THREATS TO INDIA'S BIODIVERSITY: CONSERVATION AND MANAGEMENT

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ABSTRACT

Biodiversity refers to the variety of forms – the different plants, animals and microorganisms. It also includes the genes they contain and the ecosystems they form. India is exceptionally rich in biodiversity and is one of the 12 mega-diversity centers of the world. The biodiversity hot spots include mainly the Eastern Ghats, the Western Ghats and the Northeastern hills. Deforestation, developmental activities, ecotourism and cattle browsing and grazing activities collectively contribute to the decimation of genetic, species and ecosystem diversity. Illegal commercial felling of trees to provide the material for furniture factories across the country is the main threat for biodiversity. The still existing species are facing insecurity from habitat disturbance from human-based activities, non-availability of food sources, nesting, mating and resting places in case of animal species, altered species composition and climate as well.

Biodiversity provides food, nutritional and environmental security. It is imperative for us to protect and manage different forest ecosystems and their inherent diversity for the security of human and other life on this planet. Appropriate measures are required for judicious utilization of resources and sustain biological diversity for the present and future generations.

INTRODUCTION

Biodiversity refers to the variety of forms – the different plants, animals and microorganisms. It also includes the genes they contain and the ecosystems they form. It deals essentially with dynamic processes and increases when new genetic variations are produced and decreases with the loss of genetic variation or species extinction. Thus, it is a concept laying emphasis on interrelated nature of the living world with its processes.

Genetic diversity refers to gene variation within a species. This variation can exist between individuals within a population and between different populations of the same species. This gene diversity provides organisms and ecosystems with a capacity to recuperate after change has occurred.

Species diversity refers to a variety of living species and it comprises of species richness by number and individuals and relationships between species in a defined area. This is essential for the working and evolution of communities and emergence of community level properties.

Ecosystem diversity refers to broad differences between ecosystem types including the diversity of habitats and ecological processes occurring within each ecosystem type. Each one is characterized by distinct patterns of energy flow and water cycles. The tropical latitudes are rich in biodiversity and most of the tropical forests are located in developing countries.

Biodiversity is the foundation for sustainable livelihood and food security. It is important to increase agricultural productivity, produce drugs, trap nutrients, and

maintain water cycle, soil production and protection, absorption and breakdown of pollutants and provide ecological, recreational, aesthetic, scientific and spiritual benefits.

INDIA'S BIODIVERSITY

India has the largest array of environmental stipulations by virtue of its tropical location, varied physical features and climatic types. It has the widest variety of biomass and enhanced by its association with three major biogeographic realms, namely, the Indo-Malayan (the richest in the world), the Eurasian and the Afro-tropical. It is exceptionally rich in biodiversity and is one of the 12 mega-diversity centres of the world. With 10 bio-geographic zones and 25 biotic provinces, all major ecosystems are represented here. The biodiversity hot spots include mainly the Eastern Ghats, the Western Ghats and the Northeastern hills (Pullaiah 1995). Today, India has a forest cover of 6,40,107 sq. km constituting 19.47 per cent of the total geographical area of the country; 3.5 lakh sq. km forest cover has degraded status. The forest cover of India is supposed to be 19.5 per cent of our landmass. Nearly half of this is deemed 'dense forests' while the other half 'open forests'. This forest cover is only one per cent of the world's forest cover as per the Ministry of Environment and Forests.

The plant wealth includes about 45,000 species, which make up 12% of global plant wealth. Of these, ca. 33% are endemic. These include 5,000 species of algae, 1,600 lichens, 20,000 fungi, 2,700 bryophytes, 600 pteridophytes and 15,000 flowering plants. Nearly 1000 species are considered endangered. The animal wealth includes about

81,000 species. Thirty three percent reptiles and sixty two percent amphibians are endemic. The marine wealth includes a rich variety of species with a coastline of over 7,500 km long but the species have not been recorded systematically (Pullaiah 1995; Rajmohana 1999).

The Indian region alone has given to the world nearly 167 economical plants whose center of origin/diversity lies in India, along with their 320 species of wild relatives and land races, for example, rice, sugarcane, minor millets, brassicas, rice-bean, asiatic vignas, egg plant, banana, citrus, mango, cardamom, jackfruit, jute, edible diascorea, black pepper, amaranthus, turmeric, ginger, umbellifers, cucurbits, colocasia, herbal drugs, rhododendrons, jasmine, bamboos, orchids, and betel nut. Live stock species include 27 breeds of cattle, 40 of sheeps and 22 of goats (Pullaiah 1995).

THREATS TO BIODIVERSITY

Wealth is today reckoned in terms of the capacity of a person or groups of persons to obtain goods and services through exchanges in the market place. The bulk of such goods and services are partly or wholly products of intensively managed or artificial ecosystems; crop fields, plantations, shrimp ponds, mechanical fishing fleets, factories, towns and cities. Most of these intensively managed or artificial ecosystems tend to harbor low levels of biodiversity. Rich people are then those with extensive access to produce of managed or artificial ecosystems supporting low levels of biodiversity; poor people have very limited access to such produce. Ecosystems harboring high levels of biodiversity are natural or semi-natural ecosystems with low levels of human demands for their produce. Rich

people rarely live in close vicinity of such ecosystems, though they may visit them for recreational purposes. Groups of poor people may permanently live in their vicinity. In some cases, the poor control and serve as the stewards of such biodiversity rich ecosystems. More often, though many such biodiversity rich ecosystems are subjected to overexploitation, primarily to meet the large resource demands of the rich, often living far away, with the local poor serving as agents of the resultant destruction of biodiversity. Large numbers of poor also live permanently in the vicinity of biodiversity poor, intensively managed or artificial ecosystems. There is then no simple relationship between poverty and biodiversity; the equations vary greatly from context to context (Gadgil 2001).

Overexploitation of biological resources without any regard for their perpetuation has resulted in the threat to biodiversity as a whole. Deforestation, developmental activities, ecotourism, cattle browsing and grazing activities collectively contribute to the decimation of genetic, species and ecosystem diversity. Illegal commercial felling of trees to provide the material for furniture factories across the country is the main threat for biodiversity. The legal felling of trees also adds burden on the forest systems in a variety of ways. The still existing species are facing insecurity from habitat disturbance from human-based activities, non-availability of food sources, nesting, mating and resting places for animal species, altered species composition and climate as well. In this process, some species have become endemic, some others endangered, some more threatened and others uncommon. Extinctions have become frequent and many species are disappearing without even being documented. Species are generally not being described as extinct till they

have not been spotted for many years. Loss of genetic diversity is expected to imperil agricultural productivity. The loss of both genetic and ecosystem diversities results in the loss of cultural diversity. Large animals in higher trophic levels with slow rates of population growth, with more gestation period are more susceptible to extinction due to habitat loss. The alteration of the habitat results in mass extinction of particularly the endemic species. Species with less population, whether at higher or low trophic levels are more prone to extinction due to habitat loss.

The loss of a species is bound to have deleterious effects on the remaining species in an ecosystem. This cascade effect occurs when local extinction of one species significantly alters the population size of other species. The species, whose presence or absence has a profound effect on the rest of a natural community is a key stone species, for example, *Ficus* tree which supplies food for a long period in a year for birds and other fauna. Key stone species do not enjoy equal status in all ecosystems. One serving this role in one ecosystem may not be a keystone in other ecosystems.

India may be headed for an ecological disaster unless urgent steps are taken to save forests and their inherent species diversity. If they were not protected, they would be wiped out. In consequence, a vast majority of rural and tribal populations who are dependent on the forests would also perish in course of time. We as Indians, divert, exploit, use, destroy, manipulate and dump toxics, garbage and all the wastes we generate on top of our forest system. We have not learnt that the forest is the provider for man and the tree is a tree of life. The forests of India are like 'Ali Baba's cave' and those that have the power extract some of the jewels

from the cave and toss it across to private or public sector. What is being lost today can never be replaced tomorrow, and instead of the most rich and diverse forests of India we are going to be left with green deserts. It is the infinite quest for 'quick money' in a free market economy that has fuelled the exploitation of our forests. The endless rhetoric of our politicians about the increasing forest cover of India does not stand any ground…. in fact what increases are green deserts of exotic plantations (Deccan Chronicle Report).

IMPORTANCE OF BIODIVERSITY CONSERVATION

The immediate national priority is to preserve the ecology and biodiversity of what remains. Because, each habitat with a set of community characteristics provides both direct and indirect benefits to human beings. The natural vegetation cover in water catchment areas helps to maintain hydrological cycles, regulate and stabilize groundwater tables and run off and acts as buffer against extreme events like flood and drought. The vegetation also helps to maintain soil structure, increase moisture retention capacity and fertility and nutrient recycling. Wetland vegetation is important to breakdown and absorb pollutants, filter effluents, remove nutrients, heavy metals, reduce biological oxygen demand and destroy harmful microorganisms. Forests maintain rainfall by recycling water vapour steadily into atmosphere and through canopy's effect in promoting atmospheric turbulence. The plant-animal interactions are essential to allow survival and to maintain balance between living things and the needful resources. All of this suggests that the web of life is so intimate and intricate that removal or disturbance of one part of the ecosystem is bound to affect, some way or other, the smooth functioning of many of its other

components. Biodiversity has aesthetic qualities and since time immemorial, it has satisfied recreational pursuits of human beings. India with its rich biodiversity is an important tourist attraction of the modern world. It is important for the co-evolution of human beings and their cultural identities. Despite these multiple direct and indirect benefits, biological resources are undervalued and there is a meager knowledge on many species and ecosystems. Further, conservation activities are focussed too narrowly while highly influential rich traders and manufacturers are overexploiting the valuable resources leaving the natives impoverished. The Convention on Biological Diversity held at Rio de Janeiro in June 1992 speaks about the importance of biodiversity to sustain life on this planet. 156 countries and European community signed this convention. India is a party to it. The incessant human assault on forests has left indelible scars on nature. Any repair to this nature with artificial or social forestry plantations is not a substitute for the recovery of vanished genes of evolution and instead it is simply a mockery of ecological principles through which the nature works in order.

CONSERVATION AND MANAGEMENT OF BIODIVERSITY

The protection and management of forest habitats are the two essential ways for sustaining biodiversity. Planting trees does reclamation wasteland. Selection of trees for this purpose is based on the ecology of the land. Regulation and monitoring of Industries are also required for the judicious use of natural resources to minimize exploitation.

The current state of knowledge about species and ecosystems is inadequate for providing necessary habitats *in situ* and *ex situ*. Conservation and management of biological diversity for posterity are the two most important tasks. There are two approaches for sustaining biodiversity – *in situ* and *ex situ*. *In situ* approach includes protection of biodiversity-rich areas. Such areas are named as biosphere reserves, national parks, sanctuaries, etc. This approach stands good to protect physical and genetic diversity and integrity of communities of plants and animals within their natural ecosystems for the present and future generations. *Ex situ* approach includes maintenance of species outside their natural areas in the form of botanical gardens, zoos and aquaria, germ plasm banks, grass-root collections of plant cultivars and animal breeds. This approach stands good to maintain only a small percentage of species. For this, sharing and exchange of technologies should take place between the gene rich, technologically poor nations and technologically rich and gene poor nations for taking appropriate measures for biodiversity conservation and management. The Joint Forest Management scheme involving negotiating partnerships between local institutions of forest users and state forest departments on the basis of sharing forest protection responsibilities in exchange for a share of the income from forest products is a viable option for the perpetuation of biodiversity. Awareness campaigns for the masses and general public and training courses for the educated in biodiversity conservation are also required for this purpose. Mass electronic media is another way to create awareness among the public in an effective manner on the importance of biodiversity. Biodiversity Bill for the protection of the flora and fauna of the country is the need of the hour. A clear consensus on what, where, how and how

much to be conserved is also required to contain and sustain biodiversity. Funding should be enhanced for biodiversity assessment and management. Biodiversity registers at village level also enable to take measures for conservation of biological diversity. This will be a proof of the nativity of the natural resources known by local communities. It is thus imperative that biologists and the public learn more about the importance of biodiversity and its role in the ecosystem functions. Only an international collaborative effort supported by adequate resources can accomplish the goals of the sustainable use of biological resources for maximizing the net long-term benefits to the mankind.

Recent technology advances have opened up numerous possibilities of economic utilization of even the most seemingly insignificant forms of life. At the same time, the diversity of these life forms is being eroded rapidly (Reid 1992). These twin developments have led to the adoption of an International Convention on Biological Diversity by most countries in the World (UNEP 1992). This convention commits parties to inventory their biodiversity, make all attempts to conserve these resources, and monitor the efficacy of the conservation measures adopted. These are important scientific challenges for the community of ecologists, challenges that could be turned into major opportunities to undertake exciting new lines of research of genuine applied value (Nagendra and Gadgil 1999).

The conservation and management programmes, if not taken up, there will be series of ecological disasters and tragedies in future. The forests slowly die- a way of life dies, a reservoir of traditional knowledge dies, a tribal culture dies, and the tiger dies. What dies will never come alive again

unless we act now and prevent this violation of our most precious natural resource – which is also the deepest spiritual and philosophical abode of this country. Therefore, it is imperative for us to take every possible measure to utilize the biological resources rationally, conserve and manage them for the present and future use in order to sustain life in general and human in particular.

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