

Class-7

Biodiversity and environment

1. Introduction to Biodiversity

Biodiversity refers to the variety of living organisms in an area, including plants, animals, microorganisms, and their habitats. It is crucial for ecosystem balance, providing food, medicine, and ecosystem services (e.g., pollination, water purification). Nepal, with its diverse altitudes (from sea-level Terai to 8,848m Everest), hosts immense biodiversity—over 11,000 plant species, 900 bird species, and mammals like tigers and snow leopards.

- **Importance**: Supports human life (e.g., oxygen from forests, food from crops), maintains ecological balance, and offers economic benefits (tourism in national parks).
- **Levels of Biodiversity**:
 - **Genetic Diversity**: Variations within species (e.g., different rice varieties in Nepali farms for drought resistance).
 - **Species Diversity**: Number of species in an area (e.g., Chitwan's 68 mammal species).
 - **Ecosystem Diversity**: Variety of habitats (e.g., forests, wetlands, mountains).
- **Nepal's Biodiversity Hotspots**: Terai (grasslands, rhinos), Mid-hills (forests, rhododendrons), Himalayas (yaks, blue sheep). Threats: Deforestation, poaching.

2. Ecosystems

An ecosystem is a community of living organisms interacting with their non-living environment (abiotic factors like soil, water, air). Nepal's curriculum uses examples like ponds, forests, and grasslands to explain energy flow and nutrient cycles.

- **Components**:
 - **Biotic**: Living parts (producers: plants; consumers: animals; decomposers: fungi/bacteria).
 - **Abiotic**: Non-living (sunlight, water, soil, temperature).
- **Types of Ecosystems**:
 - **Terrestrial**: Forests (e.g., sal forests in Nepal), grasslands (Terai), deserts (rare, but similar to dry areas).
 - **Aquatic**: Ponds/lakes (e.g., Phewa Lake), rivers (e.g., Koshi), oceans (though Nepal is landlocked, linked to global water cycles).
 - **Man-made**: Gardens, farms (e.g., terraced fields in hills).

- **Energy Flow**: Starts with producers (photosynthesis), passes to consumers (food chains/webs), and ends with decomposers. Example: Grass → Deer → Tiger in Chitwan.
- **Nutrient Cycles**: Carbon cycle (plants absorb CO₂, animals release it), water cycle (evaporation from lakes, rainfall).
- **Food Chains and Webs**: Linear (producer → herbivore → carnivore) or complex networks. Disruption (e.g., removing predators) imbalances ecosystems.

3. Environmental Issues

Environmental problems arise from human activities, affecting biodiversity and ecosystems. Nepal's curriculum stresses local issues like deforestation in the Himalayas and pollution in rivers.

- **Deforestation**: Cutting trees for fuel, agriculture, or timber. Causes: Soil erosion, landslides in hills; loss of habitats for animals like red pandas. Nepal has lost 25% forest cover; solutions: Afforestation (planting trees like in Community Forestry programs).
- **Pollution**: Contamination of air, water, soil.
 - **Air Pollution**: Smoke from vehicles/factories, burning wood. Effects: Respiratory diseases; in Nepal, Kathmandu's smog. Solutions: Use clean energy (solar panels in villages).
 - **Water Pollution**: Sewage, chemicals in rivers (e.g., Koshi polluted by industries). Effects: Fish deaths, unsafe drinking water. Solutions: Sewage treatment, river cleaning drives.
 - **Soil Pollution**: Pesticides in farms (e.g., overuse in paddy fields). Effects: Reduced fertility. Solutions: Organic farming.
- **Climate Change**: Global warming from greenhouse gases (CO₂). Effects in Nepal: Melting glaciers (e.g., Everest's ice), erratic monsoons, floods/droughts. Solutions: Reduce emissions, plant trees.
- **Overexploitation**: Overhunting/fishing (e.g., poaching rhinos for horns). Effects: Endangered species (e.g., Bengal tiger). Solutions: Protected areas like national parks.
- **Invasive Species**: Non-native plants/animals disrupting locals (e.g., water hyacinth in ponds choking fish).

4. Conservation of Biodiversity and Environment

Conservation aims to protect and sustainably use resources. Nepal's curriculum promotes community involvement, laws, and international efforts.

- **Importance**: Prevents extinction, maintains ecosystem services, supports livelihoods (e.g., ecotourism in Annapurna).
- **Methods**:
 - **In-situ Conservation**: Protecting in natural habitats (e.g., Chitwan National Park for rhinos, tigers).
 - **Ex-situ Conservation**: Outside habitats (e.g., zoos, seed banks for rare plants like Himalayan herbs).
 - **Sustainable Practices**: Reforestation, wildlife corridors, eco-friendly tourism.
- **Role of Government and Communities**: Nepal's Forest Act, buffer zones around parks. Community forestry empowers locals to manage forests.

- ****Global Efforts****: Biodiversity Convention; Nepal's commitments to reduce carbon footprint.
- ****Personal Actions****: Reduce waste, plant trees, avoid plastic. Example: Clean-up campaigns in schools.

Key Diagrams and Concepts

- Food chain/web (e.g., Sun → Grass → Rabbit → Fox).
- Ecosystem components (biotic/abiotic).
- Pollution cycles (e.g., water cycle with pollution).
- Maps of Nepal's biodiversity zones.

Importance and Applications

Biodiversity sustains Nepal's economy (agriculture, tourism) and culture (e.g., medicinal plants in traditional medicine). Protecting it ensures future generations' well-being.

Important Questions for Exam Preparation (Based on Nepal's Curriculum)

Multiple-Choice Questions (MCQs)

1. Biodiversity includes variety at which level?

- a) Only species
- b) Genetic, species, ecosystem
- c) Only habitats
- d) Only animals

(Answer: b)

2. An example of an ecosystem is:

- a) A single tree
- b) A forest with animals and soil
- c) A rock
- d) Air alone

(Answer: b)

3. Deforestation mainly causes:

- a) More rainfall
- b) Soil erosion
- c) Cleaner air
- d) Increased wildlife

(Answer: b)

4. Which is a renewable resource?

- a) Coal
- b) Solar energy
- c) Petroleum
- d) Natural gas

(Answer: b)

5. Conservation in natural habitats is called:

- a) Ex-situ
- b) In-situ
- c) Artificial
- d) Temporary

(Answer: b)

Short Answer Questions

1. Define biodiversity and explain its three levels with Nepali examples.
2. Describe the components of an ecosystem, giving an example from Nepal.
3. What is a food chain? Give an example from Chitwan National Park.
4. List three environmental issues in Nepal and their causes.
5. Explain the importance of conserving biodiversity.

Long Answer Questions

1. Discuss the types of ecosystems in Nepal, their characteristics, and how human activities affect them.
2. Explain major environmental problems like deforestation and pollution, with causes, effects, and solutions.
3. Describe methods of biodiversity conservation, including in-situ and ex-situ, with examples from Nepal.
4. Analyze how climate change impacts Nepal's biodiversity and suggest ways to mitigate it.

****Tips for Preparation**:** Use Nepal's curriculum textbooks for diagrams and case studies (e.g., Chitwan rhino conservation). Relate concepts to real-life (e.g., how deforestation affects landslides in hills). Practice drawing food chains and discussing local solutions. Good luck! If you need more on subtopics or PDF formatting, let me know.