

# BIODIVERSITY

( Genetic, Species & Ecosystem diversity )

[ SHORT ANSWER TYPE TOPICS ]

MBOTCC-8  
Unit- I

M.Sc. Sem-II  
(2018-20)

## Basic concept:

Biodiversity is a portmanteau word by blending the sounds and meanings of biological and diversity words together. Thus biological diversity or biodiversity refers to the whole range of variability among living organisms, including those inhabiting terrestrial, freshwater and aquatic environments which they are part of. This may include local biodiversity, habitat biodiversity and the global biodiversity. Biodiversity is usually explored at three levels of the biological hierarchy - genetic diversity, species diversity and ecosystem (or ecological) diversity. These three levels of biodiversity work together to give rise to the complexity of life on the planet earth. Human society largely depends on biological resources, and diversity of these resources and of the ecosystems sustain life on the earth. Thus, biodiversity, besides its ecological significance, ~~provides~~ <sup>has</sup> socio-economic and ~~social~~ <sup>public</sup> implications as well. Thus, biodiversity represents the sum of all the genes, varieties, species and populations in different ecosystems and their relative abundance. Loss of biodiversity implies erosion of biological resources leading to a variety of adverse implications on the sustainability of life and its well being.

## GENETIC DIVERSITY:

(i) Every individual of a plant or animal species has a definite genetic make up on account of its own specialized DNA composition. It differs from other individuals

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(2)  
in its genetic constitution.

(ii) Genes present in the organisms can form infinite number of combinations which leads to genetic variability/diversity.

(iii) Genetic diversity in the different species including those found in the wild species ~~have been~~ are known to have evolved through millions of evolutionary journey.

(iv) Loss of genetic variability affects healthy inbreeding populations, which may in the long run lead to extinction of the species.

(v) Continuous genetic recombinations occur in every sexual cycle of a species leading to new combinations of genes.

(vi) Loss of a definite genetic element from an individual cannot be substituted artificially through any means. Thus, it becomes important to save every gene of an individual of a species.

(vii) Conservation of genetic diversity can be done through a number of in situ and ex situ conservation practices developed and followed worldwide today. In situ methods include Sanctuaries, Protected Areas, Biological Parks, Wild Life Reserves, etc. while, <sup>prevalent</sup> ex situ methods include gene banks, endosperm bank, Embryo bank, Protoplast banks, etc.

(viii) National Bureau of Plant Genetic Resources (NBPGR) located at IARI, New Delhi has conserved thousands of gene accessions.

~~CONSERVATION~~  
(ix) The diversity of species within a particular area expressed by the number of species (species richness) present there is called  $\alpha$  (Alpha) diversity.  $\beta$  (Beta) diversity is the difference in diversity of species between two or more ecosystems in an area. Regional-scale species diversity is called  $\gamma$  (gamma) diversity.

(3)

(X) Shannon-Wiener index is the most common method of measuring biodiversity.

### SPECIES DIVERSITY:

(i) Species is the lowermost rank in the taxonomic hierarchy and is understood as a group of similar individuals which can and actually interbreed to produce offspring and share a common lineage.

(ii) Species diversity refers to the biodiversity existing at the species level which includes the diversity and abundance of different kinds of variations among the individuals of the species.

(iii) It shows the total number and relative abundance of species that are present in a particular community.

(iv) Species diversity may be studied at the local level or for a particular habitat or even nationally and globally.

(v) It must cover all the species of plants, animals, bacteria, viruses, fungi, algal, bryophytes, pteridophytes, gymnosperms and angiosperms. All kinds and categories of animals also form a part of species diversity.

(v) Areas with a climatic balance, such as moderate temperature, proper light and adequate precipitation exhibit a high level of species richness.

(vi) It is commonly observed that tropical climate supports more diverse plant and animal communities than the desert or polar areas.

(vii) Hotspots of biodiversity include those areas or localities which have abundance of species diversity.

There are four major biodiversity hotspots in India which include The Himalayas, Indo-Burma Region, The Western Ghats and Sundaland (lies in South East Asia).

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## ECOSYSTEM DIVERSITY (= Ecological Diversity)

(i) Ecosystem is a balanced ecological system in a particular habitat or area which comprises varieties of living ~~and~~ species (plants, animals and microbes) found in a dynamic equilibrium with constantly working network of materials and energy cycling.

(ii) Sun is the principal source of energy for all ecosystems.

(iii) ~~Biotic and abiotic~~ components of an ecosystem show the species richness of a particular kind and all ~~types~~ of ecosystems have their own diversity of species composition.

(iv) Ecosystem diversity refers to the variability among the species of producers, consumers and decomposers in an ecosystem.

This includes diversity in the same species as well as in different species.

(v) Obviously, ecosystem diversity pertains to the ~~the~~ floristic and faunistic richness as well as that of microbial populations found in the ecosystem.

(vi) Species richness of the biosphere is determined by the variations of life forms in different ecosystems existing on the planet.

(vii) Grasslands, forests, semi-arid deserts, marine & freshwater, ~~ecosystems~~ swampy marshlands - all of these have their distinct floral, faunal and microbial components.

(viii) Intricate network of variety of species in an ecosystem and the dynamic interaction among them is the ecological or ecosystem diversity.

(viii) A study of ecosystem diversity indicates the potential of sustainability of the variety of life forms and its futuristic impact assessment of the biosphere.

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