BIO-DIVERSITY - CLASSIFICATION, THREATS AND CONSERVATION

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Definition

Biodiversity is the sum total of all hidden and apparent variations that life on earth has produced and sustained

Features

Spatial Distribution of life

•Environmental conditions of the Earth have dominantly favored the origin, geographical spread and survival of every species.

• Human species are spread throughout the Earth while others like the penguins are restricted to much smaller geographical areas as the Antarctic region.

• Apparent differences in the way species are geographically distributed have led biologists to divide the Earth into regions of low and high biodiversity.

•The warm and wet part of the Earth that lies between the Tropic of Cancer and Tropic of Capricorn – the tropical region has the richest biodiversity.

• More than 50% of all the species of organisms that live on Earth are likely to be found within the tropical region and many of them cannot be found anywhere else in the world

Importance of Biodiversity

- Provides direct benefits like food, medicine, and energy and affords us a "life support system."
- Required for recycling of essential elements, such as carbon, oxygen and nitrogen.
- Responsible for mitigating pollution, protecting watersheds, and combating soil erosion.
- Acts as a buffer against excessive variations in weather and climate
- Protects us from catastrophic events beyond human control

The Relevance of Biodiversity has been attributed to the following areas

Biodiversity and food security

- Maintaining food production systems to feed growing population
- Breeders and farmers rely on the genetic diversity of crops and livestock to increase yields and to respond to changes in environmental conditions.
- Plant breeders, make use of wild genetic stock to develop high yielding varieties

Biodiversity and human health

- Nearly 3,00,000 to 5,00,000 species of plants, identified contain compounds that have medical applications
- Traditional medicine, relies on species of wild and cultivated plants, which are the basis of primary health care for about 80% of all people living in developing countries
- Only 2% of the 250,000 described species of vascular plants have been screened for their chemical compounds

Biodiversity and Recreation

- Biodiversity provides an array of recreational opportunities and aesthetic value
- Examples are the various tourist destinations that have been identified
- **Biodiversity across the borders**
- On a global scale, loss of biodiversity can even threaten national security.
- There are many national and international conflicts over water, land, and other natural resources.
- Such environmental conflicts often lead to mass migrations of people, strain national budgets, public infrastructure, and international relations
- Air and water pollution, rapid build up of carbon dioxide and green house gases which causes climate change are detrimental to many species, wild life and microbial life

Other consequences

- Nobody knows which organism/species gets extinct
- Rate of extinction is alarming and continues to rise with increasing human population

Classification of Biodiversity

- Genetic Diversity
- Genetic makeup of each individual in a particular species is different.
- Genetic diversity is the result of genetic variability between members of different species.
- Two individuals who are closely related have more genetic information and are thus more similar.
- Genetic diversity allows species to adapt to changing environments, making them more resilient to threats like climate change, habitat loss, and diseases.
- Plants and animals with diverse genetic traits can better withstand pests, diseases and droughts

Species Diversity

- A species' diversity is the number of species in a specific area or habitat, their relative abundance, and distribution patterns observed in both agricultural and natural ecosystems.
- High species diversity helps maintain ecosystem stability, resilience, and functionality.
- Species diversity ensures that ecosystems function properly.
- Each species plays a unique role, contributing to processes like pollination, pest control, and nutrient cycling.
- For example, pollinators like bees are crucial for the reproduction of many plants and the production of food crops
- Habitat loss and fragmentation, climate change, pollution, and human activities such as hunting and overfishing can significantly reduce species diversity.
- Effective conservation strategies, such as protecting natural habitats and restoring degraded ecosystems, are vital to maintaining ecosystem diversity

Ecosystem Diversity

- There are many different ecosystems, each with its own unique species.
- Ecosystems are different because of the diversity in their habitats.
- Ecosystem diversity can only be found in one region, country or state.
- This also includes forests and grasslands as well as deserts and mountains.
- Ecosystem diversity is vital for the provision of ecosystem services such as air and water purification, climate regulation, and nutrient cycling.
- Diverse ecosystems provide numerous services that are crucial for life on Earth.
- They help in maintaining air and water quality, regulating climate, and supporting a wide range of species and genetic diversity.
- For example, wetlands filter pollutants from water, forests regulate the climate, and coral reefs protect coastlines from erosion.
- Land-use changes, climate change, pollution, and invasive species can alter or destroy ecosystems, reducing their diversity.

Loss of Biodiversity

- Indicated by reduction in the number or abundance of a species in a habitat.
- Loss of biodiversity, can either be reversible or permanent.
- Human activities,sudden climate change are the main reason for biodiversity's decline.
- Growing population has resulted in a greater demand for natural resources and a higher level of waste generation.
- The ecological balance is maintained by the natural habitat.
- Many trees are being cut every year to build industries, highways, settlements, and other infrastructures that meet human needs.
- Hunting of wild animals for meat, killing of animals for research purposes are significant in the decline of biodiversity
- Large scale collection of medicinal plants for various laboratory purposes has led to the extinction of these species.
- Nature's calamities, such as earthquakes, floods, and forest fires, can also cause the loss of biodiversity
- Increase in carbon dioxide levels in the atmosphere, lead to climate change causing increase in ocean and land temperatures, which has adverse effects on species

Need to Conserve Biodiversity

- Involves protecting, managing, and restoring ecosystems, species, and genetic diversity.
- Crucial because it provides a wide range of ecological, economic and cultural benefits.
- Biodiversity supports ecosystem functions and services like air and water purification, nutrient cycling, and climate regulation.
- It also promotes resilience against environmental changes.

Economic Benefits:

- Provides resources for food, medicine, and raw materials.
- Supports industries like agriculture, forestry, and pharmaceuticals, and promotes ecotourism and recreation.

Cultural Benefits:

- Many cultures value biodiversity for spiritual and aesthetic reasons.
- Indigenous communities, in particular, rely on biodiversity for traditional practices and livelihoods.

Strategies for Biodiversity Conservation

In Situ Conservation:

- Protecting and managing species in their natural habitats.
- This includes creating and maintaining protected areas like national parks, wildlife sanctuaries, and biosphere reserves.

Ex Situ Conservation:

- Preserving species outside their natural habitats.
- This includes captive breeding programs, seed banks, and botanical gardens to maintain genetic diversity and prevent species extinction.

Public Awareness and Education:

- Educating people about the importance of biodiversity and promoting sustainable practices. Public support and involvement are crucial for successful conservation efforts.

Reference

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Thank You