Module 3: Biodiversity and its Conservation - Detailed Notes

These notes cover all important topics of Module 3: Biodiversity and its Conservation for Energy & Environmental Engineering (EEES/ES-301).

1. Introduction to Biodiversity

Biodiversity refers to the variety and variability of living organisms on Earth.

It includes diversity among plants, animals and microorganisms.

Importance of biodiversity:
- Maintains ecological balance
- Provides food and medicine
- Supports ecosystem services

2. Types of Biodiversity

1. Genetic Diversity:
Variation of genes within species.
Example: Different varieties of rice.

2. Species Diversity:
Variety of species in an ecosystem.
Example: Different animal and plant species in forests.

3. Ecosystem Diversity:
Variety of ecosystems in a region.
Example: Forests, deserts, oceans and grasslands.

3. Bio-Geographical Classification of India

India is divided into different bio-geographical zones due to varied climate and geography.

Major zones:
- Himalayan Region
- Desert Region
- Western Ghats
- Deccan Plateau
- Coastal Region
- North-East Region

India has rich biodiversity because of these varied regions.

4. Values of Biodiversity

1. Consumptive Use Value:
Direct use such as food, firewood and medicines.

2. Productive Use Value:
Commercial products obtained from biodiversity.
Example: Silk, wool, timber.

3. Social Value:
Associated with culture and traditions.

4. Ethical Value:
Every species has a right to exist.

5. Aesthetic Value:
Beauty of nature and recreation.

6. Option Value:
Potential future use of biodiversity.

5. Biodiversity at Global, National and Local Levels

Global Level:
Biodiversity across the world.

National Level:
Biodiversity within a country.

Local Level:
Biodiversity within local ecosystems such as ponds or forests.

India is one of the richest countries in biodiversity.

6. India as a Mega-Diversity Nation

India is considered a mega-diversity nation due to its rich flora and fauna.

Features:
- Contains 8% of world biodiversity
- Rich endemic species
- Wide variety of ecosystems

India has many forests, wetlands, mountains and marine ecosystems.

7. Hotspots of Biodiversity

Hotspots are regions with high biodiversity and high threat levels.

Characteristics:
- Large number of endemic species
- Habitat under threat

Biodiversity hotspots in India:
- Western Ghats
- Eastern Himalayas
- Indo-Burma Region
- Sundaland

8. Threats to Biodiversity

1. Habitat Loss:
Destruction of forests and natural habitats.

2. Poaching of Wildlife:
Illegal hunting of animals.

3. Man-Wildlife Conflict:
Conflicts due to expansion of human settlements.

4. Pollution:
Air, water and soil pollution affect biodiversity.

5. Climate Change:
Affects ecosystems and species survival.

9. Endangered and Endemic Species of India

Endangered Species:
Species facing risk of extinction.
Examples:
- Bengal Tiger
- Asiatic Lion
- Indian Elephant

Endemic Species:
Species found only in a specific region.
Examples:
- Nilgiri Tahr
- Lion-tailed Macaque

10. Conservation of Biodiversity

Conservation means protection and management of biodiversity.

Importance:
- Protects species
- Maintains ecological balance
- Conserves natural resources

11. In-Situ Conservation

Conservation of species in their natural habitat.

Methods:
- National Parks
- Wildlife Sanctuaries
- Biosphere Reserves

Advantages:
- Natural conservation
- Protects ecosystems

12. Ex-Situ Conservation

Conservation of species outside natural habitat.

Methods:
- Zoos
- Botanical Gardens
- Seed Banks
- Gene Banks

Advantages:
- Protects rare species
- Helps breeding programs

Conclusion

Biodiversity is essential for ecological balance and human survival. Conservation of biodiversity is necessary for sustainable development and protection of natural resources.