

BIODIVERSITY

SYNOPSIS:

- The variety of life on earth is known as biodiversity/biological diversity.
 - Edward Wilson popularised the term biodiversity.
 - The convention for Biological diversity was opened on 5th June 1992 at UNCED (United Nations Conference on Environment and Development).
(The Rio Earth summit of 3rd -14th June, 1992)
 - The convention was implemented from 29th December 1993.
 - Year of Biodiversity -- 2010.
 - World wild life / biodiversity week --- 1st week of October.
 - World forest day -- 21st March.
 - Three levels of biodiversity are --- a) genetic b) species c) ecological.
 - Genetic diversity is the diversity or variations of the genes within a species or among different species.
 - About 10^{10} different genes are present among the world's fauna and flora.
 - Environmental variability increases genetic diversity within a species.
 - Reserpine which is useful in treating high B.P. is extracted from *Rauwolfia vomitoria*, a medicinal plant available at Himalayan region.
 - India has 1,000 varieties of mangoes and more than 50,000 different strains of rice.
 - Species diversity is the variety of species in a given area.
 - In India, greater diversity of amphibians is present in Western Ghats than that of Eastern Ghats.
 - Species richness refers to the number of species present in a particular ecosystem or habitat.
 - Species evenness refers to the relative abundance of each species, or the distribution of different species in a given area.
 - Ecological diversity or ecosystem diversity is highest level of diversity. India with different ecosystems like rain forest, deserts, mangroves, coral reefs, estuaries etc., has more diversity than some countries like Norway.
 - Whittaker proposed three indices of ecological diversity. They are alpha, beta and gamma.
 - Alpha diversity refers to diversity within a particular area, community or ecosystem. It is measured by counting the number of taxa within the ecosystem.
 - Beta diversity is the diversity between two communities. It is obtained by comparing the number of taxa unique to each of the ecosystems.
- Sorensen's similarity index:
- $$A = 2C / (S_1 + S_2)$$
- Where C = number of species common to both communities.
 S_1 = number of species of first community
 S_2 = number of species of second community.
- Gamma diversity is the measure of overall diversity of different ecosystems within an ecological region.
 - Change in species composition between areas of gamma diversity within epsilon diversity is known as Delta diversity.

- Different levels of diversity are
 - a) a leaf --- point diversity → I category
 - b) a single plant --- alpha diversity → II category
 - c) a group of plants --- gamma diversity → III category
 - d) a large forest --- epsilon diversity → IV category.
- The area with uniform environmental conditions -- Biotope
- The area bounded by natural rather than artificial boundaries --- Ecological region.
- The largest bio-geographical division based on evolutionary distribution patterns of plants and animals --- Ecozone (bio geographic realm).
- Various ecozones in the world are ---
 - 1. Australian realm
 - 2. Oriental realm (India)
 - 3. Ethiopian realm
 - 4. Palearctic realm
 - 5. Nearctic realm
 - 6. Neotropical realm
- Endemic species are the unique species present in a specific area. Areas rich in endemic species might to be sites of active speciation.
- Biodiversity is rich in tropics.
- Species richness increases from high latitudes to the low latitudes.
- Peak of species richness is present between 20° N and 30° N.
- Tropic areas at the latitudinal range of 23.5° N to 23.5° S harbour more species than temperate and polar regions.

Area	Location	Types of species
1. Columbia	Near equator	1400 species of birds
2. New York	41° N	105 species of birds
3. Green land	71° N	56 species of birds
4. Amazonian rain forest	Mid West of USA	40,000 plants; 3,000 fishes 1,300 birds; 427 mammals; 378 reptiles, 1,25,000 invertebrates

- Reasons for more species diversity at tropic regions are
 - a) Tropical latitudes have remained stable for millions of years. It causes evolutionary diversification.
 - b) Tropical environment is less seasonal, more constant and predictable.
 - c) Constant environment promotes niche specialization which leads to species diversity.
 - d) More solar energy contributes to higher productivity.
- Simpson's index 'D' represents the probability of two randomly selected members of same species present in the same habitat.
- Shannon's index 'H' is concerned about the number of species and the relative abundance of each species. It is increased either by having more unique species or by having greater species evenness.
- Species Area Relationship (SAR) explains the relationship between area and species richness.
- Paul Ehrlich explained the Rivet Popper hypothesis to explain the importance of species diversity in ecosystem.
- Biodiversity provides different food products, medicines etc.
- Amazon produces 20 % of the total O_2 in the atmosphere. So Amazon rain forests are known as lungs of planet.

- Several threats to biodiversity are invasion of non-native species, over exploitation of resources, species interdependence, habitat loss and fragmentation, erosion of barriers, pollution, mass extinction of species etc.
- Methods for the conservation of biodiversity are in-situ and ex-situ conservation.
- National parks, sanctuaries, biosphere reserves and sacred groves and lakes belong to in-situ conservation.
- Cryopreservation, in-vitro culture, gene bank are the methods in ex-situ conservation/off-site conservation.
- International Union for the Conservation of Nature and Natural Resources (IUCN) was founded in the year 1948.
- IUCN listed all the threatened species in Red Data Books. They are mainly Critically endangered, endangered, vulnerable etc.,
- Dr. Norman Myers introduced the concept of Biodiversity Hot spots. These are the areas with more biodiversity and more threatening with destruction.
- Conservation International (CI) declared 34 Biodiversity Hot spots by the year 2006.
- Salient features of Biodiversity in India
 - 3 biomes --- tropical humid forest, tropical dry/deciduous forests, Warm deserts.
 - 3 Hotspots -- Western Ghats/Sri Lanka, Indo-Burma region & Eastern Himalayan.
 - 10 Ecoregions –
 - 5 world Heritage sites of Biodiversity –
- Legislation in India.
 - a) The Indian Forest Act, 1927.
 - b) The Wildlife (Protection) Act, 1972.
 - c) The Forest Conservation Act, 1980.
 - d) The Air Act, 1980.
 - e) The Environment(Protection) Act, 1986.
- India has only 2.4 % of the world's land area. But its share of the global species diversity is 8.1 %.
- India is one of the 12 mega diversity countries in the world.