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"Biodiversity Conservation"

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Abstract - Globally, biodiversity is facing increasing pressure on account of various factors including habitat fragmentation and destruction, climate change; over use and unsustainable use of resources the concern relating to biodiversity conservation in the face of its continuing loss is indeed unversed. The convention on biological diversity is a collective commitment of the nations to conserve and sustainability use the biological diversity for the benefit of the present and future generations. India, a recognized mega diverse country, is committed to protecting the rich heritage of biodiversity. This is so vital, to our economic and social development. Biodiversity is also directly linked with providing livelihoods to and improving socio-economic conditions of millions of our local people, thereby contributing to sustainable development and poverty alleviations.

Biodiversity provides the basic goods and services for human society to exist and secure economic and social development. Health, wealth, food security and many other needs of human beings are dependent on natural resources, and yet human beings have used these with scant regard to latter's health and survival. Such indiscriminate use and resultant loss of biodiversity threatens the very survival of the planet itself. The Convention on Biological Diversity (CBD) which entered into force in December 1993 is an international agreement among the nations of the world to arrest and reverse this situation for the welfare and survival of the planet and its denizens, as well as for inter-generational equity.

The Convention has three objectives, namely, conservation of biodiversity, sustainable use of the components of biodiversity, and fair and equitable sharing of benefits arising out of the use of genetic resources. India is one of the recognized mega diverse countries of the world. Situated at the tri-junction of Afro-tropical, Indo-Malayan and Paleo-Arctic realm, India has a wide array of ecosystems and habitats. India has only 2.4 % of the geographical area of the world, but harbours nearly 8 % of the globally known floral and faunal species. It is an acknowledged centre of crop diversity and crop wild relatives. Over 1,00,690 species of fauna and 47,480 species of flora have been documented in the 10 BZs of the country. This diversity is hosted by many types of terrestrial and aquatic systems namely forests, wetlands, grasslands, deserts, coastal, and marine ecosystems.

INTRODUCTION - The National Biodiversity Authority (NBA) was established by the Central Government in 2003 to implement India's Biological Diversity Act (2002). The NBA is a Statutory Body and it performs facilitative, regulatory and advisory functions for the Government of India on issues of conservation, sustainable use of biological resources and fair and equitable sharing of benefits arising out of the use of biological resources.

The Biological Diversity Act (2002) mandates implementation of the provisions of the Act through decentralized system with the NBA focusing on advising the Central Government on matters relating to the conservation of biodiversity, sustainable use of its components and equitable sharing of benefits arising out of the utilization of biological resources; and advising the State Governments in the selection of areas of biodiversity importance to be notified under Sub-Section (1) of Section 37 as heritage sites and measures for the management of such heritage sites. The NBA considers requests by granting approval or otherwise for undertaking any activity referred to in Sections 3,4 and 6 of the Act. The State Biodiversity Boards (SBBs) focus on advising the State Governments, subject to any guidelines issued by the Central Government, on matters relating to the conservation of biodiversity, sustainable use of its components and equitable sharing of the benefits arising out of the utilization of biological resources.

The SBBs also regulate, by granting of approvals or otherwise upon requests for commercial utilization or bio-survey and bio-utilization of any biological resource by the Indians. The local level Biodiversity Management Committees (BMCs) are responsible for promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling of knowledge relating to biological diversity.

The NBA with its headquarters in Chennai, Tamil Nadu, and India delivers its mandate through a structure that comprises of the Authority, Secretariat, SBBs, BMCs and Expert Committees. Since its establishment, NBA has supported creation of SBBs in 29 States and facilitated establishment of around 1, 55,868 BMCs. Biodiversity provides the basic goods and services for human society to exist and secure economic and social development. Health, wealth, food security and many other needs of human beings are dependent on natural resources, and yet human beings have used these with scant regard to latter's health and survival. Such indiscriminate use and resultant loss of biodiversity threatens the very survival of the planet itself.

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Biodiversity encompasses all variety and variability of living organisms. It includes biodiversity within species, between species and diversity of ecosystems. The biodiversity profile of a country at any point of time is a reflection of the presence of this kind of diversity, the consequences of the way it has been utilized and how it has been conserved through legal or other measures. The Biodiversity Profile of India presented in this chapter covers the cultural ethos and legal support for the conservation and use of biodiversity, ecosystems diversity, species and genetic diversity, status of threatened species, protection of natural habitats and species, and challenges to conservation of biodiversity.

Ecosystem Diversity of India

India's unique topographical features endow it with a diversity of terrain and terrestrial and aquatic ecosystems that harbour rich biodiversity. Based on a study of the distinctive bio geographic characteristic features of the country from north to south and east to west, 10 Bio geographic Zones (BZs) have been identified (Rogers and Panwar, 1988).

The study further identifies three subordinate levels in BZs namely, the Biotic Province- a secondary unit within a zone, of particular communities separated by dispersal barriers or gradual change in environmental factors, e.g., North-west and West Himalaya on either side of the Sutlej River, (ii) the Land Region- a tertiary unit within a province, indicating different land forms, e.g., Aravalli Mountains and Malwa Plateau in Gujarat-Rajwara Province, and (iii) the Biome- an ecological unit such as swamp/wetland or temperate broad leaved forest in each zone. Figure 2.1 shows the distribution of the 10 BZs across India.

Aquatic Ecosystems

The alluvial plains of River Ganga and Brahmaputra have extensive riverine aquatic ecosystem formations such as floodplains and oxbows known variously as *Maun, beel, chaur, jheel and pat* locally. These sustain highly productive agriculture and fisheries, besides acting as natural flood defence for communities. In arid and semi-arid zones of the peninsular and western India, several water bodies have been constructed to support domestic water and irrigation needs. The arid zone spanning Rajasthan and Gujarat has vast saline flats, monsoon fed freshwater lakes as well as salt lakes such as Sambhar, Pachpadra, Deedwana and Lukransar.

Wetland Ecosystems

Wetlands are highly productive ecosystems supporting a wide array of biodiversity providing products and services vital for human welfare. The National Wetland Atlas 2013 (ISRO, 2013) has mapped 15.26 million ha area under wetlands, which is roughly equal to 4.6% of India's land area. Of this, the share of inland wetlands is 69.22% and remaining 27.13% is coastal wetlands. The major inland wetland types are rivers/streams, reservoirs/barrages, tanks, lakes and ponds. Coastal wetlands include intertidal mudflats, mangroves, aquaculture ponds and lagoons. Nearly 60% of the wetlands fall within protected forests. India is a Party to the Ramsar Convention on Wetlands of

International Importance especially as Waterfowl Habitat - an international treaty for the conservation and sustainable use of wetlands. India has declared 27 wetlands as Ramsar Sites, Sundarbans in West Bengal was declared as Wetland of International importance in February 2019.

Coastal and Marine Ecosystems

India's coastal and marine ecosystems encompass 7,517 km long coastline, 2.02 km2 Exclusive Economic Zone (EEZ), island ecosystems, and a wide continental shelf. These ecosystems include estuaries, mangroves, coral reefs, lagoons, and seaweed and sea grass meadows. These meadows serve as nursery grounds for a vast number of faunal communities. Altogether 20,444 species of faunal communities have been recorded from marine and coastal environments of India, which is 7% of global marine diversity.

Diversity of Marine Ecosystems

(I) Mangrove Ecosystems

They occur mostly in the inter-tidal region between mean sea level to the highest spring tide in the tropical and sub-tropical regions of the world. They provide a breeding and nursing ground for various marine and pelagic species, livelihoods for the coastal communities' dependent on collection of honey, tannins, wax and fishing. They protect coastal areas from storm surges and tsunamis. Their protective role has been widely recognized especially after the tsunami of 2004. Mangroves are spread over an area of 4,921 km2 in India which is nearly 3.3 % of the world's mangrove vegetation. Sundarbans in the West Bengal accounts for almost half of the total area under mangroves in India. About 4,580 faunal and 920 floral mangrove species have been recorded from India (Zoological Survey of India (ZSI), 2018).

(ii) Seaweed Ecosystems

They are marine macro algae under three phyla or divisions, namely, Brown Algae, Red Algae, Green Algae. A total of 936 species of marine algae have been recorded from marine and coastal environments of India. (Central Marine Fisheries Research Institute (Miniseries *al*., 2012)). These systems provide breeding strands for many marine organisms.

(iii) Sea grass Ecosystems

A total of 14 species of sea grasses are reported in Indian waters. Sea grass meadows are found in eastern and western coasts, Lakshadweep islands and Andaman and Nicobar Islands. Sea grass meadows play a significant role in the processes and resources of near shore coastal ecosystems, contribute substantially to carbon sequestration and support a high diversity of fauna. The health of sea grass meadows is closely tied to that of mangroves and coral reef ecosystems as many fish migrate between these habitats for food and shelter (Central Marine Fisheries Research Institute).

Implementation of NBAP

A comprehensive web of policies and laws has evolved in the country to address various aspects of nature conservation that NBAP seeks to achieve. The fundamental policy and legal support for its implementation is embedded in the Constitution of India which creates an abiding responsibility of the State and the people of India to take positive action for the protection and conservation of natural resources.

The relevant provisions of the Constitution have already been noted in chapter 2. This chapter discusses the policy and legal instruments which contribute to the effective implementation of the NBAP in conformity with the mandate of the Constitution and international commitments of India under CBD and other biodiversity related environmental conventions.

These include the Ramsar Convention on Wetlands, the Convention on the Conservation of Migratory Species of Wild Animals (CMS), the Convention on the International Trade Endangered Species of Flora and Fauna (CITES), the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), the International Plant Protection Convention (IPPC), United Nations Convention to Combat Desertification (UNCCD), and the United Nations Framework Convention on Climate Change (UNFCCC). Actions under NBAP also contribute to implementation of the Sustainable Development Goals (SDGs).

Creating Communication, Education and Public Awareness for Biodiversity

Evolutionary history says that five mass extinction events took place over geological periods which influenced speciation and extinction rate on the earth. These were caused by natural disasters or phenomena of gradual change in earth's chemistry and physical topography.

The number of species on the earth is the result of the equilibrium reached through these evolutionary processes of speciation and extinction. But now the extinction and erosion of species is taking place in the time scale of decades through human actions without giving the planet an opportunity of reaching the equilibrium.

People themselves are generally not aware of the rate of loss their actions cause and the consequences their own survival faces as a result of extinction of species and degradation of habitats. Knowledge shapes people's perception about why and how biodiversity should be cared for, used wisely, conserved for sustainable use and inter-generational equity. A fundamental requirement of securing sustainable conservation of biodiversity requires that people are made aware of:

(i) The environmental, social, cultural, economic and intrinsic values essential for human wellbeing,
(ii) Consequences of its loss, and
(iii) The responsibility that each person must share to arrest the loss and restore whatever is possible.

Creation of Communication, Education and Public Awareness (CEPA) is therefore the first requirement of any action to save biodiversity.

NGOs, CSOs, Individuals

These have generally been powerful contributors to extending CEPA in the society. Reaching them in turn through CEPA enhances their capacity, enables them to create required awareness in other sector specific NGOs/CSOs and also amongst general public and out-of-school children.

(I) For the identified target groups at 2 to 5 and people in general, the following initiatives have been undertaken so far. MoEFCC has created a comprehensive Environmental Information System (ENVIS) comprising a network of 69 ENVIS Hubs and Resource Partners (RPs) of which 29 deal with 'State of the Environment and Related Issues' are hosted by respective States/UTs, 40 RPs are hosted by governmental institutions/NGOs/ institutes of professional excellence, with varied thematic mandates pertaining to environment, forests, climate change etc.

(ii) Nearly 300 national and regional level awareness programmes have been organised since 2014 by MoEFCC and NBA in collaboration with SBBs, NGOs, CSOs, for industry representatives, state officials, students, teachers, local communities, traditional healers and other stakeholders to extend CEPA.

(iii) Regular capacity building workshops and meetings with partners such as officials, Ayurvedic Drug Manufacturers' Association ADMA), GIZ, Centre for Agriculture and Bioscience International (CABI) South Asia, Centre for Environmental Communication (CEC) and SBBs are conducted to raise awareness and create decision taking capacities amongst various participants.

(iv) Citizen Science Initiative is being implemented across the country through networks of NGOs. It enables participants to increase their scientific understanding, learn about environmental issues and contribute to research.

(v) Film/slide shows, lectures, tree plantations exhibitions, sit and draw/quiz competitions from time to time. Periodic festivals and events with the inclusion of biodiversity as one of the important thematic area are organised.

(vi) Participation in annually held Indian Science Congress by teams from NBA and SBBs is ensured to extend information on biodiversity issues and nuances of the BD Act, and Biological Diversity Rules, 2004 (BD Rules) to scientific community, academicians, teachers, youth and school children from across India.

(vii) Recognition of outstanding work, dissemination of best practices, to promote capacity and generate awareness.

(viii) Biennial India Biodiversity Awards instituted by MoEFCC in association with United Nations Development Programme (UNDP) during Cop 11 in 2012. These have now been institutionalised in the NBA. Till 2018, 47 awards have been given under different categories. The best practices identified under the Award are captured in the publication 'India Naturally!' Four editions have already been published.

(ix) E. K. Janaki Ammal National Award instituted in 1999 for outstanding contribution in the field of Plant Taxonomy, Animal Taxonomy and Microbial Taxonomy. Twenty eight awards have been given till 2018.

CONCLUSIONS

It is imperative that the phenomenon of biodiversity is very vast, complex and interdependent and there is no single over-arching effect of diversity on either productivity or stability. The realized effects will depend heavily on environmental context and the time scale over which the effects are studied. However, it has become obvious that biodiversity is indeed important for both managed and natural ecosystems, though the relative contributions of diversity and composition remain unclear. It is therefore necessary for legislators to understand the basic science in order to maintain diversity at its current levels. If current human growth and resource management patterns do not change, it is likely that we will lose many important species, and the ecosystems of the world may never recover. In present paper the various conservation strategies by government, voluntary organizations, public participation as well as the individual efforts have been discussed, that how they commutatively plays a major role for the conservation of the biodiversity.

Human is only one more of natural creatures and should not be alien to the other life-forms. We have no moral right to destroy nature and other beings that dwell on earth. We should treat all animals and plants with compassion. Every individual can make a small and yet significant effort in the race to save our planet and conserve biodiversity.

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