

Learn the key concepts of Science topic - Ecological succession

Today in biology section, we will be dealing with nutrient immobilization, ecological succession, biodiversity. So, dive deep and learn some most interesting facts about these topics.

Nutrient immobilization

In the process of decomposition, some nutrients get tied up with the biomass of microbes and become temporarily unavailable to other organisms. Such incorporation of nutrients in living microbes (bacteria & fungi) is called nutrient immobilization.

(A) Carbon Cycle:

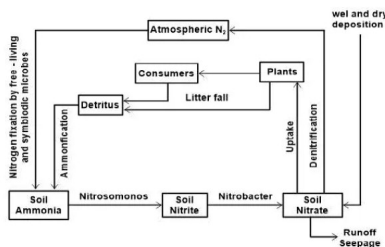
Carbon is present in the lithosphere in the form of coal and petroleum. The carbon released from them is found in the atmosphere in the form of carbon dioxide. Autotrophs utilize CO_2 , from the air to synthesize food materials which are obtained by other organisms as food. Carnivores obtain their organic food from the herbivores. These organic matter produce CO_2 , through the oxidation or respiration which dissolves in the air or water and again utilized by the plant

(B) Phosphorus Cycle:

Phosphorus is the main constituent of protoplasm, plasma membrane, bones and teeth. Main source of phosphorus is rocks. It comes from the weathering of phosphorus containing rocks in the soil. Plants absorb this phosphorus from the soil and transfer this phosphate to animals and after the death of animals it is released again into the lithosphere by the action of decomposers. Sometimes some of the elements like phosphorus and calcium reach into the sea through water from where they transform into rocks. They separate from the cycle for a long time so it is also known as the sedimentary cycle. But when these rocks break after sometime then this phosphorus is again made available to the sea plant or sea weeds, which pass into fish and sea birds. The excretory materials of birds on the rocks of the sea shore is called Guano and it is a source of phosphorus.

Note: Plants absorb phosphate from the soil in the form of orthophosphate.

(C) Nitrogen Cycle:



Ecological succession

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The gradual and fairly predictable change in the species composition of a given area is called ecological succession.

- **Pioneer community:** The community that invades a bare area is called pioneer community.
- **Seral communities:** The entire sequence of communities that successively change in a given area are called sere(s). In the successive seral stages there is a change in the diversity of species of organisms, increase in the number of species and organisms as well as an increase in the total biomass.

Types of succession

On the basis of the area on which succession occurs, it is of two types- Primary and Secondary:

(i) Primary Succession: It starts where no living organisms are there-these could be areas where no living organisms ever existed e.g. newly cooled lava, bare rock, newly created pond or reservoir. The establishment of a new biotic community is generally slow. Before a biotic community of diverse organisms can become established, there must be soil. Depending mostly on the climate, it takes natural processes several hundred to several thousand years to produce fertile soil on bare rock.

(ii) Secondary Succession: Secondary succession begins in areas where natural biotic communities have been destroyed such as in abandoned farm lands, burned or cut forests, lands that have been flooded. Since some soil or sediment is present, succession is faster than primary succession. The species that invade depend on the condition of the soil, availability of water, the environment as also the seeds or other propagules present. Since soil is already there, the rate of succession is much faster and hence, climax is also reached more quickly.

Based on the nature of the habitat-whether it is water (or very wet areas) or it is on very dry areas-succession of plants is called hydrarch or xerarch, respectively. As against this, xerarch succession takes place in dry areas and the series progress from seric to mesic conditions. Hence, both hydrarch and xerarch succession lead to medium water conditions (mesic)-neither too dry (xeric) nor too wet (hydric).

Biodiversity

The combined diversity at all levels of biological organization ranging from biomacromolecules to biomes is known as biodiversity or **heterogeneity**.

Loss of Biodiversity:

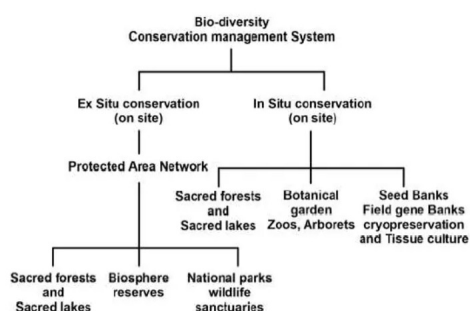
- The biodiversity has been declining rapidly due to human activities.
- The IUCN Red List (2004) documents the extinction of 784 species (including 338 vertebrates, 359 Invertebrates and 87 plants) in the last 500 years.
- The last twenty years alone have witnessed the disappearance of 27 species.
- Some examples of recent extinctions include the Dodo (Mauritius), Quagga (Africa), Thylacine (Australia), Steller's Sea Cow (Russia) and three subspecies (Ball, Javan, Caspian) of Tiger.

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Causes of biodiversity loss:

1. Habitat loss and fragmentation
2. Over-exploitation
3. Alien Species Invasions
4. Co-extinctions

Biodiversity Conservation:



(A) Ex-Situ Conservation: In this approach, threatened animals and plants are taken out from their natural habitat and placed in a special setting where they can be protected and given special care. Zoological parks, botanical gardens and wildlife safari parks serve this purpose. There are many animals that have become extinct in the wild but continue to be maintained in zoological parks. Other examples of exsitu conservation are gene banks, germplasm banks, seed banks. Gametes of threatened species can be preserved in viable and fertile condition for long periods using cryopreservation techniques, eggs can be fertilized in vitro, and plants can be propagated using tissue culture methods. Seeds of different genetic strains of commercially important plants can be kept for long periods in seed banks.

(B) In-situ conservation: It is the protection of species in their natural habitat by making their habitats protected areas for example- National park, Sanctuaries, Biosphere Reserves etc.

National Park: They are areas maintained by the government and reserved for the betterment of wildlife. Cultivation, grazing, forestry and habitat manipulation are not allowed.

Sanctuaries: They are tracts of land with or without lakes where wild animals/fauna can take refuge without being hunted. Other activities like collection of forest products, harvesting of timber, private ownership of land, tilling of land, etc. are allowed.

Biosphere Reserves: They are multipurpose protected areas which are meant for preserving genetic diversity in representative ecosystems of various natural biomes and unique biological communities. by protecting wild populations, traditional lifestyle of tribals and domesticated plant/animal genetic resources. It is a specified protected area in which multiple use of the land is permitted.



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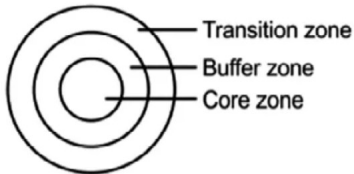
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There are 3 zones in a Biosphere Reserve



1. **Core Zone:** It lies at the center where no human activity is allowed.
2. **The Buffer zone:** Where limited human activity is allowed.
3. **Manipulating zone or Transition zone:** Where a large number of human activities would go on.

Hence by studying ecology we got to know about general ecosystems, our biodiversity, different flora and fauna, their habitat and interaction among themselves and environment etc. In the next blog we will learn about Human Physiology and its important components. We will learn the mechanism of different systems of human body and their pivotal role in human body. So, stay tuned with us.