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NAAC ACCREDITED 'A' GRADE



Topic: Biodiversity

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BIODIVERSITY - DEFINITION

The number and variety of plants, animals and other organisms that exist in an ecosystem is known as biodiversity. It is a measure of the variety of organisms present in different ecosystems. The richness of biodiversity depends on the climatic conditions and area of the region. Biodiversity is the result of 3.5 billion years of evolution.

There are 3 types of biodiversity:

GENETIC DIVERSITY

Genetic diversity is the amount of variation in genetic material (DNA) within a species or within a population. The magnitude of variation in genes of a species increases with increase in size and environmental parameters of the habitat. Genetic diversity has the following importance: (i) It helps in speciation or evolution of new species; (ii) It is useful in adaptation to changes in environmental conditions; (iii) It is important for agricultural productivity and development.

SPECIES DIVERSITY

It describes the variety in the number and abundance of the species within a region. To accurately determine species diversity, both the species richness, which is the number of different species, and the relative abundance, which is the number of individuals within each species, must be considered. The species richness depends largely on climatic conditions. When a species is confined entirely to a particular area, it is termed as endemic species.

ECOSYSTEM DIVERSITY

It describes the assemblage and interaction of species living together and the physical environment of a given area. It relates varieties of habitats, biotic communities, ecological processes in biosphere. It also tells about the diversity within the ecosystem. For example, the landscapes like grasslands, deserts, mountains etc. The ecosystem diversity is due to diversity of niches, trophic levels and ecological processes like nutrient cycling, food webs, energy flow, role of dominant species and various related biotic interactions. Such type of diversity can generate more productive and stable ecosystems or communities capable of tolerating various types of stresses e.g. drought, flood etc.

BIODIVERSITY : DISTRIBUTION

Biodiversity is not evenly distributed, rather it varies greatly across the globe as well as within regions. Among other factors, the diversity of all living things (biota) depends on temperature, precipitation, altitude, soils, geography and the presence of other species. Diversity consistently measures higher in the tropics and lower in polar regions generally. Rain forests that have had wet climates for a long time, have particularly high biodiversity. Terrestrial biodiversity is thought to be up to 25 times greater than ocean biodiversity.

BIODIVERSITY HOTSPOTS

A biodiversity hotspot is a region with a high level of endemic species that has experienced great habitat loss. While hotspots are spread all over the world, the majority are forest areas and most are located in the tropics. Colombia is characterized by high biodiversity, with the highest

rate of species by area unit worldwide ' It has the largest number of endemics (species that are not found naturally anywhere else) of any country About 10% of the species of the Earth can be found in Colombia

34 biodiversity hotspots have been identified. They once covered 15.7 percent of the Earth's land surface 86 % of the hotspots' habitat has already been destroyed.The intact remnants of the hotspots now cover only 2.3 % of the Earth's land surface.

LOSS OF BIODIVERSITY

The main cause of the loss of biodiversity can be attributed to the influence of human beings on the world's ecosystem ' Escalating human population is a major cause of biodiversity loss ' Most of the biodiversity loss has happened post Industrial Revolution through human activities

SPECIES LOSS RATE

The planet has lost 52% of its biodiversity since 1970 according to a 2014 study by the World Wildlife Fund The Living Planet Report 2014 claims that "the number of mammals, birds, reptiles, amphibians and fish across the globe is, on average, about half the size it was 40 years ago' Of that number, 39% accounts for the terrestrial wildlife gone, 39% for the marine wildlife gone and 76% for the freshwater wildlife gone ' Biodiversity took the biggest hit in Latin America

CAUSES OF BIODIVERSITY LOSS

a. Alteration and loss of the habitats:

The transformation of the natural areas determines not only the loss of the vegetable species, but also a decrease in the animal species associated to them. Introduction of exotic species and genetically modified organisms: species originating from a particular area, introduced into new natural environments can lead to different forms of imbalance in the ecological equilibrium.

b. Pollution:

Human activity influences the natural environment producing negative, direct or indirect, effects that alter the flow of energy, the chemical and physical constitution of the environment and abundance of the species;

c. Climate change:

For example, heating of the Earth's surface affects biodiversity because it endangers all the species that adapted to the cold due to the latitude (the Polar species) or the altitude (mountain species).

d. Overexploitation of resources:

when the activities connected with capturing and harvesting (hunting, fishing, farming) a renewable natural resource in a particular area is excessively intense, the resource itself may become exhausted, as for example, is the case of sardines, herrings, cod, tuna and many other species that man captures without leaving enough time for the organisms to reproduce.

e. Habitat loss and degradation:

Habitat loss and degradation create the biggest single source of pressure on biodiversity worldwide. For terrestrial ecosystems, habitat loss is largely accounted for by conversion of wild lands to agriculture, which now accounts for some 30% of land globally. In some areas, it has recently been partly driven by the demand for biofuels.

IMPORTANCE OF BIODIVERSITY:

At least 40 per cent of the world's economy and 80 per cent of the needs of the poor are derived from biological resources. In addition, the richer the diversity of life, the greater the opportunity for medical discoveries, economic development, and adaptive responses to such new challenges as climate change.

Biogeographic Zones of India

1. Trans Himalaya 2. Himalaya 3. Desert 4. Semi-Arid 5. Western Ghats 6. Deccan Peninsula
Gangetic Plain 8. Coasts 9. North East 10. Islands

BIOSPHERE RESERVES in INDIA:

Biosphere reserves are areas comprising terrestrial, marine and coastal ecosystems. Each reserve promotes solutions reconciling the conservation of biodiversity with its sustainable use. Biosphere reserves are nominated by national governments and remain under the sovereign jurisdiction of the states where they are located. Their status is internationally recognized. There are 669 biosphere reserves in 120 countries, including 16 transboundary sites.

They are distributed as follows: 70 in 28 countries in Africa 30 in 11 countries in the Arab States 142 in 24 countries in Asia and the Pacific 302 in 36 countries in Europe and North America 125 in 21 countries in Latin America and the Caribbean.

ZONES IN A BIOSPHERE RESERVE:

A biosphere reserve is divided into three zones: Core, buffer and manipulation. (i) **Core Zone:** In core or natural zone human activity is not allowed. This area is legally protected and undisturbed ecosystem. (ii) **Buffer zone:** The immediate surrounding area of core zone is buffer zone. Here limited human activities like research, education and research strategy is permitted. (iii) **Manipulation zone:** Manipulation or transition zone is the outermost or peripheral area of biosphere reserve. With the cooperation of reserve management and local people several human activities like settlements, cropping, recreation, and forestry are carried out without disturbing the environment. Buffer zone has different parts like forestry, agriculture, tourism and restoration regions.

IMPORTANCE OF BIOSPHERE

1. Conservation: Biosphere reserves conserve genetic resources, species, ecosystems and landscapes without uprooting inhabitants. Rather the traditional life style and traditional resources of the local people are maintained.

2. Development: Sustainable economic, cultural, social and ecological developments are ensured.

3. Restoration: Biosphere reserve helps to rebuild any damage caused to ecosystems and habitats.

4. Education and Research: Biosphere reserve provides a lot of scientific information for specific scientific studies and research. Exchange of information on restoration, conservation and development of biosphere can be made at national and international levels.

BIODIVERSITY CONSERVATION:

Biodiversity conservation is about saving life on Earth in all its forms and keeping natural ecosystems functioning and healthy ' Conservation is of two kinds : In-situ conservation and Ex-situ conservation In-situ conservation, the conservation of species in their natural habitats, is considered the most appropriate way of conserving biodiversity. 'Conserving the areas where populations of species exist naturally is an underlying condition for the conservation of biodiversity. That's why protected areas form a central element of any national strategy to conserve biodiversity A protected area is a geographically defined area that is designated or regulated and managed to achieve specific conservation objectives. It may be set aside for the protection of biological diversity, and of natural and associated cultural resources and is managed through legal or other effective means. This includes national parks and nature reserves, sustainable use reserves (biospheres), wilderness areas and heritage sites