

11.1 Introduction

Biological diversity or Biodiversity is defined as the variety and variability among living organisms from all sources, including *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems'.¹

11.1.1 The Convention on Biological Diversity

The Convention on Biological Diversity (CBD) is a landmark in the environment and development field, as it takes for the first time a comprehensive rather than a sectoral approach to the conservation of Earth's biodiversity and sustainable use of biological resources. It was in the year 1984 that the need to have in place a global convention on biological diversity started gaining momentum. In response, the United Nations Environment Programme (UNEP) in the year 1987 recognised the need to streamline international efforts to protect biodiversity.¹

The Convention on Biological Diversity (CBD) was negotiated and signed by nations at the UNCED Earth Summit at Rio de Janeiro in Brazil in June 1992. The Convention came into force on December 29, 1993. India became a Party to the Convention in 1994. At present, there are 175 Parties to this Convention.¹

The main objectives of the Convention are¹:

- Conservation of biological diversity;
- Sustainable use of the components of biodiversity;
- Fair and equitable sharing of benefits arising out of the utilisation of genetic resources.

11.1.2 Biodiversity Authority:

A National Biodiversity Authority has been set up at Chennai vide Gazette Notification dated 1st October, 2003 under the Biological Diversity Act 2002. The Act also

provides for establishment of State level Boards and Local level Bio-diversity Management Committees to deal with any matter concerning conservation of Biological Diversity, its sustainable use and fair and equitable sharing of benefits arising out of the use of Biological resources and associated knowledge.¹

Detailed rules under the Act have been notified for implementation of the various Provisions of the Act. The National Biodiversity Authority is in process of developing norms for Access and Benefit Sharing as related to genetic Resources and Associated knowledge.¹

11.1.3 Biological Diversity Act, 2002¹

The Central Government has brought Biological Diversity Act, 2002 with the following salient features:

1. To regulate access to biological resources of the country with the purpose of securing equitable share in benefits arising out of the use of biological resources; and associated knowledge relating to biological resources;
2. To conserve and sustainably use biological diversity;
3. To respect and protect knowledge of local communities related to biodiversity;
4. To secure sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources;
5. Conservation and development of areas of importance from the standpoint of biological diversity by declaring them as biological diversity heritage sites;
6. Protection and rehabilitation of threatened species;
7. Involvement of institutions of state governments in the broad scheme of the implementation of the Biological Diversity Act through constitution of committees.

11.2 Tamil Nadu's Biodiversity

Tamil Nadu is endowed with a rich biodiversity. The main natural habitat types are Forest, Mountains, Rivers, Wetlands, Mangroves and Beaches. Tamil Nadu has a geographical area of 1,30,058 km², which constitutes about 4 per cent of the country's total area. Tamil Nadu shares the Western Ghats (one of the 25 biodiversity hotspots) with the states of Kerala, Karnataka, Goa, Maharashtra and Gujarat. It shares the Eastern Ghats with the States of Andhra Pradesh and Orissa.²

Tamil Nadu accounts for nearly 1/3rd of the total flora of India. Species and Generic diversity of flora of Tamil Nadu is comparatively richer than the neighbourhood states. The state of Tamil Nadu harbours a total of 5547 taxa that includes 5239 species, 72 subspecies and 548 varieties distributed in 231 families under 1668 genera. Dicots constitute a major part of the flora that account for 78 per cent comprising 1944 taxa of Polypetalae, 1720 taxa of Gamopetalae and 642 taxa of Monochlamydeae. Number of Monocots in Tamil Nadu includes 1241 taxa⁷. The major groups of freshwater fauna occurring in Tamil Nadu is represented in freshwater wetlands. In general, insects dominate the freshwater fauna as found in other states (about 3000+ species). A total of 31+ and 153+ species of molluscs and fishes respectively, are so far recorded in Tamil Nadu. The Western Ghats exhibits a rich diversity of freshwater fish fauna. Of the 446 primary freshwater fishes known from India 230 species are found in the Western Ghats, of which 118 are endemic to this region. A total of 116 species belonging to 46 genera and 20 families are reported from Nilgiri Biosphere Reserve of which 11 species are endemic to Nilgiri.

The marine fauna of Tamil Nadu is rich and varied. There are 313 species of sponges and 131 species of echinoderms are recorded. Free swimmers or nekton are important components of marine biodiversity and constitute important fisheries of the world. The dominant taxa in the nekton of Tamil Nadu are fish (527 spp.) others being crustaceans (419 spp.), molluscs (336 spp.), reptiles (15 spp.) and mammals (29 spp.). Majority of the nektonic species is found in the coastal waters. There are 82 species of Scleractinian corals found in the Gulf of Manar Marine National Park⁶.

11.2.1. Biodiversity loss in Tamil Nadu

Habitat destruction, overexploitation, pollution, and species introductions are the major causes of biodiversity loss in Tamil Nadu. Other factors include fires, which adversely affect regeneration in some cases, and such natural calamities as droughts, diseases, cyclones and floods. Habitat destruction, decimation of species, and the fragmentation of large contiguous populations into isolated, small, and scattered ones have rendered them increasingly vulnerable to inbreeding depression, high mortality, and susceptibility to environmental stochasticity and, in the long run, to extinction.



Spotted Deer

11.2.2. Major threats to Biodiversity

While non-recognition of the importance of biodiversity remains the principal and overriding threat to conservation initiatives, the following are agreed to be the major threats to biodiversity:

Uncontrolled commercial exploitation of natural resources

Habitat destruction, including destruction of forests, reclamation of wetlands etc,

Adhoc extension of high input agriculture

Conversion of rich biodiversity sites for human settlement and industrial development

Destruction of coastal areas

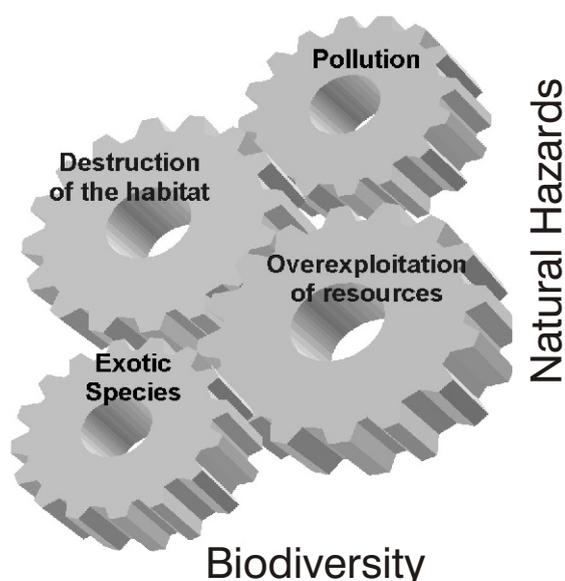


Fig 11.1. Threats to biodiversity

11.3 Protected Areas and Biosphere reserves of Tamil nadu

An area of 307.85 sq.kms. i.e. 1.36% of the total forest area of Tamilnadu has been brought under National Parks. Further, an area of 2,602.07 sqkm. has been declared as wildlife sanctuaries. Tamilnadu has also the unique distinction of having two biosphere reserves, one in the

Nilgiris and another in the Gulf of Mannar. A Tiger Reserve under “Project Tiger” has also been established combining Mundanthurai and Kalakad Wildlife sanctuaries. The Arignar Anna Zoological Park at Vandalur near Chennai is a modern Zoological park with open moat enclosures formed over an area of 602 ha of reserved forests near Chennai.⁴

11.3.1 Nilgiri Biosphere Reserve

The Nilgiri Biosphere Reserve (NBR) is the first Biosphere Reserve established in India, in the year 1986. It is located in the Western Ghats and encompasses two of the ten bio-geographical zones of India. NBR is also the first internationally designated Biosphere Reserve in India. It represents one of the world's biodiversity hotspots and provides habitat for the largest south Indian population of tigers, elephants and other large mammals.

The Nilgiri Biosphere Reserve was established mainly to fulfill the following objectives:

To conserve *in situ* genetic diversity of species

To restore degraded ecosystems to their natural conditions

To provide baseline data for ecological and environmental research and education

To function as an alternate model for sustainable development

11.3.1.1 Flora and Fauna of NBR

The Nilgiri Biosphere Reserve is very rich in plant diversity. About 3,200 species of flowering plants can be seen here. Of the 3,200 species, 132 are endemic to the Nilgiri Biosphere Reserve. Of the 175 species of orchids found in the Nilgiri Biosphere Reserve, 8 are endemic.

The fauna of the Nilgiri Biosphere Reserve includes over 100 species of mammals, 350 species of birds, 80 species of reptiles and amphibians, 300 species of butterflies

and innumerable invertebrates. 31 amphibians and 60 species of reptiles that are endemic to the Western Ghats also occur in the Nilgiri Biosphere Reserve.

11.3.2 The Gulf of Mannar Marine Biosphere Reserve (GOMMBRE)

Gulf of Mannar, situated in the southeastern coast of India extending from Rameswaram in the north to Toothukudi in the south along with its marine environment has been declared as India's first Marine Biosphere Reserve. Gulf of Mannar covers approximately an area of 10,500 km² with 21 islands covering an area of 623 ha.

The GOMMBRE lying between India and Sri Lanka is biologically one of the richest coastal regions of the world. About 3,600 species of flora and fauna are known to occur in the GOMMBRE. One of the Islands, namely, Krusadi island is called the 'Biological Paradise' as it harbors considerable species diversity. The Gulf of Mannar is rich in seaweeds, seagrass, coral reef, pearl bank, sacred chank beds, fin and shellfish resources, mangroves and number of endemic and endangered species including the *Dugong dugong* commonly referred to as the sea cow.

11.3.2.1 Economically Important Species in the GOMMBRE

The Gulf's seagrass communities are valuable habitats for commercially harvested species, particularly the green tiger prawn *Penaeus semisulcatus*, which is extensively harvested for the export market. Holothurians, found in abundance in Gulf of Mannar, are extensively exploited for export to Japan and other Southeast Asian countries as a highly priced food item for human consumption. The economically vulnerable species of seaweeds such as *Hypnea*, *Gelidiella*, *Gracelaria*, *Stiechospermum*, *Hydroclathum*, *Clathatus*, *Padina*, *caulerpa* are largely distributed in the Gulf of Mannar. In

addition, ornamental shells, chank beds, and pearl oysters are exploited in the Gulf. Sea fans and seaweeds are exported for industrial and decorative purposes.

11.4 Contribution to the State's economy

Biodiversity has a number of values, of which the direct, economic value is the most visible, and often most detrimental. However, it is rather difficult to assign values on the biodiversity that is traded or marketed within the State. Inferences however can be derived by using measures such as total fish catch/production / year, quantum of timber traded etc. The contribution of agricultural biodiversity in terms of crops, livestock, fisheries etc, can also be inferred and it is substantial in commercial value. Scant data is available on the commercial value of the plant and animal species of medicinal value, although it is well known that the world trade is of several million dollars and this is growing.

11.5 Major pressures on biodiversity conservation

The major pressures that are associated with biodiversity conservation are as follows:

- Low priority for conservation of living natural resources.
- Exploitation of living natural resources for monetary gain.
- Inadequate knowledge about the values of species and ecosystems.
- Unplanned urbanization, uncontrolled industrialization and pollution.
- Uncontrolled commercial exploitation of natural resources
- Habitat destruction.
- Adhoc extension of high input agriculture
- Conversion of rich biodiversity sites for human settlement and industrial development

Destruction of coastal areas

Other factors like forest fires and natural calamities like floods, cyclones, droughts and diseases.

11.6 The State's response to conservation of biodiversity

The Environment and Forest Departments of the Government of Tamil Nadu are involved in planning, promotion, coordination, and overseeing the implementation of the environmental and forestry programmes. At the national level, the Ministry of Environment and Forests (MoEF), is the focal point for implementation of the Convention on Biological Diversity. The mandate of the Ministry includes survey of flora, fauna, forests and wildlife, and conservation of natural resources. These objectives are supported by legislative and regulatory measures. A number of institutions affiliated with the Ministry are involved in the work related to various aspects of biological diversity. Survey and inventorisation of the floral and faunal resources are carried out by the Botanical Survey of India (BSI) established in 1890, and the Zoological Survey of India (ZSI) established in 1916.

The Forest Survey of India established in 1981 assesses the forest cover, with a view to develop an accurate database for planning and monitoring purposes. The Wildlife Institute of India undertakes studies of endangered species of animals and critical ecosystems. The Surveys organizations have published over the years, documents on flora and fauna at country, state and in some cases district levels and for selected ecosystems. Besides, extensive reports on inventories of resources indicating level of biodiversity in selected areas have also been brought out. The Surveys have also published Red Data Books on endangered species. The voucher specimens are preserved in the Central National Herbarium (CNH) of BSI and National Zoological Collection (NZC) of ZSI. The Forest Survey of India publishes every two years, a State of

Forests in India report based on remote sensing and ground truth data.

11.7 Existing Policy Responses of the State

The State's rich biodiversity and the natural resources are facing threat from the growing human and livestock population and also from various developmental activities. Biodiversity conservation has been structured covering the ecosystem diversity, species diversity and genetic diversity. Conservation of species diversity has been structured separately for plants and animals. Wild plant diversity has been structured with focus and emphasis on Red-listed plants, Endemic plants, Medicinal plants, Wild relatives of cultivated plants, allied species of cultivated plants and others. Wild animal diversity has been structured on the lines of Red listed animals, Endemic animals, Flagship species, Keystone species, Pollinators and others. Domesticated species diversity has been structured on the lines of Cultivated Plants and Domesticated animals.

Various departments manage biodiversity within the State. The Forest department manages forests, grasslands, freshwater wetland bird sanctuaries, estuarine wetlands like mangroves, coastal Biosphere Reserves like Gulf of Mannar Biosphere Reserve and entire spectrum of wild species diversity. Forests also include the rivers that pass through the notified forest areas, dams located inside the notified forest areas and tanks and ponds inside the forest areas. Agriculture department and the farmers manage agrobiodiversity, while livestock is managed by the Animal Husbandry department and farmers. Further, the Public works department controls freshwater wetlands, tanks, dams/reservoirs and rivers. Coastal fisheries is under the control of the Department of Fisheries. The Department of Revenue controls *poromboke* (wastelands) and other village common lands. At the local level, *panchayats* control minor irrigation tanks, wells and areas conserved or revered by the local communities.

11.7.1. Some of the important steps towards conservation of biodiversity are:

- Specific land area has been earmarked for extensive *in situ* conservation of habitats and ecosystems. The results of this network have been significant in restoring some rare and endangered species. A programme entitled, 'Eco-development' for *in situ* conservation of biological diversity involving local communities has been initiated in recent years. The concept of eco-development integrates the ecological and economic parameters for sustained conservation of ecosystems by involving the local communities with the maintenance of earmarked regions surrounding protected areas. The economic needs of the local communities are taken care of under this programme through provision of alternative sources of income and a steady availability of forest and related produce.
- To conserve ecosystems while balancing the needs of the local human population, the 'Man and Biosphere Programme' is being implemented. Among the twelve Biosphere Reserves in the country, two Biosphere Reserves have been demarcated in Tamil Nadu viz. Nilgiri Biosphere Reserve and Gulf of Mannar Biosphere Reserve encompassing the diversity and genetic integrity of plants, animals and microorganisms in their totality as part of the natural ecosystems, so as to ensure their self-perpetuation and unhindered evolution.
- Programmes have also been launched for scientific management and prudent use of fragile ecosystems. Specific programmes for management and conservation of wetlands, mangroves, and coral reef systems are also being implemented. National and sub-national level committees oversee and guide these programmes to ensure strong policy and strategic support.
- Eco-tourism is being promoted to ensure that tourism does not adversely impact biodiversity
- The Indian Tiger (*Panthera tigris*) is in many ways, central to conservation in India. The fall and rise in the number of tigers in India is considered an index of the extent and nature of conservation efforts. The main objectives under the scheme include wildlife management, protection measures and site specific ecodevelopment to reduce the dependency of local communities on tiger reserve resources. The Kalakad Mundanthurai Tiger reserve of Tamil Nadu is included under the Project Tiger Programme to conserve the tiger population. It is imperative to maintain and improve the available population of Tigers in Tamil Nadu for ecological value, scientific, economic, aesthetic and cultural values.
- Project Elephant was launched in February 1992 to assist States having free ranging populations of wild elephants to ensure long term survival of identified viable populations of elephants in their natural habitats. States are being given financial, technical and scientific assistance in achieving the objectives of the Project. The Project is being implemented as a 100 % centrally sponsored scheme. Main activities include ecological restoration of natural habitats and migratory routes of elephants, measures for mitigation of man-elephant conflict in crucial habitats, research on elephant management related issues and Veterinary care.⁵
- The National Afforestation and Eco-development Board (NAEB) under the Ministry of Environment and Forests has evolved specific schemes for promoting afforestation and management strategies. The states are funded in developing specific afforestation and management strategies and eco-development packages for augmenting biomass production through a

participatory planning process of Joint Forest Management (JFM) and Microplanning. Conceptually, JFM seeks to develop partnerships between local institutions of forest dependent villagers and State Forest Department for sustainable management of forest resources on the basis of sharing benefits and responsibilities through Forest Development agencies.

11.8. References

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