Introduction to Environmental Studies

B. Tech 3rd Semester

BIODIVERSITY (PART-1)

Department: Chemistry
Subject: IES (CHM2041)

Contents

- What is Biodiversity
- Types of Biodiversity
- Values of Biodiversity
- Global Biodiversity
- Biodiversity in India
- Hot spot Biodiversity

What is Biodiversity

- The term Biodiversity was first coined by Walter G. Rosen in 1986.
- The word Biodiversity originates from the Greek word BIOS = LIFE and Latin word DIVERSITAS = VARIETY or DIFFERENCE.
- The whole word BIO DIVERSITY generally therefore means: VARIETY OF LIFE.
- Biodiversity is the degree of variation of life. It is a measure of the variety of organisms present in different ecosystems.

Biodiversity: It is concerned with the variety of individuals within populations, the diversity of species within communities, and the range of ecological roles within ecosystems

Types of Biodiversity

1) Species biodiversity, 2) Genetic biodiversity, 3) Ecosystem biodiversity

1. Species Biodiversity:

i) Refers to the variety of species within a community in a region.

ii) It an index represents species richness and their abundance in a community.

ii) At present, about 1.8 million species on Earth.

iii) India is among the world's 15 Nations that are exceptionally rich in species diversity.

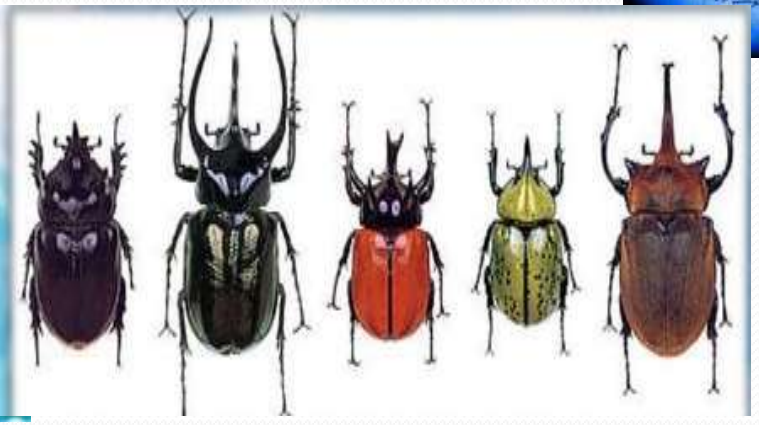
It is the variety of different species in a given area/Communities

Types of Biodiversity

2. *Genetic Biodiversity*: It may be defined as variability in genes of a particular species in a population

Recombination of gene (DNA) gives rise to some new variety

Each member of any plant and animals species differ from others due to genetic recombination.



All rice, dog, insect varieties, on colour, size , shape etc

Today the new varieties created By genetically **manipulation** of DNA

i) Disease resistant, Drought resistance crops

ii) Breed superior domestic animals (high yield Caws, plants)

iii) Better medicines and a variety of industrial products are also developed.

Types of Biodiversity

(3) Ecosystem Biodiversity:

Ecosystem: Integration of biotic and abiotic components of a particular environment and their interaction with each other

i) This is the diversity of ecological complexity showing variations in ecological tropic structure, food chain food-webs, nutrient cycling resulted different variety of Ecosystem.

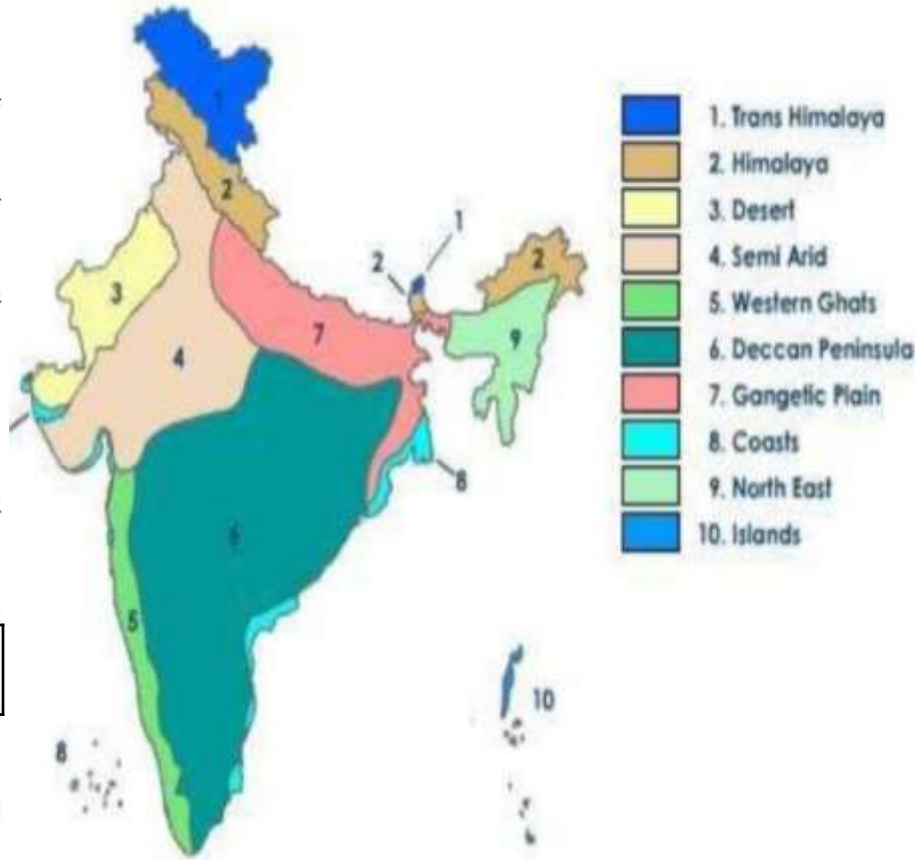
ii) variations is caused by change in physical parameters like hydrosphere, atmosphere, and lithosphere, moisture, temperature, altitude, precipitation etc.

E.g. Forest, Grassland, Desert, Pond ecosystems.

Biogeographic Classification of India

Sr. No.	Biogeographic Zone	Biotic Province	Total area (Sq. Km.)
1.	Trans-Himalayan	Upper Regions	186200
2.	Himalayan	North-West Himalayas West Himalayas Central Himalayas East Himalayas	6900 720000 123000 83000
3.	Desert	Kutch Thar Ladakh	45000 180000 NA
4.	Semi-Arid	Central India Gujarat-Rajwara	107600 400400
5.	Western Ghats	Malabar Coast Western Ghat Mountains	59700 99300
6.	Deccan Peninsula	Deccan Plateau South Central Plateau Eastern Plateau Chhota Nagpur Central Highlands	378000 341000 198000 217000 287000
7.	Gangetic Plain	Upper Gangetic Plain Lower Gangetic Plain	206400 153000
8	Coast	East coast and waste coast	6500 6500
9	North-East India	Brahmaputra Valley North-Eastern Hills	65200 106200
10	Islands	Andaman Islands Nicobar Islands Lakshadweep Islands	6397 1930 180

India is divided in to 10 major regions based on geography, climate, vegetation pattern, mammals, birds, reptiles, amphibians, insects and other invertebrates present in them.



Source: .Conserving our Biological Wealth., WWF for Nature-India and Zoological Survey of India.

Values of Biodiversity

1. Direct values (Consumptive uses)

- Food, fuel, medicines for local community –forest ecosystem.
- Food: Fish, other edible aquatic plants and animals – Marine resources
- Medicines

Quinine for malaria from the bark of Cinchona tree,

Vinblastin and vincristine, two anticancer drugs, from Catharanthus roses plant

2. Productive use value: These are the commercially usable values where the product is marketed and sold.

Animal products: like tusks of elephants, musk from musk deer, silk from silk-worm, wool from sheep, fir of many animals, lac from lac insects etc

- Pharmacist – New and better drugs/medicines
- Raw material for Industry – the paper and pulp industry, Plywood industry, Railway sleeper industry, Silk industry, textile industry, leather industry
- Agricultural – Developing new crops Better crops with plant breeding

Values of Biodiversity

3. Social Values: Preserved as valuable resource many sacred and holy plants like- based on religion worship: Tulsi, Peepal, and animals like Cow.

4. Ethical and Moral values: Ethical responsibility to protect all life forms.

- Preservation of nature through local traditions.
- Conservation of biodiversity & economic importance.

5. Aesthetic Values: Preservation of its inherent value, beauty, aesthetics and creativity for tourist attraction.

- Indian mythology eulogies animals like elephant, snake and cow.
- No visit to barren land but to enriched biodiversity promote eco- turism Industry.

6. Option Value: Keeping future possibilities open for their use is called the option value. In nature many thing yet to explore, plant , microorganism.

- The preservation of biodiversity must also include traditionally used strains already in existence in crops and domestic animals.

Indian Biodiversity

- India has a rich biological diversity of flora and fauna.
- Overall 6% of the global species are found in India.
- India ranks 10th among the plant rich countries of the world,
- 11th in terms of number of endemic species of higher vertebrates
- 6th among the centers of diversity and origin of agricultural crops.
- The total number of living species identified in our country is 150,000.
- Out of a total of 36 biodiversity hot-spots in the world, India possesses 04

1) Himalayas
2) the Western Ghats
3) Indo-Burma
4) Sundaland (Nicobar Islands)

INDIA AS A MEGA-DIVERSITY NATION

- India is one of the 12 mega-diversity countries in the world.
- The Ministry of Environment and Forests, Govt. of India (2000) records
- 47,000 species of plants (7% of world)and 4th in Asia
- 81,000 species of animals (6.5% of world).

350 mammal species – 8th in the world

1200 bird species – 8th in the world

453 reptile species -5th in the world

45,000 plant species – 15th in the world

Endemism: Species which are restricted only to a particular area are known as endemic.

INDIA AS A MEGA-DIVERSITY NATION

18% Indian plants are endemic to the country and found nowhere in the world

62% amphibians are endemic

50% of the lizards are endemic

Gene banks have collected
- 34,000 cereals
- 22,000 pulses
- 27 breeds of cattle
- 40 breeds of sheep
- 22 breeds of goat
- 8 breeds of buffalos

Many of these are dying out due to misguided adoption of all foreign things.

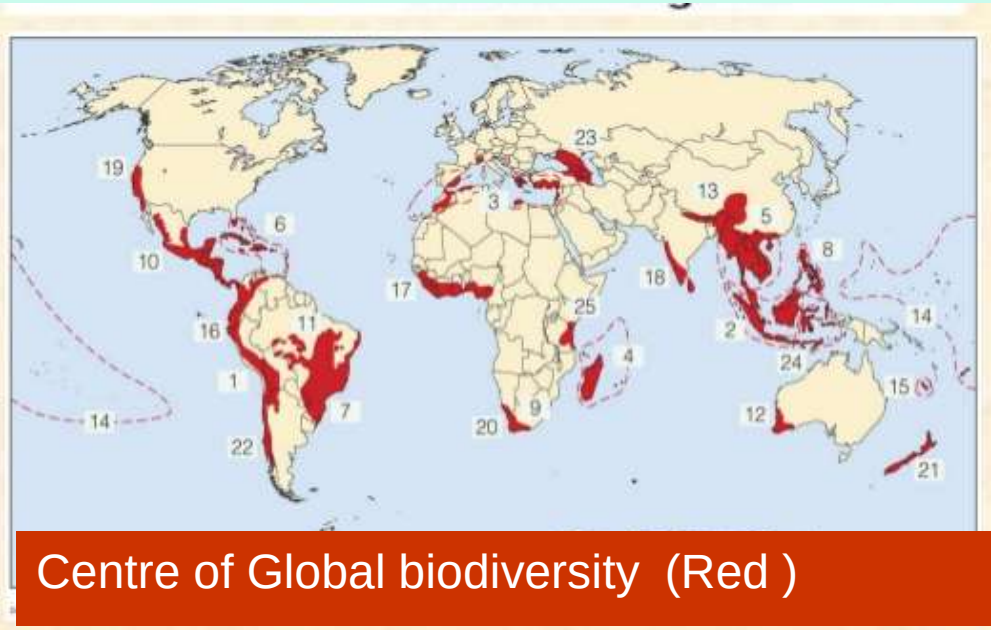
- MOEF is the nodal agency for implementation of CBD in India.
- National Biodiversity Action Plan (NBAP) was formulated in 2007

INDIA AS A MEGA-DIVERSITY NATION

- **Center of origin:**. Nearly 5000 species of flowering plants had their origin in India.
- center of origin of 166 species of crop plants and 320 species of wild relatives of cultivated crops,
- **Marine diversity:** Along 7500 km long coastline
- More than 340 species of corals. rich in mollusks, crustaceans (crabs etc.),
- Several species of Mangrove plants and sea grasses (Marine algae).
- 93 major wet lands, coral reefs and mangroves need to be studied
- Indian forests cover 64.01 million hectares having a rich biodiversity of plants in the Trans-Himalayan, north-west, west, central and eastern Himalayan forests, western ghats, coasts, deserts, Gangetic plains, deccan plateau and the Andaman, Nicobar and Lakshadweep islands.

HOT SPOTS OF BIODIVERSITY

- Areas which exhibit high species richness & high species endemism are termed as hot spots of biodiversity.
- 36hot spots in world and 04 in India
- Eastern Himalayas, & Western Ghats
- · Hotspots covering less than 2% of the worlds land area contain 50% of the terrestrial biodiversity



Centre of Global biodiversity (Red)

- About 40% of terrestrial plants and 25% of vertebrate species are endemic and found in these hotspots.
- **Major hot spot in world** i) Tropical rain forests ii)Western Amazon, iii) Madagascar, iv)North and East Borneo, v) North Eastern Australia, vi) West Africa vii) Brazilian Atlantic forests.

HOT SOPT BIODIVERSITY IN INDIA

- 1. Indo-Burma region (covering Sikkim Eastern Himalayas)
- Sikkim rich in endemic plant species. Area of 7298 Km^2 of about 4250 plant species are found of which 60% are endemic.
- Sapria himalayana, aparasitic angiosperm was sighted only twice in this region in the last 70 years.

- Cradle of flowering plants.
- Out of the world's recorded flora 30% are endemic to India of which 35,000 are in the Himalayas.

HOT SOPT BIODIVERSITY IN INDIA

(2) Western Ghats: It extends along a 17,000 Km² strip of forests in Maharashtra, Karnataka, TN & Kerala

- 40% of the total endemic plant species.
- 62% amphibians and 50% lizards are endemic
- 500 m elevation covering 20% of evergreen forest while those in 500-1500 m range are semievergreen.
- Major centers of diversity are Agastyamalai Hills and
- Silent Valley. the New Amambalam Reserve Basin

Ternstroemia japonica

Endemic plant and animals in western ghat:
Ternstroemia japonica, Rhododendron and Hypericum
Fairy blue bird, lizard hawk etc.

Fairy blue bird

However, only 6.8% of the original forests are existing today while the rest has been deforested

Thank You