Topics Covered In Biodiversity And Conservation

Biodiversity

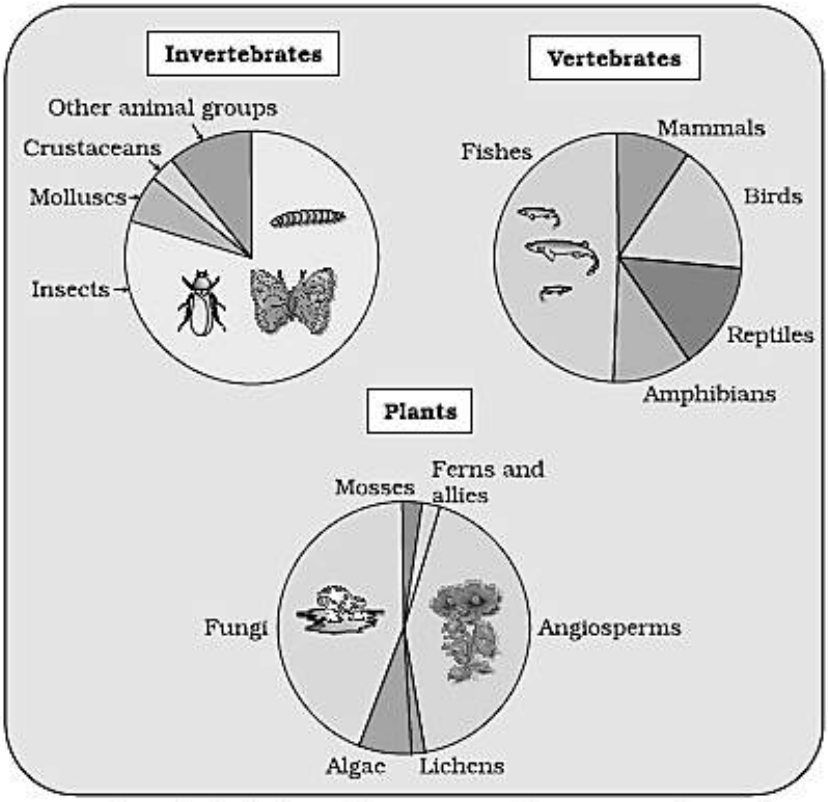
Biodiversity Conservation

Introduction To The Chapter

The term 'biodiversity' was popularized by the sociobiologist Edward Wilson to describe the combined diversity at all the levels of biological organization. Most important ones are:

- Genetic diversity - a single species may show high diversity at the genetic level over its distributional range. Example - the genetic variation shown by Rauwolfia vomitoria (medicinal plant)
- Species diversity - diversity observed at the species level. Example - Western ghat has a greater amphibian species compared to Eastern ghats
- Ecological diversity - greater diversity observed at the ecosystem level in India compared to that in Norway with its deserts, mangroves, rain forests etc.

The number of fungal species in the world is more than the combined total of the species of fishes, amphibians, reptiles and mammals. The figure below depicts biodiversity showing species number of major taxa.



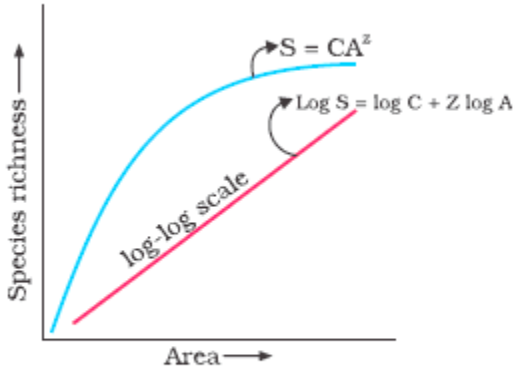
Representing global diversity: proportionate number of species of major taxa of plants, invertebrates and vertebrates

Patterns Of Biodiversity

1. Latitudinal gradients - species diversity decreases as we move away from the equator towards the poles. The different hypothesis around tropics which may account for their greater biological diversity are as follows:

- Speciation is generally a function of time, unlike temperate regions subjected to frequent glaciations in the past, tropical latitudes have remained relatively undisturbed for millions of years and thus, had a long evolutionary time for species diversification
- Tropical environments, unlike temperate ones, are less seasonal, relatively more constant and predictable. Such constant environments promote niche specialisation and lead to greater species diversity and
- There is more solar energy available in the tropics, which contributes to higher productivity; this in turn might contribute indirectly to greater diversity.

2. Species-Area relationships - The relation between species richness and area for a wide variety of taxa turns out to be a rectangular hyperbola. The diagram depicts the same.



Showing species area relationship. Note that on log scale the relationship becomes linear

On a logarithmic scale, the relationship is a straight line described by the equation
log S = log C + Z log A
where

S= Species richness A= Area
Z = slope of the line (regression coefficient)
C = Y-intercept

Loss Of Biodiversity

Loss of biodiversity in a region can lead to

- Decline in plant production
- Lowered resistance to environmental perturbations such as drought
- Increased variability in certain ecosystem processes such as plant productivity, water use and pest and disease cycles

Causes of Biodiversity losses:

- Habitat loss and fragmentation
- Over-exploitation
- Alien species invasions
- Co-extinctions

Biodiversity Conservations

Biodiversity can be conserved with these two basic methodologies:

- In situ conservation - it involves the protection and conservation of a variety of animals and plant species in its natural habitat. It includes biosphere reserves, hot spots regions, national parks and sanctuaries, wild forests etc

- Ex situ conservation - it involves protection and conservation of rare species of animals and plants outside their habitats. This conservation includes national parks, zoological parks, botanical gardens, glass houses etc. Different biotechnological applications and other techniques are used to store sperms, eggs, animal cells, tissues and embryos for a longer duration.