for this may include:

- How can local offices be created in order to represent national interests effectively at the same time as adopt and enforce aspects of international agreements? Who will compose the offices? How may offices be organized in order to allow successful interventions from both international expert bodies plus marginalized groups within nations?

6. Identifying and understanding conflicts in environmental policy between local, national and international levels. As mentioned in the last paragraph, it is possible for some environmental policies to be perceived differently at various scales. This is not simply the disagreement over some aspects of environmental priority – such as the common opposition in developing countries to avoid

any reductions in greenhouse gas emissions because this may reduce the ability to generate wealth. Instead, there are also many differences in perceived environmental problems resulting from the different use of resources and perceptions of environmental value that may indicate a more fundamental disagreement over environmental policy. Examples of this may include the different perceptions of biodiversity and wilderness between rich and poor nations, urban and rural dwellers. It is important to acknowledge these differences at the policy making stage in order to avoid reiterating global orthodoxies about environmental 'problems' which may not be shared by some local people, and may in fact avoid the most immediate environmental problems experienced by poor people: diarrhea may be more pressing environmentally for poor people globally than some more commonly discussed questions in the developed world.

Practical questions may include:

- How can policy discourse change to indicate the greater variety of environmental perceptions and values in developing countries? How may international formal institutions become more aware of their own agenda and priorities in environmental policy?

7. Identifying and monitoring new forms of risk. In urban and industrial locations, many poor people are exposed to environmental hazards such as pollution which are relatively new to communities. Local adaptations and responses to risks may therefore lack long-term technical expertise, but they will also provide new and vital information for identifying and monitoring risks. It is therefore necessary to establish capacity for monitoring and addressing risks which may be poorly understood locally, yet which invite local information. The ability to accept local information and address risks in a way that seems independent from business investors is also crucial in order to gain local trust in such monitoring systems.

Practical questions include:

- How to achieve local monitoring of new risks which are biophysically informed by national or international experts (such as medical staff), yet which gain local trust? How can local factory workers or city dwellers be educated to avoid new risks, or to communicate information about risks to experts bodies?
8. Building effective public-private synergies of environmental policy. Linked to the evolution of new systems to monitor and address risks in industry, it is also important to create institutions which utilize the environmental expertise available in the private sector which also gain local trust and effective regulation of industry. It is clear that many rapidly industrializing countries require the waste management or new technologies available from foreign investment. But investment has to be



conducted under a form of regulation that accelerates the provision of environmental infrastructure, but which achieves this for the sake of local development and environmental protection rather than for the agendas of investors alone.

Practical questions include:

- Which forms of regulation may provide investors with incentives to ensure adequate waste disposal, or to undertake technology transfer or the construction of environmental infrastructure such as waste disposal? How may these be done in ways that also ensure that they address the concerns and experiences of local communities whom may be affected by the products of this investment?

9. Building sustainable livelihoods through locally controlled access to on- and off-farm income.

Research in sustainable livelihoods has identified that locally controlled resource development may imply a movement away from both poverty and environmental degradation as a result of diversifying incomes.

Practical questions are:

- How may local farmers and migrants gain the skills to diversify incomes? What institutional factors may increase their ability to adopt new forms of generating income, and conversely which factors prevent the adoption of sustainable livelihoods? How may land tenure be managed to ensure that individuals have access to key resources to avoid poverty?

10. Building environmental entitlements. The previous section identified ways and means of building environmental entitlements at the local, national and international scale. The importance of this is to ensure that local adaptation and organization may lessen the negative impacts of both poverty and environmental degradation.

Practical questions are:

- How may the general approach to environmental policy acknowledge a greater role for local institutions based on self determination in developing countries? How may international donors and agencies intervene to allow these institutions emerge more effectively, without influencing their direction? How may international–national–local conflicts in environmental objectives be overcome in ways that ensure that poor people are able to gain access to resources?

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