

# Ecological Conservation and Natural Resource Management - A Study

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## **ABSTRACT**

Natural Resources Management concerns the sustainable utilization of major natural resources such as land, water, air, minerals, forests, fisheries, and wild flora and fauna. Together, these resources produce the ecosystem services that underpin human existence and welfare. Poor people are often critically dependent on natural resources, and suffer most when they are degraded. While poverty alleviation and sustainable natural resources management are generally compatible, some situations may require difficult tradeoffs. Nevertheless, the fact remains that without poverty alleviation, the environment in developing countries will continue to degrade, and without better natural resources management, poverty alleviation will be undermined.

**Keywords:** *Natural Resources, Management, Ecology, environment, Development, Economy.*

## **Introduction**

As humankind steps into the twenty first century, the debate on sustainable development and poverty, which has emerged on a global scale in the last two decades of the twentieth century, has now reached a crucial juncture. While, on the one hand the proponents of sustainable development are still at loss in evolving a broad consensual understanding and approach to sustainable development, the detractors too seem to be equally confused, as compelling evidences of environmental degradation and increasing levels of poverty and deprivation come to the fore with every passing day. Thus, even after two decades of intense social action and much academic inquiry, it appears that humankind has still a long way to go until some convergence about the notion of sustainable development among the masses, leaders, and thinkers emerges. While we await this to happen, conflicts between the sections of the society who are 'beneficiaries' from the 'dominant' development approach and those who are 'victims' are accentuating leading to increasing social and political strife. This

strife is most evident in the rural areas. Even today, the majority of the global population resides in the rural areas, and they continue to depend on natural resources, such as land, water, and forests for the fulfillment of their livelihoods needs. However, with the rapid degradation of these precious natural resources, due to a multitude of factors such as industrialization, urbanization, and rapidly increasing chemical intensive mono-crop agriculture. This degradation of the natural resources has resulted in threatening / destroying the livelihoods of the rural masses, especially the poor. The rural hinterland is now therefore turning into a theatre of intense human misery, which is leading to different kinds of struggles.

The natural resources are coming under increasing pressure from both increasing population and higher levels of economic activity per capita. During the period 1990 to 2030 the world's population is likely to grow by 3.7 billion. Ninety percent of this increase will occur in developing countries. Over the next four decades Sub-Saharan Africa's population is expected to rise from 500 million to 1.5 billion, Asia's from 3.1 billion to 5.1 billion, and Latin America's from 450 million to 750 million. The distribution of population between rural and urban areas has important implications for the types of stress placed on the environment. In 1990 most people lived in rural areas; by 2030 the opposite is expected to be true: urban populations will be twice the size of rural populations. Developing country cities, as a group, are expected to grow by 160 percent over this period, whereas the rural population will grow by only 10 percent. This pattern will vary substantially among regions (World Bank, 1992). Forecasting population growth is difficult, but pales in comparison with any attempt to forecast income growth per capita in the next 30 years. However, it is quite clear that the growing population aspires to a higher standard of living. This will often entail an accelerated use of natural

resources, both as inputs to the economy, and as recipients of waste. How this affect the environment is very much dependent on the structure of economic growth, the input output efficiency in production processes, and the unit rates of pollutants emitted from these activities. Higher income also means more resources to combat environmental damage. New technology enhances efficiency and reduces the amount of NR needed for a given output, as well as the pollution intensity per unit of output. (World Bank, 1992 & 1999).

Natural Resources Management concerns the sustainable utilization of major natural resources such as land, water, air, minerals, forests, fisheries, and wild flora and fauna. Together, these resources produce the ecosystem services that underpin human existence and welfare. Poor people are often critically dependent on natural resources, and suffer most when they are degraded. While poverty alleviation and sustainable natural resources management are generally compatible, some situations may require difficult tradeoffs. Nevertheless, the fact remains that without poverty alleviation, the environment in developing countries will continue to degrade, and without better natural resources management, poverty alleviation will be undermined.

Managing natural resources is challenging. Many countries with large endowments of valuable natural resources do no better, and often do worse, than less endowed countries. This recurrent fact has been called the “natural resource curse” or the “paradox of plenty”. Yet, the natural resource curse is not inevitable. Some countries have been able to effectively manage natural resources to advance their development. There is now a broad understanding of some of the measures especially in terms of the macro-economic policies that are needed to avoid the adverse effects that can emanate from natural resource endowment. But merely managing the short-term impacts is not enough to advance human development.

Natural resources account for a large share of the wealth of countries with low human development outcomes where few other sources of wealth exist (World Bank, 2006). The management of natural resources is relevant to where many countries experience low human development outcomes and given the high degree of dependence of economies on commodity exports and fiscal revenues. While this dependence has been declining, it is still by far the

highest in the world. Natural resource wealth has also been linked to the onset, intensity and duration of violent conflict (Collier and Hoeffler, 2002). In turn, conflict has negative impact on human development through the destruction of lives, assets and opportunities.

### **Natural Resources: The Basis of Life**

Natural resources provide fundamental life support, in the form of both consumptive and public-good services. Ecological processes maintain soil productivity, nutrient recycling, the cleansing of air and water, and climatic cycles. Soils are the foundation of agriculture, which in turn is the basic building block in the livelihoods of all people. At the genetic level, diversity found in natural life forms supports the breeding programs necessary to protect and improve cultivated plants and domesticated animals to safeguard food security. Wild flora and fauna form the basis of traditional medicine and much of the modern pharmacological industry.

### **Land and Soils**

Soil fertility is the result of natural processes in healthy ecosystems, which include maintaining forests, vegetative cover, and soil biodiversity. A 1990 global assessment of soil degradation found that 1.2 billion hectares almost 11 percent of the earth’s vegetated surface have been significantly degraded by human activity over the past 45 years. Soil degradation affects more than 900 million people in 100 countries, some of them among the least developed nations. Erosion, salinization, compaction, and other forms of degradation affect 30 percent of the world’s irrigated lands, 40 percent of rainfed agricultural lands, and 70 percent of rangelands (Watson et al., 1998).

### **Water**

Water is one of the most important natural resources. Irrigation expansion has been driving factor in the Green Revolution process. Gross irrigated area went up by over 300 per cent, from 22.6 m ha in 1950-1951 to 57 m ha (gross irrigated area over 75.1 m ha) in 2000-2001, rendering India as the country having the largest irrigated area in the world. The ultimate irrigation potential for the country has been estimated at about 140 m ha (59 m ha through major and medium irrigation projects, 17 m ha through minor irrigation schemes and 64 m ha through groundwater development). So far, the irrigation potential of nearly 100 m ha has already been created, but only about 86

m ha is being utilized, thus leaving a gap of 14 m ha between created and utilized potential.

The following issues should be addressed for conservation and efficient utilization of water resources:

- Assessment and judicious use of water resources.
- Slow and poorly monitored progress of irrigation infrastructure and water storages.
- Ineffective utilization of irrigation potential developed.
- Unsustainable use of ground water resources in some zones and underutilization of the resources in other zones.
- Pricing and distribution of irrigation water.
- Environmental and ecological considerations.

### **Forests**

Forests form the basic resource for maintaining the soil/water regimes and ecological services, hence optimizing productivity of forest means augmenting resilience of soil, water and agriculture, which are the pillars of rural livelihood security. Green cover is indicator of resilience of the natural resources and a primary requirement for sustainable agriculture production. Thus forest cover needs to be recognized as the “Natural Resource Infrastructure for agriculture/primary production/rural economic growth”. Good density forest will thus provide required ecosystem services, but also material products in plenty for communities. Thus investment in forest estate is an investment for growth. With the above backdrop, the Group recommends the following steps for sustainable management of forests through a watershed system.

In the areas where the forests are situated in the catchment of watersheds, the Forest Department may be ensured in the planning for watershed management and other similar schemes. Maintenance of the normal profile of forests should be a primary concern of the watershed management plan. Moreover, this will ensure both technological and extension inputs to encourage provision of tree planting in the schemes.

Forestry personnel are the only group of government employees formally trained in natural resource management. This grass-root level network of about 1.35 lakh executive and front line staff has been underutilized in natural resource management of the country due to lack of investment in forestry. Investment in this sub-sector provides scope for strengthening natural resources management and Human Development equally. Involvement of the

state forest establishment may be insisted for providing technical assistance in planning and implementation of watershed management activities by nominating them as Project Implementing Agencies.

For rural economic evolution, all the available land resources need to be brought under production systems of one or other kind. For rainfed areas, forestry or perennial crops are the most cost effective means of doing this in terms of requirement of investment, manpower and inputs. The development of such areas into common property resources with responsibilities of community groups for planning and looking after such resources will reduce pressure from forests and also provide needed biomass for value addition/rural jobs. This will need state assistance and investment as rural groups are involved. State social forestry establishment can be made to work with the communities and Panchayati Raj Institutions for revival of natural resources.

Agro forestry has immense potential in adding value to subsistence as well as commercial farming, gives insurance to the farmers against crop and market failure and keeps the farmers free from intensive labour of low return farm practices in sub productive areas. It needs, apart from significant investment, strong statutory support, facilitated market by rationalizing restrictions on trade and providing credible networking support and treating tree cultivation as agriculture for incentives.

Nearly one fourth of the land resources are underproductive basically due to more withdrawal than production. It is known that the poverty map of the country coincides with the forest map. As the resilience of these habitats is the function of productivity, which in turn is a function of the growing stock, in the circumstances mentioned above, productivity can be optimized only by augmenting growing stock.

### **Fisheries**

World marine-capture fisheries production reached a new record of 107.8 million tons in 2006. As in previous years, however, the rate of increase continued to slow. Overall, exploitation of the main fish stocks (in fisheries for which assessment information is available) has remained more or less unchanged since the early 1996, despite continued technological improvements.

Recent reviews estimate that 44 percent are fully exploited, with no room expected for further expansion. About 16 percent are overfished, and there is an increasing likelihood that catches might decrease if remedial action is not undertaken. Another 6 percent appear to be depleted, with a resulting loss in total production, and 3 percent seem to be recovering slowly (FAO, 2006).

Based on total inland capture for the period 1984-96, it is clear that increasing use is being made of inland fisheries resources, although the outlook for inland aquatic resources is not encouraging. The average annual increase is about 130,000 tons. Exploitation of freshwater fisheries is most intensive in Asia and Africa.

### **Biodiversity**

The conservation and sustainable use of biodiversity is fundamental to achieving sustainable development and sustainable livelihoods. Natural habitats and their component species and genes provide both goods for consumption and ecological services to maintain healthy environments and economies. The poorest rural people are most dependent on biodiversity and natural resources for their livelihoods, and it is they who suffer first and most severely when those habitats are simplified, degraded, or otherwise impoverished. Biodiversity, however, provides two special challenges for natural resources management: 1-most of its benefits continue to be considered as economic externalities, and 2-benefits tend to accrue over the long term. Biodiversity is often regarded as a global issue; its widespread decline has cumulative impacts and consequences at the global level. Many of the benefits of improving biodiversity conservation and its sustainable use such as new medicines developed as a result of access to new genetic resources accrue to mankind as a whole. Nevertheless most of the costs resulting from biodiversity degradation, and those associated with its conservation and sustainable use; accrue primarily at the local and national levels.

The World Bank recognizes the need to support the obligations that our clients have assumed under the Convention on Biological Diversity, and is also committed to serve as an implementing agency for the Global Environment Facility. The Global Environment Facility remains, to date, the only major mechanism to address these issues, even though the benefits of biodiversity conservation and its sustainable use are the foundations of economic sustainability. (World Bank, 1995).

Many of the world's species are gravely threatened. Various projections suggest that between 1975 and 2015; from 1 to 11 percent of the world's species per decade will be committed to extinction (WRI, 1996). If current rates of loss of tropical forests (about 1 percent per year) continue for the next 30 years, the projected number of species that the remaining forest could support would be reduced by 5–10 percent, relative to forests in the absence of human disturbance. This rate of decline would represent 1,000 to 10,000 times the expected rate of extinction without deforestation by humans (Watson et al., 1998). Coastal ecosystems also face a great risk. About 34 percent of the world's coasts are potentially at high risk of degradation, and another 17 percent are at moderate risk (WRI, 1996). Fifty-eight percent of the world's reefs are at risk from human activity—about 27% are at high or very high risk (WRI, 1998). Coral reef systems eroded from destructive fishing practices expose coastal zones to more severe damage from storms.

### **Nonrenewable Resources**

At the global level our concern should not be that “nonrenewable resources will be exhausted,” as the “resource” concept evolves dynamically with new technology and discoveries. Indicators such as reserve-to-production ratios and real-price time series highlight this notion. Of real concern, however, is that some countries rich in non-renewable resources are exploiting them without investing sufficiently in human and human-made (produced) capital. That is, their genuine saving rate is insufficient for future needs. Empirically this is borne out: most of the mineral-rich countries have exhibited low or even negative, genuine savings over many years. (World Bank, 1997a).

Beyond the question of sustainability, mineral-dependent economies face other important macroeconomic issues, which are often summarized as the “resource curse.” The sheer concentration of rent-streams makes corruption and rent-seeking behavior an issue in these economies. The boom-and-bust nature of resource markets creates significant problems for governments that are highly dependent on revenues from natural resources. The tendency to boost subsidies and consumption expenditure during boom times is difficult to reverse when the bust arrives, resulting in soaring government deficits and, ultimately, in inflation and macro instability. Managing resource income requires ability to buffer revenues, policies to match investment programs to

the economy's absorptive capacity for productive investments, and mechanisms for restraining expenditure when resource prices fall.

#### Natural Resource Management Programs

Various Central Ministries and Departments are implementing programs for development of degraded lands and rainfed areas on watershed basis. The scheme wise physical and financial achievements of watershed programs of Ministry of Agriculture (MoA), Ministry of Rural Development (MoRD) and Ministry of Environment and Forest (MoEF), since inception up to the end of the Tenth Five Year Plan.

Broadly speaking, the following two approaches have been adopted for development of natural resources, namely, (i) integrated approach under watershed litated by a multidisciplinary team with sufficient funds for development of the resources and (ii) situation specific approach under which only one type of natural resource is developed at one place (outside the watershed program), and is usually facilitated by the specific development department/ministry in the areas which suffer due to over exploitation of the particular natural resource.

#### National Watershed Development Project for Rainfed Areas (NWDPR)

The National Watershed Development Project for Rainfed Areas (NWDPR) was launched during 1990-91 (Seventh Five Year Plan) on pilot basis. In the Eighth Plan, the NWDPR was extended to twenty five States and two Union Territories (Andaman & Nicobar Islands and Dadar & Nagar Haveli). The program continued in the Ninth Plan. Since November 2000, the NWDPR has been subsumed under Macro Management of Agriculture (MMA). During the Tenth Five Year Plan this program is being implemented in twenty eight States (including the three newly created states of Chhattisgarh, Jharkhand and Uttarakhand) and the two Union Territories (A&N Islands and D&N Haveli).

River Valley Projects (RVP) and Flood Prone Rivers (FPR) Programme Presently, this program is being implemented in 53 catchments having a total area of 113.40 m ha falling in 27 States. In this program all type of lands viz., Agriculture, Waste and Forest are treated in an integrated manner with suitable package of treatments viz. construction of Contour Vegetative Hedge, Contour/ Graded Bunding, Horticulture Plantation, Contour/ Stagger Trenching, Sowing and

Planting of Plants, Silvi-Pasture Development, Pasture Development, Afforestation, Farm Pond, Percolation Tank, Drainage Line Treatment ( such as Earthen Loose Boulders, Water Harvesting Structures, Check Bund, Spill-way, Sediment Detention Structures etc.) The unit cost of Rs. 6500 per ha and Rs.10000 per ha are adopted for the Category-I (75% area having less than 8% slope) and Category-II (75% having more than 8% slope) respectively for treating the area in its entire treatment period (which varies from 3-5 years).

#### Watershed Development Project for Shifting Cultivation Area (WDPSA)

An area of 43.57 lakh ha, is affected by Jhum/Shifting Cultivation mainly in the States of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Orissa and Tripura. Such cultivation is also found in sporadically in the States of Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, Kerala, Karnataka and Sikkim. As per recommendation of the Task Force on Development of Shifting

Cultivation Areas, constituted by the Ministry of Agriculture in the year 1983, the Scheme for Control of Shifting Cultivation /Jhum was launched in the VII Five Year Plan (1987-88) with 100% central assistance to the State Plan covering North Eastern States and 2 States viz., Andhra Pradesh and Orissa. The Scheme was initially implemented on Family Development Approach and 26512 jhumia families were benefited under the program with an expenditure of Rs.60.72 crore.

#### Reclamation of Alkali Soils (RAS)

About 70.00 lakh ha is affected by salt problem, out of which about 35.81 lakh ha suffers from alkalinity in the country. Such alkali soils are largely located in 11 States, namely, Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh. The isolated and projectized approaches for reclamation of alkali soils are adopted. Overall unit cost of reclamation under the Isolated Approach is Rs.11,300 per ha. Likewise, overall unit cost of reclamation under the Projectized Approach is Rs.57, 300 per ha.

#### Drought Prone Areas Program (DPAP)

Drought Prone Areas Program (DPAP) is the earliest area development program launched by the Central Government in 1973-74 to tackle the special problems faced by those fragile areas which are constantly affected by severe drought conditions. The Drought

Prone Areas Program was in operation in 627 blocks of 96 districts in 13 States during 1994-95. On the recommendation of the Hanumatha Rao Committee, 384 new blocks were brought into the purview of this program and 64 were transferred from DPAP to DDP. Consequently, coverage of the program was extended to 947 blocks of 164 districts in 13 States. With the reorganization of States, districts and blocks, at present the program is under implementation in 972 blocks of 182 districts in 16 States.

#### **Desert Development Program (DDP)**

Up to 1994-95 the Desert Development Program was in operation in 131 blocks of 21 districts in 5 States. On the recommendations of the Hanumatha Rao Committee, 32 new blocks were brought within the purview of the program and

64 blocks were transferred from DPAP. Consequently the coverage of the program was extended to 227 blocks of the country. With the reorganization of districts and blocks, the program is under implementation in 235 blocks of 40 districts in 7 States.

#### **Integrated Wasteland Development Project (IWDP)**

Integrated Wastelands Development Project (IWDP), a Centrally Sponsored Project, has been under implementation since 1989-90. From 1st April 1995, the program is being implemented through watershed approach under the Common Guidelines for Watershed Development. The IWDP envisages the development of non-forest wastelands in the country. The basic approach in implementation of this program has been modified from 1.04.1995 when the above Common Guidelines came into force.

#### **Projects with Ministry of Agriculture**

The Ministry of Agriculture is servicing also externally aided watershed development projects for the development of degraded and rainfed areas since 1983. Many of the projects have been completed and at present there are 5 on-going externally aided Projects. These programs lay special emphasis on components like natural resource management, livestock development, infrastructure and institutional development etc. Under the externally aided projects an area of 1.81 m ha was to be covered at a cost of Rs 3,967.37 crore till the end of the X Plan.

#### **Projects with Ministry of Rural Development**

The Ministry of Rural Development is also servicing externally aided watershed development projects for

the development of degraded and waste land areas. These programs lay special emphasis on components like natural resource management, livestock development, infrastructure and institutional development etc. Under the above projects, an area of 0.50 m ha is expected to be covered at a cost of Rs. 292.67 crore till the end of the X Plan.

#### **Hill Area Development Program (HADP)**

The objectives and focus of the programs under HADP have been changing over each five-year Plan within a broad framework of strategy and approach since its inception in the V Plan. In the V Five Year Plan, programs were mainly beneficiary oriented. In the VI Plan, although the emphasis shifted to eco development, it retains the general form and shape of the program as that of the normal State Plan with the same sectoral approach. During the VII Plan, however, the emphasis was laid upon eco development, eco preservation and eco restoration. In the VIII Plan, the program focused on community involvement and management of land and water resources.

#### **Western Ghat Development Program (WGDP)**

During the V Five Year Plan, the main objective of the WGDP Program was to promote horticulture Plantation, Afforestation, minor irrigation, animal husbandry and tourism. Accordingly, activities addressing these sectors were taken up under this program. During the VI Plan, an emphasis was laid on promoting beneficiary oriented and infrastructure development activities. During this period, the Watershed Development Programs were also taken up on a pilot basis. During the VII and VIII Five Year Plans, the approach remained the same with a focus on the integrated development on compact watershed basis.

#### **Forest Development Programs by Ministry of Environment and Forests and Managing Forest Lands in Watersheds**

The Ministry of Environment and Forests is also implementing programs by adopting watershed approach. Most of these programs aim to afforestation in watershed areas under the National Afforestation and Eco-development Project. Up to the end of the X Plan, a total area of 0.07 m ha was covered at a cost of Rs. 47.53 crore. The program has been conceived as a long-term measure for restoration of ecological balance by conserving, developing and harnessing land, water, livestock and human resources. It seeks to promote the economic development of the village

community and improve the economic conditions of resource poor and disadvantaged sections of society in the rural areas.

Rajasthan has distinct problems because of large tracts of Hot Arid (sandy) areas. In view of the problem of sand dune stabilization in ten districts of this State, special projects are under implementation under DDP since 1999- 2000 for combating desertification by way of shelterbelt plantation, sand dune fixation and silvi pasture development. These ten districts are Barmer, Bikaner, Churu, Jaisalmer, Jalore, Jhunjhunu, Jodhpur, Nagaur, Pali and Sikar.

### CONCLUSIONS

Managing natural wealth and turning it into prosperity is challenging. Countries endowed with natural riches can either find the path to increased human development or fall prey to the natural resource curse. This paper argues that an overall strategy to manage natural resources for human development consists of two broad elements: a) avoiding the resource curse through timely macroeconomic management and b) expanding people's choices with the revenues obtained from the natural resources through investment in human, physical and financial capital and the expansion of efficiency-enhancing social protection.

Gelb and Grasmann (2010) distil some of the common features of countries that have been able to avoid the resource curse and use natural resources to enhance their development. These countries have been able to avoid boom-and-bust cycles and to spend resources effectively. While institutions seem to have determined these outcomes in some countries, success has even been achieved under challenging political and governance conditions.

There is no reason why, even if all of these conditions are not wholly met, to greatly enhance the management of natural resources for development. Another finding of Gelb and Grasmann (2010), also highlighted in other literature, is that the successful management of natural resources has relied on home-grown strategies that take into account the given

opportunities and address the challenges specific to each country.

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