

# NATURAL RESOURCES AND CHRONIC POVERTY IN INDIA: A REVIEW OF ISSUES AND EVIDENCE

*Amita Shah*

*Working Paper 43*



**Chronic Poverty  
Research Centre**



**Indian Institute of  
Public Administration**

## **Abstract**

Natural resources perform multiple functions as a driver, maintainer, potential exit route, and also an effective escape mechanism in the context of poverty dynamics, especially in a predominantly agrarian economy such as India. The discourse on poverty reduction however, has often overlooked some of the major concerns of natural resource management, despite recognizing the criticality of agricultural growth for reducing rural poverty in the country. This paper presents an overview of the interface between natural resources and poverty in India and pleads for better equity and sustainability in resource management by ensuring sustained investment in support institutions at various levels.

While a number of schemes have been undertaken for management of natural resources viz; land, water, and forests by adopting participatory approaches, much of this remains isolated from the mainstream strategies for enhancing agricultural productivity across the three sets of regions-dry land; high potential rain fed; and high potential irrigated-where the emphasis is mainly on crop technology and yield maximization. The challenge now, is to shift towards water efficient and knowledge/employment intensive systems of agricultural production. Achieving this would require a more nuanced approach, which incorporates differential agro-ecological features on the one hand, and employment-livelihood needs on the other.

**Key words:** Natural resources, Poverty, India, Dry land, Forest, Tribal.

## **Acknowledgements**

The author would like to thank Dr. Andrew Shepherd for comments on an earlier draft and Prof. Aasha Kapur Mehta and CPRC for providing the opportunity to prepare a comprehensive review on the theme that is critically linked to the discourse on chronic poverty in India and elsewhere. Thanks are also due to Ms Roo Griffith for careful editing of the paper.

Amita Shah (Ph.D.) is an economist, has wide ranging experience of conducting research on various aspects of development economics. She is a Professor at Gujarat Institute of Development Research, Ahmedabad (India). Her research interests include sustainable agriculture and rural livelihood, participatory natural resources management, gender and development, trade and environment, migration and agriculture-industry interface, and chronic poverty.

Email: amitagidr@gmail.com

# Contents

- 1. Introduction.....4**
- 2. Conceptual framework.....6**
  - 2.1 Natural resources–poverty interface: Emerging perspectives.....6
  - 2.2 Natural resources–chronic poverty linkages.....7
  - 2.3 Mediating processes.....8
    - 2.3.1 Natural resources as exit route to escape poverty: Centrality of agriculture.....8
    - 2.3.2 Linkage with economic diversification.....10
    - 2.3.3 Migration: Strengthening rural–urban linkages.....11
- 3. Natural resources and poverty reduction: What do we know?.....13**
  - 3.1 Typology among states by natural resources–poverty interface.....14
  - 3.2 Natural resources and poverty: Land, water, forest.....16
    - 3.2.1 Land and multidimensional poverty .....16
    - 3.2.2 Irrigation and poverty reduction.....17
    - 3.2.3 Forest dependence and poverty.....18
- 4. NR and long-duration poverty: Some evidence.....19**
  - 4.1 Areas facing high incidence of poverty over a long time.....19
  - 4.2 Households facing chronic poverty: Link with natural resources.....21
  - 4.3 Natural resources and chronic poverty related thematic and policy imperatives.....23
- 5. Policy approaches and way forward.....24**
  - 5.1 Disjointed approach in natural resource management and agricultural growth.....25
  - 5.2 Diversification and migration.....27
  - 5.3 Summing up.....28
- References.....29**

# Natural Resources and Chronic Poverty in India:

## A Review of Issues and Evidence

Amita Shah

Degradation of natural resources from whatever causes can have a high human cost for poor. It can put a severe burden on their ability to meet their needs, can destroy their means of livelihood and can reduce their options to take defensive actions when faced with adversity such as crop failure. Thus, preservation and even regeneration of natural resources are needed not only for sustainability but also for protecting and helping the poor (Parikh, 1998).

### 1. Introduction

Natural resources constitute an important source of livelihoods as well as a coping mechanism for a large proportion of the 0.82 billion rural poor world over. The poor, especially in rural areas, not only depend on these resources to earn a subsistence income: for many of them, these are the only assets available for their survival (WRC, 2002). According to a rough estimate, natural resources constitute roughly 20-25 percent of the income of the poor (Parikh, 1998). In addition, incomes earned from agriculture on small landholdings and allied activities often work as an important strategy for the non-poor to sustain their livelihoods given the uncertainty of incomes from non-farm sectors. Nevertheless, sole dependence on natural resources may in many cases lead to a deep downward spiral in a household's economic well-being, owing to shocks like droughts and floods. It has been estimated that about 1.3 billion people live on marginal land and more than half of the rural poor have landholdings too small to provide adequate income; nearly one-fourth of them are landless (UNCHS, 1996). Depletion of the stock of natural resources (capital) would therefore have a significant adverse impact on income levels among those who live in rural areas and also among those who are pushed out to urban areas and yet continue to seek income support from rural areas (WRC, 2002).

Natural resources thus perform multiple functions with respect to chronic poverty in rural areas: driver, maintainer, potential exit route and also effective escape mechanism.<sup>1</sup> Besides the direct impact on household income, natural resources can influence people's well-being through impacts on morbidity and mortality caused by polluted air and water. What is less recognised, however, is the role that natural resources play indirectly in terms of boosting overall economic growth in some of the predominantly agrarian economies like India (Sastry, et al., 2003).

Ironically, the discourse on poverty reduction often overlooks the critical role of natural resources with respect to the multiple functions noted above (WRC, 2002). The omission could possibly owe to the fact that natural resources are often seen as synonymous with the primary sector – shifting away from which is generally viewed as an upward trajectory towards economic growth and associated poverty reduction. This is particularly true in a situation where natural resources are already facing severe pressure, causing depletion of

---

<sup>1</sup> It is argued that environmental vulnerability is central to low productivity, which is the main cause of chronic as against transient poverty. For details, see Scott (2006) and CPRC (2006).

natural capital, because of the dependence of the poor on these resources for survival. In such situations, natural resources are more likely to be seen as a driver or maintainer of chronic poverty, rather than as a potential exit route or mechanism for escape.

Another reason for the relative neglect of natural resources in the poverty discourse could be that the interface between natural resources and poverty is multi-patterned, complex and empirically difficult to ascertain (Markandya, nd). Besides this, using natural resource management as an effective exit route or escape mechanism calls for addressing institutional challenges pertaining to property rights regimes, collective management and decentralised governance – many of these are difficult to deal with. However, this is not a valid justification for the neglect of natural resource management. On the contrary, it has been argued that 'it is difficult to obtain a clear picture of rural life in the world's poorest regions without taking into consideration the direct role the local resource base plays in supporting needs of the poor, and the local institutions they managed to create in order to cope with their subsistence needs' (Dasgupta and Maler, 2004: 4).

The empirical research examining the interface between natural resources and poverty is somewhat scanty and inconclusive. The reasons for this are twofold: (i) the interface is essentially a two-way transaction: whereas the poor are often victims of degraded natural resources, at times they also resort to degrading the very resource on which their survival depends (Duriappah, 1998; Nadkarni, 2000); and (ii) the interface is highly location specific: aggregate analysis at regional/national level may not bring out the clear picture (Dasgupta and Maler, 2004). This is particularly true in light of the fact that the empirical reality is often influenced by population mobility, where the shift is often from environmentally fragile to economically more developed areas (Dasgupta and Maler, 1995). Broad insights from the studies by and large suggest that poverty does not cause huge damage to the environment (or natural resources), whereas environmental degradation exerts a disproportionately large impact on the poor (Markandya, nd). It is therefore imperative to understand the influence that natural resource endowment and its management exert on chronic poverty, especially under the varying context-specific situations.

It is in this context that this paper tries to present an overview of the interface between natural resources and poverty in the context of India. The main objectives are:

- (i) To develop a conceptual framework for examining the interface between natural resources and chronic poverty in the Indian context.
- (ii) To review empirical evidence on the interface across states/regions with varying levels of natural resource endowment.
- (iii) To discuss policy imperatives for promoting sustainable agricultural growth, economic diversification and development-induced migration.

The analysis is based mainly on secondary data and draws substantially on earlier studies carried out by the Chronic Poverty Research Centre (CPRC) and existing literature with a specific focus on India.<sup>2</sup>

---

<sup>2</sup> For details on the earlier studies by CPRC (India), see the CPRC–Indian Institute of Public Administration (IIPA) Working Paper series on [www.chronicpoverty.org](http://www.chronicpoverty.org).

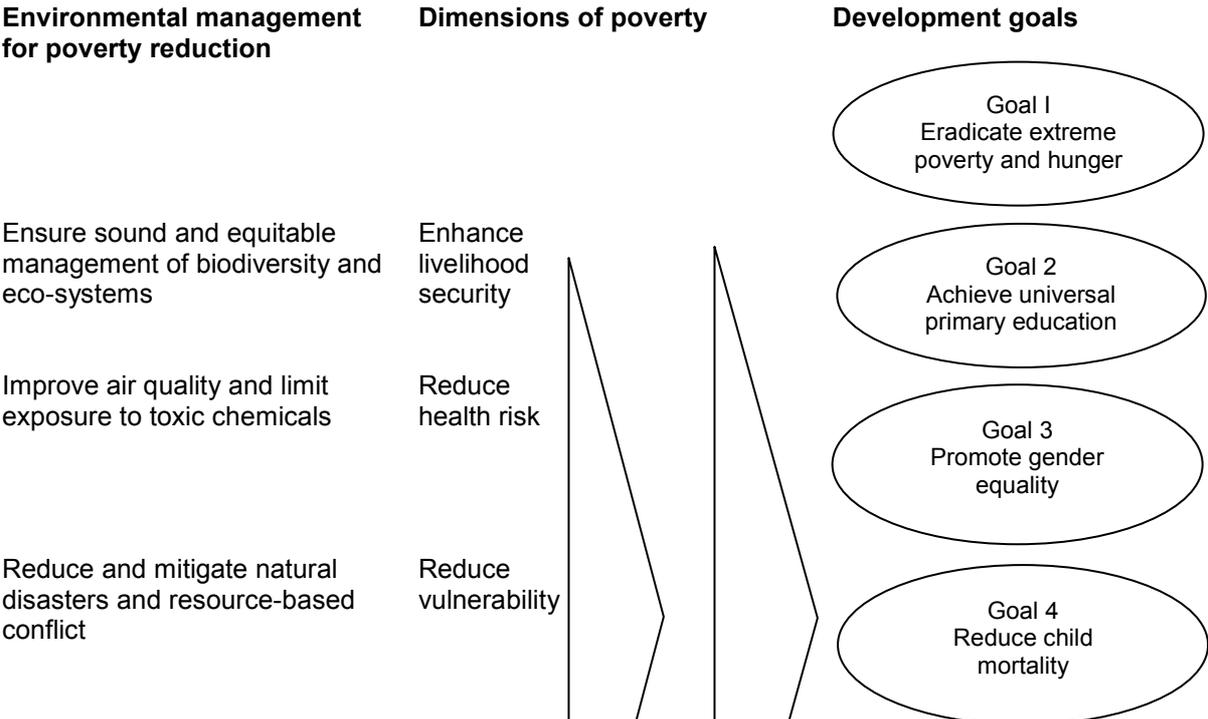
## 2. Conceptual framework

### 2.1 Natural resources–poverty interface: Emerging perspectives

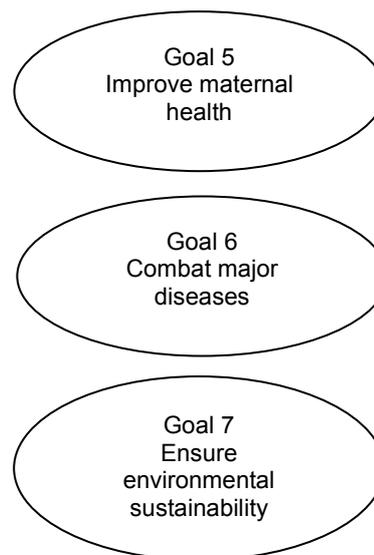
The empirical evidence on the interface between poverty and the environment, as noted earlier, is fairly sketchy and somewhat inaccurate. This is mainly so because of the multi-patterned as well as complex nature of the interface between the two. Basically, the complexity emanates from the fact that use of natural capital, consisting of resources such as land, water (inland and sea), forest and minerals, constitutes an important precondition for poverty reduction in large parts of the country. In the absence of this, people, especially in rural areas, may remain under chronic poverty conditions in the midst of rich natural resources. Population growth, for the want of properly calibrated distribution, may further aggravate the situation. Out-migration and dependence on alternative activities outside the primary sector may also have a negative impact on the environment, both directly, through processes of production in non-agriculture sectors along with urban growth and changing lifestyles, and indirectly, through neglect of land as well as other natural resources at the place of origin (Bilsborrow, 1992). It is therefore imperative to work out strategies by means of which people can find employment and income from a combination of activities with minimum negative impacts on the environment.

A study jointly undertaken by the staff of the UK Department for International Development (DFID), the European Commission (EC), the UN Development Program (UNDP) and the World Bank (DFID et al., 2002) provides a good starting point for understanding the linkages between natural resources and the Millennium Development Goals (MDGs). Insofar as the MDGs capture some of the important dimensions that are relevant to the concept of chronic poverty, the framework could also serve as a starting point towards evolving a conceptual framework for understanding the interface between natural resources and poverty (see Figure 1).

**Figure 1: Mainstreaming environment into poverty reduction**



Reduce and mitigate climate variability and change



Source: Figure 1 in DFID et al. (2002).

More recently, a paper by CPRC researchers in the UK discussed the broad contours of the inter-linkages between environment and chronic poverty. The analysis, to a large extent, lays emphasis on the vulnerability and uncertainty caused by environmental factors, which eventually operate as drivers or maintainers of chronic poverty. However the paper rightly emphasises the point that environment (or natural resources) may not be seen merely in the context of a thematic understanding on vulnerability and uncertainty, since the former is more of an overarching factor that may cut across several thematic concerns of chronic poverty.<sup>3</sup>

## 2.2 Natural resources–chronic poverty linkages

Taking the above proposition forward, we have tried to identify in the context of India the role that natural resources are currently playing in terms of exit route and/or escape mechanism, and the potential they have for ameliorating chronic poverty in future. While doing so, we reflect on the two important features of the Indian economy: asymmetry in sectoral growth and the critical inter-linkages of agricultural growth and sustained overall growth in the economy (World Bank, 2006). Taking an approach such as this will help promote an understanding of the role that natural resources play, not only in influencing poverty dynamics but also in connecting various thematic concerns of chronic poverty, such as **uncertainty** (plus risk and vulnerability); **assetlessness** (plus low returns and inequality); and **adverse incorporation** (plus social exclusion). The conceptual framework in Table 2 is based on certain important realities characterising the interface between natural resources and poverty in India.

**Table 1: Critical role of natural resources growth and poverty reduction in India**

Main functions/impacts of natural resources	Mediating factor/process	Implications for poverty reduction
---	--------------------------	------------------------------------

<sup>3</sup> Other overarching factors in the CPRC framework could be pace and composition of macroeconomic growth; demographic dynamics; and political economy (including property rights regime).

Land (and water) is basic factor of production	Growth in agriculture increases overall economic growth	4-5% growth in agriculture sector reduces rural poverty by 3% per annum (Radhakrishna, 2002)
Enhance environmental sustainability	Land and water management	Contributes to real saving hence productive capacity of the economy
Increase employment/rural wages	Primary sector accounts for nearly 57% of workforce	Increase in agriculture wage rate is the single most important channel for reducing rural poverty (Panda, 2003)
Promote sectoral linkages	Enhances economic diversification	Strong co-relation between agriculture and non-agriculture gross domestic product (GDP) (Gandhi, 1997) and also between agriculture and rural non-farm sector (Ravallion, 2000)
Provide food, fodder and drinking water	Marginal and small farmers accounting for 80% of cultivated area derive a major part of their subsistence food requirement	Contributes towards household's food security, reduces hazards (especially for women) in collection of fodder and drinking water
Restrict distress migration to urban areas. 60-80% of people still live in rural areas	Provisioning of basic amenities including water and sanitation in rural areas	Enhances human welfare
Regional balance	Centrality of natural resource-based development	Reduces conflicts between rich and poor areas

The inter-linkages depicted in Table 1 define broad contours of the impact that natural resources, especially, land, water and forest, may exert on poverty in India. The impact may work through direct as well as indirect channels. For instance, degradation of land, groundwater or forest may exert negative impacts in terms of declining income/expenditure on food and other basic needs, including education and health. Similarly, the impact may be manifested indirectly through distress migration and/or over-depletion of natural resources, and thereby shrinkage of the productive base and increased vulnerability to natural shocks like droughts, floods, cyclones, etc.<sup>4</sup> The three major mediating processes are discussed below.

## 2.3 Mediating processes

### 2.3.1 Natural resources as exit route to escape poverty: Centrality of agriculture

Recent studies have restated the critical role of agricultural growth for poverty reduction in India (Majumdar, 2006; Mehta and Shah, 2003; Radhakrishna and Ray, 2005). While a large part of the poverty reduction impact took place in areas covered by the early phase of the Green Revolution, a similar phenomenon was experienced during the 1980s in some of the agriculturally lagging states (Bhalla, 2000).

The period starting from the early 1980s marked a turning point in India's agriculture and related sector, with unprecedented growth of 4 percent per cent per annum. Unfortunately, the sector failed to show any buoyancy in the post-reform period. The growth rate declined to

<sup>4</sup> The various channels through the agriculture sector exerting an impact on poverty reduction, based mainly on natural resource endowment, are in Panda (2003).

3 percent during the latter half of the 1990s, and further to 2 percent during 2000-2001 to 2004-2005 (Mathur et al., 2006).

Ironically, agricultural growth following the Green Revolution strategy has contributed to both poverty reduction and environmental degradation in a number of developing economies, including India. There is apparently a trade-off between growth and sustainability, at least in the short and medium terms, as depicted in Table 2. It is, however, imperative to note at this stage that what is being questioned about the Green Revolution is not the technology *per se*; rather, it is more about the manner in which the technology was adopted, overlooking the required mechanisms for safeguarding the environment. Moreover, the problem lies in the fact that over-occupation with the Green Revolution strategy led to gross neglect of the simultaneous efforts required for strengthening a farming systems approach, suitable for relatively more fragile eco-systems, such as dry land, forest-based, hilly and coastal. These systems are less amenable to crop-centric, monoculture-driven and input-intensive approaches to agricultural production.

**Table 2: Typology of agriculture–environment interface**

Interface		Typology	Description
Environment degradation	Agricultural growth		
1. High	High	H-H	Poorly managed Green Revolution technology
2. High	Low	H-L	Low external input agriculture system (LEIA) as it operates in large parts of resource poor or undervalued resource agriculture
3. Low	Low	L-L	Zero external input system with limited availability of technical know-how and labour constraints
4. Low	High	L-H	Well-functioning LEIA or well-calibrated Green Revolution technology in selected areas with conducive natural resource endowment

Note: For details, see Shah (2000).

By and large, the trajectories followed in India refer to the first two scenarios, the former being confined to a limited area with assured irrigation and the latter spread over the large tracts of land with medium to low and erratic rainfall conditions (Shah, 2005b). Obviously, both of these are problematic. It is therefore imperative that the next round of agricultural growth moves from the last typology of low degradation and high growth (L-H). A moderate approach balancing the use of external inputs and calibrating knowledge-based production to suit local conditions with respect to natural resources, labour and market infrastructure may help in attaining the desired typology.

An important reason for deceleration in growth, besides the sub-normal rainfall, is that the locus of incremental growth has shifted from areas with high agronomic potential to those with medium and low potential (rain-fed areas and dry land regions): water as a source of irrigation is critical in determining potential. Sustaining the momentum of growth in medium and low potential areas would therefore call for a paradigmatic shift in the nature of technology, institutional support systems and price structure.

The World Bank (2006) study on inclusive growth and service delivery spells out differential pathways for promoting agricultural growth for three categories of area identified by Fan and Hazell (2000). These are: high potential irrigated areas; areas with moderate to high

potential; and low potential dry land areas. The pathways suggested for the three respective categories refer to intensification; diversification of farm production as well as non-farm linkages; and exit from agriculture. The issue of sustainability does not get any special mention. This is surprising, given the fact that the burden of environmental degradation, in predominantly agrarian economies like India, is placed mainly on the policies that promote intensive agriculture (Lopez, 1997). What is also missing in these pathways is the issue of poverty in ecologically fragile regions, especially forests, where intensive agriculture may not be the most suitable option.

### **2.3.2 Linkage with economic diversification**

The discourse on the centrality of agriculture growth clearly suggests that, although it is a necessary precondition, growth alone may not do the trick in terms of pulling all the rural poor out of poverty. At the same time, there is ample evidence suggesting that agricultural growth is a necessary precondition for workforce diversification from primary to secondary and tertiary sector which, in turn, has emerged as one of the most important factors in reducing rural poverty in India (Ravallion, 2000). More recent analysis on sectoral diversification lends further support to this argument by indicating that growing employment in the urban informal sector has exerted a significant impact on poverty reduction, especially through positive influences on agricultural wages, thus reinforcing the importance of rural–urban linkages (Lanjouw and Shariff, 2004; also Hansda and Ray, 2006). This suggests that a sectorally diversified economy may pave the way for lifting up the chronically poor, trapped in a log jam of weak endowments of natural, physical, financial, social and human capital.

This perspective overlooks the fact that: (i) growth of rural non-farm employment is contingent on the pace and composition of growth in the agriculture sector; and (ii) there is still substantial scope for tapping the full potential of agriculture (and related) sector by adopting skill- and labour-intensive as against input-intensive production systems. How far it is feasible to shift a substantial proportion of the labour force outside agriculture, however, would depend on the nature of sectoral linkages on the one hand, and composition of secondary and tertiary sectors on the other (Patnaik, 2007). Also, it is essential to ensure that agricultural growth does not overlook long-term sustainability of natural resources.

The discourse on employment and poverty in rural India has, by and large, focused on observed rather than potential employment elasticity of agriculture (and related) sector. This at times has led to an overstating of the urgency of pulling out a large proportion of the underemployed labour force from the sector. A recent study by Srivastava (2006: 190) clearly indicates that ‘with appropriate policy changes, agricultural sector growth may absorb a sizeable part of the incremental workforce for some time to come ... Further it does appear that contribution of the crop sector may still be quite important in those parts of the country where labour use in agriculture is already not excessive and where with appropriate investments, expansion of high value agriculture takes place’.<sup>5</sup> Large parts of the

---

<sup>5</sup> Given the fact that, with changing labour relations and increasing transaction costs, large farmers have tended to use labour-saving methods, the policy imperative is to give the rural poor greater control over land and augment the productivity of small farm agriculture to absorb more labour. The Task Force on Employment Opportunities set by the Planning Commission (2002a) has already considered this view positively.

agriculturally lagging regions with high incidence of poverty are likely to qualify for the new thrust on agricultural growth and employment generation therein.

It is thus imperative that the search for a poverty reduction mechanism continues to focus on sustainability of natural resources – economic diversification should be treated as part of the comprehensive solution rather than as an alternative to promoting broad-based and employment-intensive agricultural growth. This is particularly important in light of the fact that growth of employment in the non-farm sector in urban areas is also fairly slow, unevenly distributed across space and uncertain, i.e. depends on a number of exogenous factors.

This may imply that the dichotomy between farm and non-farm sectors, at least for some time to come, is out of place in the Indian context where: (i) the poor, as in most developing economies, have always been engaged in multiple activities, often at multiple locations (through circular migration); and (ii) the notion of sustainable agriculture is always linked to the concept of a farming system rather than focusing only on crop production. Many of the chronically poor (including the landless) in rural areas may find additional employment in rural areas, both on and off-farm, if a more holistic approach to development of farming systems is adopted.

The expansion of rural employment may have special relevance for the chronically poor (e.g. the landless), who may have relatively low mobility and a low reservation price for undertaking various work opportunities that may emerge in and around the place of origin.

### **2.3.3 Migration: Strengthening rural–urban linkages**

Environmental constraints have long been seen as one of the prime movers of populations. In many parts of the world, populations have had to move to new areas after sedentary agriculture has exhausted natural soil fertility in the former location. Increasing demographic pressure in recent decades has only expedited this process. In dry regions, where water rather than land is the primary limiting factor, population growth has resulted in overuse of water and land and, in turn, eventual out-migration (Bilsborrow, 1992).

Existing migration theories treat environmental change-induced migration as a distress phenomenon influenced by ‘push’ factors. Such migration could, in turn, lead to suboptimal land use and further degradation of land, owing mainly to the shortage of able-bodied persons within households (Scherr and Yadav, 1998). Similarly, additional income earned from out-migration could expedite the degradation process by inducing private investment in water extraction; in the absence of additional income, investment in groundwater extraction is likely to be limited. Alternatively, public and private investment in soil/water conservation measures may help promote more sustainable use of these resources and, in turn, contain distress migration. Environmental factors in general form part of the structural factors that motivate households to make a variety of decisions, including out-migration to maximise their economic wellbeing.

There is ample evidence of long-term migration of people from drought-prone regions of Gujarat, Maharashtra, Rajasthan, etc., to other parts, including hilly areas in the north. Historically, dry land regions in India have been more prone to out-migration (Deshingkar and

Start, 2003; NIRD, 2000; Sah and Shah, 2005; Shah, 2002; Visaria and Kothari, 1984). To a large extent, weather-induced uncertainty and low levels of land productivity appear to be responsible for this pattern. Of late, rapid depletion in land and water resources appears to have only aggravated the situation. Official statistics, however, suggest a decline in population mobility over the past two decades, which could be attributed to factors like limited opportunities of the kind of employment one might expect and/or abysmal living conditions in urban destinations, besides increased facility for commuting and underestimation of circular migration.

The recent discourse on migration poses a counterview, asserting that efforts in rural development do not reduce migration: at best, they may only change the pattern of migration. There is, however, little understanding on the interface between development and migration in general, and resource degradation and migration in particular. Understanding this interface is particularly important in a developing economy such as India, where the primary sector is more or less stuck in stagnancy, and the secondary as well as tertiary sectors offer low quality jobs in mainly in the informal economy.

Similarly, the discourse on migration of late has questioned the 'distress' factor for explaining out-migration as the only route for survival among the landless. It has been argued that migration, especially circular migration, is often seen as a means to augment additional income rather than being a survival mechanism for the poor (Farrington et al., 2006; Ghatak, et al., 1996; Munshi and Rosenzweig, 2005). While this may hold good for many who migrate from rural areas, the larger reality is that of a selectivity bias, which may influence the type of migrants and the jobs they find at the place of destination.<sup>6</sup> It is often noted that this kind of 'development-induced' or accumulative migration is confined to relatively better-off households in village communities, which can afford the cost of migratory movement, the risk involved in finding employment and social alienation, besides having made the initial investments in terms of education and skills/capital formation essential for undertaking such migration (Cashin and Sahay, 1996; Yadava and Yadava, 1998). There is ample evidence from India's rural areas suggesting that landless or very poor and socially marginalised communities have the least chance of migration (Connell et al., 1976; Lipton, 1980; Oberai, et al., 1989).

Until the late 1980s, it was observed that households with medium- to large-sized landholdings, with some investment in irrigation, did not have to move out of dry land regions for subsistence purposes (NIRD, 2000).<sup>7</sup> Migration for such relatively wealthy households was mainly for 'better prospects' rather than being a 'distress move' (Shah, 2005a). This phenomenon was particularly true for a subset of households that grew high-value commercial crops like oil seeds, spices, horticulture, etc. Similarly, areas with moderately good soil and groundwater table could also escape 'distress migration'. The phenomenon is reflected by studies (focusing on in-migrants) indicating that, overall, the migrant population

---

<sup>6</sup> It may be reiterated, however, that 'distress' migration is underrepresented in studies that use official statistics, and they also capture relatively long-term migrants at the place of destination. Also, the studies often capture economic status after the migrant has already shifted to the place of destination, irrespective of the status at place of origin.

<sup>7</sup> A typical weather cycle of five years, with two droughts, one average year and two good rainfall years, was sufficient to economically sustain a land holding of about five hectares.

is economically better off than the non-migrants in a given urban location (de Haan, 1999; Kundu and Sarangi, 2007).

Migration studies in India suggest that four key transformations which have taken place over the past two decades are crucial to an understanding of migration. These are: an increase in (i) landlessness or semi-landlessness (owing to division of land holdings); (ii) degradation of land and groundwater resources; (iii) urbanisation and scope for non-farm employment; and (iv) preference for migrant (contract) labour both in rural as well as urban areas (de Haan, 1999; de Haan and Dubey, 2006; Kundu and Sarangi, 2007). *Prima facie*, all these factors tend to increase out-migration from rural economies. Against these, the factors that exert negative impacts on out-migration from rural areas are: increase in irrigation; availability of public works programmes; and overcrowding or hazards when it comes to living in urban settlements.<sup>8</sup> The changing pattern of out-migration over time would therefore be the net impact of these two sets of factors operating across states/regions within the country.

The evidence from the 59<sup>th</sup> round of the National Sample Survey (NSS), indicating that about 40 percent of farmers do not wish to continue with farming as a main source of income (Bhalla, 2006), should thus be viewed as a reflection of a dilemma faced by the rural community, which is stuck between stagnant agriculture and inadequate demand for better quality of employment outside the rural areas.

By and large, the evidence suggests that the world of migrants is highly stratified, and that the divide between 'development-induced' and 'distress-induced' migration (or push and pull factors) is fairly complex and often blurred. The reality, as it obtains now, is mixed. It has been noted that there is often an element of distress, even among those who apparently migrate for income enhancement (Sah and Shah, 2005). This is so because, more than income differentials, the notion of distress is borne out in the socio-cultural context within which the expected benefits from migration are shaped. In the event, when households find very bleak chances of actually realising the expected benefits from migration, this leads to a perception of 'distress' among both those who actually migrate and those who consider migration inevitable in future. Essentially, the perception may vary across households of different social-economic-cultural backgrounds within and across villages.<sup>9</sup>

What is therefore needed is to strengthen the rural-urban interface rather than treating these as either/or options to be exercised through migration decisions (Shah, 2005a).

### **3. Natural resources and poverty reduction: What do we know?**

The existing evidence on natural resources-poverty linkages does not specifically focus on chronic or long duration poverty. Nevertheless, since a large part of rural poverty is fairly widespread, severe and structurally determined (e.g. landlessness, lack of entitlement to forest resources, social stratification, etc.), the evidence may also reflect on the interface

---

<sup>8</sup> While these are some of the known factors, environmental degradation is not explicitly stated in the Indian literature as a factor driving out-migration.

<sup>9</sup> For instance, being able to get semi-skilled job with future prospects of moving up the ladder and/or starting a business of one's own, with a decent place to live along with the family, and maintain social expenses/status back home is something that a migrant from a 'better-off' household may expect. Compared with this, the expectation of a landless poor household may be to find employment opportunities that are regular and predictable in nature. Falling short of these expectations may lead to perception of 'distress' in the local setting of a dry land region in Gujarat.

between natural resources and chronic poverty in the states that constitute the poverty square of India.<sup>10</sup>

There are mainly two major streams of studies, which focus on (i) the agriculture–poverty reduction interface across states/regions; and (ii) resource degradation (land, water, forest) and poverty as well as human development.<sup>11</sup> This section highlights major findings from the two sets of studies in the Indian context.

### 3.1 Typology among states by natural resources–poverty interface

The empirical studies seldom refer to endowment and status of natural resources as an important indicator for creating a typology of spatial poverty in India. The most often used is based on agricultural potential, which essentially refers to the extent and nature of irrigation, as indicated by Fan and Hazell (2000) and subsequently adopted by the World Bank (2006). A part of this neglect owes to limitations in data pertaining to the quality of land and quantity of irrigation, especially groundwater, accessed by farm households in large tracts of dry land areas. The same is true of the availability of land as well as forest produce among households living in predominantly forest-based regions. This is not to undermine the fact, noted earlier, that environmental issues are yet to get internalised in the analysis of developmental discourse in general, and also in exploring pathways for agriculture in particular. The approach is at best minimalist, drawing attention to a need to check further degradation of natural resources rather than working proactively towards a pathway of growth that combines regeneration of natural resources along with sustained increase in agriculture production and employment.

A study by Shah and Guru (2004), under the aegis of CPRC India tries to understand rural poverty in the light of natural resource endowment, and refers to the agronomic potential noted above, but also captures people's access, use and entitlement to natural resources. The study thus examined correlates of poverty across three categories of region: (i) forest-based; (ii) dry land; and (iii) other.<sup>12</sup> It was observed that incidence of poverty was by and large higher among forest-based regions as compared with dry land regions, although the pattern was not very clear.<sup>13</sup>

---

<sup>10</sup> These states include Assam, Bihar (including Jharkhand), Madhya Pradesh (including Chhatisgarh), Orissa, parts (eastern) of Uttar Pradesh.

<sup>11</sup> For details, see Fan and Hazell (2000); Pandey et al. (2005); Parikh (1998); Radhakrishna (2002); Roy and Pal (2002); and Shah et al. (2005).

<sup>12</sup> The regions refer to those identified by the National Sample Survey Organisation (NSSO) for which official poverty estimates are available. Classification of regions was based on identification of districts: those with more than 30 percent of the reported area as forest land were categorised as forest-based regions; of the remaining districts, those covered by special schemes like the Drought Prone Area Programme (DPAP) or Desert Development Programme (DDP), were as dry land areas and the rest were 'other'. Regions with a majority of districts belonging to forest or dry land categories were designated as forest and dry land regions, respectively. There are limitations to categorising regions using the district, which often may have more than one characteristic. Nevertheless, this may be useful as an indicative categorisation, with analytical significance, in the absence of a better alternative.

<sup>13</sup> A study conducted by the International Crop Research Institute for Semi Arid and Tropics (ICRISAT) estimated poverty across humid and semi-arid tropics and semi-arid temperate regions in the country. According to the study, poverty ratios did not vary much between the humid (23.7 percent) and semi-arid tropics (24.3 percent), although arid regions had the lowest poverty ratio (12.6 percent), followed by semi-arid temperate (14.6 percent).

The above pattern is further substantiated by identification of the 140 most backward districts in the country. Of these, 53 belong to the category of drought-prone districts, whereas 79 districts could be characterised as forest-based (see Table 3). This restates the close interface between forest-based economies and economic backwardness. This point will be further elaborated while discussing spatial concentration of poverty in the subsequent section.

**Table 3: Identification of backward districts in India**

States	All backward districts	Backward and drought-prone districts	Backward and forest-based districts	Other backward districts
Andhra Pradesh	8	5	-	3
Assam	5	-	5	-
Bihar	15	4	2	9
Chhattisgarh	10	-	10	-
Gujarat	6	2	3 (2)*	-
Haryana	1	1	-	-
Jharkhand	14	3	11 (2)*	-
Karnataka	3	3	1 (1)*	-
Kerala	1	-	1	-
Madhya Pradesh	15	8	5 (7)*	2
Maharashtra	11	3	4	4
Orissa	18	9	9 (6)*	-
Punjab	1	-	-	1
Rajasthan	5	4	- (3)*	1
Tamil Nadu	4	-	2	2
Uttanchal	2	1	- (1)*	1
Uttar Pradesh	15	8	- (1)*	7
West Bengal	6	2	2(1)*	2
<b>All</b>	<b>140</b>	<b>53</b>	<b>55 (24)*</b>	<b>32</b>

*Note:* \*These districts have dual characteristics of being dry land as well as forest-based. To a large extent, forests in these districts are highly degraded. The list of backward districts was obtained from National Food for Work Programme (Guidelines) (Ministry of Rural development, 2006). Identification of forest-based districts is based on the cut-off of 30 percent of land as forest area; that of drought-prone districts is based on the list of the DPAP.

The analysis by Shah and Guru, however, suggested that people in these two sets of regions may face different kinds of poverty and have different strategies to cope with this. For instance, poverty in dry land regions is likely to be low and transient in nature, whereas that in forest-based regions is more widespread and chronic. It was further noted that the present low level of poverty in dry land regions is mediated, among others, by overexploitation of groundwater for enhancing productivity of agriculture. It is therefore likely that some of the dry land regions may get into a deep spiral of long-duration poverty unless appropriate measures are taken to check widespread overexploitation of groundwater in the region. On the other hand, forest-based economies, given their relatively rich natural resources, seem to have better potential for redressing chronic poverty, provided that the right kind of policies and institutions are in place to establish people's entitlements to such resources.

---

Both humid and semi-arid tropics accounted for about 40 percent of India's rural poor during 1999-2000. For details, see Rao et al. (2005).

The diverse pattern of poverty among dry land and forest-based regions has been aptly summarised in a recent report on India's rural development. The report notes that 'drier states (in west) harbor lesser poverty proportions than the wetter ones (in the east). In general the states, which were under the Zamindari regime of the yesteryears and have experienced relatively ineffective agrarian and land reforms and thereafter green revolution, have been the losers, while those in the west have been gainers. Within these contours if the monsoon fails, all suffer and vice versa' (NIRD, 2000; p.9).

## **3.2 Natural resources and poverty: Land, water, forest**

### **3.2.1 Land and multidimensional poverty**

With nearly 60 percent of people still living in rural areas, land is one of the most critical assets, not only for deriving livelihood support but also for obtaining socio-political recognition. The close link between land ownership and poverty is reflected by the fact that landless and semi-landless households account for nearly 42 percent of the rural poor in India (Chelliah and Sudarshan, 2001). This phenomenon is further supported by the fact that rural casual workers, a majority of whom are landless, have the highest poverty ratio among all categories of rural workers (and also non-workers) (Bhalla, et al., 2004).

It is, however, interesting to note that the incidence of poverty (headcount ratio – HCR) was found to be higher among households with very small size of landholdings (i.e. between 0.01 and 0.4 hectares) as compared with landless and semi-landless households (Chelliah and Sudarshan, 2001). A similar observation was made by Shah and Yagnik (2007). They found that during 1983 the HCR among landless households in rural areas was lower than that among those with some amount of land. The situation had reversed by 1993: HCR for landless households was slightly lower (36.8 percent) as compared with the landed (39.5 percent). To a large extent, relatively better status of at least some of the landless households in rural areas may owe to (i) importance of migration and occupational diversification; and (ii) better livestock and/or skills base among traditional herders and artisan households, especially in dry land areas and also in some of the forest-based economies in hilly areas in the country.

A recent study by Shah (2006) examines correlation between the four sets of variables; quality, size and access to land; agricultural productivity; sectoral diversification; and poverty as well as human development across major states in India. Some of the important observations are:

- (i) Rural poverty (HCR) had significant correlation with proportion of malnourished children and was negatively associated with agriculture labour productivity.
- (ii) Whereas the human development index (HDI) for rural areas did not have a significant correlation with rural poverty, it had a positive association with land and labour productivity in agriculture, and also with rural literacy.

- (iii) Infant mortality rate (IMR) was negatively correlated with land and labour productivity in agriculture and rural literacy; a positive correlation was found between IMR and ownership of livestock among households.
- (iv) Gross irrigated area was positively correlated with agricultural labour productivity. Land productivity had negative correlation with landholding size and also with IMR.
- (v) Proportion of common property land resources (CPLRs) was positively correlated with proportion of waste land and ownership of livestock among households.

The results thus suggest a somewhat mixed picture with respect to linkages among land, poverty and human development. What is important, however, is to note the critical role of land and labour productivity in influencing both income poverty as well as human development, where irrigation is the main driver for promoting agricultural labour productivity.

### **3.2.2 Irrigation and poverty reduction**

Given the centrality of irrigation in shaping up productivity growth in agriculture, water assumes a significant role in reducing poverty, especially in the vast tract of dry land regions in the country (Narayanamoorthy, 2001; Shah and Singh, 2004). For instance, Panda (2003: 13) observed that 'in most states households with access to irrigation have only half the poverty incidence as compared to those without irrigation'. Much of the poverty reduction impact of irrigation is realised through direct and indirect employment, generated through irrigation investment. According to Panda (2003), the impact is more through increase in gross cropped area rather than through higher yields, as the former creates additional demand for farm labour, a majority of which is represented by the landless poor. It has been estimated that the cumulative impact on employment of the investment in irrigation during 1992-1997 has been of the order of 18.4 million person years (Saleth, 1997; 2002). This includes both farm and non-farm employment.

A study by Bhattarai and Narayanamoorthy (2002) indicated that, during 1970-1994, irrigation emerged as the strongest variable explaining reduction in poverty. The analysis revealed that a 1 percent increase in area under irrigation resulted in a 0.32 percent increase in yield response to all the inputs taken together. However, the authors note that the relationship between irrigation and poverty is not so straightforward: it depends on several mediating factors. For instance, irrigated areas generally attract large number of in-migrants (often poor) from less irrigated areas, thus increasing the proportion of poor in areas with high levels of irrigation. Similarly, use of groundwater irrigation in large tracts of dry land regions is variable, depending on the rainfall situation each year. Lastly, over-depletion of groundwater may lead to a declining productive base, thus reducing its poverty reducing impact in future.

Lack of significant association between irrigation and poverty at more disaggregated levels was observed by various studies. For instance, Shah and Guru (2004), using regression analysis, found that, whereas extent of irrigation was negatively correlated with rural poverty across NSSO regions in India, the relationship was not significant within each of the regions (dry land and forest-based). Similarly, Shah and Singh, (2004: 171) while analysing *taluka*

(block) data in Gujarat state, noted that 'access to irrigation is a sufficient though not a necessary condition for poverty reduction'. This implies that, in a predominantly dry land region such as Gujarat state, irrigation is not the only route to poverty reduction. At the same time, access to irrigation, often limited and uncertain in such areas, is no assurance of escaping poverty.

Overall, the evidence suggests that the developmental impact of irrigation is on the decline. The main reasons are inefficient use, poor management, declining water productivity and increasing environmental as well as financial costs. In India, nearly one-tenth of the total irrigation potential of 90 million hectares remains unutilised, and one-sixth of the actually irrigated area is affected by water logging and soil salinity. Productivity of water remains low, owing to a distorted pricing and incentives structure (Saleth, 1996). On the other hand, a large proportion of dry land regions, accounting for nearly 60 percent of the cropped area and 70 percent of the population, lives on very limited water (Shah, 2007c). Water thus constitutes one of the most important constraints to development in the country.

### **3.2.3 Forest dependence and poverty**

While there is no systematic estimate of incidence of poverty among forest-based economies, there is ample evidence suggesting concentration of the poor among tribal communities living mainly in these areas. There is also no systematic estimate of poverty among forest-dependent communities in the country. In the absence of this, high incidence of poverty among tribals as well as rural casual workers can be assumed to represent poverty conditions among a large majority of these forest-dependent people. The main reasons for this are state monopoly, degradation and lack of entitlement. The exceptions are the states in the northeast region, where incidence of poverty is low and indicators of human development are quite favourable possibly because tribals in these states 'have inalienable rights that they exercise on various assets including land and these tribals are not displaced and dispossessed. Perhaps, it their dominant status and the political power that they have enjoyed over long years that ensured their escape from poverty beyond simple income measures' (Radhakrishna and Ray, 2005: 59). By 1999-2000, the HCR among tribals was 45.9 percent (Thorat and Mahamallik, 2006), as compared with 41.8 percent among rural casual workers, as noted by Bhalla et al. (2004). There are of course non-tribal communities living in the forest areas; their economic plight is not likely to be significantly better than the tribal communities.

The above observation was further substantiated by Kumar et al. (2000), who noted that the poorest in India live in and around forest regions and that poverty has remained intractable for a large proportion of the tribal population in the country. In fact, their condition is worse than that of casual workers in rural areas. According to the available estimates, about 100 million people reside in forests and are heavily dependent on forest resources for their livelihood. Besides these, about 275 million people live on the fringes of the forests and earn a bulk of their livelihood from the forest (Pandey et al., 2005).

A careful examination of the evidence suggests that, although the tribal population has significantly higher incidence of poverty as compared with the non-tribal population,

irrespective of spatial characteristics or access to forest resources, lack of entitlement to forest resources exerts a significant influence on poverty in forest-based regions. This was borne out by a comparative analysis of the two forest-based regions in Orissa (Southern and Northern). It was observed that incidence of poverty was lower in Northern Orissa, owing to various factors, such as better forest management practices and relatively lower incidence of displacement faced by rural communities (Padhi et al., 2006). The impact of regional characteristics was further supported by Shah et al. (2006), who noted that poverty among the non-tribal population in Southern Orissa was higher than among the tribal population in other regions in the state, including the Northern region. This restates the importance of area-based characteristics, capturing natural resource endowment on the one hand and other dimensions, such as access to resources and governance, on the other.

Overall, the above analysis suggests that the interface between natural resources and poverty may hinge on two types of situations: (i) areas facing water (irrigation) scarcity and (ii) areas with higher dependence on forest.<sup>14</sup> The first situation represents low endowment, whereas the second signifies lack of proper entitlement to resources. It is thus useful to focus on the two sets of regions while examining natural resources-linked poverty in India.<sup>15</sup>

#### **4. NR and long-duration poverty: Some evidence**

This section tries to identify states/regions that have experienced long-duration poverty, and reviews the link between natural resources and chronic poverty at the household level. Studies, by and large, are based on panel data, where ownership of land and access to irrigation have been considered as independent variables to explain poverty over a longer period of time.

##### **4.1 Areas facing high incidence of poverty over a long time**

According to recent estimates, poverty (HCR) in India declined from 36.02 percent in 1993-1994 to about 28.27 percent in 2004-2005 (Dev and Ravi, 2006). The rate of decline in poverty works out to be 0.7 percentage points per annum, falling from 0.85 during the previous decade, i.e. during 1983 to 1993-1994.

Spatial concentration of poverty, however, has remained more or less the same. The top five states on incidence of poverty during 1983 were: Orissa, Bihar, Tamil Nadu and West Bengal (with almost the same poverty ratio), Madhya Pradesh and Uttar Pradesh. More or less the same states continue to top the list of states (see Table 4). By 2004-2005, West Bengal was no longer among the five poorest states, and was replaced by Maharashtra. Together, the top seven states during both years constituted nearly 74 percent of all the poor during 1983, which had increased to nearly 78 percent by 2004-2005. Overall, there has been an increase

---

<sup>14</sup> In an earlier study, Chambers et al. (1989) developed a typology of poverty as core and periphery. In the 'core' poverty, there is more landlessness and limited involvement of poor in non-farm employment; dependence and exploitation are more mediated by social relations. 'Peripheral' poverty, in contrast, is linked more with water scarcity, resource degradation, lack of infrastructure and distance from markets; dependence and exploitation are more commercial and more bureaucratic in relations with contractors and officials.

<sup>15</sup> For further details on a stylised description of the two sets of regions, see Shah and Guru (2004).

in the concentration of the poor among the major states in the country. This increase has been registered by five out of the seven states (except West Bengal and Tamil Nadu).

**Table 4: Concentration of poverty among major states in India**

1983				2004-2005		
State	HCR	Rank	% share	HCR	Rank	% share
Orissa	65.31	1	5.70	47.07	1	6.03
Bihar	62.71	2	14.64	41.53	2	16.53
Madhya Pradesh	49.23	5	8.61	37.21	3	10.79
Maharashtra	43.13	7	9.04	29.95	4	10.36
Uttar Pradesh	46.94	6	17.42	33.25	5	20.93
Tamil Nadu	53.48	4	8.47	28.31	6	6.10
West Bengal	53.60	3	9.77	25.67	7	7.23
<b>All India</b>	<b>44.93</b>		<b>100</b>	<b>28.27</b>		<b>100</b>

Source: Table 8 in Dev and Ravi (2006).

At regional level (below which official estimates of poverty are not available), the scenario is somewhat similar (Table 5). The top 20 regions with higher incidence of poverty remained more or less the same during the period from 1983 till 1999-2000. Region-wise estimates for poverty are yet to be worked out. Although there are problems of comparability of poverty estimates during 1999-2000, it can be assumed that this has not influenced relative ranking during the same survey.

**Table 5: Top 20 regions by level of poverty (HCR): Major states in India (no. of NSS regions)**

States	43 <sup>rd</sup> round	50 <sup>th</sup> round	55 <sup>th</sup> round	Change
	1987	1993-94	1999-00	94/94 -99/00
1. Orissa	3	3	2	-1
2. Madhya Pradesh	6	6	6	NC
3. Maharashtra	3	3	2	-1
4. Bihar	3	3	3	NC
5. Andhra Pradesh	1	1	2	+1
6. Assam	1	1	2	+1
7. Tamil Nadu		1	1	NC
8. West Bengal			1	+1
9. Uttar Pradesh	1	2	2	NC
10. Karnataka	1	1	0	-1

Note: NC = no change.

Source: Based on estimates prepared by Jha and Sharma (2003).

Table 5 reveals that the top 20 regions were spread over eight to ten out of the 17 major states in India. Over the three surveys conducted during the period between 1983 and 1999-2000, four regions exited the list and five entered the list of the poorest regions. The four regions that exited were: Inland Northern Maharashtra; Inland Eastern Maharashtra; Coastal Orissa; and Inland Northern Karnataka. The regions that entered were: Inland Southern Andhra Pradesh; South Western Andhra Pradesh; Plain Western Assam; Assam Hills; and Western Plain West Bengal. Further, an attempt was made to identify 15 out the 20 poorest regions that had remained in this list at all three points in time (see Table 6).

**Table 6: List of 15 regions appearing in the three NSSO rounds**

Sr. no.	Regions in descending order	Category of region
1	Orissa – Southern	Forest-based
2	Madhya Pradesh – South Central	Forest-based
3	Madhya Pradesh – Chhatisgadh	Forest-based
4	Orissa – Northern	Forest-based
5	Madhya Pradesh – South Western	Forest-based
6	Maharashtra – Eastern	Forest-based
7	Bihar-Southern	Forest-based
8	Madhya Pradesh-Central	Other
9	Bihar – Central	Dry land
10	Uttar Pradesh – Central	Other
11	Tamil Nadu – Coastal Northern	Forest-based
12	Bihar – Northern	Other
13	Madhya Pradesh – Vindhya	Forest-based
14	Madhya Pradesh – Malwa Plateau	Other
15	Uttar Pradesh – Eastern	Other

*Note:* Categorisation of regions based on Shah and Guru (2004).

*Source:* Table 8 in Dev and Ravi (2006).

These 15 regions are spread over the six states, which also correspond with the states listed in Table 3. However, it is important to note that a majority of the regions (nine out of 15) belong to forest-based areas, as per the three-way classification of regions identified by Shah and Guru (2004).

The scenario above clearly suggests a close link between forest-based economies and high incidence of poverty in the country.

#### **4.2 Households facing chronic poverty: Link with natural resources**

A number of studies have gone into examining the extent of long-duration poverty and the factors influencing it. Generally, these include economic factors, such as size of landholding, access to irrigation, ownership of livestock and income from agriculture. In what follows, we summarise the main observations emerging from different studies based on panel data, resurvey of villages or recall through participatory methods.

**Table 7: Natural resources as an explanation for long-duration poverty**

Details of the study	Main findings on natural resources–chronic poverty linkages	Remarks
1. Gaiha (1989) – National Council of Applied Economic Research (NCAER) panel survey	Landlessness/semi-landlessness most important feature among chronic poor  Greater access to cultivable land as well as modern agricultural inputs most important factors for escaping chronic poverty	This is a structural factor, recognised by most studies in the Indian context
2. NCAER (1986a;1986b) – NCAER panel survey	Acquisition of land and intensive use of labour important for upward movement	Intensive use of labour is likely to be linked with increased irrigation and resultant increase in cropping intensity or change

	Loss of land driving downward mobility	in cropping pattern
3. Singh and Binswanger (1993) – ICRISAT longitudinal data for 218 households in six villages for the period 1975-1976 to 1983-1984	Poor quality of land one of the important features of poor vs. non-poor households  Loss of land the main reason for entry into poverty	Increased crop productivity during study period may have led to declining poverty even among semi-arid tropics region  Sub-division of land emerges as one of the most important factors leading to poverty
4. Bhide and Mehta (2004)	Incidence of persistence of poverty far greater among agricultural labour households as compared with cultivators  Non-agricultural employment associated with higher incidence of poverty during initial year; pattern reversed after 10 years	Earnings from non-farm employment may have improved owing to growth in agriculture. Prior to this, rural non-farm employment would have been confined mainly to traditional artisan activities with very low productivity
5. Bhide and Mehta (2005) – NCAER panel survey 1970-1998	Land the only asset (other assets were livestock and house) with significant influence on households in persistent poverty as against those having exited from poverty	Impact of irrigation not discussed explicitly
6. Krishna (2003) – tracking poverty over 25 years through recall	Irrigation and improvement in land (besides employment in government or industry/service sectors) important escape routes in Gujarat and Andhra Pradesh	Sustainability of irrigation as escape route in a drought-prone region is contingent on management of water resources – individually as well as communally
7. Shah and Sah (2004) – tracking poverty over 10 years through recall	Sub-division of land (and associated increase in population) single most important factor driving a non-poor household into poverty in Madhya Pradesh	Access to power for using lift irrigation device the prime need of households. Migration not a preferred option mainly because of the associated hazards (including loss of dignity) at the place of destination
8. Shah et al. (2006) – perception-based changes in wellbeing over 10 years through recall	A substantially large proportion of poor indicated positive changes in consumption of basic commodities like cereals, clothing and housing. This is despite the fact that nearly 90 percent of households in the four villages under study were currently poor.	These observations contrast drastically from that by A. Krishna in dry land states like Gujarat and Andhra Pradesh where substantial proportion of rural households had exited poverty over 25 years
9. Sharma and Karan (2003) – resurvey of 12 villages in Bihar	Landlessness, low quality of land and non-availability of irrigation facility listed as first three factors responsible for persistent poverty among large proportion of rural households	Out-migration one of the important coping mechanisms; incidence of out-migration increased from 10-19% of the workforce, covering 25% of rural households during resurvey period

Source: Adapted from Mehta and Bhide (2003).

Two observations emerge from the above studies. First, access to land and irrigation assume special importance in determining chronic poverty. Second, loss of land or declining landholding size is an outcome of increasing demographic pressure, which is often missing in

the discourse on chronic poverty. Of course, pressure on land is accentuated as a result of absence of any major technological breakthrough to raise the productivity of labour in agriculture and negligible increase in demand for labour outside this. Issues of agricultural growth and sectoral diversification thus keep surfacing in the discourse on chronic poverty. It may be noted that the findings in Table 7 are fairly similar to those obtained in the existing studies on poverty *per se*.

### 4.3 Natural resources and chronic poverty related thematic and policy imperatives

The linkages between natural resources and chronic poverty noted above imply that management of natural resources ought to be significant in analysing chronic poverty and identifying policy recommendations for India. Table 8 presents a broad framework for (i) identifying the thematic issues relevant for chronic poverty; and (b) highlighting policy imperatives with respect to natural resource management which could work as an exit route from chronic poverty, especially among the rural poor. It is imperative that the CPRC framework integrates natural resource-based livelihood systems as an integral part of requisite policy.

**Table 8: Natural resources and relevance for thematic concerns of chronic poverty in the Indian context**

	Type of resource	Main features and focus	Thematic relevance (H, M, L)		
			Uncertainty (risk and vulnerability)	Assetlessness (low returns and inequality)	Adverse incorporation (and social exclusion)
<b>1</b>	<b>Land</b>				
1.1	Private	Landlessness (41% of rural households are landless or semi-landless)	-	H	M
1.2	CPLR	Declining access as well as quality of CPLRs (about 45% of rural households collect fodder/fuel from CPLR; average size of CPLR is 0.31 ha. per household, which is less than what is required for sustaining one unit of cattle)	-	M	M
<b>2</b>	<b>Water</b>				
2.1	Irrigation	Nearly 60% of cultivated area is dry land; receives very little and uncertain irrigation	H	H	-
2.2	Drinking	Inadequate, uncertain and unsafe water	H	-	H
<b>3</b>	<b>Forest</b>				
3.1	Non-timber forest produce (NFTP)	Degradation and state monopoly in management	-	M	H
3.2	Conservation (compensation mechanism)	Displacement and inadequate relocation and rehabilitation (R&R) mechanism	-	H	M

Note: H, M and L denote high, medium and low relevance to the thematic areas of CPRC.

## 5. Policy approaches and way forward

India's response to the concerns for sustainable development raised during the Rio Summit was cautious yet complacent, asserting that negative externalities of intensive agriculture were confined only to limited areas, and that growth during the Green Revolution period had an overall significant poverty reduction impact (Rao, 2001). More recently, however, there has been increasing concern about the fact that the agricultural growth attained during the 1980s was mainly irrigation centric which, in turn, has resulted in water logging in areas with assured (surface) irrigation and over-depletion of groundwater in water-scarce areas. Both these areas are unlikely to be sustainable in the long run. This implies that irrigation-induced agricultural growth and the resultant reduction in poverty may have an uncertain future at best.

Since the high potential area has almost reached a plateau in terms of promoting intensive agriculture, the onus of growth in crop production is mainly on rain-fed areas with medium potential, which are essentially made up of large tracts of the central-eastern regions with high incidence of poverty. Dry land areas do not appear to be on the agenda for high agriculture growth, given their limited irrigation potential. In fact, as per the World Bank (2006) study, these areas may follow the pathway of exit from agriculture; sectoral diversification and out-migration may assume special significance, as noted earlier.

Another important debate refers to forest degradation and the exclusionary approaches being adopted in forest protection/conservation. Recognising that a large proportion of India's poorest live in and around forests, appropriate policies for forest development may work as an important strategy (i.e. exit route) in reducing poverty in these regions. Plantation and afforestation have become important components of policies for employment generation and poverty reduction, especially since the Ninth Five-year Plan in India.

It may be noted, however, that the recent revival of emphasis on agricultural growth is more a matter of necessity (for sustaining the momentum in overall economic performance), rather than a conscious choice to change the composition of agricultural growth, notwithstanding the clear recognition of the need to increase demand in the economy. This is reflected by the fact that the demand gap is to be met mainly by creating wage incomes through various employment guarantee schemes and strengthening rural markets, rather than through increased employment and income from agricultural production as such. Similarly, there is a sustained thrust on boosting agricultural productivity *per se* by extending the same strategy to newer areas, with an additional thrust on high-value crops. This implies a 'business as usual' approach, rather than calibrating changes in composition of growth that is spatially more broad based, employment generating and environmentally sustainable.

## **5.1 Disjointed approach in natural resource management and agricultural growth**

The policy perspective on agricultural growth in India of late has clearly recognised the need for sustainable management of natural resources as an important precondition. According to an assessment by eminent agricultural economist C.H.H. Rao (1994: 249-250), 'of the two major sources of degradation namely, deforestation and chemicalisation of agriculture, the former constitutes a much greater threat at the present stage of agricultural development in India. A high rate of deforestation has been associated with low irrigation, low level of agricultural income, low wage rate, and high incidence of rural poverty. It is much less associated with high population growth and a greater increase in number of livestock. The package of measures most likely to reduce pressure on the environment is the development of land augmenting technological change with an environmentally sound irrigation base, particularly in the low productivity region with extensive poverty'.

The above perspective has been echoed by policy (Planning Commission, 2002b). The broad objectives are:

- Growth that is based on efficient use of resources and conserves soil, water and bio-diversity.
- Growth with equity, i.e. growth which is widespread across regions and covers all farmers.
- Growth that is demand driven and caters to domestic markets as well as maximising benefits from exports of agricultural products in the face of the challenges arising from economic liberalisation and globalisation.
- Growth that is sustainable technologically, environmentally and economically.

It appears that the policy approach, notwithstanding concerns for environmental sustainability, continues to lay special emphasis on enhancing agricultural productivity without exploring alternative avenues in terms of crop-mix, technology and relative output price – all these having a significant bearing on resource use sustainability. The approach does not essentially seek to explore alternative approaches to achieve agricultural growth, which has to come increasingly from rain-fed and dry land agro-ecological systems. Policies need to recognise a paradigmatic shift from a crop input-centric approach to a farming systems approach suitable to different agro-climatic conditions across the country.

Obviously, this kind of a disjointed approach will not provide any clear guidelines with respect to whether and in what manner sustainable management of natural resources may impinge on the strategy for growth in agricultural production. This is what is observed in the major policy initiatives for natural resource management, consisting mainly of micro-level schemes for watershed management, minor irrigation and community forestry. What is worrying is that these schemes are being designed and implemented in an segmented or isolated manner, rather than taking a holistic view of the various natural resources through an integrated approach, establishing close links with the livelihoods of the poor. Unless this is corrected, it

is unlikely that the full potential of natural resource-based production and livelihood support will be attained.

Conceptually, the Watershed Development Programme offers a mechanism for developing an integrated approach to land, water and forests. Unfortunately, achieving convergence is difficult, as indicated by the recent experience in setting up the National Authority for Rain-fed Agriculture (NRAA) (see Department of Land Resources, 2006). Besides, there are problems of multiplicity of programmes as well as agencies dealing with natural resource management at micro/decentralised level. While the recent thrust on employment guarantee schemes explicitly focuses on watershed development and afforestation as activities of high priority, the issue of convergence and a holistic approach still remains unaddressed.

For the forest-based economy, the major initiatives in terms of improved land rights (through the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006) and resource transfer through food for work programmes (especially under the National Rural Employment Guarantee Act – NREGA) are moves in the right direction. The major thrust of employment generation programmes in these areas covers forest regeneration, but improvements in infrastructural support for processing and marketing of NTFP is an essential precondition for linking regeneration efforts with income enhancement of the poor. However, the extraction-oriented approach, focusing mainly on regeneration, collection and marketing of NTFP, may not always be compatible with the long-term goal of resource management in these regions. In this case, it may be useful to think of compensatory mechanisms for forest dwellers for their contribution towards conservation. This may perhaps help ensure both conservation (wherever essential) and the wellbeing of the people who historically managed the forest resources in a sustainable manner. While both approaches (employment guarantee and compensatory mechanisms) are essentially rights based, the additional mileage of the latter is that it reinstates local people's stake in the management and conservation of forests (Shah, 2007b).

A brief summary of the policies essential for a holistic approach to natural resource development is presented below.

**Table 9: Natural resources working as exit route and escape mechanism from chronic poverty**

		Required policy initiatives
<b>1</b>	<b>Land</b>	
1.1	Redistribution	Completing unfinished task in Orissa, Bihar, Madhya Pradesh, Rajasthan, Andhra Pradesh
1.2	Consolidation of holding (contract farming)	Need for appropriate legal mechanism for benefit sharing and protection of rights
1.3	Releasing encroachment on CPLRs	Revival of local institutions under different schemes
<b>2</b>	<b>Water</b>	
2.1	Regeneration of groundwater Treatment of catchments and flood control Safe drinking water	Various initiatives for watershed development Multi-layer planning and treatment for watershed development at sub-basin level (including participatory management of minor irrigation schemes) Local initiatives: resource regeneration and benefit sharing, keeping sustainability and equitability as central objectives
<b>3</b>	<b>Forest</b>	

	Participatory management Land titles	Joint forest management (JFM), joint protected area management (JPAM) Appropriate R&R policies
--	---	--

## 5.2 Diversification and migration

The typology of states described in Section 3 referred to economic diversification as an important factor driving regions and households out of poverty. The World Bank study (2006) also recommended exit from agriculture as an important strategy for poverty reduction, especially in dry land areas. Similarly, a study by Farrington et al. (2006) focusing on the changing scenarios of rural livelihoods in two predominantly dry land regions in India addresses the issue of poverty reduction policies by suggesting a multi-pronged approach as noted earlier. The study suggests three major policy interventions: (i) enhancement of local production along with provision of a basic level of public goods and services in rural areas at affordable prices; (ii) out-migration for employment in activities with higher productivity; and (iii) livelihood finance for supporting natural resource-linked activities – individual as well as community based.

However, the present interventions, although important, may not help resolve the problem of adverse incorporation of marginalised communities (landless, scheduled castes/tribes and women) into the functioning of various markets in rural areas. Efforts to improve inclusion of low-income households in markets will require a wide-ranging intervention, starting from raising functional literacy, access to information and physical infrastructure (such as feeder roads and low cost bus services), besides steps like liberalising land lease markets, etc. (Farrington, et al., 2006).<sup>16</sup>

While these are valuable thoughts that may help reduce chronic poverty in rural areas, there is a small caveat in the context of natural resources–chronic poverty discourse. That is, policy opportunities for diversification through migration and/or market development are likely to overlook the fact that, in the absence of adequate preventive measures, both these may end up bringing about further degradation of natural resources in rural areas. This may happen in the form of neglect of land with low productivity (used by the poor who may migrate out) in the case of the former; and overexploitation of soil and water resources in order to benefit from the price-related incentives resulting from improved market integration.

Obviously, the solution does not lie in preventing the chronic poor from migrating or the poor from enhancing their earnings. Also, it could be argued that concerns for environmental sustainability, especially in the context of resource use in agriculture, could be compromised in the short run provided the economy is able to effectively shift a large part of the workforce towards non-farm sectors and also attend to the goal of inclusive growth.<sup>17</sup> But this, as noted earlier, would call for changing the composition of growth, which is employment generating, hence broad based and empowering. This may also involve exploring alternative avenues of extending livelihood support to the rural poor (especially the chronic poor in forest-based

<sup>16</sup> It has been noted that 'poor people's incentives to invest in protecting or expanding their environmental entitlements depend on several factors such as availability of alternative technological options that bring higher returns in the short term and stabilize livelihoods, access to markets ... and enabling policies and institutional arrangements' (Shiferaw, 2002: 17).

<sup>17</sup> See Footnote 2.

economies) by way of compensation for protecting natural resources (Shah, et al. 2006). It is thus imperative that the new set of policy approaches seeks multiple opportunities – development of an integrated farming system, out-migration (including short term) and market integration.

### 5.3 Summing up

The foregoing analysis examined the close interface between natural resources and poverty – severe and long duration – in rural India. Highlighting the multi-patterned association between the two, the analysis tried to ascertain influence of land, water and forest resources on poverty in rural areas. The empirical analysis indicates that, whereas landless households make up a major proportion of the chronic poor, agricultural productivity rather than ownership of land *per se* has a significant influence on poverty among rural households. To the extent that access to irrigation helps enhance land productivity, water emerges as the most critical factor in shaping people's economic well-being.

However, the available evidence indicates that access to irrigation is a necessary but not sufficient condition for poverty reduction, especially in large tracts of dry land regions in the country. Out-migration and access to non-farm employment are other important factors mediating the impact of irrigation on poverty.

Dependence on forests, in the absence of adequate access and entitlements, emerged unequivocally as a maintainer of high incidence of poverty. Resource degradation appears to be both a cause and a result of chronic poverty in the region. The two important policy imperatives are: (i) recognising tribals' land rights as well as their stake in the management of forests; and (ii) exploring avenues for resource transfer as a means of compensation for management and conservation of forest resources.

The contemporary policy discourse on agriculture focuses on three broad approaches: (i) expediting the process of workforce diversification including rural–urban migration; (ii) shifting the locus of growth to high potential regions in central/northern/eastern states; and (iii) promotion of high-value crops/related activities within the primary sector. Since these approaches are closely interrelated, they need to be seen in conjunction with each other. Elements of each of the three approaches are essential for mustering a major shift in the pace as well as composition of agricultural growth in the country. Arriving at an appropriate mix of the three approaches, however, would require a more synthesised understanding of the scope as well as constraints facing each of the three approaches, going beyond departmental boundaries. Future policies may need to address the issue of effective management by adopting integrated natural resource management and an appropriate institutional setup promoting people's participation.

It is essential that the next round of agricultural growth offers huge potential for welfare enhancement. Policies need to be robust enough to bring in a paradigm shift in terms of the manner in which the expected growth in productivity is to be achieved. The conventional source of productivity enhancement, especially since the Green Revolution, centred around water as well as input-intensive practices. The challenge now is to **shift towards water-**

**efficient and knowledge-employment-intensive systems of agricultural production.** Achieving this would require a more nuanced approach, one which incorporates differential agro-ecological features on the one hand and employment/livelihood needs on the other.

Within this ambit of promoting sustainable growth of the agriculture (and related) sector, adopting an integrated farming system approach, alternative avenues for workforce diversification (mainly through increased mobility) and market integration may be explored. This kind of transition from primary to secondary and tertiary sectors is likely to be more consistent with overall objectives of growth and poverty reduction in the long run.

Finally, the analysis restates the importance of treating natural resource management as an important factor in escape or exit from chronic poverty. Given the dynamic context, poor and chronically poor may be seen as some kind of a continuum rather than strictly as separate categories. Similarly, the divide between on-farm and off-farm work (in rural and urban locations) may be seen in a holistic manner, bearing in mind the sectoral linkages. It is imperative that issues like natural resource management, as well as demography and governance, be treated as overarching concerns, cutting across the three themes (uncertainty, assetlessness and adverse incorporation) within the CPRC framework. Future research as well as policy engagement on chronic poverty in India should therefore try to move increasingly towards a systemic approach and build on the inter-linkages across the themes.

## References

- Bhalla, G.S. (2000). 'Indian Agriculture: Issues and Strategies'. Paper presented at the Seminar on Reforms for a Resurgent Republic. Indian Institute of Management, Bangalore, 8-10 December.
- Bhalla, G.S. (2006). *Economic Situations of the Indian Farmers: Some Findings from the NSSO 59<sup>th</sup> Round*. Paper presented at the Professor L.S. Venkataramanan Memorial Lecture 6, Institute of Social and Economic Change, Bangalore, 12 April.
- Bhalla, G.S., Karan, A.K. and Shobha, T. (2004). *Rural Casual Labourers, Wages and Poverty: 1983 to 1999-2000*. Working Paper 14. New Delhi: CPRC and IIPA.
- Bhattarai, M. and Narayanamoorthy, A. (2002). *Impact of Irrigation on Agricultural Growth and Poverty Alleviation: Macro Level Analysis in India*. Tata Water Policy Programme 12. Vallabh Vidyanagar, Gujarat: IWMI.
- Bhide, S. and Mehta A.K. (2004). *Correlates of Incidence and Exit from Chronic Poverty in Rural India: Evidence from Panel Data*. Working Paper 15. New Delhi: CPRC and IIPA.
- Bhide, S. and Mehta, A.K. (2005). *Tracking Poverty through Panel Data: Rural Poverty in India 1970-1998*, Working Paper 28. New Delhi: CPRC and IIPA.
- Bilsborrow, R.E. (1992). *Rural Poverty, Migration, and the Environment in Developing Countries: The Case Studies*. Policy Research Working Paper 1017. Washington, DC: World Bank.

- Cashin, P. and Sahay, R. (1996). *Internal Migration, Centre State Grants, and Economic Growth in the States of India*. Working Paper 95/66. Washington, DC: IMF.
- Chambers, R., Saxsena, N.C. and Shah, T. (1989). *To the Hands of the Poor: Water and Trees*. New Delhi: Oxford and IBH Publishing Company.
- Chelliah, R.J. and Sudarshan, R. (2001). *Income Poverty and Beyond: Human Development in India*. New Delhi: Social Science Press.
- Connell, J., Dasgupta, B., Roy, L. and Lipton, M. (1976). *Migration from Rural Areas*. New Delhi: Oxford University Press.
- Chronic Poverty Research Centre (2006). *Chronic Poverty and Environment*. Manchester: CPRC/University of Manchester.
- Dasgupta, P. and Maler, K.G. (2004). *Environment and Resource Economics: Some Recent Developments*. Working Paper 7. Kathmandu: SANDEE.
- Dasgupta, P. and Maler, K.G. (1995). 'Poverty, Institutions and the Environmental Resource Base', in Behrman, J. and Srinivasan, T.N. eds *Handbook of Development Economics, Vol. III(A)*. Amsterdam: North Holland.
- Department for International Development, European Commission, UN Development Program and World Bank (2002). *Linking Poverty Reduction and Environmental Management: Policy Challenges and Opportunities*. Washington, DC: World Bank.
- Department of Land Resources (2006). *From Hariyali to Neeranchal, Report of the Technical Committee on Watershed Programmes in India*. New Delhi: Ministry of Rural Development, Government of India.
- Deshingkar, P. and Start, D. (2003). *Seasonal Migration for Livelihood in India: Coping, Accumulation and Exclusion*. Working Paper 220. London: ODI.
- Dev, M. and Ravi, C. (2006). 'Poverty and Inequality: All India and States, 1983-2005'. *Economic and Political Weekly* 41(6): 509-521.
- Duriappah, A.K. (1998). 'Poverty and Environmental Degradation: A Review and Analysis of the Nexus'. *World Development* 26(12): 2169-2179.
- Fan, S. and Hazell, P. (2000). 'Should Developing Countries Invest More in Less-Favoured Areas? An Empirical Analysis of Rural India'. *Economic and Political Weekly* 35(17).
- Farrington, J., Deshingkar, P., Johnson, C. and Start, D. (2006). *Policy Windows and Livelihood Futures: Prospects of Poverty Reduction in Rural India*. New Delhi: Oxford University Press.
- Gaiha, R. (1989). 'Poverty, Agriculture Production and Prices in Rural India – A Reformulation'. *Cambridge Journal of Economics* 13(2): 333-352.
- Gandhi, V. P. (1997). 'The Role of Agriculture in India's Economic Development: A Survey', in Desai, B.M. (ed.) *Agriculture Development Planning for Ninth Plan Under New Economic Environment*, New Delhi: Oxford & IBH Publishing Company.

- Ghatak, S., Levin, P. and Price, S.W. (1996)/ 'Migration Theories and Evidence: An Assessment'. *Journal of Economic Surveys* 10(2): 159-198.
- Haan, A. de (1999). 'Livelihoods and Poverty: The Role of Migration – A Critical Review of the Migration Literature'. *Journal of Development Studies* 36(2): 1-47.
- Haan, A. de and Dubey, A. (2006). 'Are Migrants Worse Off or Better Off?' *Margin* 38(3): 9-25.
- Hansda, S. K. and Ray, P. (2006). 'Employment and Poverty in India during the 1990s: Is There a Diverging Trend?' *Economic and Political Weekly* 50(27): 3014-3023.
- Jha, R. and Sharma, A. (2003). 'Spatial Distribution of Rural Poverty: Last Three Quinquennial Rounds of NSS'. *Economic and Political Weekly* 38(47): 4985-4993.
- Krishna, A. (2003). 'Falling into Poverty: The Other Side of Poverty Reduction'. *Economic and Political Weekly* 38(6): 533-542.
- Kumar, N., Saxena, N., Alagh, Y. and Mitra, K. (2000). *Alleviating Poverty through Participatory Forestry Development: An Evaluation of India's Forest Development and World Bank Assistance*. Washington, DC: World Bank.
- Kundu, A. and Sarangi, N. (2007). 'Migration, Employment Status and Poverty: An Analysis across Urban Centres'. *Economic and Political Weekly* 42(4): 299-307.
- Lanjouw, P. and Shariff, A. (2004). 'Rural Non-Farm Employment in India: Access, Income and Poverty Impact'. *Economic and Political Weekly* 39(40): 4429-4446.
- Lipton, M. (1980). 'Migration from Rural Areas of Poor Countries: The Impact on Rural Productivity and Income Distribution'. *World Development* 8(1): 1-24.
- Lopez, R. (1997). 'Where Development Can or Cannot Go: The Role of Poverty–Environment Linkages'. Proceedings of Annual Bank Conference on Development Economics, World Bank, Washington, DC, 30 April – 1 May.
- Majumdar, N.A. (2006). 'Centrality of Agriculture to India's Economic Development'. *Economic and Political Weekly* 91(1): 51-61
- Markandya, A. (nd). 'Poverty Alleviation and Sustainable Development: Implications for the Management of Natural Capital'. University of Bath, UK.
- Mathur, A.S., Das, S. and Sircar, S. (2006). 'Status of Agriculture in India: Trends and Prospects'. *Economic and Political Weekly* 41(52): 5327-5336.
- Mehta, A.K. and Bhide, S. (2003). 'Issues in Chronic Poverty: Panel Data-based Analysis', in Mehta, A.K., Ghosh, S., Chatterjee, D. and Menon, N. eds *Chronic Poverty in India*. New Delhi: CPRC and IIPA.
- Mehta, A.K. and Shah, A. (2003). 'Chronic Poverty in India: Incidence, Causes and Policies'. *World Development* 31(3): 491-511.
- Ministry of Rural Development (2006). *National Food for Work Programme (Guidelines)*. New Delhi: Government of India.

Munshi, K. and Rosenzweig, M.R. (2005). *Why Is Mobility in India So Low? Social Insurance, Inequality, and Growth*. Working Paper 121. Cambridge, MA: CID, Harvard University.

Nadkarni, M.V. (2000). 'Poverty, Environment, Development: A Many Patterned Nexus'. *Economic and Political Weekly* 35(14): 1184-1190.

Narayanamoorthy, A. (2001). 'Irrigation and Rural Poverty Nexus: A Statewise Analysis'. *Indian Journal of Agricultural Economics* 56(1): 40-56.

National Institute of Rural Development (2000). *India: Rural Development Report: Regional Disparities in Development and Poverty*. Hyderabad: NIRD.

National Council of Applied Economic Research (1986a). 'Changes in Household Income, Inter-Class Mobility and Income Distribution in Rural India: A Longitudinal Study, 1970-1971 to 1981-1982'. New Delhi: NCAER. Mimeo.

National Council of Applied Economic Research (1986b) Demographic and economic Interrelationships in Rural India: A Longitudinal Study (unpublished report), New Delhi.

Oberai, A. S., Prasad, P. H. and Sardana, M.G. (1989). *Determinants and Consequences of Internal Migration in India: Studies in Bihar, Kerala, and Uttar Pradesh*. New Delhi: Oxford University Press.

Padhi, S., Panigrahi, N., and Mishra, A.K. (2006). *Tribal Population and Chronic Poverty in Orissa: A Note on the North-South Divide*. Working Paper 27. New Delhi: CPRC and IIPA.

Panda, M. (2003). 'Role of Agriculture in the Poverty Reduction Process in India'. Indira Gandhi Institute of Development Research, Mumbai.

Pandey, V.L., Kuman, P. and Kamath, R. (2005). *Sustaining Human Development in India States: The Role of Forests*. Mumbai: National Research Programme on Growth and Human Development, Indira Gandhi Institute of Development Research.

Parikh, K.S. (1998). *Poverty and Environment: Turning the Poor into Agents of Environmental Regeneration*. Working Paper No.1. New Delhi: Social Development and Poverty Elimination Division, UNDP.

Patanaik, P. (2007). 'A Model of Growth of the Contemporary Indian Economy'. *Economic and Political Weekly* 42(22): 2077-2081.

Planning Commission (2002a). *Labour and Employment*. Report of the Special Group on Targeting Ten Million Employment Opportunities per Year over the 10<sup>th</sup> Plan Period. New Delhi: Government of India.

Planning Commission (2002b). *Tenth Five Year Plan, Agriculture*. New Delhi: Government of India.

Radhakrishna, R. (2002). 'Agricultural Growth, Employment and Poverty: A Policy Perspective'. *Economic and Political Weekly* 37(3): 243-250.

Radhakrishna, R. and Ray, S. (2005). 'Poverty in India: Dimensions and Character', in Parikh, K. ed *India Development Report*. New Delhi: Oxford University Press.

- Rao, C.H.H. (1994). *Agricultural Growth, Rural Poverty and Environmental Degradation in India*. New Delhi: Oxford University Press.
- Rao, C.H.H. (2001). 'Sustainable Development of Agriculture', in Chopra, K., Perrings, C., Rao, U., Parigh, K. and Rao, C.H.H. eds *Ecological Economics for Sustainable Development*. New Delhi: Academic Foundation.
- Rao K.P.C., Bantilan, M.C.S., Singh, K., Subrahmanyam, S., Deshingkar, P., Rao P.P and Shiferaw, B. (2005). *Overcoming Poverty in Rural India*. Patancheru: ICRISAT.
- Ravallion, M. (2000). 'What is Needed for a More Pro-Poor Growth Process in India?' *Economic and Political Weekly* 35(13): 25-31.
- Roy, B.C. and Pal, S. (2002). 'Investment, Agricultural Productivity and Rural Poverty in India: A State-Level Analysis'. *Indian Journal of Agricultural Economics* 57(4): 653-679.
- Sah, D.C. and Shah, A. (2005). 'Migration in Remote Tribal Areas: Evidence from South Western Madhya Pradesh'. *Indian Journal of Agriculture Economics* 60(2): 184-204.
- Saleth, M.R. (1996). *Water Institutions in India: Economics, Law and Policy*. New Delhi: Common Wealth Publishers.
- Saleth, M.R. (1997). 'Irrigation-induced Indirect Employment during the Eighth Plan: An Estimation Procedure with Tentative Estimates'. *Indian Journal of Labour Economics* 40(2): 279-88.
- Saleth, M.R. (2002). 'Introduction', in Saleth, M.R. ed. *Water Resources and Economic Development*. Boston, MA: Edward Elgar.
- Sastry, D.V.S., Singh, B., Bhattacharya, K. and Unnikrishnan, N.K. (2003). 'Sectoral Linkages and Growth Prospects: Reflections on Indian Economy'. *Economic and Political Weekly* 38(24): 2390-2397.
- Scherr, S.J. and Yadav, S. (1998). 'Land Degradation in the Developing World: Issues and Policy Options for 2020'. *Wastelands News*, November 1997 – January 1998: 57-59.
- Scott, L. (2006). *Chronic Poverty and the Environment: A Vulnerability Perspective*. Working Paper 62. Manchester: CPRC/University of Manchester.
- Shah, A. (2000). *Food Security and Environment: Issues and Evidence*. Working Paper 116. Ahmedabad: Gujarat Institute of Development Research.
- Shah, A. (2002). 'Water Scarcity Induced Migration: Can Watershed Projects Help?' *Economic and Political Weekly* 36(35): 3405-3410.
- Shah, A. (2005a). *Land Degradation and Migration in a Dry land Region in India: Understanding the Dynamics*. Working Paper 10. Kathmandu: SANDEE.
- Shah, A. (2005b). *Poverty and Natural Resources: Understanding the Dynamics in Context of Dry land Regions in Western India*. Working Paper 25. New Delhi: CPRC and IIPA.

- Shah, A. (2006) *Environmental Implications of Agriculture and Policy Initiatives in India and the EU: Review of Evidence and Issues*. Working Paper E/277/2007. New Delhi: Institute of Economic Growth.
- Shah, A. (2007a). 'Patterns, Processes of Reproduction, and Policy Imperatives for Poverty in Remote Rural Areas: A Case Study of Southern Orissa in India'. [www.chronicpoverty.org](http://www.chronicpoverty.org).
- Shah, A. (2007b). 'Patterns, Processes of Reproduction, and Policy Imperatives for Poverty in Remote Rural Areas: A Case Study Southern Orissa in India'. Paper presented at the Conference on Understanding and Addressing Spatial Poverty Traps, CPRC/ODI, Cape Town, 29 March.
- Shah, A. (2007c). 'Mainstreaming Environmental Concerns on Dry Lands in Policy Framework'. New Delhi: UNDP. Mimeo.
- Shah, A. and Guru, B. (2004). *Poverty in Remote Rural Areas in India: A Review of Evidence and Issues*. Working Paper 21: CPRC and IIPA.
- Shah, A. and Sah, D.C. (2004). 'Poverty among Tribals in South West Madhya Pradesh: Has Anything Changed Over Time?' *Journal of Human Development* 5(2): 249-263.
- Shah, A. and Yagnik, J. (2007). *Estimates of BPL-households in Rural Gujarat: Measurement, Spatial Pattern and Policy Imperatives*. Ahmedabad: Gujarat Institute of Development Research.
- Shah, A., Nayak, S.K. and Das, B. (2006). 'Ensuring Livelihood Entitlements in Forest Based Economies in Orissa: An Alternative Perspective'. *Margin* 38/39(4/1).
- Shah, A., Pandey, V. and Kamath, R. (2005). *Sustaining Human Development in India States: The Role of Land*. Mumbai: National Research Programme on Growth and Human Development, Indira Gandhi Institute of Development Research.
- Shah, T. and Singh, O.P. (2004). 'Irrigation Development and Rural Poverty in Gujarat, India: A Disaggregated Analysis'. *Water International* 29(2): 167-177.
- Sharma, A.N. (2005), Agrarian relations and Socio-Economic Change in Bihar, *Economic and Political Weekly*, Vol. 40, No.10, pp. 960-972.
- Shiferaw, B. (2002). *Poverty and Natural Resource Management in the Semi-arid Tropics: Revisiting Challenges and Conceptual Issues*. Working Paper 14. Patancheru: ICRISAT.
- Singh, R.P. and Binswanger, H. (1993). 'Income Growth in Poor Dryland Areas of India's Semi-arid Tropics'. *Indian Journal of Agricultural Economics* 48(1): 51-64.
- Srivastava, R. (2006). 'Trends in Rural Employment in India with Special References to Agricultural Employment in India: Meeting the Employment Challenge'. Paper presented at the Conference on Labour and Employment Issues in India. Institute of Human Development, New Delhi, 27-29 July.
- Thorat, S. and Mahamallik, M. (2006). *Chronic Poverty and Socially Disadvantaged Groups: Analysis of Causes and Remedies*. New Delhi: CPRC and IIPA.

UN Centre for Human Settlements (1996). *An Urbanising World: Global Report on Human Settlements*. Oxford: Oxford University Press.

Visaria, P. and Kothari, D. (1984). 'Migration in Gujarat: An Analysis of Census Data'. Ahmedabad: Sardar Patel Institute of Economic and Social Research. Mimeo.

World Resources Company (2002). *World Resources 2005: The Wealth of the Poor: Managing Eco-systems to Fight Poverty*. Washington, DC: World Resources Institute.

World Bank (2006). *Inclusive Growth and Service Delivery: Building on India's Success*. Development Policy Review. Washington, DC: World Bank.

Yadava, K.N.S. and Yadava, S. (1998). *Migration Studies: Evidence from Rural Field Studies*. New Delhi: Shipra Publications.