

CORE COURSE-8; PLANT GEOGRAPHY, ECOLOGY AND EVOLUTION (BOT-A-CC-4-8-TH)

Topic: 4: Conservation of Biodiversity

Syllabus: 4.1. Level of Biodiversity: genetic, species & ecosystem diversity

Definition: “Biodiversity refers to the variety and variability among living organisms, the ecological complexes in which they occur and the way they interact with each other and the environment.”

Coined by: The term **biodiversity** was coined by Walter G. Rosen in 1985.

Levels of biodiversity: Biodiversity deals with the variety of living organisms found in the biosphere. Theoretically this variability can be observed at three levels. But all three are intertwined in such a way that practically it is impossible to separate.

(A) Genetic Diversity: Genetic diversity deals with the variation of genes within a species between individuals of a population or between different population groups of the same species.

Genes, made of DNA, are the building blocks that determine how an organism will develop and what its traits and abilities will be. This level of diversity can differ by alleles (different variants of the same gene, such as blue or brown eyes), by entire genes (which determine traits, such as the ability to metabolize a particular substance), or by units larger than genes such as chromosomal structure.

India being one of the 12 mega-diversity countries possesses rich genetic diversity.

(B) Species Diversity: Species diversity deals with the variety of living species in defined geographical area i.e., species richness or species abundance. Equatorial region is species rich region.

India ranks 10th in the world and 4th in Asia in plant diversity and ranks 10th in the number of mammalian species and 11th in the number of endemic species of higher vertebrates in the world.

Species diversity may be measured using the following characteristics:

1. **Species richness** - the number of species within a particular sample area.
2. **Species evenness** - this refers to the evenness in number of individuals of each species in the area. It represents equitability of species as given by their relative abundance.
3. **Relative abundance of species of various categories** – It is indicated by the total number of individuals of a species in an area. The categories might include size classes, trophic levels, taxonomic groups, or morphological types.

(C) Ecosystem diversity: Ecosystem diversity deals with the difference between ecosystem types, including the habitat diversity and ecological processes in an ecosystem type. Patterns of energy flow, water and nutrient cycle, succession, competition, mutualism etc. are distinct in each ecosystem. This is the number of species in a community of organisation in a particular habitat. It also represents the collective response of species to different environmental conditions.

Ecosystem diversity deals with species distributions and community patterns, the role and function of key species, and combines species functions and interactions. The term "ecosystem" here represents all levels greater than species: associations, communities, ecosystems, and the like.

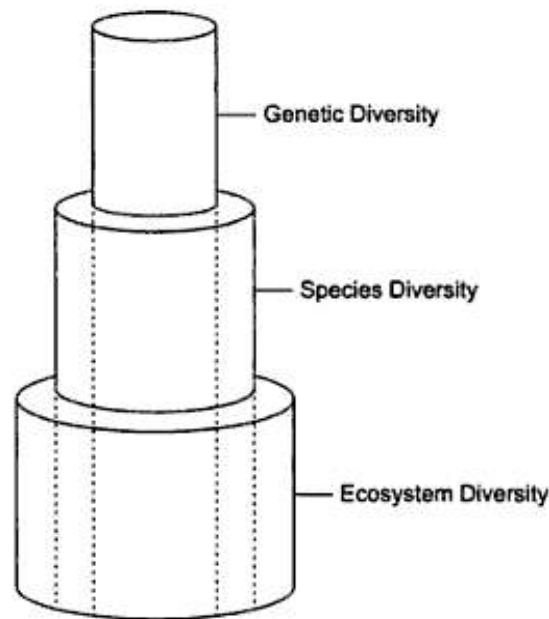


Fig. 1.1 The three hierarchical scales of biodiversity and their interrelationships (adapted from di Castri and Younés 1996)