

Section B and C

Volume-23

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E. BIORESOURCES AND USES OF BIODIVERSITY.

India occupies only 2.4 per cent of the world's land area but its contribution to the world's biodiversity is approximately 8 per cent of the total number of species which is estimated to be 1.75 million. Of these, 126,188 have been described in India. The species recorded includes flowering plants (angiosperms), mammals, fish, birds, reptiles, and amphibians, constitutes 17.3 per cent of the total whereas nearly 60 per cent of India's bio-wealth is contributed by fungi and insects.

Based on the available data, India ranks tenth in the world and fourth in Asia in plant diversity, and ranks tenth in the number of endemic species of higher vertebrates in the world. There are ten biogeographical zones in India. They can be classified as follows:

1. Trans-Himalayas. An extension of the Tibetan Plateau, harbouring high-altitude cold desert in Laddakh (J&K) and Lahaul Spiti (H.P.) comprising 5.7 per cent of the country's landmass.
2. Himalayas. The entire mountain chain running from north-western to north-eastern India, comprising a diverse range of biotic provinces and biomes, 7.2 per cent of the Country's landmass.
3. Desert. The extremely arid area west of the Aravalli hill range, comprising both the salty desert of Gujarat and the sand desert of Rajasthan, 6.9 per cent of the country's landmass.
4. Semi-arid. The zone between the desert and the Deccan plateau, including the Aravalli hill range is 15.6 per cent of the country's landmass.
5. Western ghats. The hill ranges and plains running along the western coast line, south of the Tapi river, covering an extremely diverse range of biotic provinces and biomes. 5.8 per cent of the country's landmass.
6. Deccan peninsula. The largest of the zones, covering much of the southern and South-central plateau with a predominantly deciduous vegetation is 4.3 per cent of the country's landmass.
7. Gangetic plain. Defined by the Ganges river system, these plains are relatively homogenous and is 11 per cent of the country's landmass.
8. North-east India. The plains and non-Himalayan hill ranges of North Eastern India,

with a wide variation of vegetation and is 5.2 per cent of the country's landmass.

9. Island. The Andaman and Nicobar Islands in the Bay of Bengal, with a highly diverse set of biomes. 0.03 per cent of the country's landmass.
10. Coasts. A large coastline distributed both to the west and east, with distinct differences between the two; Lakshadweep Islands are included in this with the percent area being negligible.

Apart from the above mentioned biogeographic classification, ecosystems can also be demarcated on the basis of purely geographical or geological features, such as mountains, islands, valley, plateau, oceans, etc. On the basis of vegetative cover like forests, grasslands, mangroves, and deserts. On the basis of climatic conditions, such as arid and semi-arid areas, permanently snow covered areas, high rainfall areas; on the basis of soil characteristic and other such criteria. The main natural biomes/ecosystems are: forests, grasslands, wetlands, mangroves coral, reefs, deserts, etc.

FOREST: India is endowed with diverse forest types ranging from the tropical wet evergreen forests in North-Eastern to the tropical thorn forests in the Central and Western India.

GRASSLANDS: The diversity of grasslands in India is high ranging from semi-arid pastures of western part of the Deccan peninsula, the humid semi-waterlogged tall grassland of the Terai belt, the rolling shoal grasslands of the western ghat hilltops, and the high altitude alpine pastures of the Himalayas.

WETLANDS: Wetlands are the habitat of some of world's endangered and threatened flora and fauna. For example, the Western and Central flock of Siberian crane, one of the most endangered cranes in the world, uses Keoladeo Bird Sanctuary, Bharatpur, Rajasthan, as its winter site. Chilka lake, Orissa, is the habitat of many threatened species, such as green turtle, Hawksbill turtle, dugong, and blackbuck.

MANGROVES: Mangroves are salt-tolerant ecosystems in tropical and sub-tropical regions. In India harbours some of the best mangroves swamps in the world, located in the alluvial deltas of Ganga, Mahanadi, Godavari, Krishna and Cauveri rivers, and on the Andaman and Nicobar group of Islands. The largest stretch of mangroves in the country lies in the Sunderbans in West Bengal.

The predominant mangroves species are; *Avecennia officinalis*, *Heritiera fomes*, *Ceriops decandra*, *Rhizophora mucronata*, etc.

CORAL REEFS. The coral reef cover in Indian water is roughly estimated upto 19,000 Sq. Km. Indian coral reef are as follows:

Palk Bay and Gulf of Mannar; Gulf of Kachchh; Andaman and Nicobar Islands; Lakshdeep Islands and Central West Coast.

DESERT. Three kinds of desert are noticeable in India:

1. The sand desert of western Rajasthan and neighboring areas.
2. The vast salt desert of Gujarat.
3. The high-altitude cold desert of Jammu and Kashmir and Himachal Pradesh.

Desert fox, desert cat, houbara bustard and some sand grouse species are restricted to Thar Desert, Rajasthan.

In the Rann of Kachchh, lies the nesting ground of Flamingoes and the only known population of Asiatic wild ass.

The distinctive animals of cold desert are: Kiang (relative of wild ass of Kachchh), snow leopard, yak, Tibetan antelope, Ibex, Blue sheep, Tibetan gazelle, Woolly hare, etc.

GRADIENTS OF BIODIVERSITY

Biodiversity varies with change in latitude. When one moves from high to low latitude (i.e., from the poles to the equator), the biodiversity increases.

In the temperate region, the climate is severe having short growing period for plants. On the other hand, in tropical rain forest the conditions are favourable for growth of plants throughout the year. Favourable conditions are helpful for speciation, and large number of species develop and grow. The mean number of species of vascular plants per 0.1 ha sample area in tropical rain forests varies from 118-236, while in temperate zones, this range is 21-48 species. Such a correlation between diversity and latitude is also found for a variety of several other taxa, such as ants, birds, butterflies, moths, etc.

In the similar way, there is a decrease in species diversity from lower to higher altitudes on a mountain. Increase of 1000 metres in altitude results in a temperature drop of about 6.50 C. Such temperature drop and seasonal variability at higher altitudes are responsible for lowering the diversity. The latitudinal and altitudinal gradients of species diversity are two master gradients. To some extent regional and taxa related gradients also affect biodiversity. It is

expected that prevalence of more complex and heterogeneous environment makes the flora and fauna more diverse and complex.

FORESTS

The forest is 'a plant community predominantly of trees and other woody vegetation, usually with a closed canopy'. The word forest has been derived from the Latin 'foris' meaning outside, the reference being to a village boundary or fence, and it must have included all uncultivated and uninhabited for the diverse purpose of forestry, whether covered with trees, shrubs, climbers, lianas, etc. or not. The Indian word 'jungle' has been adopted in the English language to describe a collection of trees, shrubs, etc., that are not grown in a regular manner. Forests are a very striking feature of the land surface. They vary greatly in composition and density and stand in marked contrast with meadows and pastures. Certain forests are evergreen, like the Deodar forest of Kashmir and Himachal Pradesh, while others are deciduous, becoming leafless either before the advent of winter when vegetative activity almost ceases, such as the oak forests of the Himalayas, or else just before the onset of intense dry summer, to reduce transpiration to the minimum, like the teak forests of Madhya Pradesh.

IMPORTANCE OF FORESTS

The forests of a country make a natural asset of immense value. Unlike its mineral resources, including fossil fuels, which in course of time will either get exhausted or their utilization will become uneconomic due to increased costs for obtaining and processing them, the forests, if of adequate extent ideally dispersed, scientifically managed, and judiciously utilized can be kept perpetually productive and useful, conferring many benefits, direct and indirect, on the people. Deforestation is the main cause of soil erosion. The floods, drought and loss of precious wild life are also due to deforestation. Thus the economy of the country and quality of life of weaker section of society have been much deteriorated. In this country, particularly in the Himalayan region, shortage of fire wood and water has been causing great misery to the womenfolk. They have to spend the whole day in the collection of fuel wood for cooking the meals of the day. It is thought that time is not far when the cost of food would be lesser than the cost of fuel to cook it.

AFFORESTATION. As there is a general shortage of forests and as wood is a bulky commodity which cannot be transported to a long distance, it would be desirable to develop forests on all the wastelands. Afforestation is also needed for minimizing soil runoff and for aesthetic and hygienic reasons. The technique to be adopted for this purpose varies according to...