Chronic Poverty and the Environment: a Vulnerability Perspective

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Abstract

The relationships between poverty and the environment are highly contested, debated and researched. The sustainable development agenda, advocated at the 1987 World Commission on Environment and Development, brings these relationships to the fore. Environmental sustainability, alongside social and economic sustainability, is seen as an essential component in achieving the goal of sustainable development. The relationship between environmental sustainability and poverty is two-fold. From an environmental perspective poverty is often seen as a key driving force behind unsustainable environmental use. In relation to poverty reduction though, the environmental aspect of sustainability is often neglected. This is despite the fact that the poor are the most exposed to environmental changes and are the most reliant on access to natural resources for their livelihood and coping strategies. Environmental change then, can drive poverty. When looking at the chronically poor – those who remain poor for much or all of their lives, many of whom pass on poverty to their children – the transmission of assets which can buffer against environmental hazards and of entitlements to good-quality environmental resources are important.

This paper highlights some of the key thinking on poverty-environment relationships before introducing a framework focusing on the importance of environmental vulnerability in explaining poverty dynamics. The 'environment' is often equated with the natural environment; environmental vulnerability with earthquakes, volcanoes, floods and droughts. The environment, however, is much broader than this and can be seen in wider terms as the bio-physical setting within which people relate to each other and to their surroundings. A more holistic perspective on the environment helps to view it, not as a driver and maintainer of chronic poverty acting in isolation, but rather as a cause which interacts with the other social, political and economic factors identified by the Chronic Poverty Research Centre (CPRC).

The work of the CPRC on the environment is synthesised and a review of the literature on poverty-environment connections points to three main themes that require further consideration when addressing chronic poverty:

- the environment and health;
- access to and use of natural resources; and
- climate change

It is recommended that in depth literature research be conducted on specific areas within these themes in order to investigate further how and why they are important for our understanding of chronic poverty; to identify any gaps in knowledge and to determine whether there is a role for the CPRC to carry out research to increase our understanding. Finally, it highlights the need for the CPRC to fully incorporate the environment across the main problem areas around which it does research.

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1. Poverty and the environment: complex connections

Debates about poverty-environment connections originate in 18th century Malthusian ideas of a vicious poverty-environment spiral where the poor 'seldom think of the future' and continually degrade their natural resource base (Malthus, 1798). The debate has moved on since then, particularly with it now being acknowledged that the poor are acutely aware of any negative environmental impacts (DFID, 2001), with these being the result of larger processes of inequality and marginalisation. Despite the time dedicated to the debate though, the poverty-environment connection is still described as a 'big question' with which the scholarly community must engage (Harman, 2003; cited in Gray and Moseley, 2005) with there being 'little consensus as to what the rural poverty-environment relationship really is' (Cavendish, 1998).

Poverty-environment connections have been studied by many disciplines and in many regions. The central focus has been on the impacts of poverty upon the environment. Here, models such as the environmental Kuznets' curve which theorises that environmental damage is low in the initial stages of development, rises with rapid industrialization and then falls again as economies mature; the 'tragedy of the commons' thesis (Hardin, 1968) and images of a Sahara advancing in waves due to deforestation and overgrazing (Stebbing, 1935; cited in Dregne and Tucker, 1988) gained the status of 'received wisdoms' (Leach and Mearns, 1996). Whether or not acknowledged, even in the 1980s the conventional approach to environmental problems remained a neo-Malthusian framework (Schubert, 2005) with in-depth studies predominantly occurring at the large scale of the nation (Gray and Moseley, 2005).

Indeed, Lele (1991; cited in Reardon and Vosti, 1995) argues that the relationship between poverty and the environment is seldom systematically explored. Prakash (1997) also points to the use of general terms such as 'poverty' and 'environment' making the links between them dependent on the specific meanings given to each. Certainly, the relationship(s) need to be disaggregated – with one of the central questions being whether different sorts of poor people (varying by level of poverty, profession, location, age, gender) degrade or improve components of the environment in different ways (Forsyth *et al.,* 1998). Obviously this is a key question when specifically looking at chronic poverty.

It is not just the poverty aspect which needs to be addressed in greater detail; but also the environment side. Many assumptions about environmental degradation are contested. They are based on ideas of a 'climatic climax' vegetation community as advocated by Clements in 1916 and notions of a carrying capacity, which, when exceeded, results in unstoppable degradation. The basic idea behind both of these principles is that of equilibrium – both between various environmental factors and also between people and their environment – any deviation from this is seen as a linear departure into an 'inferior' state (Leach and Mearns, 1996). The development of the 'new ecology' (Botkin, 1990; cited in Leach and Mearns, 1996) emphasises the 'disequilibrium' of many arid and semi-arid ecosystems. It realises that there are many pathways of change and also stresses that changes can be reversed (Westoby *et al.,* 1989; cited in Brockington and Homewood, 1996). In other words there is no successional theory where changes in species composition or vegetation cover are thought to represent progressive change to a degraded state.

The concept of sustainable development – 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs' – as advocated at the UN conference on Environment and Development (1987) should have brought a systematic relationship between different aspects of poverty and the environment to the fore. Sustainable development is typically conceptualised under three columns – economic, social and environmental - with the sustainability of each being necessary. However, DFID notes that the environmental aspect is often totally neglected or given

inadequate attention. As a result many environmental trends, in relation to poverty reduction, are negative (DFID, 2000). When looking at chronic poverty – multidimensional poverty of long duration and which is often passed from one generation to the next – the transmission of entitlements to good quality environmental resources for future generations is extremely important; for environmental sustainability is 'primarily an issue of intergenerational equity' (Norgaard; cited in Hiskes, 2005).

Sustainability though, is a highly contested concept; who decides what is sustainable? 'Strong sustainability' is one conceptualisation – demanding that stocks of both human-made and natural capital are maintained over time. This is associated with excessive constraints on economic growth (Pearce *et al.,* 1989; cited in Adams, 2001) and is seen to suit environmentalists opposed to development and to pose impossible problems for governments and business (Adams, 2001). Because of this, the notion of 'weak sustainability' is also used. This involves trade-offs between losses to natural capital in one project and gains elsewhere and also allows for the substitution of human-made capital or human-induced 'natural capital' for the lost natural capital (Barbier *et al.,* 1990; cited in Adams, 2001). The substitution of natural capital raises questions about the intrinsic value of non-human nature as well as the concept of 'critical natural capital', or those aspects of nature which, once lost, cannot be replaced (Adams, 2001). The extent to which society accepts trade-offs between natural and human-made capital depends on whether sustainable development is seen as merely another form of 'development' or as a new concept that 'challenges orthodox assumptions and means a radical departure from conventional thinking and practice' (Reid, 1995).

Under sustainable development the relationship between poverty and environmental change is described as a two-way interactive process (Gray and Moseley, 2005). Poverty is viewed as both a cause of environmental degradation and also a result of people living in fragile and ecologically vulnerable environments. Shyamsundar (2002; page 2) finds it helpful to break down this relationship for the purposes of poverty alleviation and to ask; 'how do environmental factors impact the lives of the poor and poverty reduction efforts?' This question emphasises the role of environmental factors as determinants of poverty; something about which people are often uneasy due to echoes of environmental determinism and its imperialist connotations. However, in Asia around 60% of the poorest people live in ecologically fragile and vulnerable areas and in sub-Saharan Africa this figure is 50% (Leach and Mearns, 1991). These environments include flood plains, mountainous and hilly regions and fragile forest ecosystems; while the urban poor live and work in environments with high exposure to environmental hazards. A DFID (2001) review of 23 Participatory Poverty Assessments emphasises how the poor do feel vulnerable to environmental shocks and stresses. In the words of a Kenyan 'the poor live at the whim and mercy of nature' (1997; Narayan *et al.,* 1999)**.** These shocks and stresses can play a key role in moving people down to a lower state of well-being – they act as 'drivers of poverty' (CPRC, 2004).

However, seeing the environment as the sole determinant of poverty doesn't acknowledge the reasons behind why people live in environmentally vulnerable areas. Where current understandings of poverty-environment relationships are different from previous ones is their acknowledgement of the role of institutions in shaping people's relationships with the environment. Leach *et al.,* (1997; cited in Forsyth et al. 1998) use the idea of 'environmental entitlements' to explain how components of the environment become entitlements for different people, allowing them to obtain benefits from it. Indeed, the poor are well aware that their lack of power both underpins and shapes their relationship with the environment; with their low status and powerlessness limiting their control of, and access to, environmental resources (DFID, 2001).

2. Environmental vulnerability and chronic poverty

The relationship between environmental vulnerability (exposure to shocks, stresses and seasonality) and poverty is complex; with vulnerability to environmental change being a key dimension of poverty. The relationship is dependent on the frequency and magnitude of environmental change (the 'external' cause) and the coping ability of a community (the 'internal' cause), which, when confronted by an environmental change, results in certain outcomes (this may be a success or failure at dealing with the change) (Ellis, 2003). These environmental changes are on a spectrum ranging from those over which the poor have no influence and can only build their resilience against including 'exogenous shocks' (IMF, 2003) such as volcanic eruptions and external stresses including changing rainfall patterns, through to changes, which under certain circumstances, the poor can control and mitigate, such as soil erosion.

Prakash (1997) argues that the poverty-environment debate can be addressed from the angle of there being a connection between poverty and environmental vulnerability. Environmental risks and uncertainty represent the real underlying causes of degradation, forcing the poor to adopt coping mechanisms which may undermine their natural resource base.

With relation to chronic poverty, however, Devereux (2002) argues that vulnerability results in transitory poverty – with there being a sudden collapse in returns following a shock or a stress – from which communities will recover. Chronic poverty, he argues, results from low productivity and low returns from labour, land and capital. Siegel and Alwang (1999), however, see environmental vulnerability as central to low productivity. They believe that an uncertain environment results in a 'vicious cycle of vulnerability'. Environmental vulnerability leads to management strategies which allocate assets inefficiently, leading to low returns, low consumption, low savings and investment, a limited asset base and in turn lower returns, consumption and savings. Sinha *et al.* (2002) also argue that the mere possibilities of what they term 'disaster fluctuations' may create risk-averse behaviour, with people acting in cautious and non-entrepreneurial ways even during normal times. This limits their prospects of increasing their well-being. At the other end of the spectrum, however, studies in Bangladesh show how the desperately poor may adopt a 'gambler's throw' strategy as they know an environmental shock is almost inevitable (Shahabuddin *et al.,* 1984; cited in Sinha *et al.*, 2002).

The relationships between environmental vulnerability and chronic poverty, then, require further investigation. The following framework (Figure 1) looks at the compounding role of environmental shocks, stresses and seasonal shifts in chronic poverty. This is followed by a discussion of environmental vulnerability and examples of how different environmental hazards impact on people's livelihoods. The following section then synthesises the work of the Chronic Poverty Research Centre (CPRC) on the environment before highlighting areas for future consideration; the environment and health; use of and access to natural resources; and climate change. The paper concludes with recommendations on how these areas should be incorporated into the work of the CPRC.

Explanations of concepts used in this paper:

Vulnerability: combines exposure to an event with sensitivity to its adverse consequences (Devereux, 2001).

Hazards: events, which if they occur, will result in adverse consequences.

Risk: understanding the probability of a specific hazard (event) occurring; this may be on the basis of past experience (CPRC, 2004).

Uncertainty: the likelihood of an event occurring is unknown (CPRC, 2004).

These events may be:

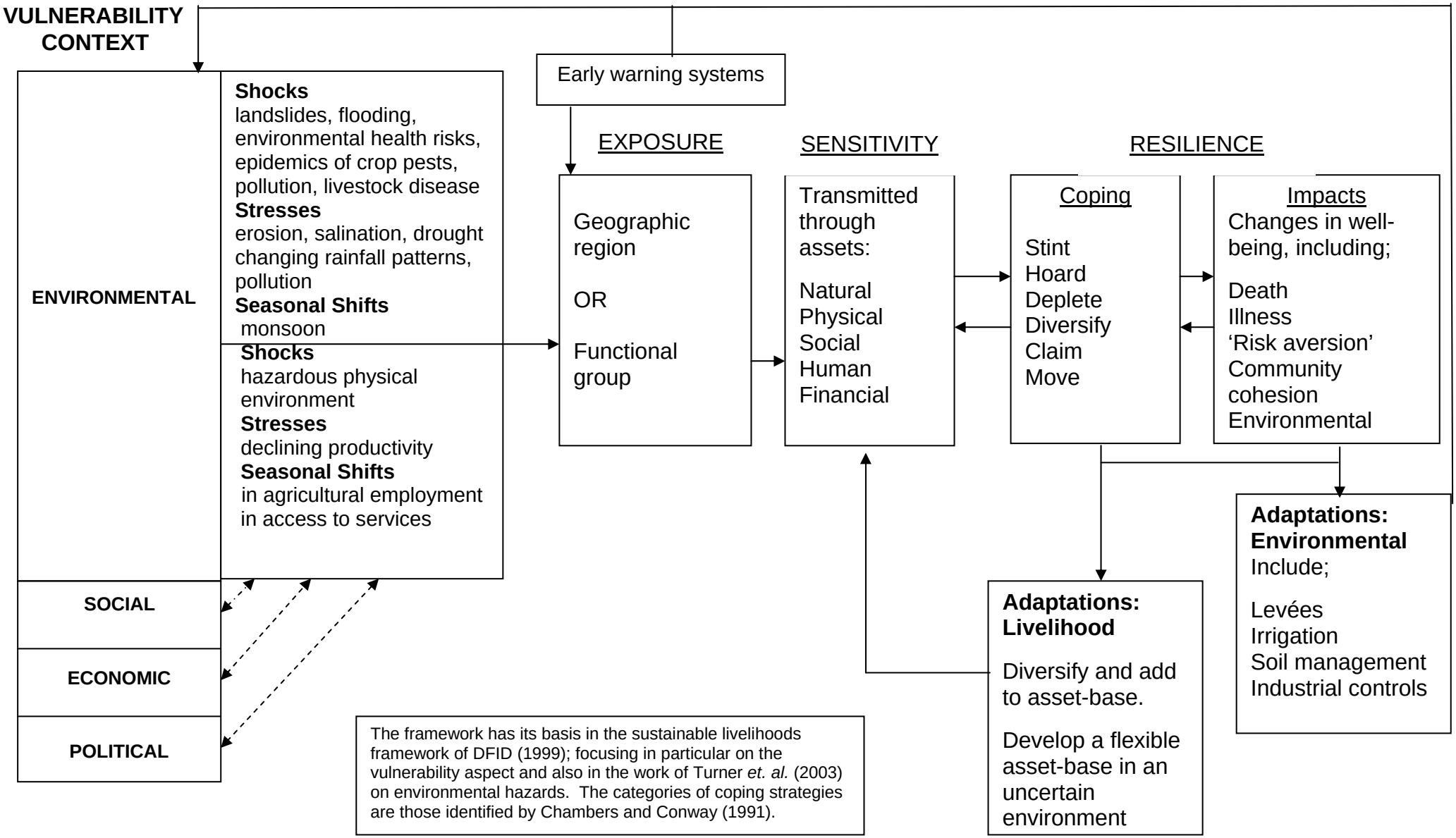
- Shocks: rapid changes
- Stresses: are more predictable; have an important influence on the rates of return of different livelihood strategies
- Seasonal Shifts: one of the most enduring sources of hardship for the poor (adapted from DFID, 1999)

Environmental Vulnerability: Predictions of risk in different locations give an indication of an area's environmental vulnerability (or exposure to risk). It is difficult to factor in uncertainty (Forsyth, 2003).

The framework combines aspects of the two major approaches to environmental vulnerability. On the one hand, the orthodox approach states that vulnerability is best addressed by mitigating those environmental changes considered to be the main causes of risk. Alternative approaches, on the other hand, emphasise reducing vulnerability by increasing the ability of societies to adapt to these changes – through reducing exposure or increasing sensitivity and/or resilience (Forsyth, 2003).

On the left of the framework are certain aspects of the vulnerability context; this context frames the external setting in which people exist and shows the aspects which are furthest outside their control (DFID, 1999). While the focus here is on the environment this is not to suggest that environmental factors operate in isolation. For one, people's 'environment' is not confined to their so termed 'natural' surroundings, but also includes physical infrastructure and setting. The aim is not to view the environment as a 'sector' to be analysed separately with relation to poverty reduction, but rather as a cross-cutting theme interlocking with the other areas identified as causes of poverty by the CPRC – economic, social and political factors. Box 1 highlights some of the main linkages.

Figure 1: A Vulnerability Framework



Box 1 Examples of the wider impacts of environmental vulnerability:

SOCIAL

Poor Health – environmental shocks often destroy water and sanitation infrastructure exposing people to raw sewage; floods leave behind stagnant water providing a source of exposure to cholera and malaria.

Seasonal food shortages with associated low levels of consumption and nutrition lead to stunting in children and make people more susceptible to other diseases.

Discrimination and Inequality – governments unwilling to make long-term investments in vulnerable environments; also, the 'urban bias' of investment and state intervention. Evidence that the poor receive less help following an environmental shock making them further disenfranchised (Sinha *et al.*, 2002).

'Culture of Poverty'- constantly being exposed to environmental risks can make people unwilling to invest in their environment and to become risk-averse.

Human Capital – Padamukti in Indonesia and Khaliajuri in Bangladesh – seasonal flooding makes it difficult for children to get to school (Narayan *et al.,* 2000).

POLITICAL

Violent Conflict – environmental degradation can escalate into violence – examples include severe water shortages, widespread desertification, health-threatening toxic contamination and environmental refugees (DFID, 2000). However, you cannot assume that degradation or resource scarcity 'predispose violent conflict' (Hagmann, 2005).

ECONOMIC

Economic Growth – 'Exogenous shocks' affect output and incomes and can destroy physical capital, which unless replaced, will have longer term effects on growth. The 1992 drought (which can be viewed as a shock or stress) in Zimbabwe resulted in a 9% contraction in GDP. This was due to the country's high reliance on agriculture in which production dropped by 23% (IMF, 2003).

Low Productivity – Crop yields in Africa could be halved within 40 years if degradation of cultivated land continues at present rates (DFID, 2000), while the agricultural sector has a significant impact on poverty (Shah *et al.,* 2005).

Seasonal Unemployment – with there often being few non-agricultural opportunities in rural areas.

The purpose of the framework is also to draw greater attention to the dynamic nature of poverty; this is why the focus is on the vulnerability context, for it better captures change processes as 'people move in and out of poverty' (Lipton and Maxwell, 1992; cited in Moser, 1998). This is in line with a key aim of the CPRC to identify factors which are important drivers, interrupters and maintainers of poverty (Hulme *et al.,* 2001). Poverty measures are generally fixed in time and poverty is often seen as essentially a static concept (Moser, 1998). However, the CPRC specifically focuses on the durational aspect of poverty. To do this it uses the spells approach which looks at the transition (or lack of transition) from one welfare status to another e.g. from being poor to being non-poor or from being chronically poor to being transiently poor (Hulme *et al.,* 2001).

Tracking the effects of environmental changes on different groups and geographic areas helps to highlight when and how people are driven into poverty, the factors which maintain them in poverty and occasions when they can escape. For instance, even though all households may be equally exposed to a risk these risks are transmitted through assets; with the number and combinations of assets influencing the degree to which people are likely to suffer from the negative effects of

environmental change (Moser, 1998). Because of this Siegel (2005) argues that for successful poverty reduction there must be analysis of the quantity, quality and productivity of assets needed by different households in different geographical areas which enable people to improve their well-being.

When addressing whether environmental change can be a driver of chronic poverty it is also important to look at resilience, for 'resilience provides the capacity to absorb shocks whilst retaining function' (Folke *et al.,* 2002). The flip-side to resilience is vulnerability – when a system (the combined social-ecological system) loses resilience it becomes vulnerable to changes which previously it could absorb (Folke *et al.,* 2002). Resilience includes both coping strategies and long-term adaptations. Coping is often seen as being negative, though this is not necessarily the case, with crop diversification reducing vulnerability from future environmental risks, particularly crop pest epidemics. However, in the absence of sufficient assets or public safety net systems, households may adopt coping strategies, including selling family land, that prevent them escaping from poverty in the future (Skoufias, 2003).

Adaptations are long-term management strategies which, in the case of environmental adaptations, illustrate instances where people have managed to avoid the negative impacts of environmental change. In many cases they feed-back into and influence the environmental vulnerability context. These range from small-scale land management practices, including stone lines to prevent soil erosion, to large-scale hydrological infrastructure to reduce the impacts of flooding or drought (Forsyth, 2003). However, in the case of uncertain and complex environments, resilience requires increasing the ability to cope with, adapt to and shape change; to develop flexible livelihood systems rather than the adoption of rigid management strategies aiming to keep the social-ecological system in an artificial steady-state (Folke *et al.,* 2002).

Environmental vulnerability drives and maintains poverty in many ways; it is necessary to analyse these different ways closely in order to identify potential 'interrupters'. Boxes 2, 3 and 4 follow the effects of environmental changes on different communities.

Box 2 Environmental Shocks

The 1998 Bangladesh flood covered, at its peak in September, 2/3 of the country, causing severe damage to the *aman* monsoon rice crop which was due to be harvested in November/December. The unusually long duration of the flood waters precluded any possibility of re-planting rice seedlings.

Resilience:

COPING: Selling assets, reducing expenditure and food consumption, borrowing for food and to fund other expenses including education and health, farming, repayment of loans and purchases of agricultural equipment. Borrowing was mainly from non-institutional sources such as friends and neighbours. A year later, even though there was an improvement in the number of households in debt, the amount of debt was still equivalent to a large share of total household expenditure, leaving them more vulnerable to another shock.

The Government of Bangladesh used targeted cash transfers, though these were small relative to the needs of households.

Private sector rice imports from India supplemented domestic food supplies. These helped to stabilise rice prices, preventing further fall in household purchasing power and calorie consumption.

IMPACTS: Households exposed to the flood suffered severe crop losses (equal to 24% of the total value of anticipated production for the year), employment opportunities for daily labourers declined and over half of the households exposed lost critical assets. Illness – particularly among children, including stunting, wasting and diarrhoea– due to greater exposure to contaminants, reduced access to safe water and food and the greater difficulties in providing proper care for children. Over a year later 58% of children exposed to the flood remained stunted. The flood also had a long-term negative impact on the nutrition of pre-school children whose nutrition was already very low. The resulting chronic malnutrition has left them more vulnerable to future natural

ADAPTATIONS: Government responses to previous floods enabled a long-term expansion in the winter season rice crop (*boro*), which has reduced dependence on the flood susceptible *aman* rice crop. Improved infrastructure made it easier to get food to those who needed it.

Del Ninno *et al.* (2003)

Box 3 Environmental Stresses

In the Ethiopian highlands, land degradation, mainly due to soil erosion and nutrient depletion, is one of the most important environmental problems. Due to inherently good soils and relatively abundant rainfall, the highlands account for 95% of the country's cultivated area. FAO (1986) estimates that 50% of the highlands are significantly eroded; with 4% of these being irreversibly degraded.

Environmental adaptations include the construction of graded soil-stone bunds, Fanya Juu bunds (where soil is moved uphill so the basin is below the embankment), afforestation, planting of grass strips and also traditional (and less effective) methods of erosion control including drainage furrows and cut-off drains used together with crop rotations. The actual practices which are used are site-specific. Many of them, however, result in loss of productive land.

If small holders anticipate lower or the same immediate returns from switching to a soil-conserving regime substantial installation costs prohibit them from investing in conservation. Soil erosion continues.

Shiferaw and Holden (1999)

Box 4 Seasonality

Residents of the Bolangir District in India – report how it is impossible to recover from the 5 year cycles of drought. This is due to extreme losses of crops, indebtedness, starvation (during droughts household consumption falls by over 50%), land-alienation, sale of assets and irreparable damage to nearby forest resources.

Narayan *et al.* (1999) - Voices of the Poor – India 1997 and 98

3. The CPRC and the environment

The CPRC identifies the environment as one of four general categories of factors affecting the incidence of chronic poverty. It breaks down environmental causes into:

- Disasters (floods, droughts, earthquakes etc.)
- Propensity for disease ('The Tropics')
- Environmental degradation
- Low quality natural resources
- Remoteness and lack of access

The first three fit broadly under the problem area of insecurity, risk and vulnerability – the aspect on which the framework focuses – while the last two are encompassed by the problem theme of assetlessness, low returns and inequality (determining the sensitivity of a community to environmental shocks, stresses and seasonality). Climate change is now also increasingly acknowledged as a factor which can impact on all five of these environmental causes of chronic poverty.

3.1 Environmental hazards (leading to disasters)

The term 'environmental hazards' is more useful here than 'disasters'. Disaster refers to levels of material damage and losses of human life which may result from a particular hazard. In other words, it doesn't refer to the environmental event behind those impacts (Middleton, 2002). For the CPRC what is important are the pathways through which an environmental hazard becomes a disaster in terms of driving people into chronic poverty. These pathways are a function of social, political and economic factors as well as of 'natural' processes (Wisner *et al.,* 2004).

The CPRC cites natural hazards or 'shocks of nature' (CPRC, 2004) as one of the key drivers of chronic poverty. Many of these shocks are extreme weather events – floods, droughts, extreme temperatures and windstorms. Others are geophysical hazards such as landslides, volcanic eruptions and also biological hazards including epidemics of crop pests and livestock diseases.

It is not just the impact of an environmental disaster which can drive chronic poverty. Okidi and Mugambe (2002) point to people living in the mountainous areas of Eastern Uganda as being particularly susceptible to chronic poverty, with a major reason for this being the exposure of the area to earthquakes and landslides. As people feel their homes are always at risk they live in a state of anxiety and are unable to plan ahead or engage in long-term investments in the area.

Perhaps the term 'shocks of nature' restricts the environmental shocks considered by the CPRC. Smith (1996; cited in Middleton, 1999) uses the term 'environmental hazards' to refer to a spectrum with purely natural events at one end and distinctly human-induced events at the other. For people exposed to shocks to their physical and natural environment; whether they were 'naturally caused' is irrelevant. Environmental hazards not properly considered by the CPRC, though briefly mentioned in some of the working papers (Mitlin, 2003; Kapur Mehta and Shah, 2001), include pollution shocks and stresses and also the implications of living in a hazardous physical environment, for example in poor quality housing, beside a railway line or on a rubbish tip.

3.2 The environment and health (propensity for disease – 'the Tropics')

As implied above, there is more to environmental health as a driver and maintainer of chronic poverty than is implied by 'propensity for disease – 'the Tropics''. There are particular diseases associated with the Tropics; Aliber (2001) highlights the cholera

epidemic in KwaZulu-Natal as being the result of the characteristics of the natural environment combined with an inadequate physical environment where an infrastructure backlog has left people more exposed to contaminated water. However, there are also other environment-related health problems including diarrhoea and acute respiratory infections (DFID, 2000).

The CPRC argues that 'ill health – particularly of the household's main income earner – is perhaps the most common driver of chronic poverty at the individual and household level' (CPRC, 2004; page 44). The idea of an 'ill health spiral' describes how illness leads not only to the loss of human capital; but also requires expenditure on treatment. However, the CPRC has not really addressed the specific issue of environmental health; defined as 'those aspects of human health, including quality of life, that are determined by physical, biological, social and psychological factors in the environment' (World Bank, 2000; cited in Shyamsundar, 2002). Why the environment and health requires further consideration is explained later in this paper.

3.3 Environmental degradation

Environmental degradation is the equivalent to 'environmental stresses' as identified as part of the vulnerability context. The types of degradation which the CPRC identifies include salination, deforestation and pollution. The transmission of entitlements to natural resources through inheritance is key to the inter-generational transfer of poverty. A degraded environment affects not only the well-being of the present generation; but also affects the livelihood possibilities of future generations who are reliant on those resources and leaves them more exposed to environmental shocks (Moore, 2001).

Looking at Koraput - a forest region in southern Orissa – Shah *et al.* (2005) report serious deforestation and land degradation. Forest area has declined as a percentage of the total area from 37% during the 1980s to 30.2% in 1999, while in some areas degraded land constitutes 72% of the total forest area. The authors conclude that this degradation is the result of alienation from the land and the physical isolation of the communities living in the area. The conservation, regeneration and development of forest resources by the government has not been combined with efforts to alleviate poverty and meet livelihood needs. Instead, the poor have been alienated from their resources. This has set up a downward spiral of overuse of resources (by both the poor and the rich), deprivation, further extraction of resources, increased control by the state (for conservation) and then further degradation through the clearing of the forest for crop cultivation.

In Lesotho, while the ascending poor saw an increase in the proportion of households with productive fields between 1993 and 2002, the chronically poor and descending poor saw an increase in the number of households with unproductive fields. Seven households out of the 328 visited in both 1993 and 2002 had lost their fields due to erosion (Wason and Hall, 2004). The reasons as to why land belonging to the chronically and descending poor became unproductive over this time are unclear. Reasons given for degradation by CPRC working papers are that population growth and the resulting pressure on resources directly contributes to deforestation and environmental degradation (Okidi and Mugambe, 2002) and also that pervasive poverty results in degradation as the poor have to undermine their environmental resource base simply to survive (Gore, 2003)[1]. Other reasons include the fact that the chronically poor, often being marginalized groups, own or have access to more fragile and vulnerable land and also have little access to the environmental

[1] There is a body of research showing the opposite though; for instance the work of Fairhead and Leach (1996) on forest islands in Guinée.

information, knowledge, inputs and technologies required for sustainable land management.

3.4 Low quality natural resources

Areas with low quality natural resources can be termed 'marginal lands' and include arid zones, swamps, saline lands and steep slopes. In Africa, the highest incidence of poverty occurs in arid zones (UNDP, 1997; cited in Bird *et al.,* 2002). The quality of the physical environment is a key determinant of the sensitivity of a particular community and area to risks. This is because the quality of natural assets available, in particular land, in both rural and urban areas is a key dimension of poverty, with the poor speaking extensively about assets and much less about income (Narayan, *et al.,* 1999).

Adverse agro-ecological conditions limit the livelihood opportunities available. There is a perception that households living in unfavourable ecosystems compensate for this through expanding their non-farm activities. However, panel data from a sample of 273 households in 16 flood-prone villages in Bangladesh shows that for the extreme poor this compensating mechanism is not truly in place. In 2000 income from non-agricultural activities for the extreme poor (excluding non-agricultural labour income) was 13% of their income. Presumably this is because the extreme poor lack access to financial assets and/ or human capital (Sen and Hulme, 2004).

Water is another key natural resource. In the upper catchments of river basins in the Koraput region of southern Orissa the absence of irrigation is a major ecological constraint on the livelihood opportunities available (Shah *et al.,* 2005). The availability of fuelwood is also important. Half of households spend over 2 hours collecting fuelwood in Lesotho (Wason and Hall, 2004). This absence of choice is a key dimension of poverty.

As mentioned before though, the relationship between natural resource quality and poverty is not fixed and is mediated by a range of factors; particularly institutional arrangements. There are areas which are abundant in natural resources but contain high numbers of poor people; while the 'natural resource curse' refers to the paradox that countries with high-value natural resources often have slower economic growth than those countries without them. Also, so-termed 'low quality natural resources' can rapidly become high value ones, as with the spread of aquaculture through the previously viewed marginal lands of the tropics as the value of shrimp increased.

3.5 Remoteness and lack of access

In the vast majority of developing countries the incidence of poverty in rural areas is higher than that in urban areas. Here there is a recognition that 'place matters' (Bird *et al.,* 2002). This focus on place combines the previous environmental causes of chronic poverty; vulnerability and the low quality of natural resources. So termed 'spatial poverty traps' are argued to have low agricultural potential, often having no access to irrigation, while also being vulnerable to climatic fluctuations, pests, diseases and man-made and natural hazards (CPRC, 2004).

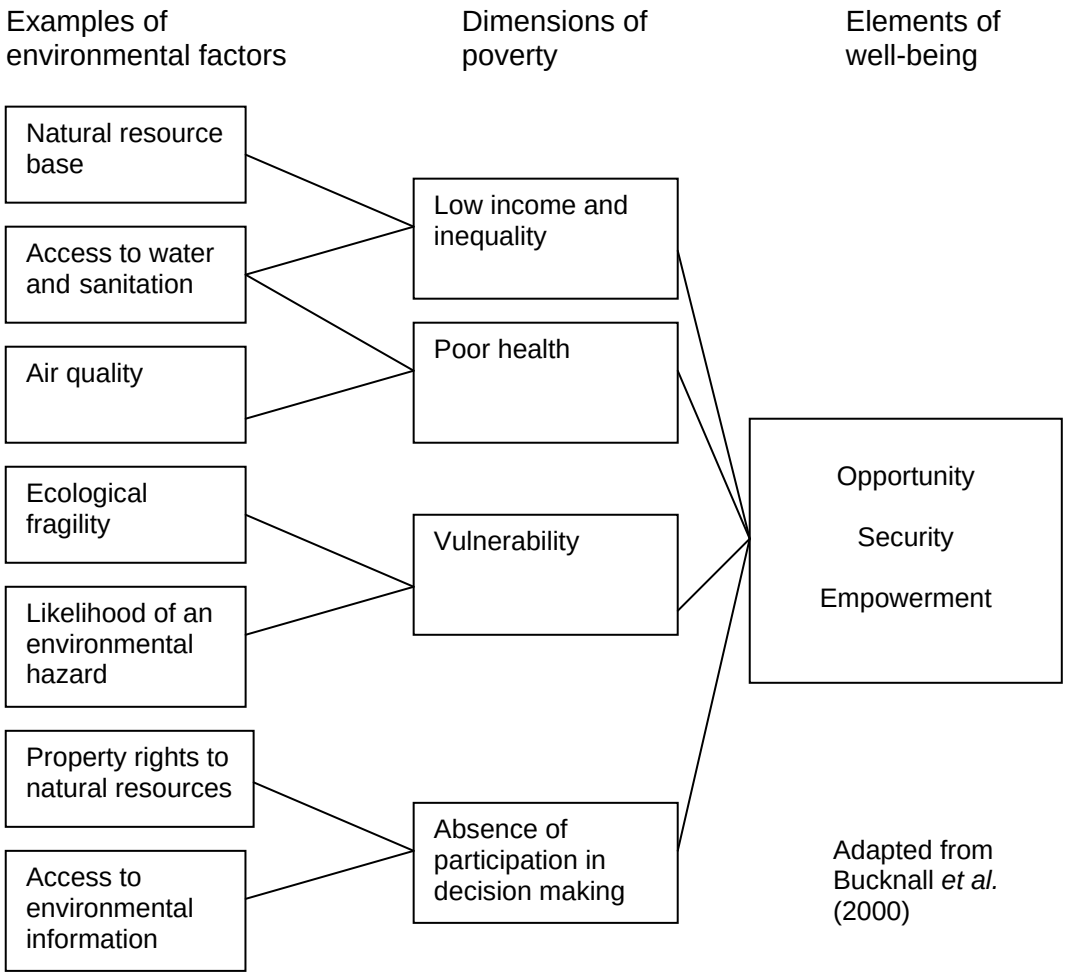
Spatial poverty traps result from a combination of deficiencies in both the natural and physical environment. Rural poverty is associated with isolation, lack of roads, poor infrastructure and limited institutional presence (Kapur Mehta and Shah, 2001). In Lesotho, for instance, the majority of the chronically poor are found in mountainous areas where, despite efforts, government services are generally worse. This meant that in 2002 only 65% of the chronically poor had access to clean water; a much lower percentage than for the ascending poor and the never poor (Wason and Hall,

2004). Certainly, mountainous areas provide engineering challenges for the provision of infrastructure.

Environmental causes of poverty, then, often combine with other political, social and economic causes so that the chronically poor 'commonly experience several forms of disadvantage and discrimination at the same time' (CPRC, 2004). This can be seen in poverty traps in the forest-region of Koraput. Here, dependence on fragile forest resources, which experience frequent droughts and physical isolation, combines with the fact that most of the people living there belong to socially marginalized groups. This results in 'logjams of disadvantage' (de Haan and Lipton, 1998; cited in Bird *et al.,* 2002).

The impression is that the CPRC has examined the two causes of chronic poverty which lie under the theme of assetlessness, low returns and inequality (low quality natural resources and remoteness and lack of access) in greater depth than the environmental aspects of chronic poverty under the theme of insecurity, risk and vulnerability (environmental hazards, the environment and health and environmental degradation). It is important that the environment is fully addressed across all the themes, for it is a key aspect in all dimensions of poverty as Figure 2 illustrates.

Figure 2: The environment impacts on all dimensions of poverty



4. Areas for further consideration

4.1 The environment and health

- 'Environmental factors are responsible for almost a quarter of all disease in developing countries'; while the poor, particularly women and children, are most affected by environmental health problems (DFID, 2000; page 16).
- The environmental components of disease are highest in less developed countries. In sub-Saharan Africa environmental factors are the cause of 27% of the total burden of disease (World Bank, 2000; cited in Shyamsundar, 2002).
- Premature deaths and illnesses resulting from environmental risks are comparable with those from malnutrition and larger than those from all other preventable risk factors (Lvovsky, 2001).

From a survey of 1000 households in the Greater Accra Metropolitan Area, Songsore and McGranahan (1993) argue that intra-urban differences in morbidity and mortality can be explained in terms of unequal access to resources that help people to protect themselves from environmental risks. They find a strong correlation between socio-economic status and prevalence of diarrhoea with 22% of children in the poorest quintile having had diarrhoea in the 2 weeks prior to the interview compared with only 9% of children in the richest quintile. They explain this disparity in terms of access to environmental services (particularly safe water), lack of knowledge and an inability to prevent diseases by the poorest. The poor are more exposed to health hazards; living in crowded conditions and so being more subject to parasitic and diarrhoeal infections. For instance, 69% of the poorest but only 12% of the richest households shared toilets with more than 10 people, while only 6.3% of the poorest had access to in-house piped water compared with 78% of the richest quintile.

The World Bank divides these environmental health risks into two broad categories (2000; cited in Shyamsundar, 2002):

- traditional hazards relating to poverty and lack of development including lack of safe water, inadequate sanitation and waste disposal, indoor air pollution and vector-borne diseases (such as malaria).
- modern hazards, including urban air pollution, agro industrial chemicals and waste caused by development which lacks environmental safeguards.

The impact of traditional hazards exceeds that of modern hazards by a factor of 10 in Africa and by a factor of 5 in Asia (except China) (Lvovsky, 2001).

The most important hazard, particularly for urban populations, is faecal contamination of water and food resulting from inadequate sanitation systems, compounded by unreliable and unsafe water supplies (DFID, 2000). The second most significant hazard is indoor air pollution (Shyamsundar, 2002).

4.1.1 Lack of Access to Clean Water and Sanitation

Diseases primarily stemming from a poor water supply include diarrhoea, dysentery, cholera, conjunctivitis and typhoid (Lvovsky, 2001). The poor are more likely to be affected by these diseases, due not only to their greater exposure, but also because low nutrition makes them more vulnerable. The 'poor' however, are not a homogenous group and in a rural context it is poor women who are more exposed to water-borne diseases because of their domestic and agricultural tasks (Bucknall *et al.*, 2000).

4.1.2 Indoor Air Pollution

Approximately 1 billion people are affected by problems caused from using traditional biomass fuels (dung, charcoal, crop residues, wood). They are exposed to high levels of indoor pollution from cooking and heating with inefficient fuels in poorly ventilated areas (DFID, 2000). It is women who are more exposed to this pollution and suffer disproportionately from the resulting acute respiratory infections and chronic respiratory diseases.

'Modern' fuel sources are often too expensive for the poor. Lesotho has recently seen an increase in the price of oil-based fuels, with the price of paraffin rising above the rate of inflation and becoming too expensive for many households. The country is not extensively electrified and other 'modern' power sources such as solar power are far to expensive to install. Many Basotho, then, have decided to economise by returning to using traditional fuels, despite the fact that fuelwood is becoming difficult to find (Wason and Hall, 2004).

Acknowledging the importance of environmental risks requires a shift in focus in approaches to ill-health. Many of the underlying causes of disease, injury and death in developing countries lie outside the realms of the health care system (Doumani and Listori, 2000). They lie in the absence of basic services. However, the health sector tends to focus on interventions within the health care delivery system rather than looking at other sectors which are the source of the problem (Doumani and Listori, 2000). In developing countries an unprecedented number of people are now living in urban areas. With this increased concentration of people it is likely that environmental health risks will only become more important. This has significant implications for the way which the CPRC thinks about ill-health and identifies interrupters of poverty.

The CPRC has focused in depth on the role of ill-health shocks as drivers and maintainers of chronic poverty. The environment itself plays a key role as a driver of these ill-health shocks – a link which has not been examined by the CPRC. In comparison with other health shocks, such as HIV/AIDS, those primarily caused by environmental factors should be easier to address. How they can be, and thus how many 'ill health spirals' can be avoided, requires further investigation.

4.2 Access to and use of natural resources

The poor are most dependent on diverse natural resources and are most vulnerable when biodiversity is lost (DFID, undated). Natural resources are central to the livelihood and coping strategies of the poor providing food, livestock feed, household products, income and also environmental services.

Looking at the Shindi ward in Zimbabwe, not seen as being abundant in natural resources, Cavendish (1998) points to the numerous goods provided by environmental resources. These include wild foods such as honey, nuts and fish; wood for construction and making furniture; making fishing canoes and hunting nets from bark and woven mats from grass and reeds. In many instances these goods are also traded. Roughly 35% of total household income is derived from freely-provided environmental goods. Poorer households, however, are most dependent on these resources with the poorest 20% of households deriving over 40% of their income from environmental sources (Cavendish, 1998). This finding is also re-enforced by recent work in two coastal areas of Vietnam. This stresses the value of open-access resources such as mangrove products, mud-worms and clams for the livelihoods of the landless and poor; with their importance being greatest for the poorest. Indeed, these resources are becoming more important for their livelihood strategies because

of a shift to types of private land use (including shrimp farming) which exclude the poorest (Luttrell, 2006).

Environmental resources also provide the basis of coping strategies in ecologically vulnerable environments, with people eating certain leaves and vegetables only in times of drought (Cavendish, 1998). The natural environment is the only resource which is 'free' and so the poor turn to greater exploitation of it in the absence of other sources of credit (Tanzania, Voices of the Poor; cited in DFID, 2001). How can policies achieve a balance between allowing the poor access to natural resources during hard times, while also ensuring that this biodiversity is protected for future generations? Is there a role here for non-natural resource-based coping strategies? What kind of institutional arrangements are needed?

4.2.1 Conservation of Natural Resources

The exploitation of the environment by the poor is an explored and contentious area. Though, the notion of a 'downward spiral' of degradation is obviously over simplistic (Forsyth *et al.,* 1998), there are circumstances under which poverty can contribute to degradation. In Malawi, for instance, water scarcity is linked to deforestation by the poor and the resulting siltation has, as one researcher observed, 'covered most of the springs' (Narayan *et al.,* 2000). In other words, poverty has negative effects on the environment, and the environment then negatively impacts on poverty. Here the policy context within which the poor live is very important. Barbier (2000) points to erratic agricultural pricing policies during the 1980s in Malawi which distorted the incentives for poor smallholders to adopt less erosive crops in their farming systems.
In Africa, traditional approaches to conservation have involved the establishment of protected areas for wildlife and the exclusion of access by local people to this land. For the Maasai in Tanzania a Serena Lodge in Ngorongoro Conservation Area meant the loss of two springs which provided the only sources of reliable water during the dry season (Neumann, 1995). Conservation of biodiversity should not mean loss of critical assets for the less powerful. This, however, is precisely what it has meant and largely still means in Africa where the 'powerful, persistent and popular vision' of 'fortress conservation' lives on (Brockington, 2002). This approach to conservation stems from the view that the only way to save nature is to forcefully exclude people from the areas designated to protect it.

This is increasingly questioned, particularly through Community Based Natural Resource Management (CBNRM) which is seen as taking policy and rewards 'to the people' (Logan and Moseley, 2002). It approaches wildlife management as both an antidote for rural poverty and as a proactive mechanism for redressing the negative economic impacts of environmental shocks (Metcalfe, 1994; cited in Logan and Moseley, 2002). Here, however, the notion of 'community' poses problems, for while a community is treated as a homogenous entity, this is rarely the case (Neumann, 1997). In many instances new institutions have been created to oversee wildlife management, rather than making use of pre-existing ones. Within these institutions ethnic conflicts and intra-community conflicts are often re-exposed. Here, there are mixed views as to the involvement of the least powerful members of any 'community'. This has implications for the chronically poor.

Similar observations are made from the Machakos district in Kenya, seen as being a success story in diverting long-term environmental degradation. Increasing population density in this instance has contributed to agricultural intensification and technological innovation. At the household level farmers have invested capital and labour in terrace construction, hedging, fencing and dam building. At a community level off-farm income has enabled investment in infrastructure and services such as shops and stores (Tiffen *et al.,* 1994). This situation is seen as an environmental and

poverty-alleviation success story. However, the management of and improvements to the land are argued to have resulted in increased inequality in access to resources and further polarisation of wealth (Murton, 1999). How can the least powerful be involved in, rather than excluded from, conservation and development efforts?

4.2.2 Common Pool Resources

The above example illustrates the difficulties in expecting land systems to adjust smoothly to satisfy the evolving functional needs of agriculture, population growth and urbanisation (Platteau, 1992).

So called 'traditional' land systems include common property arrangements where an outstanding feature is the 'Right of Avail' that is automatically applied to all members of a community. Households are allocated land for cultivation out of clan reserves which becomes the exclusive property of the household as long as they continue to belong to the community and actively use the land. Unallocated land remains accessible to everyone in the community for activities including harvesting of natural resources, grazing and hunting (Kalabamu, 2000). During times of need land can be reallocated to ensure that all households have sufficient supply (Kalabamu, 2000). In other words, common pool resources provide an organisational framework to give community members maximum insurance against risks that cannot be adequately self-insured against (Platteau, 1992).

Cavendish (1998) argues that in Zimbabwe the great majority of environmental resources are derived from the commons. The commons, then are extremely important for the welfare of poorer households (Cavendish, 1999). These findings support earlier research by Jodha (1986) who concludes that 95% of poor households (landless labourers and small farmers with less than 2 ha of dryland) in Andhra Pradesh are dependent on common property resources for food items. He argues that the decline of common pool resources results in further pauperisation of the poor.

Common pool resources, then, are extremely important in preventing people slipping further into poverty. However, this does not mean that they necessarily provide an escape route from poverty for the chronically and transitory poor. Cavendish (1999) argues that as many environmental income sources require no initial investment they are both disproportionately undertaken by rural households and they also provide low returns. In other words, they do not enable households to overcome the constraints that prevent them from significantly raising their income. Should escape routes from chronic poverty involve the promotion of non-natural resource based livelihood strategies?

4.2.3 Land Reform

Land reform 'changes the prevailing pattern of ownership, usage and control of land' (Platteau, 1992). Land reform and land policy affect the way land is used and its environmental sustainability (DFID, 2002). Land reform is seen as necessary for political reasons, reasons of agricultural productivity and to ensure sustainable use.

From a poverty alleviation perspective one of the challenges of land reform is attempting to capture the complexity of common pool resource arrangements. Under these arrangements 'tenure niches' may overlap and vary by resources and season. For instance, rights to trees do not necessarily coincide with the rights to the land on which they grow (Chambers and Leach, 1989; cited in Maxwell and Wiebe, 1999).

Land reform does not just involve land redistribution but can also include a re-definition of the terms and conditions in which land is held (Bruce, 1986; cited in Platteau, 1996). This may include land titling. One of the worries of land titling is that individuals may secure exclusive rights of ownership to previously commonly-owned lands (Atwood, 1990; cited in Ballantyne *et al.,* 2000). Individualisation also often places ownership of household land in the head of that household, who is usually a man. As a result he acquires the right to sell the land and the rights of his wife and children to shares of the land, which they had under customary law, become void (Bruce, 1993). The death of the male household head then makes female-headed households vulnerable to dispossession. This makes the intergenerational transmission of poverty only the more likely.

Land reform is essentially a 'political process' (Bassett, 1993). For this reason it is often the poor who suffer the most from it, even though they are the most dependent on access to land and freely available natural resources. What mechanisms can prevent the poor being excluded in land reform?

The private land allocation process in Vietnam included limits on how much land could be allocated to any one household and is one instance where there has been success at including the poorest. It did though, still favour male-headed households (Ravallion and van de Valle, 2003). This particular land allocation process, which switched rural workers from a socialist mode of agricultural production, is not only linked with greater equity but also with increasing productivity.

4.3 Climate change

- 'Climate change is occurring and is widely recognised to be a serious risk to development' (IPCC, 2001).
- 'The evidence that human induced climate change will affect many parts of the developing world is now scientifically accepted' (IPCC, 2001; cited in Huq *et al.,* 2005).
- Climate change is frequently cited as one of the most important environmental problems confronting human development (UNDP, 2002; cited in Schipper and Pelling 2006). It is seen as an additional obstacle to the achievement of sustainable development in the next century (Schipper and Pelling, 2006).

Even though the precise nature of climate change impacts are uncertain, climate change is happening and it is already having an impact, with its effects being commented on by West African partners of the CPRC.[2] It will continue to 'present a significant challenge for developing countries' (Adger *et al.,* 2003) and is not just a future consideration independent of, and to be sidelined by, what appear to be the more pressing issues of poverty alleviation and economic development (IPCC, 2001; cited in Davidson *et al.,* 2003).

There are two response strategies to climate change; mitigation and adaptation. Previously, the majority of research focused on mitigation (or the reduction of greenhouse gas emissions). However, as the impacts of climate change have started to be observed, interest in adaptation as a legitimate response has increased (Burton *et al.,* 2002).

Developing countries are particularly anxious to stress the importance of adaptation to climate change as they are disproportionately exposed to its impacts (Adger *et al.,* 2003). Africa, for instance, is more exposed to its impacts and this is combined with a

[2] Personal communication, Andy McKay, 2006.

dependence on small-scale farming for both food and employment (Simms and Reid, 2005). In other words, 'climate change is happening and it is affecting livelihoods that depend on the natural environment, which, in Africa, means nearly everyone.' (Simms and Reid, 2005). This is particularly ironic, considering that the areas which are most exposed to the impacts of climate change tend to be those which have contributed the least to greenhouse gas emissions. Africa, for instance, is responsible for less than 7% of global emissions and only 4% of CO_2 emissions (Davidson *et al.,* 2003). This also means that the continent's contribution to the mitigation of emissions can only be limited.

4.3.1 Adaptation

There are different approaches to understanding adaptive capacity. Scenario or top-down approaches help to understand how dangerous climate change is, while systems or bottom-up approaches stress current vulnerability to climate change at the community level. This requires an understanding of peoples' livelihoods (Huq and Reid, 2004). Certainly, for too long the climate change debate has looked at the global level and has ignored local processes (IISD, IUCN and SEI, 2003a). Also, the scenario approach, through focusing on the potential future impacts of climate change, by default directs attention away from current impacts (Burton *et al.,* 2002). Bottom-up studies, however, start with the present, not the future. The emergence of bottom-up approaches is an area where the CPRC should be involved.

This changing emphasis can be characterised as a shift from looking at climate change in terms of impacts to focusing on vulnerability (Burton *et al.,* 2002). In other words, looking at both people's exposure to change (which includes to climate variability and not just to the impacts of human-induced climate change) and also their resilience to this. This also helps to overcome the tendency of treating people as passive victims to climate change impacts. Adger *et al.,* (2003) point to how people have adapted to climate variability in the past and continue to do so (pastoralists in the West African Sahel and smallholder farmers in Bangladesh and Vietnam). Bottom-up approaches, then, don't assume that adaptation policy has to be created from scratch, something which is often the case when focusing on future impacts (Burton *et al.,* 2002).

An analogue approach to climate change also pays greater attention to adaptation responses which already exist or were used in the past. It involves taking detailed case studies of past responses to climate variability (temporal analogues) or present-day behaviour in regions with climate conditions similar to those that might possibly develop in another area (spatial analogues) and seeing how individuals and institutions anticipate and respond to these risks (Adger *et al.,* 2003). The drawbacks here though, are that the characteristics of future climate change are likely to be very different to current variability; particularly in terms of the rate and magnitude of change and also that current socio-economic conditions differ to those in the past (Adger *et al.,* 2003). Because of this, some adaptation strategies may turn out to be redundant. Indeed, traditional coping strategies may not be sufficient and without the knowledge or resources the poor may have to rely on ad-hoc and unsustainable responses, potentially reducing their resilience to a range of shocks and stresses (DFID, 2004).

Certainly, effective adaptation is far from inevitable. There are bound to be obstacles. Interventions are necessary to enhance people's ability to adapt to new conditions without becoming more vulnerable or shifting towards maladaptation. How does policy influence these actions and responses? Adaptation to climate change is also not costless. Investments in adaptation will 'inevitably have winners and losers' (Kates, 2000; cited in Adger *et al.,* 2003). Local communities face differential climate

impacts and have different vulnerabilities. Particularly in the case of the chronically poor, national governments do not necessarily put forward the interests of different groups equally (Paavola and Adger, 2002). What institutional and technological conditions can promote equitable adaptation? (Adger *et al.,* 2003). Do the chronically poor have access to information about climate variability and is this information a useful asset? There is a role here for the CPRC to take note of present adaptations by the poor and to link these to different policy environments.

To be successful it is argued that adaptation should seek out win-win approaches. Climate change should be seen as an opportunity for beneficial change. Conservation of mangrove belts, coral reefs, wetlands and forests through community-based sustainable management are examples of where immediate benefits to the poor, and also a long-term reduction in vulnerability to climate change, go hand in hand. However, how can these win-win measures be identified? (IISD, IUCN and SEI, 2003b). Research is also needed on the role of collective action in adaptive capacity at the community-level of decision making (Adger *et al.,* 2003). Adaptation is not something that should be 'done' to or for people. How should adaptation responses be implemented? Box 5 highlights some of the lessons learned from tropical hillside communities.

Box 5 Increasing the Resilience of Tropical Hillside Communities through Forest Landscape Restoration

Tropical hillsides in Latin America, Africa and Asia cover 9% of the world's landmass. Approximately 525 million people live and farm on these lands and they provide an important basis for livelihood strategies. However, hillsides are inherently fragile. Soil is easily eroded, limiting productivity, destabilizing settlements and contributing to flooding in lowland areas.

PASOLAC (Programa para la Agricultura Sostenible en las Laderas de América Central)
Operating in Nicaragua, Honduras and El Salvador since 1992, PASOLAC aims to increase agricultural productivity of the hillsides through improved soil and water management. Hillsides here cover between 60 and 80% of the land area and hillside production is important for export products (such as coffee) and other agricultural goods.

However, the hillsides are characterised by severe land degradation. Due to deforestation the absorptive capacity of the soil has declined, so infiltration rates have decreased and groundwater levels lowered. Droughts and floods have severely impacted on hillside livelihoods. These are likely to increase as a result of climate change; for climate change is likely to exacerbate the impacts of El Niño, exposing the area to more weather extremes. Local observations of climate conditions have supported IPCC predictions of more frequent and prolonged droughts, more irregular rainfall patterns and more frequent and intense extreme rainfall events and hurricanes.

PASOLAC has established a network of organisations working on sustainable agriculture and forestry; validated and implemented around 50 soil and water management techniques by farmers; created a competitive fund that partially finances project activities and designed tools for participative monitoring and knowledge transfer.

Building resilience against climate change and climate variability:
There is evidence that soil and water conservation, agricultural diversification and use of organic fertilisers are effective against droughts and that conservation practices can increase the resistance of agroecosystems against heavy rainfall. In particular, water retention by the soil has increased while the tree component of agroforestry is effective at limiting erosion caused by heavy rainfall.

'Development benefits':
Organic fertiliser and earthworm cultivation have improved the financial performance of agricultural activities. The tree component of agroforestry has also enabled diversification of income opportunities.

Even though the impacts of climate change were not considered in the original programme design, because PASOLAC has addressed the problems that will be exacerbated by climate change, it can qualify as an adaptation programme.

PASOLAC is a 'win-win' situation – it is following a development path which is linked to building resilience against the potential impacts of climate change. It began with a solid understanding of the needs and priorities of local communities; realising that a human-based approach is necessary for the acceptance of innovations. This, combined with a familiarity of the main climate risks in a region and how they link with livelihood resilience and vulnerability, are lessons which future adaptation projects can learn from. IISD, SEI and IUCN (2003a)

As PASOLAC shows, addressing the impacts of climate extremes and variability are already an integral part of development activities and, in this case, climate change did not require anything different in operational terms (Agrawala, 2004). Climate change does, however, add urgency to understanding and addressing the poor's vulnerability to current and future climate variability and to re-evaluating the role of policies and programmes in reducing this vulnerability (DFID, 2004). It requires organisations like the CPRC to ask for each policy and project; 'is this increasing or decreasing people's vulnerability to the climate?' (Simms and Reid, 2005). Research on climate change should not be restricted to technical, scientific research. When aiming to reduce poverty, just as important is research on the social and institutional issues of ensuring effective adaptation responses, learning from those successes and replicating them on larger scale (Huq *et al.,* 2005). Climate change is a central component of environmental vulnerability. To increase resilience to it and to ensure effective and equitable adaptation requires an understanding of people's livelihoods and current responses. Here the CPRC can play an important role.

5. Recommendations

This paper has stressed the importance of environmental shocks, stresses and seasonality in causing, and preventing escape from, chronic poverty. It suggests that there are six priority environmental issues. Two are related to health and the environment; three are linked with access/entitlements to land and other natural resources and one is connected to climate change. These are:

- The importance of water and sanitation as drivers of environmental health problems. Fundamental questions here are; what are the best ways to ensure that the chronically poor have access to clean water? What is the role of education in promoting better sanitation?

- The role of indoor air pollution as a cause of poor health. What are the options for safer fuel sources?
- The role of different assets, in different geographic areas, in helping people to recover from environmental shocks, stresses and seasonality. How do 'shocks of nature' result in acute poverty for some and chronic poverty for others?
- The importance of access to natural resources as part of the livelihood and coping strategies of the poor. How can this access be protected through land reform? Are the strengthening of common property regimes or moves to private ownership the answer? Or, is the route out of transitory and chronic poverty the promotion of non-natural resource-based livelihood strategies?
- The relationships between land degradation and poverty, land degradation and population growth, land degradation and land ownership; including the role of policies and institutions in mediating these relationships and protecting the resource base available to the chronically poor.
- The identification of 'win-win' approaches for adaptation to both present-day climate variability and future climate change. What institutional and technological environments promote equitable adaptation? How should adaptation responses be implemented?

None of this is really new, although the importance of adaptation in the context of reducing poverty is a more recent area of research.
It is recommended that the CPRC carries out in-depth literature research on these areas. The output from this would:

- Investigate further how and why these environmental factors are important for our understanding of chronic poverty.
- Bring attention to gaps in our knowledge.
- Identify what, if any, the role of the CPRC is in carrying out research to increase our understanding of these relationships.
- Address how the CPRC can better incorporate these environmental issues across the research themes, at all stages, so that the final study better addresses environment/chronic poverty links.

6. Conclusions

Environmental vulnerability is an important factor when looking at the dynamics of poverty. Environmental factors though, do not operate in isolation. They have social, economic and political dimensions which, when operating together, produce 'logjams of disadvantage.' Some people, then, are more susceptible to the adverse impacts of environmental hazards because of their position within society (Wisner *et al.,* 2004). They are more exposed to these hazards and also have lower sensitivity and resilience because of the unequal distribution of assets, access to natural resources and of information and knowledge across social groups. Whether the aim is to reduce poverty or to ensure environmental sustainability, the 'environment' and 'society' cannot be treated as separate entities.

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