

Natural Resource Management and Bio-Diversity Conservation in India

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“Environmental degradation is an increasing threat to long-term development with severe effects on health, trade, and poverty reduction efforts in general. It is in our interest to ensure that policies and institutions actually support sustainable development.” --Andrew S. Natsios, Administrator, USAID

I. INTRODUCTION

The socio-economic structure of human development and frontiers of human survival enforces inconsistent policies that combat the man environment relationship. The institutional process of development and the nature of the political economy also underline devastating effects on the environmental landscape. The increasing human population and pressure inflict the loss of environmental sustainability, which raise questions on all these issues. Notably, there is an assorted propinquity between man and the environment in terms of geographical location and level of development.

Biodiversity loss and human poverty due to chronic natural catastrophes is another consequence which has busted the economy and peasant life for a long time, especially since 1947. ¹ Protection of land, forests, waterways, and wildlife is particularly important due to their contributions to food production, fuels, shelter, medicines, livelihoods, and cultural values. Preserving biodiversity by maintaining a variety of plant and animal species and protected ecosystems provides resilience in the face of environmental changes. As biodiversity is lost, communities become more vulnerable and valuable genetic resources are diminished. ²

With only 2.4% of the world's land area, India is home to 16% of the world human population and contributes immensely to global biodiversity with about 8% of total number of species. India is recognized as a mega biodiversity country and has four identified bio-hotspots, viz. the Himalaya hotspot, the North East of India, the rainforests of the Western Ghats and the Andaman & Nicobar Island chain. According to the livestock census of 2003, the country has about 485 million livestock population and 489 million poultry population, being the first in cattle and buffalo population, second in respect of goat and third in respect of sheep population in the world. India has 57% of the world's buffalo and 16% of the world's cattle population.

This means there is not only human population but also livestock population pressure on the shrinking natural resources. Though India is bestowed with 4% of the world's freshwater resources, the distribution is highly skewed across regions. The Ganga–Brahmaputra–Meghna basin with 33% of the land mass has 60% of total water flows, while the western coastline with 3% of the area has another 11%. This leaves just 29% of water resources in the remaining 64% of the area (peninsular India), thus keeping most of peninsular India water-starved compared to other parts of the country. ³

The ability of developing countries to reduce poverty, grow sustainably, and maintain opportunities for future generations rests indent management and use of their natural resources. Protection of land, forests, waterways, and wildlife is particularly important due to their contributions to food production, fuels, shelter, medicines, livelihoods, and cultural values. Preserving biodiversity by maintaining a variety of plant and animal species and protected ecosystems provides resilience in the face of environmental changes. As biodiversity is lost, communities become more vulnerable and valuable genetic resources are diminished.

As economies grow, environmental quality tends to decline, with humans at fault for the bulk of environmental problems. Activities such as logging, mining, industrial development, the exploitation of plant and animal resources, and conversion of natural habitats into cultivated land lead to ecological degradation, species extinction, and pollution of the environment. Breaking this pattern requires a focus on more efficient resource use and environmental protection. Energy plays a key role in the management of natural resources and the transition to environmentally sound economic growth. The selection, use, and development of cleaner energy sources have a direct effect on the environment, with related health, economic, and social benefits.

II. THE ENERGY-NATURAL RESOURCES MANAGEMENT AND ENVIRONMENT NEXUS

Much of the focus of the international community regarding natural resources and the environment is on the loss of biodiversity and the use of fossil fuels with their detrimental impact on the environment in terms of and water, higher prevalence of disease, and increased vulnerability to natural disasters. Without alternatives, poor

communities tend to overuse or under employ natural resources that are important for the protection of beneficial goods and services for domestic use and export. As economies grow, environmental quality tends to decline, with humans at fault for the bulk of environmental problems. Activities such as logging, mining, industrial development, the exploitation of plant and animal resources, and conversion of natural habitats into cultivated land lead to ecological degradation, air pollution, acid rain, and atmospheric changes related to increased concentrations of greenhouse gases.

Fuel wood

In most developing countries, wood fuels are the primary source of energy and a significant contributor to land degradation, with annual harvests depleting forests at an alarming rate. Sustainable forestry practices and more efficient use of fuel wood through improved technologies can address these issues and turn traditional fuels that are harvested unsustainably into renewable energy resources that contribute to rural development, enhance ecosystem management, advance carbon sequestration, and minimize biodiversity loss.

Fossil fuels

Using fossil fuels allows for significant improvements in living conditions, but comes at a cost to air and water quality, biodiversity, and land. With energy demand, primarily for fossil fuels, expected to grow by 60% over the next 25 years, the implications for the environment are enormous. These include impacts such as poor local air quality from power plant emissions; motor vehicle and industrial facility effluents; acidification of water from the combustion of fossil fuels; oil spills and leaks into soils, and water sources; and climate change. Reducing emissions and other environmental impacts from fossil fuel use requires a portfolio of cleaner, more efficient energy technologies.

Large hydropower

Large-scale hydropower projects are in use throughout the world, providing a renewable source of electricity. Constructing dams, however, can result in the displacement of human populations, loss of forest and wildlife habitat, decline in species, and loss of aquatic biodiversity in both upstream and downstream fisheries. To protect natural resources, projects must be designed with attention to the local environment and the well-being of communities. Emphasis is now on developing small scale hydropower projects that have less impact on the environment.

Bio-fuels

Bio-fuels, such as ethanol, biodiesel, and biogas, are derived from sugar beets, sunflowers, and other crops and offer a potentially viable ecological alternative to conventional fossil fuels. Bio-fuel production creates employment opportunities, encourages fuel diversification, and promotes rural development using local resources, even for the poorest countries. However, widespread production of wood and crops for bio-fuels requires the protection of biodiversity in plant species, especially for breeding fast-growing native fuel wood.⁴

III. EXTENT AND CAUSES OF LAND DEGRADATION GLOBALLY

Type	Current Extent of Damage (millions of hectares)	Causes and Recent Losses
Deforestation	580	<ul style="list-style-type: none"> • Vast reserves of forests have been degraded by large-scale logging and clearing for farm and urban use. • More than 220 million hectares (ha.) of tropical forests were destroyed during 1975-90, mainly for food production.
Overgrazing	680	<ul style="list-style-type: none"> • About 20% of the world's pasture and rangelands have been damaged. • Recent losses have been most severe in Africa and Asia.
Fuel wood Consumption	137	<ul style="list-style-type: none"> • About 1,730 million m³ of fuel wood are harvested annually from forests and plantations. • Fuelwood is the primary source of energy in many developing countries.
Agricultural Mismanagement	550	<ul style="list-style-type: none"> • Water erosion causes soil losses estimated at 25,000 million tons annually. • Soil salinisation and water logging affect about 40 million ha. of land globally.
Industry and	19.5	<ul style="list-style-type: none"> • Urban growth, road construction, mining, and industry are major

Urbanization	contributors to land degradation.
	• Valuable agricultural land is often lost.

Source: United Nations Environmental Programme (2003), *Global Environment Outlook 3*

In India, close to 275 million rural people depend largely on natural resources for their livelihoods. However, over the last few decades, the equilibrium between natural resources and livelihoods has been under increasing pressure, threatening both the ecological security of the country and increasing the vulnerability of rural communities. Rural populations are, therefore, the primary stakeholders in biodiversity conservation and sustainable use of natural resources. Through centuries of co-existence, communities living in the proximity of biodiversity rich areas have acquired invaluable traditional knowledge that has shaped their culture and livelihoods. Community-based natural resource management is a key approach to conserving biological diversity and supporting local livelihoods.

- Make national and state policies and programmes more responsive to the strong linkages between sustainable rural livelihoods and biodiversity conservation.
- Enhance the capacities of communities and institutions of decentralized governance to integrate sustainable rural livelihoods, while ensuring equity, transparency and accountability.⁵

Bio-diversity Levels

- *Biodiversity*, or *biological diversity*, is the variety of all life forms. There are three levels of biodiversity:
- Genetic diversity—the variety of genetic information contained in individual plants, animals and micro-organisms
- Species diversity—the variety of species
- Ecosystem diversity—the variety of habitats, ecological communities and ecological processes.

Biodiversity occurs in all environments on Earth—terrestrial, aquatic and marine.

Biodiversity is not static; it is constantly changing. It can be increased by genetic change and evolutionary processes, and it can be reduced by threats which lead to population decline and extinction.

Biodiversity Conservation

Conserving biodiversity is an essential part of safeguarding the biological life support systems on Earth. All living creatures, including humans, depend on these life support systems for the necessities of life. For example, we need oxygen to breathe, clean water to drink, fertile soil for food production and physical materials for shelter and fuel. These necessities can be described collectively as *ecosystem services*. They are fundamental to our physical, social, cultural and economic well-being. Ecosystem services are produced by the functions that occur in healthy ecosystems. These functions are supported by biodiversity and its attributes, including the number of individuals and species, and their relative abundance, composition and interactions.

Ecosystem services can be divided into four groups:

- Provisioning services (e.g. food, fiber, fuel, fresh water)
- Cultural services (e.g. spiritual values, recreation and aesthetic values, knowledge systems)
- Supporting services (e.g. primary production, habitat provision, nutrient cycling, atmospheric oxygen production, soil formation and retention)
- Regulating services (e.g. pollination, seed dispersal, climate regulation, pest and disease regulation, water purification).⁶

India is one of 17 mega-diverse countries, as identified by Conservation International, and has four biodiversity hotspots. India contains 668 protected areas comprising of wildlife sanctuaries, national parks, tiger reserves, elephant reserves, community reserves, and conservation reserves. India is recognized as one of the eight Vavilovian centers of origin and diversity of crop plants, and possesses more than 300 wild ancestors and close relatives of cultivated plants, which are still evolving under natural conditions. India is also a vast repository of Traditional Knowledge (TK) associated with biological resources. At the same time in India, a large population is dependent on forests for their livelihood, either fully or partially. The figures estimated for forest dependent communities in India vary from 200 to 350 million people.

This dependence is in the form of collection of a variety of non-timber forest produce for subsistence and livelihood purposes, collection of fuel and fodder for subsistence and livelihood purposes, and lifestyles such as shifting cultivation or pastoral nomadic – which are dependent on natural resources. At the same time, local communities have been continuing with diverse sets of ownerships, rights, and concessions over the use of natural resources such as forests, inland waters, coastal areas, and alpine meadows etc. Thus, the ecosystem services, as characterized by the framework of Millennium Ecosystem Assessment, form an integral part of association of local communities with the ecosystems in India.

Thus, in the context of REDD+, the scope of biodiversity is not restricted to species diversity and populations, but also encompasses the strong dependence of local communities on the ecosystem services for subsistence and

livelihood purposes. As the definition of REDD+ suggests, the regime provides an opportunity for not only carbon oriented management of the natural resources but also the scope to develop biodiversity conservation as an important objective of the management of natural ecosystems.

IV. CONCLUSION

In conclusion, the REDD+ regime has to enhance the carbon and other ecosystem services, it should strengthen the efforts of biodiversity conservation, and help secure the livelihoods of the ecosystem dependent local communities in India. The proposed REDD+ regime provides an opportunity for sub-national actors, like States, to address the delicate issue of poverty in resource-rich regions such as forested and tribal dominated States. Such a regime also gives an opportunity for developing a much needed integrated approach for implementation of developmental programs and enforcing biodiversity conservation at the local level. The state-level regime could assign a statutory role for facilitating the integrated approach to an identified agency like REDD+ Cell.⁷

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