

## **Course Syllabus:**

### **Module 1: Introduction to Biodiversity (6 hrs.)**

Biodiversity, or biological diversity, refers to the variety of life forms on Earth, encompassing the different plants, animals, microorganisms, the genetic information they contain, and the ecosystems they form. It is a key factor in the resilience and productivity of ecosystems, providing essential services like food, medicine, and clean water. Understanding biodiversity is critical to maintaining the balance of ecosystems and ensuring sustainable development. This module aims to explore the various facets of biodiversity, its significance, and the methods used to measure and conserve it.

#### **Definition and Types of Biodiversity (Genetic, Species, Ecosystem)**

Biodiversity can be categorized into three main types: genetic, species, and ecosystem diversity. **Genetic diversity** refers to the variation in genes within a species, providing the raw material for adaptation and evolution. **Species diversity** is the variety of species within a particular region, contributing to the richness of life forms. **Ecosystem diversity** involves the variety of ecosystems in a specific area, including their biological communities and the interactions among them. Together, these levels of biodiversity ensure the stability and resilience of ecosystems, enabling them to withstand environmental changes and disturbances.

#### **Importance of Biodiversity in Ecosystems**

Biodiversity is fundamental to the health and functioning of ecosystems. It enhances ecosystem productivity, where each species, no matter how small, has an important role to play. High biodiversity ensures a variety of crops, promotes soil fertility, and supports the natural processes of pollination and pest control. Moreover, it provides resilience against environmental changes and disturbances, such as climate change and natural disasters. In essence, biodiversity is the foundation of ecosystem services that sustain human life and the planet's natural balance.

#### **Biodiversity Hotspots: Global and Indian Perspectives**

Biodiversity hotspots are regions with exceptionally high levels of species diversity, many of which are endemic, meaning they are found nowhere else on Earth. These areas are also under significant threat from human activities. Globally, there are 36 recognized biodiversity hotspots, including the Amazon rainforest, the Congo Basin, and the Coral Triangle. India, with its diverse climate and geography, is home to four biodiversity hotspots: the Himalayas, the Western Ghats, the Indo-Burma region, and the Sundaland (which includes the Nicobar Islands). These regions are critical for conservation efforts due to their rich species diversity and the unique ecosystems they harbor.



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## "Biodiversity and conservation."

Essay-type questions.

- 1) Discuss the various threats to biodiversity and suggest measures to mitigate them.

A Threats to biodiversity are numerous and interconnected, posing significant risks to ecosystems and species worldwide. Key threats include habitat loss and fragmentation, often caused by deforestation, urbanization, and agricultural expansion, which reduce the living space for species and disrupt ecological processes. Pollution, including plastic waste and chemicals, overexploitation faster than they can recover. Invasive species introduced by human activity can outcompete native species, leading to decline or extinctions. Disease can also spread more rapidly in disrupted or fragmented habitats. To mitigate these threats, several measures can be implemented. Habitat protection and restoration are crucial, including establishing protected areas and wildlife corridors that connect fragmented habitats. Biosecurity measures can prevent the introduction and spread of invasive species. Lastly,



Indigenous and local communities take lead in managing and protecting their lands and resources. These areas often support high levels of biodiversity and provide critical habitats for endangered species. Such areas are often threatened by poaching or deforestation.

Overall, community participation enhances the effectiveness of biodiversity conservation by integrating local needs and knowledge,

① Promoting sustainable practices and ensuring that conservation efforts are socially and culturally appropriate.

### Short Answers :-

② What are biodiversity hotspots? Discuss their significance.

A) Biodiversity hotspots are regions that are rich in endemic species but are also highly threatened by human activities. To be classified as a hotspot, a region must have at least 1,500 endemic vascular plants and have lost 70% or more of its original habitat as they harbor

Species that are not found anywhere else. Protecting these regions, also preserves ecosystem services that are vital for human well-being, such as carbon storage and water filtration.

Describe the role of zoos in ex-situ conservation.

Zoos play a vital role in ex-situ conservation by providing a sanctuary for endangered species and maintaining genetic diversity through captive breeding programs. Zoos also contribute to conservation research, helping to develop strategies for species recovery and habitat restoration. Their efforts are most effective when combined with in-situ conservation, which focuses on protecting species in their natural environments. In this way, zoos complement broader conservation efforts to preserve the planet's biodiversity.