Poverty and environment linkages in mountains and uplands: Reflections on the 'poverty trap' thesis

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Abstract

In this paper I will first consider a central premise of the idea of a poverty trap that there is a mutual and spiraling relationship between poverty and environmental degradation. The argument maintains that, mainly due to inherent short time horizons and risk, poverty encourages over-exploitation of the physical environment which results in further impoverishment. Using both conceptual and empirical material, this paper examines some of the major linkages that are believed to exist between the processes of poverty and environmental degradation, with a focus on the Western Himalayan Regions of India - the state of Himachal Pradesh and the hill districts of Uttar Pradesh. In particular, the paper investigates whether the relationship is functional or causal, and assesses the role of other factors, particularly institutions and social and cultural influences. The concern with poverty in rural mountain areas reflects the importance of these regions internationally: mountains and uplands represent the majority of the Food and Agricultural Organisation's (FAO) "critical zones" - those areas of the world that are not able to grow enough food to feed their inhabitants adequately. Hence some of conclusions reached here will be of relevance to similar geographic regions of the world.

Abrégé

La thèse du « piège de la pauvreté » a pour axiome l'existence d'un rapport mutuel, animé d'une dynamique en spirale, entre pauvreté et dégradation de l'environnement. L'idée est que, surtout pour des raisons intrinsèques (horizons chronologiques limités et risques), la pauvreté incite à la surexploitation de l'environnement physique, ce qui aboutit à un surcroît d'appauvrissement. Faisant appel à des éléments conceptuels et à des données empiriques, ce texte examine certaines des articulations majeures dont on croit qu'elles lient ces deux processus (pauvreté et dégradation environnemenale), en observant les régions de l'Himalaya occidental en Inde — l'État d'Himachal Pradesh et les districts montagneux de l'Uttar Pradesh. La réfléxion porte tout spécialement sur la nature — fonctionnelle ou causale — de ce rapport et évalue le rôle

d'autres facteurs, en particulier celui des institutions et des influences sociales et culturelles. La préoccupation manifestée pour la pauvreté en zones montagneuses rurales reflète l'importance cruciale de ces régions au plan international: les zones montagneuses et les hautes terres forment la majorité des « zones critiques » de la FAO (il s'agit des régions du monde inaptes à cultiver suffisamment d'aliments pour nourrir leurs habitants de manière adéquate). En conséquence, certaines des conclusions auxquelles on parvient ici seront pertinentes pour des régions géographiques semblables, situées ailleurs dans le monde.

Resumen

La premisa central de la tesis acerca de la trampa de la pobreza dice que existe una relación recíproca y creciente entre la pobreza y la degradación ambiental. El argumento sostiene que debido a los horizontes de corto plazo y a los riesgos inherentes a esta situación, la pobreza estimula la sobre-explotación del medio ambiente físico lo cual conduce a un ulterior empobrecimiento. Esta monografía utiliza tanto material conceptual como empírico en el examen de los vínculos más importantes que, se cree, existen entre los procesos de empobrecimiento y de degradación ambiental, utilizando como ilustración las regiones del Himalaya occidental (el estado de Himachal Pradesh) y distritos de las colinas de Uttar Pradesh en la India. La monografía examina en particular si la relación es funcional o causal y evalúa el papel de otros factores, especialmente las instituciones sociales y las influencias culturales. La preocupación por la pobreza en las zonas rurales montañosas refleja la importancia internacional que tienen estas regiones puesto que las zonas montañosas y altas representan la mayor parte de lo que la Organización para la Alimentación y la Agricultura (FAO) ha denominado como 'zonas críticas' y que son aquellas regiones del mundo que carecen de la capacidad de producir los alimentos necesarios para alimentar a sus habitantes. Es por esto que algunas de las conclusiones a las cuales se llega en esta monografía resultan pertinentes para otras partes del mundo.

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Contents

Introduction

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At least part of the debate concerning poverty and the environment hinges on terminology. Since both poverty and environment are very general terms the links between them are to some extent dependent on the specific meaning that is attributed to each. As we shall see, multiple plausible meanings are possible in different contexts and arriving at a modicum of semantic clarity can prove to be quite useful for purposes of analysis. While I treat these issues at length in a subsequent section, for clarification the word "poverty" is used in this paper in the absolute and not in the relative sense, i.e., referring to those people whose income, expenditure or quality of life falls below the specific level that is considered to form the line of absolute poverty.

General estimates suggest that the total numbers of the absolute poor in 1990 were 1,133 million and will be 1,107 million in 2000. Of this number, the poor in South Asia totaled 562 million in 1990 and will become 511 million in 2000, while those in Sub-Saharan Africa numbered 216 million in 1990 and will rise to 304 million by 2000. These figures, adopted by The World Bank, compute the poverty line at an income per capita of USD 370 at 1985 purchasing power parity (PPP) dollars; in 1990 the equivalent poverty line would stand at USD 420 (World Bank 1992: 30).

Since many poor, rural communities undertake a large part of their productive activities in a subsistence economy, with a high dependence on biomass, it has been argued that a method based entirely on incomes (even price-adjusted incomes) does not provide an accurate or uniform interpretation of the relative

impoverishment of such communities in comparison with other communities that do not have access to such a subsistence economy.

An alternative method of measurement is a nutrition-based poverty index which includes a measure of daily calorific intake in order to indicate energy deficient diets. The FAO and World Health Organisation (WHO) have set standard requirements for the amount of calories needed for a person to function at full capacity in normal daily activities. Those who consume less than 90% of this standard are determined to lack enough calories to maintain an active working life. Similarly, because the need for a minimal quantity of food among the poor remains relatively inelastic, those households that spend at least 80% of their total income on food are included among the absolutely poor. When this yardstick is employed, the people who comprise the poorest of the world's poor are estimated to be between 700-730 million, of which some 470 million live in South Asia and another 150 million in Sub-Saharan Africa (figures for 1980 reported in Pearce and Warford 1993).

The poverty trap thesis specifies a circular or a spiral relationship between poverty and environmental degradation; in other words, it suggests that environmental degradation leads to poverty which in turn leads to further degradation. *Prima facie*, at the macro-level there is some evidence of the geographical coincidence of poverty and degraded environments. Worldwide estimates suggest that roughly half of the world's absolute poor - the estimates vary between 370 million to 580 million people - live in environments that are highly degraded or inherently fragile and are susceptible to degradation (Leonard 1989; Durning 1989). Such environments essentially comprise deserts, tropical forests and mountains. Significantly, the Himalaya remains one of the poorest regions in the world as measured by income per capita with some 50% of its 150 to 175 million people reported to be below the line of absolute poverty (Bhattarai 1990). It thus represents one of the major examples of the coincidence of rural poverty and fragile environments. For the Indian areas of the Western Himalaya, the proportion of the rural population below the poverty line was estimated at 48% in Uttar Pradesh and nearly 25% in Himachal Pradesh (figures for 1987-88 from Drze and Sen 1995).

But the fact that a substantial proportion of the world's poor people live in degraded environments does not of itself demonstrate that poverty causes environmental degradation or vice-versa. In those primarily rural areas where people live in a local, biomass-based agricultural economy, it is plausible that environmental degradation or the lack of natural productivity in the environment can lead to poverty due to the lack of surplus, the thinness of markets, the absence of institutional development and the continual shortage of time due to the demands of subsistence existence - foraging for fodder and fuel, fetching water, cultivation, grazing livestock, attending to offspring, cooking etc. In such conditions, degradation can and does lead to poverty,

especially in the absence of any successful process of environmental regeneration.

On the other hand, does poverty lead to degradation? In order to prove this proposition it is necessary to demonstrate that some quality inherent in the condition of poverty results in environmental degradation in the broad majority of social, environmental and policy contexts. The poverty trap literature is full of typically broad generalisations such as: "poverty can drive ecological deterioration when desperate people overexploit their resource base, sacrificing the future to salvage the present", or "the cruel logic of crucial short-term needs forces landless families to put rain forests to the torch and mountain slopes to the plough" (Durning 1989: 40). However, such a self-evident truth flounders when subjected to further systematic investigation. A number of empirical studies dramatically contradict the broad conclusions of the poverty trap thesis, and instead, present a very different picture of the relationship between poverty and the environment.

In this paper I will argue that this second aspect of the poverty trap - that poverty leads to degradation - has not been adequately demonstrated by its proponents. Instead I will suggest, in agreement with the analysis of some environmental economists, that poverty is not so much a cause of environmental degradation as a mechanism by which the true underlying causes are transformed into actions that degrade the environment. In other words, environmental degradation is a negative externality whose causal roots, as well as solutions, lie in institutional and policy issues rather than in poverty itself.

The first part of this paper develops the argument in relation to three commonly cited reasons for environmental degradation. This is followed by an institutional perspective on the poverty-environment relationship, particularly the role of social capital and other related concepts. In part three I conclude by examining some of the implications arising out of the arguments presented in earlier parts of the paper. For those who are interested, an appendix describes alternate methods of interpreting and assessing income per capita and environmental degradation as well as presenting two contrasting views of the essential relationship between income and degradation.

Driving Factors and Mechanisms of Environmental Degradation: Links with Poverty?

In this section I examine three typical sets of causes or factors of environmental degradation: i) short time-horizons and low resilience to risk; ii) population growth; iii). Technology and technological change. With each factor, I shall attempt to analyse whether poverty is in some sense a determining cause or whether it is better considered as an intermediate expression or secondary cause. In addition, I shall briefly consider reasons other than poverty that may be responsible for environmental degradation.

I limit myself to these three factors both for reasons of economy and because they are among the most commonly advanced explanations for environmental degradation at the micro- and mesoscales at which the effects of poverty on the environment can generally be expected to operate. It will be evident that each of them does not have a similar relationship with poverty. The effects of technology, for instance, are quite distinct from those usually associated with poverty. My reason for adopting such a combination is that, though in a limited way, it allows the possibility of comparing some of the commonly attributed causes for environmental degradation over broadly similar geographic contexts and scales. I shall also argue that the environmental effects of technological change can be somewhat different in areas where poverty is widespread than is the case elsewhere.

Short Time-Horizons and Risk

It is often stated that poverty as defined through most indicators and methods (real income, daily calorie intake, proportion of total income spent on food, individually or in any combination) imposes an inherently short time-horizon on the use of environmental resources. The poverty trap thesis similarly implies that the poor lack an ability to forgo present subsistence in favour of savings for future consumption or environmental quality. This coupled with their high degree of *resource dependence* leads to a preoccupation with short-term results, thus producing environmental degradation (Durning 1989; Mink 1993).

At the level it is stated, that of a general schematic, it is hard to dispute this thesis except to add a general qualifier: the lack of a long time-horizon is by no means an exclusive characteristic of the poor. For instance, in the Western Himalaya (as well as elsewhere) commercial companies and government enterprises have routinely displayed short-time horizons in conducting mining operations without concern for internalising the costs of sustainability or restoration. A typical example is the extent of limestone mining in the Doon Valley before a court order closed a majority of the mines (WWF-I 1988; Bandyopadhyay 1989). Examples of similar tendencies are reported from other parts of the Himalaya (Bhattarai 1989; Pathak 1989).

More specifically, the short-time horizons that are routinely attributed to the poor may actually be the result of a lack of appropriate policy frameworks and incentives to regulate the behaviour of the poor towards environmental resources. Observers have noted that poor mountain farmers put in a tremendous amount of planning and labour into building and maintaining terraced fields, controlling soil erosion, nurturing tree species for fuel, fodder and soil fixing, and intricate social and engineering mechanisms responsible for conserving, harvesting and distributing irrigation water (Rhoades 1988; Ives and Messerli 1989; Ramakrishnan 1992; Ostrom 1995). Under typical mountain conditions, the parcelling out of land holdings into small fields at different

altitudes is essentially a rational approach to environmental risk through a strategy of diversity:

> Scattered fields reduce the risk of total crop failure. Due to the practice of planting a wide range of crops and varieties in different localities and at various altitudes, a poor yield in one part of the valley does not imply the same results elsewhere... If frost, hail or an avalanche destroys the crops at one level, this may affect only one of a family's many parcels. A few feet of elevation can make a difference of one or two days in the maturation of the crop, allowing a stepwise progression of harvesting activities... Finally, the dispersion of land holdings makes sure all families have access to soil types of varying quality and are not restricted only to low yielding fields. (Rhoades 1988: 4)

For similar reasons connected with risk, trees and other environmental resources play an important safety net function against exogenous stresses and shocks. Besides the climatic variations and uncertainty referred to by Rhoades, such shocks can include marginalisation to more and more fragile or unproductive areas, rapid changes in prices and the agricultural economy prompted by macro-economic factors, as well as policy signals that create insecurity and diminish incentives for maintaining a balance between the local economy and conservation of the environment.

In general, poverty implies a low resilience to risk because the options available are few and savings usually low. This low resilience means that, in the absence of other options, the poor typically resort to a net drawdown of environmental resources during shocks - for instance by cutting trees in order to make up for shortfalls in crop yields or income. What is involved here is not so much an inherently short time-horizon as the presence of *risk and uncertainty* in the overall environment. It must be noted, however, that systematic empirical studies on the Poor's response to such stresses and shocks over time as well as the typical time-horizons adopted by them are relatively rare.

A related and well documented area is how rural communities create local institutions for the collective management of environmental resources held as common property. This literature, which draws heavily on the "new institutional economics", provides an arresting contrast to the poverty trap literature. Both empirically and conceptually, it suggests that if certain conditions are fulfilled local, self-governing common property institutions are a sustainable and equitable form of management for a wide range of environmental resources, including forests, water, fisheries, etc, in rural communities and diverse settings across the world.

Without going into extensive details here let us note that a variety of detailed, systematic studies of common property institutions in rural areas of the world,

operating in a variety of different environmental, social and economic conditions, effectively propose a diametrically opposing thesis to the poverty trap by demonstrating how community control over resources can serve to regulate individual short time-horizons despite the presence of poverty. Quite significantly, these studies do not suggest that short-term interests regularly win over concerns of sustainability and long time-horizons when the community involved is poor. At least in part, this is because such common property institutions provide resilience against exogenous risks and uncertainties through a collective sharing of risk and burden. For the individual household such sharing can have the effect of dampening risks and lengthening time-horizons. However the efficacy of such institutions in averting *collective* risks, such as from natural disasters, famines and shocks due to macroeconomic factors, is less certain. In such cases it is indeed quite possible that the institution may break down, or that some degradation in environmental resources occurs.

On the evidence of this institutional mediation of risk it is probably more accurate to state that a shortened time-horizon, rather than being an underlying cause of environmental degradation, is more typically an *intermediate expression or mechanism* resulting from low resilience in the face of shocks and the overall risky environment experienced by the poor. Such shocks and risks represent the real underlying cause for environmental degradation. This is an important distinction. Under different conditions, for instance if shocks do not occur or if adequate capacity and resilience are built to confront them, (eg, by extending the strategy of diversity to different areas of production or by providing credit on soft terms for alternate forms of income-generation) the existence of poverty does not imply that environmental degradation must follow as a consequence (Pearce and Warford 1993). This view suggests that the provision of micrcocredit, through institutions such as the Grameen Bank, helps reduce the possibilities of environmental degradation or the drawdown of environmental resources compared to areas where access to credit is not readily available. From a policy perspective it is imperative that the lending policies of rural credit institutions should be sensitive to the impact of stresses and shocks on the economy of the poor. While this is readily acknowledged in the case of natural disasters such as cyclones and earthquakes, the impact of macroeconomic factors is often more difficult to perceive.

While local common property resource institutions are largely self-governing and do not require direct support or assistance from the state, many scholars have noted that an enabling policy environment is an important precondition for their strength and success. At the very least policies should not create obstacles to the effective functioning of institutions in the exercise, for instance, of minimal rights to organise or to levy sanctions against persistent offenders (Ostrom 1990; McGinnis and Ostrom 1993). If *de facto* policies, on the other hand, act to prevent farmers from harvesting trees even on private lands then there is little incentive for farmers to grow trees at all. Chambers,

Saxena and Shah (1989) and Saxena (1988) report this situation in large parts of India including the Himalayan hill regions of Uttar Pradesh, where most district magistrates, ignorant of tree-harvesting laws, enforce regulations about tree-felling that have no formal or explicit policy basis. These authors argue that such measures have had the opposite effect than was intended: they have reduced rather than increased the amount of trees grown on private lands because farmers do not nurture trees, pull out young saplings and prefer to put their lands to other uses. Such a situation has the simultaneous effect of putting additional burden on state and common forests as surreptitious withdrawals of fodder and fuelwood from these areas increase.

According to this, it is not short time-horizons so much as exogenous factors and misguided policy and administrative mechanisms that are primarily responsible for the environmental degradation attributed to the poor. Some authors have suggested that this view is representative of how the poor themselves see the situation. Despite the fact that poverty is usually accompanied by malnutrition, poor health and illiteracy these authors argue that the poor do not simply suffer passively. Instead they recognise that they are often placed in situations involving high risk and exercise whatever options are available to them in order to minimise this risk (Chambers 1994). Consequently, enabling policies are needed that are based on sound research about the risk environment and the local techniques deployed to combat it. Policies that enhance these techniques and measures through an appropriate mix of economic and institutional incentives rather than undermining them constitute an effective way to combat environmental degradation in regions of absolute poverty such as the Himalaya.

Population Growth

Population growth is commonly cited as a major contributor to environmental degradation on the grounds that it leads to increased consumption and a higher demand for natural resources. A particular feature of poor households in this respect may be that, given their lack of economic resilience, such additional demand will typically be met from the commons and state-owned resources instead of from private property. Paradoxically, the poor may bear a significant amount of burden from the resulting environmental degradation. But the relationship between population growth, poverty and environmental degradation is more complex than this description suggests, and is characterised by a number of important feedbacks and qualifications.

Firstly, under certain conditions poverty can lead to high fertility and a greater demand for children. For instance, under the socio-economic conditions prevalent in many parts of Asia and Africa children are forms of social security for parents as well as a source of additional farm labour. In areas where forests and other environmental resources are effectively held as common property or

open access an increased number of children enhances the household's ability to collect fuel, fodder and other biomass (Pearce and Warford 1993: 153).

Partha Dasgupta reports micro-level studies from the Himalaya which estimate that children between the ages of 10 to 15 years spend one-and-a-half times the number of hours at work than adult males, and carry out such tasks as collecting fuel and fodder, grazing animals, household chores and marketing (Dasgupta 1992). Narpat Jodha's empirical studies in semi-arid areas of India have amply demonstrated that the rural poor depend on the commons for a majority of their biomass needs, in marked contrast to other economic strata (Jodha 1986); and that well-intentioned policy responses to population pressure such as land grants, land reform, etc. have often led to an erosion of the commons (Jodha 1985). At the *collective* or social level, then, population growth can lead to resource scarcity and environmental degradation.

Individual households may seek to combat this through increases in family size, especially where the commons provide a large part of the daily needs of biomass, as in much of the Himalaya. The costs involved in raising children under such conditions are typically low because educational facilities are basic or non-existent, educational qualifications do not improve employment prospects and modern health care facilities are usually absent. Typically, high fertility rates among poor households stem from a high private benefit/cost ratio which produces a greater demand for children, although other factors such as social norms and traditions will also influence decisions. At the *household* or private level the benefits of a larger household may outweigh the costs. This situation may continue until an external factor, policy intervention or Malthusian check stops the negative spiral (Dasgupta 1992).

Observers have noted that given the constraints on household decision-making, policies for family planning and provision of contraceptives will not affect fertility reductions beyond the point where the household benefit/cost of children is optimised (Kabeer 1994). Also, total fertility rates will typically exceed the desired number of children to make up for prevailing rates of child mortality. Clearly such demographic conditions prevail in most of the Himalaya where population growth is generally higher than in the surrounding plains, and where over the decade 1971-81 ranged from 23.71% in Himachal Pradesh and 27.21% in the Uttar Pradesh Hills to a high of 53.16% in Mizoram (Chand and Thakur 1991).

Secondly, fertility rates are not directly linked with poverty. Recent micro-level research on household behaviour suggests that the causes of fertility decline are complex. Demographic theory may err when it lumps them together into an all-embracing notion of "development". More recent demographic theory considers trends in fertility and mortality as autonomous, acting on population growth and structure but not in turn being affected by them. Proponents of demographic transition theory, while they see population growth

as potentially leading to economic problems, offer this as a reason why fertility *should* decline, not why it *does*. The feedback effects of high fertility on poverty are not generally seen by modern demographers as leading to reflexive adjustments at the micro-level, for example through Malthusian effects on wages and land. Rather it is the role of economic development in bringing about changes in the household benefit/cost of children that is emphasised (Coleman 1986).

It is certainly true that given declines in mortality (which are often among the first effects of development), improved health care and female literacy as well as higher levels of state expenditure on social security, fertility will decline though it may do so at varying rates depending on social and cultural factors. Improved mortality rates and levels of public health care increase the chances of children surviving into adulthood. Better levels of state-sponsored social security provide an alternative to the benefits of children as old-age security for parents. Simultaneously, the costs of children increase substantially with economic development through expenses e.g. education necessary for better paying jobs, better health care and generally higher consumption levels. All this has the effect of reducing the parental benefit/cost of large families, resulting in lower fertility and fewer children. This process will usually first take place in urban centres where state-sponsored schemes and other effects of development are more readily accessible than in rural areas (Pearce and Warford 1993).

The basic example of this process cited in the literature is one in which benefit/cost is an inverse function of family size. In such cases the costs of children increase in direct proportion to family size while the benefits of additional children decline. These situations can be represented by a declining straight line as shown in figure 1, and seem largely true for European conditions of social security and welfare.

The evaluation of the benefit/costs of children is however mediated by a range of cultural and institutional factors and is clearly capable of varying significantly between societies. This is in consonance with the general distinction made by many authors between societies in which security is derived from individual ownership of land and/or communal welfare systems, and others in which individuals depend on their family or wider kinship group for economic and other support (Schofield & Coleman 1986; Boserup 1986; Smith 1986). For example, cultural and socio-economic conditions prevalent in sub-Saharan Africa have created a characteristic relationship between benefit/cost and family size, leading to persistently high fertility in that part of the world. These conditions include prevailing customs that allow large families to claim a higher share of land from the commons and culturally-held notions of security from children that state schemes cannot effectively substitute.

The relationship between benefit/cost and family size under sub-Saharan conditions is represented by the curved line in figure 1. This shows benefit/cost *rising* with family size before declining on further increases. It will be apparent that the benefit/cost of large families is greater along the curved line than the straight line. Pearce and Warford suggest that as educational and off-farm employment opportunities increase and patterns of land tenure and ownership change, conditions in sub-Saharan Africa will begin to favour smaller families. They comment that the problem at present is that these factors seem to be changing far more slowly than those reducing the mortality rate (Pearce and Warford 1993).

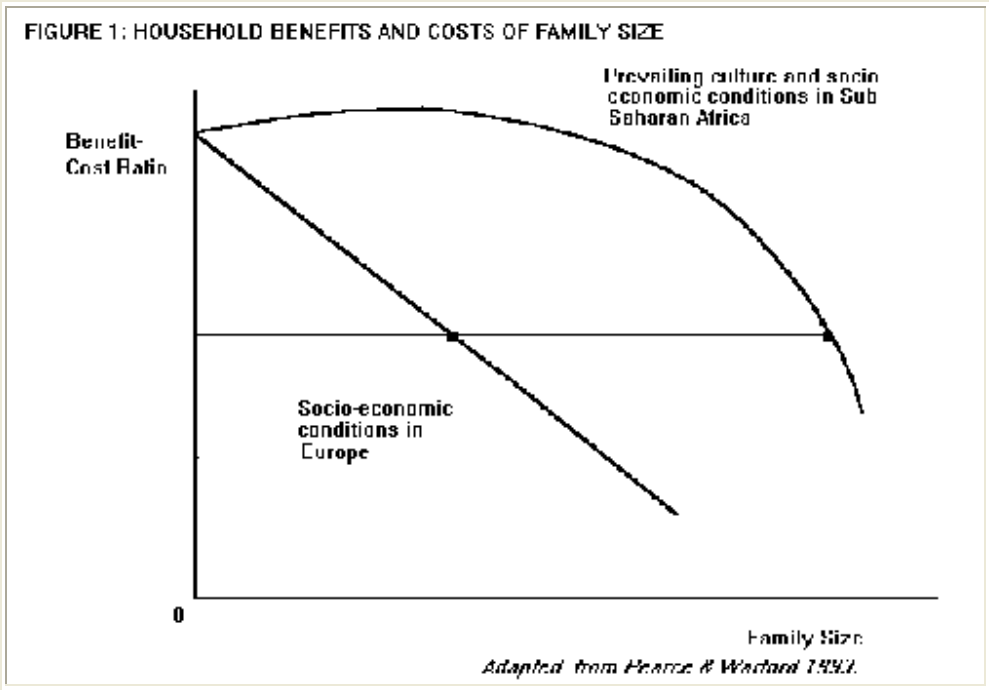

Figure 1: Alternate Valuations of Benefit-Cost at Different Levels of Family Size

It is worth noting here that in many societies the costs of children are shared unequally among parental couples. Such costs include foregone work capacity and risks from pregnancy as well as the provision of food, clothing, shelter, time and care. In most societies the predominant part of these costs is incurred by the mother. Consequently women often tend to have a preference for smaller families than men (Dasgupta 1992). On the other hand, men traditionally play a greater role in determining reproductive behaviour and family size because of their greater influence on household decision-making. In such conditions structural changes in occupational profile leading to higher levels of female literacy, employment and financial independence will empower women and better reflect their preference for smaller families within household decision-making (Boserup 1986). In some cases women may resort to covert strategies: Kabeer reports cases in Bangladesh where women from poor

households often used contraceptives without permission from their menfolk (Kabeer 1994: 150).

Although the analysis of household decisions about family size has been influential in the analysis of demographic trends, it may present a rather limited view of the relationship between poverty and fertility. Much of the foregoing discussion implies a positive correlation between poverty and fertility (though as we have seen this may be extensively mediated by social and cultural factors). On the other hand, the work of Ester Boserup and others on the interaction of micro- and macro-level factors influencing family size, notes that fertility is sensitive to many disparate forces. Their argument takes into account evidence that in many countries households suffering from prolonged conditions of poverty and high risk have chosen to reduce total household expenditure by lowering fertility.

Boserup focuses on the household as a reflexive entity with the capacity to adjust for changes in conditions and prospects over time. She observes that as family size increases households have a number of options open to them: the parents or children may take a job (or an extra job), increase their economic activity in the informal sector, migrate for seasonal or permanent employment elsewhere or adopt contraception in order to reduce fertility and control family size. In other words, they can adapt both income to family size and family size to income (Boserup 1986).

Because the period of rapid population growth has largely coincided with economic expansion in both developing and industrial countries, most families have in the past resorted to the former option. But as more and more developing countries become dependent on exports or capital imports, as international prices of commodities fluctuate, as protectionism and an unwillingness to receive migrants becomes more widespread, and as the debt crisis forces economic contraction in many countries, the number of possible options is reduced. While parents' need for getting help and security from children is highest in such times of crisis, the possibility of getting their help is lowest.

In an environment of persisting economic uncertainty, households are likely to control family size as a means of minimising household expenditure. In Bangladesh, for instance, modern contraceptive use increased from 3% to 40% and the total fertility rate declined during the 1970-80s in the absence of any real change in economic conditions (Kabeer 1994). In Ghana, which has for a long time suffered from severe economic crises, the use of family planning services is far more widespread than in Kenya (where fertility rates have been among the highest in the world through the early 1990s) although the services are available in a relatively smaller part of the country. Boserup remarks that in countries such as Ghana and Bangladesh an atmosphere of continuing

economic crises and uncertainty has diminished incentives for large families and created "poverty-led" fertility transitions (Boserup 1986).

It must be acknowledged that the factors that determine human fertility are considerably more complex than economic status, however this is measured. They depend instead on the interaction of numerous factors which include: changes in the institutions governing resource use and land distribution, shifts in occupational structure and the empowerment of women, variations in the risk portfolio of households at various levels of family size, the effects of the macroeconomic climate, and an acceptance of the notion and the means for better fertility control (Boserup 1986; Coleman 1986).

Given the range of disparate factors that operate here, it may be unproductive to seek a simple correlation between fertility rates and poverty levels. However the essential implication for our purpose is that poverty leads to population growth only in the presence of certain socio-economic and institutional conditions and over specific time-horizons. Even in terms of policy implications it is not so much higher incomes as transformations in the social and institutional environment - including changes in occupational and socio-economic structure -that will control spiraling population growth and fertility rates. Clearly, however, providing family planning services and contraception where there is a demand for them remains an urgent and often neglected task.

Thirdly, there is no fundamental relationship between population density and environmental degradation. The assumption that high population density will necessarily cause greater anthropogenic degradation is exceptionally difficult to justify given the available evidence. In fact, this assumption is critically challenged by many systematic micro-level studies and observations. The actual relationship between population density and the environment must instead be considered in the context of social, institutional, historical and geographical conditions.

One frequent source of confusion here is the fact that many indicators of degradation are primarily naturally-occurring. For example, the predominant part of soil erosion in the Himalaya is caused (despite populist conceptions to the contrary) by geological processes of mass wasting combined with the erosive effects of intense monsoon rainfall. The proportion of total erosion caused by human activities, though not calculated systematically for the whole Himalaya, may, on the strength of sample analysis, be as low as 5-10% (Ives and Messerli 1989).

More importantly, the impact of population density and growth on the environment is governed by institutions that have the capacity to compensate for increased demand for natural resources through changes in patterns of land use, transformations in social and technological organisation, and socially-driven processes of environmental restoration. How population growth affects

these patterns of organisation and how institutions respond to population growth are critical issues. For example, in Machakos District in the highlands of Kenya, studies in population-environment relationships over 1930-90 found that the population increased six-fold during this period. In the first three decades the rate of soil erosion caused great alarm. However by 1990 soil erosion had greatly decreased, tree-cover had increased, and cultivation and grazing practices had been radically transformed to suit conservation needs. The explanation offered for this primarily concerns a rapidly rising population and labour force involved in conservation activities, although processes such as infrastructure investments, capital inflows and the proximity of markets were also involved (Tiffen and Mortimore 1992; Tiffen, Mortimore and Gichuki 1993). Similarly, a study of Kakamega District in Kenya found denser populations were associated with more trees: as population density increased farm size decreased which in turn encouraged tree planting on the land (Bradley 1991).

A country-wide study of soil conservation practices in Kenya categorised households according to "proper", "acceptable" or "poor" conservation practices. Households in the latter group were found to be typically comprised of a female farmer living alone with insufficient resources to exchange labour with friends and neighbours. The reasons attributed for this were social isolation and a lack of ability to build reciprocal relationships based on the exchange of labour - in other words, a lack of labour rather than excessive population (Ferguson-Bisson 1992; Tjernstrom 1989).

Throughout the Himalaya the intensive building of cultivation terraces, historically driven by increases in population on a limited amount of arable land, has dramatically reduced the high rate of natural soil erosion through a mix of labour intensive practices (Ives and Messerli 1989). In the middle hills of Nepal, as supplies of fodder and fuelwood from the commons have diminished due to population growth, farmers have planted and protected trees on their own land (Gilmour 1989). In all these areas, conservation strategies have typically been associated with an increased availability of people as well as improvements in local organisation. On the other hand, environmental degradation, such as an increased felling of trees, has usually been related to a perceived insecurity of rights and the unpredictability of government policies rather than to increased population pressure (Chambers 1994).

The specific pattern of environmental degradation can be influenced by the structure of institutional incentives at the local level. A detailed study of forest cover in Garhwal and Kumaon during the 1980s by the Indian government found that the extent of deforestation was related to the structure of property and access rights. While tree cover had degraded to 10% on forest lands owned by the revenue department, it was 50% in forests owned by the forest department and highest of all - 70% - in forests owned and managed by local communities and village forest councils *(van panchayats)* (Saxena 1988).

It must be noted that an expansion of arable land driven by population growth has been considered a significant reason for deforestation in Asia, Africa and Latin America although not in Europe (Pearce and Warford 1993: 167). This may be because agricultural growth in the former regions has primarily been extensive rather than intensive. Ester Boserup's analysis of technological change (which is treated further in section iii) suggests that wide-ranging institutional change accompanied and drove agricultural intensification in Europe once certain thresholds of population density were attained (Boserup 1981).

It is plausible that the critical thresholds that trigger such institutional change will vary in different social, environmental, historical and geographical circumstances. However, it is also true that population growth will lead to agricultural expansion at the cost of significant environmental degradation in the absence of a sustainable process of intensification. Indeed, this can happen even at relatively low levels of population density. The other side of the coin is that agricultural intensification itself results in severe environmental impacts. This and related issues are discussed in the next section of this paper on technological change.

Based on the three propositions discussed in this section we may now suggest that the impacts of population growth on the environment are crucially and centrally mediated by institutions operating at different levels and scales of natural resource use. What form these impacts take depends at least in part on the specific policy mechanisms in force. Improved systems of natural resource pricing and accounting, provision of savings and credit facilities, enabling mechanisms for the growth of participatory natural resource institutions, balanced regimes of property rights, and in general a wider range of options for the poor can be crucial in preventing adverse impacts on the environment. Even for rural subsistence societies in poor countries where official policies have little direct influence on the prevailing socio-economic system; improvements can be effected through measures which facilitate, that provide incentives for the growth of autonomous institutions for local natural resource use.

This is not to say that such local institutions will reduce fertility rates or change the social rate of discount for natural resource use in the absence of other measures. We lack systematic research to be confident of the socio-economic feedback effects of such institutions. It is clear, however, that such institutions may contribute to a more equitable distribution of the benefits and burdens of natural resource use and management, and thus reduce environmental degradation associated with the distortions of private and asymmetric distribution of benefit and costs. As stated earlier, by providing a collective forum for the sharing of costs and risks such institutions also help mitigate the low resilience typically associated with poverty.

Technology and Technological Change

Technology and technological change represent another set of factors responsible for environmental degradation. Although technological change is clearly not a factor that is attributable to poverty, there are at least two reasons why degradation caused by such change is pertinent to an analysis of environment - poverty linkages. Firstly, in the rural areas being studied in this paper, the poor derive most of their subsistence directly from the natural resource base. In these conditions, any degradation of this base by external agents or factors must affect the Poor's access to resources. Secondly, because the processes through which the impacts of technology on the environment are cognized and confronted are primarily social and cultural, the powerlessness of the poor means that they are not able to gain access to the social and political institutions through which such adverse effects are redressed. Consequently, this means that the poor have to bear a disproportionate amount of the externalised costs arising from the introduction of new technologies.

Studies from the Himalaya note that modern road building methods are a major cause of anthropogenic soil erosion. Valdiya estimates that in the Indian Himalaya the building of one kilometre of road with present techniques creates 40,000 to 80,000 cubic metres of debris, while maintenance involves the removal of a further 411 to 724 cubic metres/km. of debris annually. These destructive methods continue to be used although alternative cost efficient and environmentally benign methods based on traditional techniques of soil fixing have been demonstrated by engineers (Sharma and Bhattarai 1990). The latter provide an efficient means of addressing problematic local trade-offs between development and conservation, bringing markets and communications to remote villages without incurring the costs of landslides, slope erosion, deforestation and buried fields as is generally the case at present.

In fact, critics have often pointed out that the construction of roads, public buildings and dams in the Himalaya reveal a pattern of misguided public investments, often involving ostensible measures for the alleviation of poverty as well as the externalisation of associated environmental costs. A number of recurrent features associated with technological change in the Himalaya can briefly be mentioned here:

- In most cases the adoption of modern technologies does not involve an internalisation in formal cost-benefit assessments of the associated environmental degradation.
- The costs of such degradation are disproportionately paid by the rural poor, who are the primary users of the commons and environmental resources.
- The distribution of benefits resulting from the use of such technologies is usually not equitable due to deep-rooted social-economic factors,

including the domination of local elites and their influence on executive agencies.
- Social benefit/cost and integrated technology assessments are the exception rather than the rule. When carried out, such assessments usually do not involve the participation of all beneficiaries in order to reach optimal solutions for the local population.

Significantly, a series of studies for the World Bank found little evidence that poor communities degrade their environment. In fact the authors of these studies question the relative ability of the poor to cause environmental degradation given their low nutritional status and lack of capital equipment. Instead, the studies identify technology and economic factors among the primary causes of degradation, eg, new roads that open up virgin territories, misguided price and incentive mechanisms, and population growth (Jagannathan 1989; Jagannathan and Agunbiade 1990; Jagannathan, Mori and Hassan 1990).

One of these studies mapped changes in land use in the highlands of Kabupaten Sukabumi, Indonesia, by comparing remote sensing imagery for 1976 and 1986. Over this ten-year period 27% of forest land was lost. Of this, 40% was converted to scrubland, 24% to mixed gardens, 10% to estates and another 25% to buildings. The authors note that the conversion to gardens and estates was driven by market incentives. The demand for fuelwood encouraged the conversion scrubland, and was in turn converted to estates and gardens. The only change attributed to poverty was when landless cultivators converted abandoned estates to cultivation using slash-and-burn cultivation. Open-cast mining also contributed to forest loss, while deforestation was particularly evident immediately alongside new roads. The study concludes that in this case it was primarily the economic system through the pattern of market incentives, public investments and macroeconomic policies that caused degradation (Jagannathan 1989; Pearce and Warford 1993: 273-74).

Another study in Nigeria suggests that land clearance and de-vegetation took place chiefly along roads and settlements and on the best soils. The study notes that changes in land use have been driven by new infrastructural investments such as roads, increases in prices of food crops relative to tree crops, the structure of agricultural incentives (including fertiliser subsidies), the location of farm service centres and the pattern of investments in rural water supplies (Jagannathan 1989). As all these suggest, sustainable technological change requires the evolution of new institutions and methods of operation as well as the presence of appropriate policy and incentive mechanisms. Boserup's model of agricultural intensification suggests that in Europe it was rapid population growth that provided the historical impetus for both technological and institutional change. The model describes four broad phases:

1. At the primary stage, low population density and long agricultural fallow periods have minimal environmental impact: this holds true for most subsistence societies in history.
2. As population density grows, more land is brought under cultivation and shorter fallow periods lower natural soil fertility. Finally, fallow periods are abandoned entirely and the establishment of sedentary farming and settlement ends the frequent population movement that fallow farming entails. New methods of sustaining land fertility and productivity must be found to replace the soil's capacity to regenerate naturally. These consist of increased labour inputs at first, followed by organic manure, artificial fertiliser, animal power and mechanical power.
3. As the population continues to settle and grow, new technologies and systems are devised to increase production and to make more efficient use of natural resources, moderating loss of soil fertility and environmental degradation. At the same time new institutions have to evolve to facilitate infrastructure for the large-scale transportation, trading and marketing of produce.

Essentially, the process involves population growth leading from extensive to intensive agriculture, resulting in reduced soil productivity. Farmers respond by introducing technological change (Pearce and Warford 1993). It also involves widespread institutional change, including rapid transformations in social, economic and political systems. The rate of technological change ultimately becomes exponential and independent of demographic change (Coleman 1986).

4. If population density continues to grow then biophysical limits will ultimately be reached, causing irreversible environmental degradation. The exact location of such limits for any ecosystem, however, is hard to identify accurately given the complex uncertainties in our knowledge of the interaction of social, technological and environmental systems.

Is the process outlined above, which essentially traces institutional development in Europe, applicable to other areas? It is important to understand that the process is mediated by many physical and social factors. For instance, labour intensification is not always linked to improvements in productivity. The steep cultivated terraces of the Himalaya require a progressively higher amount of labour for their maintenance and the prevention of soil erosion (Ives and Messerli 1989). While it is labour intensive, this kind of subsistence mountain farming does not result in high productivity given the physical conditions as well as the lack of capital to invest in sustainable methods by which to raise yields.

Further, some soils and ecosystems may not support conventional intensive farm technologies; indeed, certain soils may be quickly damaged by mechanical ploughing as in sub-Saharan Africa (Pearce and Warford 1993). Related problems are that the capacity of technological change to keep pace with

declining soil fertility may not develop adequately, or that technological development may not take place for various reasons. Because soil types and environmental conditions are different in other parts of the world, the same technical solutions that worked to increase productivity in Europe cannot simply be replicated elsewhere. Nor will technological change take place if suitable investments are not made sufficiently and in time, and if prices, property rights and incentives are not conducive for technical innovation.

Finally, it must be remembered that although population growth can stimulate technological change it also, and as a first step, causes resource degradation. There is thus at stage three of the model described above a crucial tension between the role of population growth in creating technological change and its role in causing environmental degradation. This tension is essentially one that social and economic factors - in the way institutional organisation, social mobilisation, prevailing incentives for innovation and productivity and feedbacks in fertility rates affect the equation - can serve to both resolve and amplify (Pearce and Warford 1993).

This section of the paper investigated the linkages between poverty and the environment. While environmental degradation may cause poverty in rural areas of poor countries, I have suggested that there is little in the way of systematic evidence to suggest that the relationship is circular or forms a "trap"; in other words, that poverty in general is causally or intrinsically linked to environmental degradation. In the next section I will discuss some important aspects and perspectives concerning the role of institutions in relation to the major themes of this paper.

Reconsidering Aspects of Poverty and the Environment

One reason for this section of the paper is that poverty and environment are extremely broad terms and can frequently create confusion when precise definitions and meanings are sought in different contexts. Here I am referring not so much to per capita incomes, nutritional status, poverty lines, and environmental indicators and so on; in economics such quantitative means of measurement have reached a reasonable depth of sophistication. What I want to point to instead is that there are multiple aspects and understandings of both poverty and the environment, and that appreciating some of the reasons for this may help sensitise us in our present task.

Another reason is that adopting a wider focus of the institutional linkages between environment and poverty can be useful for contextualising our analysis in all its complex dimensions. To seek such a focus is to recognise that poverty is a deep-rooted, complex condition and that perhaps one reason why efforts to reduce poverty fail is because they are based on an excessively reductionist analysis. However, this focus does make the argument more complex and forms the principal reason to place this part of the paper, dealing

with matters of definition, after rather than before the main analysis. I will leave it to the reader to judge how much this departure from the usual practice is justified. As we shall see, at least some of the problems and contradictions referred to in the first part originate in matters of definition.

I am assuming that the reader is familiar with the work of the new institutional economists as well as with the considerable literature on local institutions for common pool resource management. I do not therefore discuss this conceptual background at any length. For such reasons it is possible that the arguments presented in this section may at times appear to be short and compressed.

Transaction Costs and Social Capital

The International Workshop on Environment and Poverty held at Dhaka in July 1993 provided a forum for economists, sociologists, anthropologists, political scientists and development professionals to discuss their conceptions of poverty. Papers presented at this workshop included one from Majid Rahnema, former Iranian minister and UNDP official. He observed that the modern concept of poverty combines several different characteristics and "lacks" which in vernacular Persian would be referred to in separate terms such as starvation, homelessness, isolation, etc. Pakistani scholar and former World Bank economist Arshad Zaman remarked that contemporary economic analyses and prescriptions on poverty neither recognise nor address its most important dimension - that of isolation and the lack of social relations.

Somewhat surprisingly, while modern analysts of informal and subsistence economies have long recognised the centrality of social bonds in maintaining trading networks students of formal markets have generally ignored this dimension of exchange relationships. We know that in informal economies the creation of a strong knowledge base through kinship ties, neighborhood learning webs, the informal exchange of skills and reciprocal structures of mutual aid can serve to ease transactions and reduce attendant risks (Cantor, et al 1992). Kenneth Arrow is among the few contemporary economists to acknowledge the role of such processes: he notes that social norms and codes "are reactions of society to compensate for market failure" and possess a collective optimality function.

One interesting feature of these views is the suggestion that just as there are different forms of capital (natural, financial, human, and social) so there are distinct kinds of poverty that are linked to a lack of each form of capital. Although an absence of financial capital is most usually associated with poverty, this would imply that the degradation or fragility of the environmental resource base leads to a depletion of natural capital; low levels of health and education result in low human development and capital; and a dearth of trust and reciprocity in civic relations produces a paucity of social capital. I want to

suggest that these alternative conceptions refer to different kinds of poverty with differing implications for the environment.

The concept of social capital is especially pertinent here. As is well known, social capital refers to features of social organisation, such as trust, norms and networks that can improve the efficiency of society by facilitating coordinated actions. The importance of social capital derives from the fact that there are many situations where, though it may otherwise be beneficial for individuals to cooperate, the high costs of transacting (such as the costs of monitoring, bargaining, obtaining information and enforcing agreements) effectively prevent cooperation.

That transaction costs are a pervasive fact of life is now generally recognised, primarily due to the work of the new institutional economists. Douglass North, for instance, contends that there are inherent constraints on human interaction that structure exchange because individuals possess culturally-derived mental models, incomplete information and limited mental capacity. Thus North argues that the zero-transaction cost model of efficient markets and instrumental rationality described by neo-classical economics is valid only when it is costless to transact. In reality, quite a large part of a typical national economy is comprised of transaction costs (North 1995).

In his seminal study of civic institutions in Italy Robert Putnam found that social capital - in the form of trust, norms of reciprocity and networks of civic engagement - can make a crucial difference in overcoming transaction costs (Putnam 1992). By providing the trust that makes it possible for actors to monitor and enforce agreements without external intervention, and by supplying the information about others that is necessary to assess negotiating positions, social capital reduces the costs and risks of cooperation.

Stocks of social capital tend to be self-reinforcing and cumulative, successful collaboration in one endeavour building connections and trust that act as social assets to facilitate future collaboration in other, perhaps unrelated tasks (Putnam 1993: 136-38). Putnam's study concludes that social capital is a central factor in stimulating the growth of institutions, meant both in the sense of the *rules* - legal or customary - for assigning resources as well as the *organisations* for defending particular interests.

Social capital and transaction cost analysis form mediating links between the study of market and non-market arenas because many processes of human interaction such as cooperation and exchange involve substantial costs (Douglas 1989). Indeed, the two concepts have become vital analytical tools in the study of a wide range of institutional forms, from formal markets to the informal local institutions through which rural communities manage their natural resource base.

Poverty, Sustainability and Institutions

In general, environmental sustainability requires improved cooperation and institutions in order, among other things, to mediate among competing uses of environmental resources and services. This is so not only for resources held as common property through the "tragedy of the commons" scenario but also for many aspects of private property. For instance, a poorly maintained agricultural terrace may cause damage to the fields of others downhill and downstream - runoff, erosion and pollution do not respect property boundaries. In such cases institutions facilitate sustainable environmental management by reducing the transaction costs of achieving a balanced distribution of goods and burdens.

What I am alluding to is that although poor communities in rural areas of the South may lack other forms of capital, they often possess social capital in good measure. Many decades ago, Karl Polanyi discovered that the features that distinguish virtually all subsistence societies in human history are a generalised norm of reciprocity and a right to minimal subsistence. According to Polanyi, these features explain the near universal absence of *individual* starvation in subsistence societies (Polanyi 1957). James Scott provides further empirical confirmation of the operation of such norms in his study of Malaysian peasant society (Scott 1976). In developing an analytical framework for poverty in mountain areas Narpat Jodha acknowledges that these "collective sharing and limited redistribution mechanisms" are part of the traditional coping strategies of mountain communities (Jodha 1993: 6).

Where poor communities have accumulated a stock of social capital an institutional pathway to local management of the natural resource base is a possible option. Informal village-level institutions can, among other things, enhance the resilience of poor households by providing a means for distributing individual risk across the community in the face of environmental and macro-economic shocks. As a consequence, such informal institutions can serve to prevent environmental degradation during exogenous shocks as discussed earlier in this paper. Social capital, by facilitating trust, rules and information about partners, is vital for the success of such institutions. In this sense social capital has a primary role in overcoming the first of the three major mechanisms for degradation studied in this paper, that of low resilience and high risk.

Social capital has a smaller but no less distinct role in controlling environmental degradation because of inappropriate technology choice, or as a side-effect of technological development. Clearly, the social and environmental impacts of technological change in sectors such as forestry, water management and road construction (where these are primarily local and may affect access to or regeneration of resources necessary for subsistence) will better be addressed by collective organisations than by isolated

individuals. Where there are insufficient formal or legal means for compensation, or where complex technical issues and trade-offs are involved, local organisations (often nested in larger translocal or regional movements) provide a forum for representing and reconciling different social interests and values with respect to technology choice.

One reason why social capital may have a lesser, more uncertain role in mitigating degradation from technological factors is because of an unfortunate coincidence: while the environmental impacts of technological development are likely to be most severe on the poor, the interests of the poorest and most vulnerable households will in most cases be under-represented in local institutions. Despite this unfortunate situation, by providing the reciprocal norms and civic networks that facilitate social cohesion and response, social capital constitutes an integral aspect of the institutional resilience necessary for technological change. Its presence in wider arenas than the local, such as between different constituencies and interest groups in a society or nation, is vital for the development of sustainable technologies. On the other hand, it is also necessary that technology assessments in fragile areas, including mountains and uplands, take into account and be sensitive to the interests and perceptions of poor communities during planning as well as in implementation.

The relationship of social capital with population growth is more tenuous than in the case of the two factors discussed above. Indeed, there seems to be no clear correlation between social capital and population growth. We have seen how in some places prevailing customs and institutions (eg, the proportionate distribution of land from the commons in parts of sub-Saharan Africa) encourage larger families. In other places where local institutions enforce a commons regime with rules of equal access and equal benefit for households, individual households may have greater incentives to reduce fertility than under such customs or in an open access regime.

The work of John Simons suggests that decisions about family size are substantively influenced by cultural factors such as the level of commitment to prevailing social institutions and reference groups (Simons 1986). The analysis becomes complex if we accept Boserup's thesis that population growth itself triggers technological change and institutional development. Admittedly, this is a vast subject but given the extent to which the issue is relevant here, it is probably adequate to point out that fertility behaviour and population growth are not functions of social capital per se. However, they are clearly sensitive to the specific content of traditions, customs, norms, economic incentives, the behaviour of reference groups, etc., acting within and through social institutions.

As the literature on local commons makes amply clear, inadequate attention has been paid in official circles to the fact that the success of local institutions depends greatly on the structure of policies and incentives. Elinor Ostrom

(1990) identifies eight design principles evident in "long-enduring" common-pool resource institutions, many of which have direct implications for policy. Similarly, Agarwal and Narain (1989) argue that the success of village organisations in natural resource management depends on three basic conditions: *control* of the community over a clearly demarcated resource; *unity* or accord in the community; and distributional *equity*. If, on the other hand, policy frameworks do not recognise the rights of communities to organise for cooperative action or if community organisations are somehow not considered competent to participate in the management of the local resource base, then the relevant local institutions may simply not develop effectively or adequately. The existence of appropriate policies is thus an important enabling factor in the success of local institutions.

Examples of successful institutions in natural resource management in the Himalaya include the integrated management of watersheds in the Sukhomajri-Nada cluster of villages in Himachal Pradesh (Chopra, Kadekodi and Murty 1990; Mishra and Sarin 1987). Management functions in this case were performed by communities organised along settlement and caste groups. More generally, the devolution of forest management both before and after the initiation of joint forest management in Himachal Pradesh can also be said to be successful. During the earlier phase, this success is partly indicated by significant long-term improvements in forest cover (Kuster 1993). In both cases, government agencies played a critical role: in the first an official soil and water research institute provided the initial technical innovation, while in the second the forest department established policies and institutional support structures enabling local management regimes over resources that remained the legal property of the state.

In comparison, prospects for natural resource management through local institutions in the hill areas of Uttar Pradesh remain bleak despite the moderate success of the *van panchayats* (village forest councils) of Kumaon since the 1920s (Guha 1989). Saxena notes that these councils, officially instituted during British rule, have had a mixed record. While some have achieved substantial success in conserving local forest cover through participatory management practices, others have failed in checking deforestation on lands under their charge. In general and despite some notable exceptions, durable examples of village-level institutions remain relatively rare in the Uttar Pradesh hills.

The difference is at least partly attributable to the degree of decentralisation supported by general policy frameworks in each state. In a recent comparative study of social opportunity and economic development in Indian states, Jean Drze and Amartya Sen note that decentralisation of political institutions can be a key and under-acknowledged influence on human development and social institutions. That the decentralisation of administrative structures and policies in Himachal has worked to produce positive results - in marked contrast to the

overly centralised structures of Uttar Pradesh - is also evident from an analysis of social indicators for each state. In terms of rates of female literacy or infant mortality, Himachal ranks very near the top among all Indian states while Uttar Pradesh is close to the bottom (Drze and Sen 1995: 46-56).

Finally, it must be reiterated that the role of local institutions should not be overemphasised. Such institutions will not regulate environmental impacts caused by the effects of macroeconomic shocks or through rapid population growth in areas where the demand for children is high due to prevailing socioeconomic factors. The focus on local institutions is relevant essentially because it reveals a persistent assumption of *institutional failure* within the downward spiral view of the poverty and environment relationship. Within a decentralised policy framework local institutions do over time provide a basis and context for better social development, and we know that improvement in social indicators often has the effect of reducing the parental demand for children. Moreover the existence of responsive, resilient and accountable local institutions also provides a focal point for social concern about the local environment and, more importantly, a means for translating that concern into collective actions and practices aimed at ensuring a balanced and productive environmental resource base.

In the earlier sections of this paper we have seen why the downward spiral view is unduly simplistic and does not reflect the behaviour of poor communities in most cases; that the relationship between poverty and environment is mediated by institutional, socio-economic and cultural factors; that degradation in areas of endemic poverty is more often caused by the effects of the mismanagement of macroeconomic, institutional and other policies and factors; and that, given improved management of such factors, poor rural communities can and will have excellent reasons to value the environment in both the short- and the long-term. They are most likely to do this if there are local institutions to facilitate the collective management, utilisation and conservation of the environmental resource base through a pattern of appropriate investments and practices. The latter include the balancing of private consumption with the collective benefits of conservation, and the lengthening of time-horizons through the collective management and pooling of household risks from unforeseen events.

If we take the downward spiral view literally, on the other hand, then we must expect that the poorer the people in a given area or ecosystem the more degraded and less productive the environment will be; that in comparison to those who are not poor the poor regularly tend to adopt short-term over longer-term horizons in order to augment meagre incomes and low rates of consumption. Such a view contradicts a wide range of empirical and historical studies and ignores two vital issues: (i) it does not distinguish between different forms of capital, assuming that poverty involves a paucity of all kinds of capital including social capital and institutional assets and (ii) it ignores

social processes such as trust, civic networks and institutional assets in poor communities as largely irrelevant to the relationship between poverty and the environment.

Conclusion

The evidence presented thus far should confirm the general point that the causes of rural environmental degradation are linked to complex exogenous factors rather than originating in poverty. The linkage of degradation with poverty, where it occurs at all, depends greatly on the particular strategies poor communities adopt for coping with prevailing conditions which in turn depend on the nature of options open to them, on the policy frameworks of national and local governments and on macro-economic factors. Thus the proper relationship between poverty and environmental degradation should largely be seen as one of coincidence rather than of the spiraling chain of cause and effect implied by the poverty trap thesis.

I have noted that under certain conditions poverty may result in high fertility and rapid population growth which in turn cause degradation. However there are many credible explanations which stress the central roles of risk and uncertainty, macroeconomic trends, the status of women, the structure of institutional incentives and the overall socio-economic environment in driving population growth. We have also seen how poverty can both enhance and restrict fertility rates depending on the impact of specific macroeconomic factors upon the household. Here also, poverty acts if at all as an intermediate or proximate expression of other forces responsible for environmental degradation.

This view has some important implications for policy:

1. Environmental degradation can be minimised in areas of widespread poverty if accurate assessments of micro- and macro-level causes for degradation are made, and if appropriate institutional measures are taken to allow poor communities to enhance their resilience in the face of economic and environmental shocks and risks. This might include the provision of soft credit, particularly during extended periods of macroeconomic change or serious natural disasters and hazards, as well as the regular supply of cheap fuel and clean drinking water.
2. Equally vital are enabling policies that allow local community institutions to manage environmental resources as commons where they are able to demonstrate they can achieve this successfully, as well as measures that permit them to lease or access state and public lands for joint management in collaboration with state agencies. While the process of accumulating surplus and escaping poverty may cause environmental degradation and drawdowns in natural capital, this can be

optimised and controlled by a balanced distribution of the social and private costs of such degradation.

3. Last but not least, such a view also suggests that measures to control and reverse environmental degradation will be beneficial for purposes of poverty alleviation as well as for increasing the future availability of natural capital. This is particularly so for rural areas consisting of fragile and marginal environments in poor countries. The evidence presented in this paper suggests that the efforts to improve the environment will succeed if poor local communities are considered stakeholders rather than mere culprits or victims. This requires long-term changes in official policies and institutional transformation to facilitate collaboration between agencies and local communities and serve as a check and balance on them, rather than simply being technical supervisors.

The problems of poverty, and of the nature of its impact on the local environment are complex. In order to overcome these problems it is necessary for poverty assessments to integrate the multiple dimensions, causes and implications that are characteristic of the phenomenon of poverty. Recent acknowledgement of the place of social capital in sustainable development represents a welcome shift in this direction. The challenge to contemporary analysts of poverty is to construct a framework that is complex enough to incorporate such different dimensions. For instance, to be able to consider the impact of a poor community on the environment accurately we need to have some idea of the range of options open to its members, assess the level of risk or uncertainty that is involved with each option, recognise the socio-economic forces affecting population growth, evaluate the institutions that mediate social, technological and economic change, and estimate the amount of social capital and institutional resilience present within the community, among other issues.

It is true that we know more about the operation of some of these factors than others and that underlying causes are often not well understood. However it is difficult to concede given the micro-level studies and empirical literature cited in this paper, that these factors and dimensions (and consequently the causes of environmental degradation) are exclusively or even mainly dependent on levels of economic deprivation. Consequently, greater attention needs to be paid to the structure of institutional incentives for environmentally sound practices in rural areas of widespread and general poverty. While it is possible that economic stability and reductions in poverty may ultimately lead to changes in the way the various factors determining environmental degradation operate, a principal conclusion of this paper is that there are other, more immediate mechanisms to understand and address the causes of degradation.

Appendix: Environment, Degradation and Income

This appendix deals with issues of definition and assessment in respect of income levels and environmental degradation. I will suggest that the relationship between them depends entirely or very substantially on such matters; moreover, that if the most appropriate definitions are used, this relationship is very different from the one that is usually assumed to exist.

In an edition of *World Development Report*, The World Bank (1992) relates various environmental indices to the levels of income per capita of selected countries. Indicators such as population without safe water and urban population without adequate sanitation are shown to decrease with higher levels of income whereas others such as municipal waste per capita and carbon dioxide emissions per capita increase with rising incomes.

The relationship of urban concentrations of atmospheric pollutants (such as sulphur dioxide) with income per capita is represented as a bell-shaped curve, so that such concentrations are increasing functions of income when incomes are low and decreasing functions when incomes are high (fig. 2). In keeping with the historical experience of the OECD countries, this bell-shaped curve suggests a general relationship between income levels and the extent of environmental pollution.

Partha Dasgupta (1994) remarks that if this view is accepted it is tantamount to saying there is a trade-off between the environment and poverty in the short run but in the long run this trade-off disappears. Dasgupta also suggests that, in general terms, the demand for some aspects of environmental quality is as for luxury goods, in that it increases sharply once incomes grow beyond the point where basic necessities can be met. Dasgupta argues that implicit in such a relationship is the assumption that the specific variables being measured are GDP per capita and an aggregate of industrial effluent. When the value of income considered relates to the real or net national product the relationship, he suggests, will be quite different. Similarly, the relationship is different when local environmental resources such as forest products, pastures or water sources are considered instead of aggregate industrial pollutants.

Although Dasgupta in his paper does not describe what the relationship between real (NNP) income per capita and environmental degradation might look like, he argues that the essential problem is that environmental resources are not priced properly. When this is done, the household incomes of the poor will be valued differently and the idea of poverty itself may be re-evaluated. The trade-off between poverty and the environment is likely to be more tenuous when poverty is measured properly to include the value of environmental resources.

Dasgupta further argues that there are considerable conceptual dangers in aggregating environmental resources into an all-purpose notion of "the environment", and pleads for a minimal distinction between those

environmental goods and services that act as sinks for industrial effluent and those that provide a source of the biomass necessary for local production. Yet Dasgupta's essential prescriptive idea, that policies directed at growth in incomes will also have beneficial effects on the fertility behaviour and local resource base of the poor, is hardly new (Dasgupta 1994: 258).

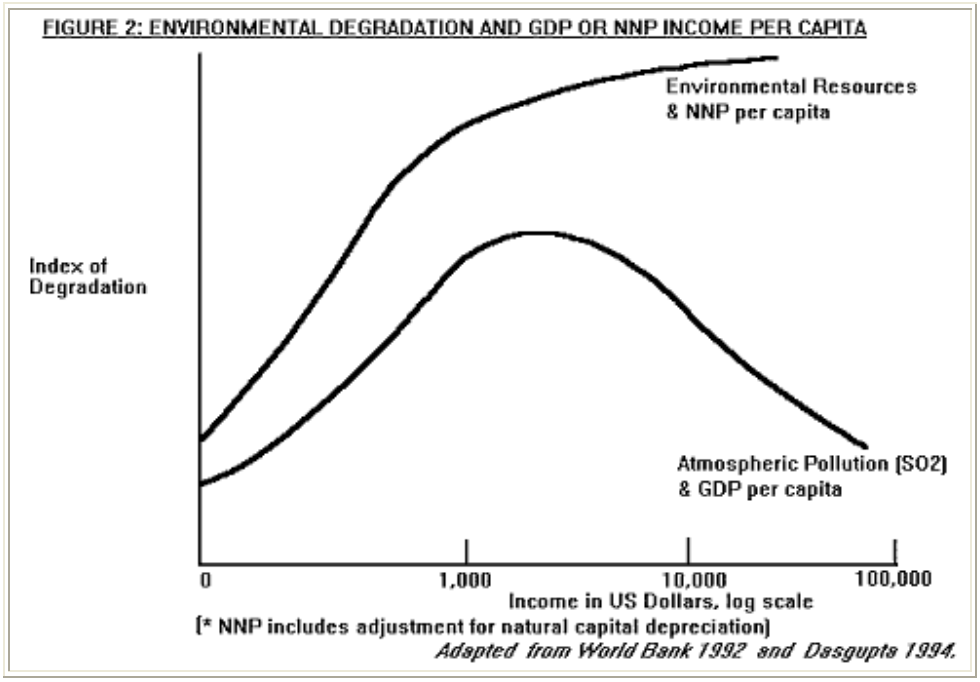

Figure 2: Alternate representations of the relationship between environmental degradation and income

Computing a value for NNP that accounts for depreciation in natural capital involves complex issues of sustainable resource use. Charting the growth and productivity of environmental resources and living organisms or the stability and resilience of ecosystems, even small ones, are matters fraught with scientific uncertainty (Holling 1986; Van Latesteijn, et al 1994/5). The result is that the dividing line between natural capital and natural product can become rather blurred. There are other problems in valuing those natural resources that are essentially renewable against substitutes that are non-renewable or that may regenerate only very slowly.

Despite these problems, I have attempted to plot (as a very general trend) the relationship of NNP per capita with the degradation of environmental resources. I suggest that the marginal rate of degradation declines with increasing income (fig. 2). It should be noted that while at higher incomes the use of local biomass resources will decline and local degradation may even be

reversed, these local resources will be substituted by others such as energy derived from coal or petroleum and manufactured goods produced from natural raw materials.

These proposals raise two main questions and implications. One concerns the trade-off between local degradation and the degradation of environmental resources in general. If increases in income serve to replace local degradation with degradation in the vicinity of those who are relatively less well-off, then degradation may be considered a form of economic "bads" with the consequent distributional implications. It has been noted in the USA, for instance, that concentrations of toxic pollutants are highest in neighbourhoods that are disadvantaged by income and ethnicity (ie. that are primarily African-American or Hispanic). There are many indications, however, that most often people do not view risks from pollution in such elegant economic terms but instead tend to see them as ethical issues intrinsically and essentially beyond the scope of economic compensation.

The other question relates to the implications of pricing environmental resources. While Dasgupta's recommendations about proper pricing are admirable in respect of environmental accounting procedures, there is one way in which they may be problematic. I want to suggest that one reason poor households retain informal access to local resources such as forests, water sources and grazing lands is because these resources are not priced. As prices, even notional prices, are attributed to such resources there are those who will begin to question this form of free access. The persistence of the Matthew Effect (Unto him that hath shall be given...) does not instill much confidence in the power of economic tools to address chronic problems of poverty and the environment. As I have tried to show earlier, I believe the solution lies in civic and political institutions; or, more specifically, in the institutional structures of rights and entitlements that govern the relationship between local communities and the environmental resource base, an area I have explored in a somewhat different context elsewhere.

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Notes to readers

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