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POVERTY AND NATURAL RESOURCES: MEASURING THE LINKS (SOME ISSUES IN THE CONTEXT OF KARNATAKA)

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POVERTY AND NATURAL RESOURCES: MEASURING THE LINKS (SOME ISSUES IN THE CONTEXT OF KARNATAKA)

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Abstract

Natural resources (NR) such as land, water, trees, plants and air provide the basis upon which human and other living beings survive and carry on their varied activities like agriculture, forestry, fisheries and tourism. However, most of the societies being characterised by socio-cultural constraints through a system of stratification, there is unequal access to the NR for the poor and marginalised. This has lead to an extremely impoverished situation where large sections of population are excluded from accessing these resources. Degradation of environment in the recent years has made matters worse for them. While degradation is caused by a number of factors, the blame for the same is squarely placed upon the poor who are accused of overusing the NR for their survival and are hence denied access to use of NR (like collection of forest wood for fuel or minor forest produce for economic security). Women are the worst sufferers in this situation as household food and water security continue to rest with them especially in the case of poor and very poor households.

The issue, therefore, is the understanding of the links between poverty and NR and measuring them. Besides efforts at their rejuvenation, the NR needs to be efficiently managed to enhance their utility with equity. This process has to be monitored to achieve sustainability and should enable poverty reduction and protect those who have somehow come out of poverty from being trapped again into it, due to environment-related shocks, such as flooding, drought and climate change, to mention a few. Such protection is central to their livelihoods, health and security.

This paper is an attempt to address issues relating to the above, looking at the situation in the state of Karnataka, delineating various forms of interventions needed to be undertaken by academicians, policy makers, community-based associations and the public at large.

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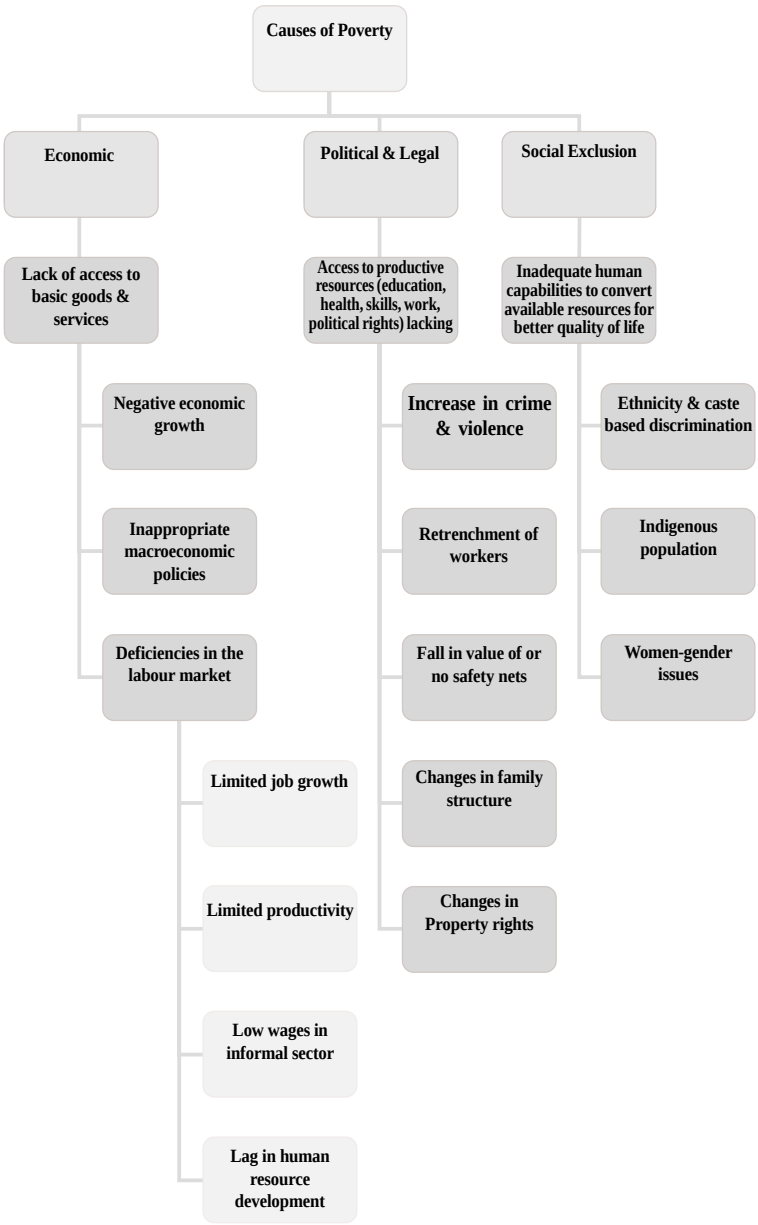
1.1. Introduction

Poverty impacts the living conditions of people in their physical, economic, moral and psychological aspects in a variety of ways. Conceptualising it in its many dimensions has necessitated adoption of diverse criteria. A look at the definitions of poverty reflects the growing complexity of its nature and dimensions. The conventional definitions have found poverty to be characterised by insufficient income for securing basic goods and services. However, those that followed these definitions have upheld life expectancy, health, education, child mortality etc., as the key non-economic indicators of poverty. Experiments with understanding the levels of consumption and expenditure were the third type of criteria in this context (Blackwood and Lynch 1994).

In the 1990s, poverty came to be linked with entitlements, which referred to various bundles of goods and services with people having traditional control and command over them. This definition placed due cognisance upon the means of acquiring the goods and services, as well as their availability in a given society. Further, the ability to meet the basic needs of life comprising the physical and non-physical forms was also defined as being non-poor. The former included conventional items like food, health care, education, shelter etc., and the latter were referring to participation and identity of people in public sphere of activities (World Bank 1996).

The various aspects of poverty and its multiple dimensions are shown in the chart below:



Thus, poverty is a complex mixture of many sorts of deprivations (Sen 1987). For example, the World Bank-initiated Poverty Reduction Strategy Papers are addressing poverty in its social, economic, political and environmental aspects. What is important is that besides the conventional dimensions, the links between poverty and environment have come to be accepted to design programmes for poverty reduction. Impaired access to productive resources (agricultural land, physical capital and financial assets) leads to absolute low income, unemployment, undernourishment etc. Inadequate endowment of human capital is also a major cause of poverty. Generally, impaired access to resources shifts the focus on poverty and it curtails the capability of individual to convert available productive resources to a higher quality of life (ibid.)

This issue of links between poverty, environment and natural resources is understandable. However, while the economic and social aspects of poverty are well established, its links with environment still needs to be explored and documented.

1.2. Poverty and Environment

The dependence of the poor on the NR, as being truly immense, has been argued by the existing studies on the above links. NR form the poor people's basic survival strategy in all societies. Land, water, air, wood fuel etc., are some of the resources that were obtained traditionally from the nature, without having to incur any cost to use them. However, increasing utilisation of NR for sectors like energy production, agricultural productivity, livestock rearing, etc., has left these resources in a degraded condition. Although such use has been by the resourceful, rich and the powerful, who own the NR like land, water, etc., it has left the poor with little or no property rights over these resources leading to marginalisation and poverty.

The above situation calls for measures to improve the NR to obtain better output and to manage them through proper regulations. This is crucial for Poverty Reduction (PR) as the poor and the downtrodden sections of the society have to use the NR for food security, fuel-wood, fodder and clean water, among many other requirements. This

understanding of the interrelationship between poverty and environment has led to what is known as the asset-based approach to poverty reduction. It has stressed upon reducing the risks of vulnerability and enhancing the ability of poor households to participate in economic activities. The poor must be in a position to reap income from environmental or eco-system services that is fundamental for their economic empowerment and equal access to resources that are natural.

Against this backdrop, the present paper is an attempt to:

- Understand the relationship between the NR and rural poverty levels and identify ways of measuring the links;
- Identify gender and regional dimensions of such links and
- Delineate the various levels of interventions to address the situation

1.3. Poverty and Natural Resources: Linkages

Human societies and NR are inextricably linked and their relationship is an on-going process. It was the natural resource like river valleys as the cradles of human civilisations that nurtured and enabled people to prosper. The political economy of conservation and use of NR is embedded in every society's values and norms. While the resources are natural in their origin and availability, their use and rights over them are matters of economic and political control. In countries like India, inequality that characterised the social hierarchy of castes and communities affected this sector where NR were used and conserved. Land, for example, as one such resource, is traditionally owned by a few, while large sections of the rural population are wage workers with no entitlements. Likewise, the distribution of water, for drinking and domestic purposes, and for agriculture and other economic initiatives, has also been skewed. Thus, a great divide is created between the rich and the poor, with the former holding unlimited control over and access to NR. Livelihoods are designed and framed along this hierarchical system where access to NR is

determined by structural constraints. Some sections of the society are not eligible to freely use them. Property rights assume significance in this context of economic activities based on the NR.

Deprived of ownership titles and rightful access to the NR, most often the poor tend to use those resources that are not privately owned. These are termed the common property resources, such as forests, hilly areas, rivers and streams, tanks and other public water bodies. The increasing use of the CPR by the poor has led to the criticism that it has led to the fast degradation of the NR. The poor are blamed for leading to such degradation and causing environmental decay. It has come to be believed that population growth is linked to overuse of resources that forced the poor to damage the environment. Thus, the debate is that poverty has to be reduced at the cost of environment or one has to protect the environment at the cost of the poor. This has been viewed as a vicious circle and measures to break the same have assumed significance in recent times. A 'win-win' situation that would both reduce poverty as well as protect the environment has come to be stressed upon.

There is vast body of literary material on the question of NR and poverty – both in the sense of poverty having been the result as well as the cause of environmental degradation. Although the working paper concentrates on this specific issue, it is vital to understand two perspectives that have emerged in the same context but at the global level. They are:

a) an actor-oriented perspective, highlighting the strategies used by the rural poor to establish and secure access to natural resources, as well as the means of livelihood it provides for them, and

b) a structural perspective where the patterns of inequality shape poor people's agency to gain access to natural resources, both directly with other actors and mediated through institutions.

1.4. Uses of Bio-Diversity to the Poor

A large majority of the poor in developing countries depend upon the natural resources like forest produce and ecosystems for meeting their basic needs. These include resources for farming, livestock rearing, fishing, hunting etc. Thus, natural resources act as wealth generating and sustaining sources for the poor. They have several characteristics that make them attractive to them. Such environmental resources are easily available, renewable, widely dispersed and often found in areas denoted as common property, where the poor can access them without themselves owning them.

Thus, ecosystems are considered the wealth of the poor. For those living in severe poverty, nature is a daily lifeline. It is an asset for those with scanty material means of living. This is especially true of the rural poor, who comprise three-quarters of all poor households worldwide. Harvests from forests, fisheries, and farm-fields are a primary source of rural income, and a fall-back when other sources of employment falter. But programmes to reduce poverty often fail to account for the important link between environment and the livelihoods of the rural poor. As a consequence, the full potential of ecosystems as a wealth-creating asset for the poor - not just a survival mechanism – remains to be effectively tapped.

There are differences in the ways the rich and the poor use environmental assets. The rich derive absolute income from environmental resources while for the poor, income is in relative terms. The rich also exercise greater control over natural resources due to their power situation. The poor depend upon the common property for food, firewood and fodder to livestock. Thus, they have greater vulnerability to risk. Their inability to accumulate wealth from natural resources results in overuse and degradation. This is addressed as 'downward spiral thesis' that will finally lead to decline in environmental resources. Often, degradation is also attributed to corrupt local institutions.

II

Measurement of Poverty - NRM Links

2.1. Complexity of measuring poverty

While attempting to understand the ways and means of measuring the links between poverty and NRM, what is crucial, as well as complex, is deciding the indices of measuring poverty itself. The first challenge in such measurement is that in the absence of a universally acceptable definition of poverty, it needs to be measured with both subjective (utility) and objective (poverty lines, basic needs etc) perspectives. Conventional measuring indices are of the objective type. It is only relatively recently that subjective perceptions of poverty have become acceptable and popular (Chambers 1997). Partly their acceptance has to do with the social and process indicators of poverty and the linkages of poverty with equity and vulnerability (the concept of entitlement) that have brought researchers close to concepts such as well-being and when they have limited or restricted choices and opportunity for a tolerable life.

The second challenge to measurement of poverty is the variety of poverty itself. These are the simple living standard measure, poverty line, determination and the measures involved in absolute and relative poverty. Often, consumption expenditure is preferred to income as a measure of living standard.

The post-social summit 1995 focus has also been upon making provision for greater coherence in overcoming the tendency to rely on disjointed sets of small-scale interventions or programmes, to a more coherent and broad-based ones. In India, for example, it came to be criticised that hitherto, the integrated poverty alleviation programmes had resorted to a two-way approach, viz., growth on one track and human development on the other; and that the two rarely intersected. This meant that economic policies were not made pro-poor but social services were burdened with having to directly address poverty. This was very much true of countries like India where the policies were based on a

socialistic pattern of welfare and reform and where social inequality persisted based on structured discrimination in all spheres of life.

2.2. Viability of Existing Methods

Poverty is measured by economists using quantitative analysis methods. These methods permit precise measurement and comparisons over time and regions. But in recent times, poverty measurement analyses have given credence to the perceived measures of the poor themselves in their diversity of cultures and in more holistic forms.

In the above context, basic needs of people have come to be construed as encompassing the conventional items like food, water, clothing and shelter. Following the World Social Summit on poverty held in Copenhagen in 1995, the term has been expanded to include other assets like education, health, credit, participation in political processes, security and dignity. The concept of well-being was added so that by 2000, poverty came to be described in terms of material deprivation, low levels of education and health, exposure to vulnerability and risk, voicelessness and powerlessness. These indices may lack the precision and comparability of income or consumption measures but are nevertheless significant in their own ways.

2.3. Indicators of Poverty

Measurement of poverty depends upon arriving at certain indicators of defining a situation as poverty-ridden. The prevalent pattern in estimating poverty at national and state levels includes a range of economic, social and regionally specific indicators. Lack of productive assets, income and basic needs is one such. These indicators will have reference to the social and economic conditions in which the poor are placed such as, being landless, working as casual labourers, women in general, widows, orphans, elderly, sick, disabled, displaced, refugees and people living in areas prone to natural calamities, those with few livelihood options, basic services, infrastructure, and so on. Another set of indicators include

something like assessing seasonal fluctuations in income, calculating it during times of abundance and at times of hardship, in a calendar year.

We have to also note that men and women use resources differently and have different roles in society. To be effective, strategies to decrease poverty and preserve the environment must, therefore, pay close attention to the impact of disparities between women and men on access to resources and opportunities. Moreover, there is much evidence that gender equality and empowerment of women has positive effects on a variety of other important aspects of development – notably population growth and health. Gender roles influence perceptions of poverty quite strongly and extensively. Here, attention is paid to household issues, including food, water availability, and men, as traditional income earners focusing on their responsibility for providing for the family and the community.

III

3.1. Environmental Degradation and Impact on the Poor

Why do the Poor Depend on the Environment?

It is often debated that environmental degradation is a cause of accentuated poverty. At the same time, poverty itself can be a cause of environmental degradation. This reverse causality stems from the fact that for the poor people in the developing countries, such as India, a number of environmental goods and commodities act as income supplements to households, especially during times of acute economic stress. This is also supported by studies elsewhere (Falconer and Arnold, 1989). Therefore, the upcoming debate is one that describes this as a process of cumulative causations, where poverty, high fertility rates and environmental degradation feed upon one another. It has been reported that the impact of erosion of environmental resource base can be so strong and wide-wielding that it could induce certain categories of people to become destitute, against a situation where the economy is prospering.

In several countries of the world inaccessibility of the poor to credit and resource inputs leave them with no choice other than to employ natural resources, such as forests, woodlands and rivers, in order to survive. Quite often, their continuous exploitation of these resources by the rich and the poor, has led to stress/depletion and environmental degradation, there by making mainly the poor, both the agents and victims of unsatisfactory ecological practices. In most rural areas of the developing countries, the duration for which a land is left fallow has declined (to four to five years) and in several instances, it is as low as hardly two years. Short fallow period is usually not adequate for regeneration of vegetation and the restoration of host nutrients; soil and water quality are, therefore, quickly depleted.

Among the poor; frequent cutting of forest trees with low replanting rate has resulted in scarcity of fuel wood. Immediate effect of this is that the poor households turn to alternative fuels such as crop residues, coconut husks, rice hulls or elephant grass. The smoke from these inferior fuels, according to Cece Laki (1985), is often more poisonous than that of fuel wood, while emissions from all biomass fuels are known to be dangerous sources of air pollution in the house. Also, scarcity of fuel woods forces women to make what is available burn slowly. WHO (1984), reckons that under slow burning conditions wood fuels are capable of producing pollution concentrates higher than fossil fuels and subject the households to more smoke pollutants. The incessant cutting down of trees for firewood and charcoal have hindered prospect for increased yield and hastened the prospect of the creeping desertification. Use of natural resources by industries and resultant industrial pollution from improper waste disposal has further affected the plight of the poor. Other consequences of over exploitation of environment due to poverty are depletion of fish in the local rivers, tanks, wells, streams and other traditional water bodies.

3.2. Poverty leading to Environmental Degradation

The causes of environmental degradation are attributed to accentuated poverty, on the one hand, and to poverty itself, on the other. This is so, because the poor, it is argued, treat environmental resources as complementary in production and consumption to other goods and services. Environmental resources supplement the income of the poor, especially in times of food crisis (Falconer and Arnold 1989).

A number of cumulative factors take birth out of such a situation where poverty causes environmental degradation, accompanied by high fertility rates – all feeding upon each other. The overall economy may still prosper but certain categories of people would be affected in their livelihood bases when there is such degradation (Dasgupta 1993). In the absence of social safety nets and secure livelihoods, the poor would lose access to inputs still further that leaves them at the mercy of natural resources like forests land and water in order to survive. Sometimes their continuous exploitation has caused depletion and environmental degradation, thereby making 'the poor both the agents and the victims of unsatisfactory ecological practices'. 'Short fallow periods are usually not adequate for regeneration of vegetation and the restoration of host nutrients; soil and water quality are therefore quickly depleted'.

Use of alternative fuels which are not amenable for burning fast has led to increased air pollution in the households. Scarcity of fuel wood has resulted in the use of crop residues, coconut husk, rice hulls etc which not only burn differently in pace than regular firewood but also emit poisonous smoke that adds to air pollution. The type of houses adds to congestion of smoke (Cece Laki 1985). Another notable consequence of over exploitation of environment due to poverty is the depletion of fish in the local rivers and streams.

IV

4.1. Environment and Poverty in the Indian Context

Anti-poverty Programmes

As was true elsewhere in the developing world, the national policies in India were criticised for their weak link with environment and the natural resources component till recently. Despite recurrent natural disasters leading to worsened poverty situation, the anti-poverty programmes of the State and the Centre had lacked a significant environmental component. No specific mention of the need for environmental protection and regeneration had been made. Moreover, the situation was marked by rigid functional division within the government against cross cutting concerns. Despite the realisation that there is a link between poverty and natural resources, the programmes were not reflecting the link between the two. Efforts towards breaking down of poverty and its link with the natural resources are expected to reflect this situation. Poverty alleviation (now reduction) strategies are significant in addressing environmental issues if they try to reduce the dependence of the poor upon natural resources. This is universally true and applicable. By designing and providing economic activities suitable to every agro-climatic region in the state, it is quite possible to reduce the burden of dependence of the poor on nature for work or resources to live.

A review of anti-poverty programmes of the eighties and earlier, in India and other developing countries shows that they have failed in making growth pro-poor, targeted inequality sufficiently and enabled empowerment of the poor. They are criticised for being prescriptive about supplementing rapid growth with social spending and safety nets that have proved to be inadequate.

4.2. Social Exclusion and Poverty

Poverty in the context of societies like India is not just deprivation. Poverty eradication efforts and development also hinges on the

expansion of freedom of choice that people have before them. It goes beyond where individuals fail in (or are forbidden from) accessing the means for survival that would enable them to satisfy their essential needs and to also participate in the development of society. This resulted in two major handicaps for the poor: one was that it excluded them from reaching to an upgrading of their capabilities to lead better lives. The second was that any attempt at eradication of poverty was curtailed or made ineffective by the structural constraints prevalent in Indian society, like caste, ethnicity, gender and so on. This is addressed as failure of capabilities and entitlements (Sen 1999).

Poverty, therefore, in the Indian context, goes beyond mere income deprivation and is a state of poverty in which individuals cannot access the living conditions that would enable them to both satisfy their essential needs and participate in the development of the society to which they belong. Here, people cannot achieve their potential through upgrading their capabilities. They are socially excluded from mainstream livelihood systems because of deliberate and structural constraints such as caste, ethnicity or other social barriers. These render poverty eradication efforts difficult and intangible.

V

5.1. Situation in Karnataka

NR &Rural Livelihoods

The contribution of natural resources to rural livelihoods in Karnataka is no less important than it is in the case of the other states. It is widely recognised that environmental resources add to the quality of human life and that the fast deterioration of these resources also leads to increasing poverty and vulnerability. More than 80 per cent of people are employed in natural resource based activities in rural areas, especially in agriculture. Therefore, the link between poverty and environmental degradation is important to be established. What is important is to

develop a systematic framework for tracking the relationship between poverty and environmental degradation.

The state has advanced significantly in understanding its environmental problems and the ecological risk factors that were increasing along with environmental deterioration. It is also realised that ecological vulnerability has to be addressed with institutional changes, projects and programmes to protect the environment and natural resources. An environmental policy is in place supported by co-ordinated policy programmes and implemented both by the government and the NGOs to rehabilitate polluted areas. There are efforts to manage erosion, laws exist to improve water resources, modernise mining, forestry, fishing, conservation of bio-diversity etc.

Environmental Degradation and Policy Approaches

A review of efforts in this direction confirms that realisation about the importance of environmental degradation and depletion of natural resources to the economy came up only during the late '80s. The policy makers are not able to fully appreciate these environmental concerns and give them due weightage in their plans and policies. There is also the criticism that environmental considerations are not adequately addressed in the government's overall planning framework.

Although the first few Plan periods did lay emphasis upon addressing poverty and bringing about economic development, the '70s and the '80s were important in so far as the approach in this regard underwent changes. It was then that the government in Karnataka made serious efforts at poverty alleviation. The percentage of people living in absolute poverty and relative poverty[2] has increased

[2] Absolute poverty is measures household income comparing it with the cost of a basket of specific goods and services. Relative poverty measurement compares household income and spending patterns of groups or individuals with the income and spending patterns of the general population. With in these two broad approaches, there are a number of variations, just as there are a number of groups in the society with a variety of measurements.

over the years, forcing the government to adopt a multi-sectoral approach to recognise the multi-dimensional nature of poverty and linkages between influencing factors. The priority areas have been health care, rural connectivity (roads), education, water and sanitation and agriculture and allied services.

Human Development Report

The credit for obtaining baseline information about Karnataka goes to the publication of the Human Development Report for Karnataka in 1999. It provided both a vision of its achievements as well as challenges to accomplish poverty reduction. The issue of income poverty, that was addressed during the last part of the 20th century, as the goal of poverty eradication, continues to be an important dimension of overall poverty alleviation strategy.

First of all the HDR and other statistics have established that the state has considerable regional variation in living standards. The northern and southern regions have shown lower per capita expenditure than in the eastern and coastal regions. Rural poverty rates are also the highest here. The poorest regions also have the highest concentration of SC and ST households. The coastal districts and those lying in the Western Ghats are those regions, where households are engaged mostly in non-farm activities and exhibit the lowest rural poverty rates. The two poorest regions also have the lowest educational outcomes. Not just this, even the so-called urban areas also reflect rural patterns of life.

Quite expectedly, in both rural and urban areas, HHs among the SC and ST communities display high poverty rates. More than 65 per cent of SC/ST population in urban areas lives below poverty line, while the urban poverty rate for them is also high at 40 per cent. Forming more than a quarter of the total population of the state, these communities hence constitute more than one third of the total number of the poor.

VI

Critical Analysis

6.1 Balancing the Act of NR Conservation and Poverty Reduction

Karnataka is one of the states in India where natural resources are not extremely degraded, population growth is under some control and food insecurity is not grave. But rural areas in the state are still facing problems as they depend on natural resources for livelihood support with agriculture, livestock rearing and small manufacturing, trade and services as the occupations of the people. If poverty has to be alleviated or reduced in the state, in its links with environment or NR, the situation is such that it just cannot be accomplished without further exploiting the NR and intensifying people's further dependence on land, water, forest and others. The pressing need to survive, in the wake of increased gap between the better placed and the poor and marginal farmers and the landless, wrong practices of over use of NR and causing its fast depletion are common. Increasingly, land that was hitherto left fallow or was reserved as common property of all in a village and uncultivable type of land – are included under agriculture. Sustainable intensification of agricultural production without degradation of NR is thus a challenge to researchers, policy makers, development practitioners and grass-roots workers. It should also be remembered that the poor are not willful destroyers of NR which forms their life support system. There are a number of cultural and religious practices enshrined in the social lives of the rural and forest dwellers that condition their livelihoods in their relationships with nature and its resources[3].

Instead it is better to address the issue from the perspective that the poor are the unwilling and passive victims of ecological

[3] The presence of Devara Kaadu in the districts of coastal and Malnad areas of the state and the sacred groves there as well as elsewhere are cases in point here.

degradation. Hence, designing poverty reduction strategies in environmentally degraded areas have to take into account this factor seriously. The problem is that degradation of environment upon which the poor depend for survival, would only further impoverish them. They would have a weakening ability to adopt themselves to sustainable management practices. This has to be noted while making such pro-poor strategies for development.

What is important at this juncture is to first of all identify issues that are important as links; then identify measuring indices and then try to undertake regeneration activities. The loss of links has to be measured appropriately to proceed with later stages.

6.2. Index for Measuring the Links between Poverty and NR in Karnataka

a) Access to Land

Land is a much cherished agricultural asset and hence forms the crucial indicator of the link between poverty of settlements and their dependence upon nature for survival. It is even argued that sustainable livelihood management is more significant to rural people than managing the natural resources. Factors responsible for poverty include lack of productive land, access to technology, credit, agricultural inputs, forest products, safe water, sanitation facilities etc. People often rate land, water and forests as the principal natural resources. Besides these, lack of access to land is also mentioned frequently as a constraint in improving productivity, and securing livelihoods. Inequality in access to land has been a major threat in this context. The Land Act, designed to strengthen the land rights of the poor and those of the women, need further strengthening. Degradation of natural resources, particularly with regard to the ability of the soil to produce land, was quoted as most central constraint to increasing production and securing livelihoods. However, rural people are more worried about rapid erosion of sustainable livelihood than managing natural resources.

Land being the most basic NR influencing human life, it is also a base for many other sectors of economic activities like agriculture, industries, infrastructure etc. As a result, land is also one of the most overused, degraded NR due to subsistence practices, accelerated soil and water erosion, erratic rainfall, increase in population (human and livestock) and so on. Land is classified into arable and non-arable types, the latter comprising the forests, pastures (permanent and current fallow), cultivated waste and land put to non-agricultural use. Karnataka has about 60.50 lakh hectares of land in this category, of which 9.67 lakh hectares is rocky and located mostly in dry and coastal areas forming 15 per cent in each. 79 per cent of non-arable lands are gravelly; 99 per cent are found in transitional and dry zones. 27 per cent have high slopes located in hilly zones (50.85 %) and coastal (35.32 %) respectively.

Table 1 Type of Agricultural Land in Karnataka (in %)

Sl . No.	Type of land	Proportion	Category
1.	Good for cultivation	19	II
2.	Moderately good (Land with erosion, slopes etc)	41	III
3.	Fairly Good	23	IV

Source: Department of Water Resources, GoK.

Erosion is a problem in non-arable land in the state, 54.51 per cent of which is severely eroded[4]. This is particularly true of dry (73.55 %) and transitional zones (97.05 %). But the state is in a favourable situation as far as its agricultural land is concerned, with 83 per cent (of land) being suitable for agriculture. The remaining land is comprised of forests, pastures, for mining and quarrying activities, as wild life reserves and used for recreational purposes.

[4] There are 6 types of soils in the state: Red soil (37.2%); black cotton soil (27.77%); others/alluvial (15.74%) and Lateritic (11.6%)

On an average, about 80 per cent of land is under rainfed conditions, while only the remaining 20 per cent is under irrigated conditions. This puts Karnataka next only to the state of Rajasthan in its land use. 70 per cent of total geographical area is under arid climatic zone with scanty rainfall. 120.85 lakh hectares are under cultivation, while 68 lakh hectares (forming 57 per cent of total geographical area) need soil and moisture conservation treatment. Soil degradation occurs due to intensification of agriculture, overgrazing, deforestation, enhanced industrialisation, groundwater depletion and contamination due to salinity. This naturally makes agriculture expensive, difficult to produce food, fodder and fibre. 7.7 million hectares forming 40.3 per cent of total geographical area, is thus affected by degradation. Poor soil, lack of watershed activities, soil and water conservation activities – all have led to more than 300 tons of soil per hectare getting washed away, every year.

Watershed Activities & Issues in Land and Soil Conservation Processes.

The state government has launched watershed activities since the 1980s in its different zones which have led to more than 350 such projects as of today. But there is still much to be covered under these projects.

The following are, therefore, the unresolved issues in the above context:

- Soil and water erosion due to unsustainable practices and loss of land fertility
- Excess of irrigation leading to land degradation
- Loss of vegetation and increased pressure on land capacity
- Increased use of chemicals leading to contamination of soil and water and
- Mining and quarrying leading to land degradation

Besides the above, fragmenting landscape and habitation have hindered developmental activities. Increased use of fertilizers has led to increased environmental problems since the Green Revolution[5].

Salinity in the command areas of the major irrigation projects of the state like the Tungabhadra, Cauvery, Ghataprabha, Malaprabha, Upper Krishna etc. has affected 1.27 lakh hectares of land (or 10 per cent of the total land under irrigation in the state). There is an increase in the gross sown area in the last 5 -10 years in the state due to increased irrigation potential (from 117.59 ha to 120.02 ha in 2002). The area sown more than once has also increased by 18 per cent leading to pressure on land. The increase of land under horticulture and plantation is up by 20 per cent.

However, the major problem here is that the farmers, especially the poor and the marginal landowning ones, have brought even those lands that were common property of the village under cultivation. Decline in fertility has resulted in stagnation of overall productivity in the state due to land degradation. Common property resources have been encroached in most villages, not even leaving the established forests, 'Gomalas' (village common property area), road sides and railway lines. Solid wastes have been dumped on the road side and tank bunds, leading to silts and weeding. Tank siltation being high in many cases has led to breaches.

Collapse of traditional village panchayats and others have led to absence of regulatory mechanisms for the common property resources causing non-adoption of soil and water conservation measures. River basins, water bodies, vegetation etc are, therefore, not adequately protected. Forestry sector is the only exception here.

[5] Fertilizer consumption by the country accounts for 16 kilograms per hectare as against the world average of 54 kilograms. The share of Karnataka is about 10-11 kgs.

Land use policies governing crop cultivation also need to address and regulate unsustainable farming practices like monoculture, excess use of water, leaving land fallow, multiple cropping practices etc.

The government has adopted soil and water conservation measures through community support in non-arable lands through fencing, vegetative covers or filters etc. Natural and proper drainage to drain excess water is also undertaken besides many such measures.

Table 2 Districts with Environmental Degradation in an extreme form

Sl. No.	Districts	Agricultural Practices
1.	Shimoga, Mandya, Belgaum and Raichur	Excessive Use of Chemicals
2.	Gulbarga, Raichur and Bijapur	Excessive use of pesticides
3.	All districts in the north eastern plain region	Soil Erosion
4.	Districts in Central and Western Ghat Region	Water erosion

Source: Department of Water Resources, GoK.

b) Water resources

Drinking Water & Sanitation

In any state and national level water policies, those relating to drinking water receive the first priority followed by irrigation, industries, power, fishing and recreation. Karnataka has 36,679 tanks with a command area of 6, 84,518 hectares. Ground water is estimated at 485 TMC. Exploitation is more in dry taluks of north and south interior Karnataka. In the past, rural communities used to restore and maintain water bodies like tanks but now after the state took over them, these are degraded. Their water holding capacity has been reduced to only 30 per cent. Women, children and the poor belonging to a watershed are thus affected as they have no alternative sources of obtaining safe water for drinking. Problems associated with it are long distances to access them, clean source, cost of buying water, time wasted by women and

school missed by children and diseases – all lead to low productivity and burden on women. They are compelled to walk long distances or wait in long queue to collect water for drinking and domestic purposes. Loss of biodiversity also affects the poor who depend on it.

Causes of tank siltation are identified to be:

- Overgrazing and destruction of vegetative cover in catchment area, high run off and soil erosion;
- Improper land and crop management practices;
- Encroachment of forest for agriculture and reduced tree cover and
- Extending cultivation to marginal lands.

6.3. Water Users' Committees

The Department of Water Resources, Government of Karnataka (GoK), has formed water users' committees, which are empowered to procure water from the irrigation department, prepare water budgets, levy and collect water charges and manage water distribution systems. The Jala Samvardhana Yojana Sangha (JSYS), GoK, was established in 2001 to facilitate the planning and implementation of the task of rejuvenation of tanks basing upon community participation. In rural areas, 36 per cent of habitations have received 55 litres of per capita of water per day and 7.8 per cent of habitation received less than 20 litres. The State Water Policy 2002 has fixed certain stringent norms for water consumption.

Closely linked to water is the facility for sanitation that is lacking in almost all villages. A toilet room built as part of the house is very rare. Open space is used in 99 per cent of cases by people to defecate themselves. This has led to poor sanitation, outbreak of diseases etc.

Water for Agriculture

There is a lot of unauthorised irrigation in the river basins of the state, leading to shortage of adequate water for all.

Non-adherence to planned crop patterns and absence of equity in supplies to tail-end farmers in distributaries and canals is the cause for shortage of water. Excessive cultivation of high duty crops like rice with double cropping practices have led to water logging and salinity. There are 380 watersheds in the state, with a target of covering 1.25 lakh hectares of

Table 3 Unauthorised Irrigation Practices in Karnataka's River Basins

Sl. No.	Type of Irrigation	Water consumed for irrigation	
		Krishna	Cauvery
1.	Minor	——	8.71
2.	Medium	3.39	—
3.	Lift	25.19	—
4.	Major	11.89	0.9

Source: Department of Water Resources, GoK.

area (2003) with a total of 29.10 lakh hectares that formed 24.90 per cent of total treatable area. This is part of natural resource management through watershed based treatment. Degradation of traditionally community-owned tanks due to silting has accelerated the decay of the tanks and other water bodies. Minor irrigation works serve as a source for growing irrigated crops. Surface areas being large get evaporated soon and provide limited storage. They enable irrigation to chronically drought-prone areas. Depletion of water and its inequitable supply, distribution with inadequate availability are the two major problems in the state severely affecting the NR of water. It is made acute in recent times, due to drought and water quality problems. Except the Western Ghats and the coastal regions, the rest of the state is under its grip. Northern plateau suffers from excessive use of water for agriculture, on the one hand, and drought-prone areas needing watershed treatment, on the other. Water pollution as in Tungabhadra River (particularly in Davanagere and Harihar taluks) has been the result of indiscriminate effluent discharge by the factories and industries. There

is also a high level of siltation in the Tungabhadra reservoir. In the southern part, surface and groundwater pollution and degradation of tanks has been quite high in recent years.

c) Forests and other such natural resources

An important natural resource that brings lot of economic good to the rural people is forest. It is important for fuel-wood, minor forest produce, other products that are forest based like medicines, water, fodder and food. Often, the people face a ban to use the forests due to prevalence of forest laws. The other issue here is the degradation of the environment, and the third, population density. Environmental changes lead profoundly to decline in forest produce and worse crop yields in agriculture leading to food insecurity etc.

Under constant pressure in all eco-system in Karnataka is its biodiversity, including the streams, rivers, coasts, forests, village common property like grasslands, sacred groves, village common pasture/groove (Gundu Thopu), animals, plants, aquatic treasure etc. These were traditionally protected and conserved through participatory processes with links established with the divine or natural objects. The human settlements established interaction with the local ecosystem through these objects thereby exhibiting their attitudes towards nature. However, over time, the unsustainable harvest of ecosystems has led to degradation of biodiversity. The vegetation in forest areas has come under constant threat with illicit felling of trees for firewood, collection of other produce like fodder etc. An adverse reaction of scarcity of fuel wood is also noted to be affecting the quality and quantity of food consumed by the family. Women are forced to use that type of fuel which burns slowly, when wood fuels produce pollution concentrates that are higher than other forms of fuel (WHO 1984). Thus the households are subjected to more degree of pollutants. Logically, the increased cutting down of the trees leads to increased scope for desertification.

From the point of view of regeneration of natural resources, short periods are often considered as not enough for rejuvenation of soil and water qualities and components. Scarcity of fuel wood is emerging as a significant problem in the rural areas which is attributed to frequent cutting of forests. In the absence of even that, women turn to alternative fuels such as crop residues, coconut husks, rice hulls or dung cakes. The smoke from these inferior fuels is often more poisonous than that of fuel wood (Laki 1985). For that matter, emissions from all biomass fuels are known to be potential threats to environmental purity.

The largest composition of harvest from the forest is by way of removal of biomass in the form of fuel for domestic use by adjoining villages and fodder grazed by cattle. The increase in cattle and human population has a high pressure on the forests.

The government has taken few measures to correct the situation. The Biological diversity Act 2003 aims to conserve sustainable use and equitable sharing of benefits of India's NR. It empowers the state to delegate biodiversity management to local bodies. Karnataka is also the first state to have biodiversity information system involving local communities, teachers, students and others to document NR in their area. Women are empowered in particular to participate in watershed activities. It also entrusts them with conservation responsibilities through documentation. It has declared 16 per cent of the total forest area under protected areas' network. The forest dependent communities are encouraged to gain self-sufficiency in restoring their livelihoods through the World Bank assisted eco-development project. Out of the three types of energy resources, even here, firewood forms the main source of fuel in 85 per cent of households. Its share in total energy sources is 42 per cent (electricity forms 47.5 % and petroleum products, 10.5 %). Firewood is used in cooking, water heating besides small scale production of bricks, tiles, jaggery, puffed rice etc. As per one estimate, per head, per year, 0.5 tons of firewood is required in Karnataka. The district of Uttara Kannada and coastal and Malnad areas

use it drawing from forests. In the northern plateau, Prosphis Juliflora acts as the provider of fuel wood for a large part.

6.4. Problems in the Development Indicators & their Monitoring

There are certain inherent problems in identifying indicators to be used to measure the link between NRM and poverty. They are:

- Characteristics of Poverty
- Relative significance of environmental conditions and
- Limitations of applications

Within Karnataka, and based on district-wise situations, these could be further tailored to suit sub district levels catering for variations in poverty and environmental conditions. Causes of poverty are location-specific. Therefore, indicators have to be locally generated, measured and monitored over time to track changes, existing and potential data sources have to be identified. Data sources for the above information would be the documents available with the Bureau of Statistics and Commerce, GoK, department of finance, planning and other line departments, participatory approaches, household surveys etc. Poverty-environment indicators are needed to monitor the impact on the environment of the economic, social and cultural activities of the poor. They are also needed to monitor the impact of environmental conditions on their activities.

Who should do the monitoring?

Ideally, people who are affected by the changes in natural resources' availability and depletion have to be prepared to monitor the interventions. Here one should remember that mere providing accessibility to poor to use natural resources is not enough. They have to be freed from falling prey to 'poverty traps' again and again. This can be curtailed by giving these vulnerable and poor sections of

society certain new facilities to depend upon. They have to be taught the uses of natural resources and ways of exploiting them in a systematic manner so as not to deplete them.

Further, the poor dependent on environmental resources have to be provided with alternative methods of performing their economic activities so as not to disturb or harm the environment. Gainful employment that results in the production of a product with value addition is welcome in this context. Floriculture, dairying, home-based processing units etc., are examples here which are gender-sensitive also and allow much larger number of women to participate in them.

Capacity building and Enabling Mechanisms

It is here that the role and importance of participatory enabling mechanisms and capacity building exercises is relevant and timely. Capacity building enables the hitherto marginalised and poor to access nature and its resources much more ably and gainfully with less or no harm to the source. What is important here is that these efforts should always aim at not letting any poor household to slip back into poverty, after it has been treated and its quality of life is substantially improved. It is here that the sustainability of such enabling mechanisms gains importance.

The state of Karnataka has had rich experience of training and capacity building exercises organised through a cross-section of State and Central government programmes. These in fact gained momentum during the late '70s and later in mid-eighties we had the Viswa programme that was entirely an entrepreneurship development programme of the State of Karnataka. However, the success rate of this and many such programmes has been relatively poor due to a number of issues that have to do with the characteristics of poverty itself.

(1) Characteristics of Poverty

Increasingly, poverty has gained a multi-dimensional status and has come to have many faces. Poverty is generally identified as being characterised by the following factors:

1. Low calorific intake

According to the NSSO data (60th round), the general intake of food by people in poor and very poor households is valued to be low as also in its nutritive content. This again is further differentiated by using gender, age, rural/urban, occupation and such other socio-economic indicators. Child poverty is a rising phenomenon in many parts of India and the developing nations. Pregnant and nursing mothers have reportedly severe anemic conditions, a problem that extends to the old and the sick in the household. It is often remarked that India has come over severe mortality problem but has started to face rising morbidity of its population, particularly at the rural areas and among the urban poor.

The poor are forced to reduce already inadequate levels of consumption even further when struck by natural calamities. Loss of employment caused by some disasters leads people to emigrate in search of employment, or to move into illegal activities such as prostitution, drug trafficking and delinquency.

2. Low in housing and sanitary facilities

Next to food and nutrition, we come across severe constraints in the poor accessing housing and sanitary facilities both of which are dearly linked to environment. More than half of the country's poor live in cheap and dilapidated form of dwelling conditions. Poor housing is vulnerable to inadequate construction, people do not have enough savings to cover emergencies and the poor sector rarely compensates for losses. Lack of drainage and sewerage system, provision for good and sufficient drinking water, energy services, sanitation and so on also add to the problem of deprivation for the poor who live in poor housing conditions. The fact that the premises (site) and the building (the house) do not belong to them adds to their woes and uncertainty.

3. Low literacy, especially of women and girls

Literacy is an issue that the government both at the centre and the states in India took serious note of in the recent past. Besides the

earlier programmes of adult literacy, elementary education, provision of infrastructure and personnel, financial and material assistance to children from poor and socially excluded households/communities etc., the post-2000 programmes under the banner of Sarva Shikshan Abhiyan have embarked upon implementing compulsory education programmes, arresting child labour, and so on, by creating avenues for citizen-participation by forming what are known as 'School Development Monitoring Committees' in every village for every school there. Yet, education of girls is far from being satisfactory and drop-out rate among them as compared to that of the boys continues to be high. Girl-child labour and girl-illiteracy are also serious problems to be reckoned with.

4. High indebtedness

The poor are also characterised by high rates of indebtedness and are vulnerable to debt bondage. Erosion of livelihood bases that tend to be dependent upon natural resources, particularly in semi-arid areas, forces such households to destitution and utter poverty. It is here that the role of proper management of natural resources assumes significance.

5. High out-migration

An important characteristic of the poor is their habitual, seasonal migration from their habitation in search of livelihoods or simply for wage work. This alone is enough to alienate them from their land, home, homestead and livestock driving them to greater poverty levels than what they experience in their native places. This also portrays persisting poverty among the landowning households especially from semi-arid areas where marginal and to some extent small landowners face acute poverty levels due to land degradation and loss of productivity. This tends to affect their livelihoods directly and accelerates the pace of migration. It needs no special mention that even with migration to urban areas for wage employment about three in four people in the state live in rural areas depending upon natural resources for their survival.

There are chances of people transforming the resource while trying to use and manage forest and other natural resources in order to benefit for their livelihoods. Pressures of poverty may lead to deforestation, but it need not always be the case. There is also the threat of users belonging to multiple categories with different and competing interests. This makes the process of evolving participatory control and management of forests difficult. More than anybody else, the needs of the poor get eroded and come into conflict with those of the wealthier and other sectors who prefer to privatise natural resources keeping an eye on exploiting the market opportunities.

6. Lack of Effective Participation in Political Processes

Despite the introduction of decentralised governance system or the panchayati raj institutions at village, block and the district levels (called as taluk and zilla, respectively in local language), the poor are still marginalised from effective participation. The PRIs in the Indian context have been able to achieve representation of the poor in these people's political bodies largely owing to the constitutional guarantees that insist upon representation and reservation on such grounds as gender, caste and class. Poverty is associated with poor and ineffective assertion of political roles especially when it is combined with a low caste status or gender-based discrimination.

Poverty imposes constraints in people's ability to express needs and exploit new opportunities. The poor will be affected more due to lack of accountability and competence with in government/political processes and the prevalence of patronage, dependency and hegemony – all of which inhibit participation.

7. Limited or no Right to Resources

A strong cause of poverty is the absence of any kind of right to natural resources for gaining economic and usufruct rights over them. This is especially true of the weaker sections including women.

8. Social discrimination and social exclusion

Poverty is also closely linked to rigorous practicing of societal constraints that impose discrimination and exclusion upon downtrodden communities and women.

9. Lack of access to critical services

Limited opportunities to broad-based economic growth and lack of access to critical services also connote poverty of an extreme type.

(2) Relative significance of environmental conditions.

Poverty in relation to environmental conditions is understood in terms of degradation, over-use of limited available land for agricultural purposes, high population pressure in available land, increasing congestion in urban centres etc. Further deterioration due to unplanned growth, increasing provisions of water disposal and pollution etc.; due to environmental problems like loss of top-soil, deforestation, water shortage, flash floods, degradation of large tracts of agriculture, forest and pasture lands, etc., - have increased considerably over the years. Deforestation leads to increased fuel collection time for the poor, decline in opportunity to generate income from forests, etc. Environmental degradation also implies increased or worsened pollution, especially in the fast-growing urban centres; loss of bio-diversity, increased use of toxic pesticides, unsuitable use of chemical fertilisers, depletion of natural resources and rapid growth of population. The strategy of farmers has been to obtain quick yields rather than sustainability. All sections of economic activities, like agriculture, forestry and tourism industry, are not developed on a sustainable basis.

(3) Comparison of Large Populations

Population, development and environment are inter-linked but extend to large geographical boundaries. The indicators for assessing the situation emerging from these are given in appendix I.

Conclusions

Despite its rapid strides in development, a large majority of the people in Karnataka are still poor without any sustained means of access to social security or credit, on the one hand, and resources, on the other, to support them. Continuous exploitation of natural resources has lead to their degeneration and depletion. It is the poor who are blamed for the wrong environmental practices that is quite contrary to the fact that it has been the poor as native population in forests and rural areas who have been, since long, nurturing these resources.

a) Land

Rain-fed and semi-arid tropics face much of the brunt of the degradation of NR since they have larger proportions of the poor residing in them and are forced to adopt their livelihoods to the existing resources although it would mean overuse of the same. Scarcity of land and population density has led to expansion of area under agriculture encroaching into fragile ecosystems. These are unsuitable for agriculture due to slopes and presence of marginal lands. With no resource improving measures, it leads to soil degradation, loss of biodiversity and deforestation etc. The reasons are attributed to lack of strong institutional structures, lack of property rights in land and dominance of open access and unregulated common property rights. Empirical and policy oriented research is needed to suggest how to resolve issues of land use in eco-regions and at spatial levels. Research and extension has to concentrate attention upon diversification of rain fed farming through tree cultivation, watershed practices and Soil and Water Conservation measures, cropping plan and bio-diversity practices.

The Bundi Command Area model of Rajasthan, where farmers came together to monitor water distribution practices to ensure canal irrigation is a case in point here. Holistic approaches to manage tanks and other water bodies and restoring degraded pastures and grazing lands and de-silting tanks and other water bodies that enhance water storage capacity have to be undertaken with the participation of local bodies.

In Karnataka there have been successful efforts of adoption of better land use patterns. The Kuntanagere case is a reference here, where land use pattern has undergone changes. For example, gullies formed by soil erosion have been reclaimed by implementing silvi pasture; agro-horticultural systems have replaced agricultural crops.

Likewise in Hirehalla watershed of Belgaum district, 4285 hectares of watershed was treated and 298 hectares brought under forest vegetation. In Allapura, sediment flow reduction was achieved by the implementation of watershed based land treatment. After the Kallambella watershed project, average yield of groundwater inside the watershed area was enhanced by 2321 gallons per hour as compared to 850 outside the watershed.

b) Water

The state water policy 2002 has fixed norms guiding water supply and consumption. In rural areas, 36 per cent of habitations would receive 55 litres per capita per day of water. 7.8 percent of habitations receive less than 20 litres. In urban areas, the norm is 67 litres of water per capita per day. 88 per cent of towns have no adequate supply. However, further regulation of water consumption and conservation could be achieved by:

- Basin-wise planning and management system for optimum utilisation of water
- Comprehensive groundwater recharge programmes, to be implemented by line departments like department of Minor Irrigation, Watershed Development, Mining & Geology, with the over-all co-ordination of decentralised governing bodies (Panchayats), both in rural and urban areas.
- Ceiling on water use for non-domestic purposes like construction, gardening, health and use of water tankers on a private basis.

The Cheluvanahalli village is a case in this context. It is located in Kolar taluk of Kolar district. Under the integrated tank management and development plan, there was a blend of community's contribution and government's effort since June 2002 that has culminated in rejuvenation of water bodies substantially.

c) Forests

Since 1996, Forest Protection Committees have been seriously addressing people's participation in the protection and maintenance of forests. A major handicap in this direction is that the poor, most of the times, lack usufruct rights to the NR. They also lack legal rights over the resources that they live with, more due to locally created and operational constraints of caste, class, gender and other dividing forces. This is true of the large sections of the poor who are incidentally also from the so-called low castes, and those categorised as the Scheduled Castes, Scheduled Tribes and other backward groups. Besides them, women across all communities are excluded from making decisions about eco-system management. These are the vital issues that need to be addressed through proper governance mechanisms. Then only the "economic potential of ecosystems to reduce rural poverty" becomes meaningful. This also enables the government to address and accomplish the Millennium Development Goals in an inclusive manner.

Need for Data on Linkages

Understanding the linkages between poverty and natural resource management necessitates systematic generation of data on geographical distribution of poverty in all districts of the state. Poverty-environment mapping has to be made going beyond income and assets to capture people's vulnerability, social capital and powerlessness. In recent decades, there has been a decline in the poverty levels in the state. However, increasing globalisation and market integration is referred to as the cause of much environmental degradation due to faster economic growth. Reduction in poverty is in the absolute number of poor. But poverty is

likely to increase accompanied by growing marginalisation in certain disadvantaged regions, like the Hyderabad Karnatak area. Here, besides backwardness, adverse climate, poor infrastructure and presence of large sections of deprived populations have added to incidence of poverty. Here the absolute number of poor is high who also live in agricultural areas that are low in potentiality or productivity.

Role of Institutional Factors

Recent studies (The World Resources 2005[6]: The Wealth of the Poor: Managing Ecosystems to Fight Poverty) have been asserting that NR have a great potentiality to address poverty issues. Many poor households depend on the environment around them as the only source they have access to. "Environmental resources are absolutely essential, rather than incidental, if we are to have any hope of meeting our goals of poverty reduction". In this context, the report has placed high importance upon the need for decentralised institutions and people's bodies to consider environmental management seriously to alleviate poverty.

Two types of institutions (among few others) are considered more pertinent to be discussed here in the context of measuring the links between poverty and NR. They are (a) the decentralised institutions of planning and governance (called the Panchayat Raj Institutions) and (b) the women's Self-Help Groups (SHGs). Karnataka has carved a niche for itself in both respects and supposedly to be successfully too. The state's experimentation with Panchayat Raj System (as a revival of the age-old village panchayat system of self-rule) began much earlier than the 73rd and 74th Constitutional amendments making these institutions

[6] World Resources 2005: The Wealth of the Poor: Managing Ecosystems to Fight Poverty is the 11th in a series of biennial reports on global environment and governance issues published since 1984. This particular report's focus on poverty issues follows upon conclusions from the previous two reports — the first was about ecosystems and the second was about governance. Since 1996, the series has been published jointly by The World Bank, the United Nations Development Programme, the United Nations Environment Programme, and the World Resources Institute.

mandatory governance bodies in rural, and subsequently, in urban areas of India. The state of Karnataka was the first in the country to pre-empt the need for providing representation to the hitherto excluded sections of society, especially the Women and the SCs and STs. With 25 per cent of seats initially and later extended to 33. 3 per cent of seats in all tiers of these bodies reserved for women and reservation of seats to the SC, ST, OBC and other socially excluded communities, the respective communities have received a facelift in getting elected to leadership roles. It also provided the much needed political empowerment to them thereby facilitating decision-making, planning and implementing development programmes, with an eye on the vulnerable and the poor.

The formation of self-help groups of women is another critical institutional arrangement that the state has taken up as a result of which lakhs of women have gained access to income generation activities and thus, economic empowerment through savings and internal lending. There are a variety of these groups formed by a multitude of agencies – government (in that, both state and centrally sponsored), NGO-sponsored, community based, those formed as part of one or the other development intervention and so on. Watershed committees, water and sanitation committees, forest protection groups or committees, and tank protection committees are the prominent ones in Karnataka.

Both women's and people's (including both men & women) committees in the sectors of watershed and drinking water, sanitation and other sectors have shown marked improvements in the productive processes. Ecosystems have been successfully managed by local communities based on models from Maharashtra' Darewadi and other villages. It has come to be realized that NR have a great potential in reducing poverty but only when properly integrated with the interests of stakeholders and a sustainable policy framework. Community-based decision-making processes have been able to rejuvenate the environment and make it accessible to the poor in particular.

It is expected that the above people-based and people-led institutions would be able to create awareness among others in their jurisdiction to undertake measures to protect the environment and to conserve it without affecting their own dependence upon its resources. This is a critical question since the state is regionally heterogeneous with many diverse cultures, occupations and livelihoods. The dependence of people on NR is diverse and unequal. Poverty levels vary from one region to another and also from one village and block to others, making it difficult to estimate accurately the dependence of the poor on them. Moreover, the status of NR is also not uniform. Its level of degradation is also no less heterogeneous and complex.

What is intriguing is the lack of co-ordination between the different institutions like the Command Area Development Authority (CADA), Irrigation Department, the district, block and village Panchayats and the Watershed Development Department.

Malthusian Type of Linkages

When institutional means of livelihood security are missing, immediate survival needs and food security become overriding objectives of the poor. The situation makes them look for short-term gains and subjective time preferences. When their immediate survival is threatened, households without sufficient assets fall back upon what is available and is in the realm of free availability. Thus the Malthusian type of linkage emerges between poverty and degradation of NR. No future options for sustainable intensification of agriculture and other livelihood options are in sight. The poor and marginal farmers are compelled to be trapped in a mutually reinforcing cycle of poverty and livelihood degradation.

To break this declining trend what is needed is sustained investment in human and natural capital. Agricultural research, water management technologies and socio-economic factors like institutions, access to market, policies etc., are the need of the hour. The type of livelihood strategies the resource users practise through production

and consumption decisions, existing market policies and institutional incentives – determine the outcome of links between poverty and NR management. In such vulnerable system, livelihoods and environment link may develop into a downward spiral with increase in demographic pressure. The households may lack appropriate technology, policies, markets and institutional arrangements. This again limits the adaptive responses for resource users; impoverishment and resource degradation is the result.

There are cases in the state which have demonstrated the ability of local communities to successfully deal with reversing the problem of resource degradation along lines of Boserup-type of responses. Local wisdom matters a lot. The panchayat raj institutions have arrived on the scene in a big way. What are urgently needed is proper investments and incentives to encourage collective action; it has to be supplemented with private resource improvement investments through appropriate technology enabling policies and access to markets and institutions. More than anything, it recommends that micro-level research has to come up with explanations to questions such as: the multiple facets of environment-related poverty and its impact on food, fuel and fodder security, access to clean water, air etc; levels of dependence of the poor on environmental goods and services (like forest produce, water etc), in both the formal and informal markets; extent of employment that is generated or income-earning opportunities provided by the natural resources; recognition of the effects of environmental hazards (floods and pollution, for example) on people's health, livelihoods and vulnerability and, lastly, social security measures prevailing and needed in this context.

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Appendix I Indicators

Percentage of poor with secure user rights to land for farming

- Percentage of poor living on marginal lands such as ecologically fragile ones
- Poor farmers with access to land to grow for household consumption
- Living in ecologically fragile areas whose main source of livelihood is agriculture, subsistence agriculture or farm labouring
- Non-farm sources of livelihood for the poor
- Access to sustainable irrigation facilities
- Hours spent by women and children to collect water and seasonal variation in the same
- Access to sanitation facilities by women
- Areas of forest consumed by user groups with representation of the poor
- Hour spent per day per week to collect fuel wood by women and children
- Percent of common property land available for women to collect fuel wood and non-timber products
- Percentage of forests managed by user groups with representation of poor
- Percentage of poor women with access to common property land for collecting fuel wood and other non-timber products
- Percentage of poor using firewood, straw, thatch, cow dung, leaves etc
- Amount of time spent by poor to collect water
- Distance traveled by poor to collect water
- Access to sanitation
- Average area with tenancy rights of poor
- Percentage of irrigated area in total cultivated area of the poor
- Average cultivated area of the poor
- Percentage of landless poor
- Percentage of poor with own land

- Proportion of poor living in ecologically fragile areas whose main source of livelihood is agriculture.
- Percentage of poor with adequate fish catches
- Percentage of health burden on the poor related to environmental factors
- Disease incidence related to environmental factors
- Vulnerability of children under five years
- Percentage of people living in substandard housing
- Percentage of population living in areas prone to diseases
- Immunity coverage, infant mortality rates, child mortality rates, maternal mortality rates, use of health facilities
- Time taken to reach a nearest health clinic
- Access to health facilities and percentage of households availing of birth attendant during child birth
- Percentage of poor with substandard housing
- Average house space per household
- Percentage of poor people living in flood prone areas
- Number of poor displaced by landslides, fire, etc
- Number of deaths due to environmental disasters