

Subject: Basic Ecology (ZOL-502)
(BS Zoology 6th Semester)

Overview of Ecosystems

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What is an Ecosystem?

- An ecosystem is a biological environment consisting of all the living organisms (biotic components) and the non-living (abiotic components) in a particular area, interacting with each other.
- These interactions form a system that facilitates the flow of energy and cycling of nutrients.
- **Components of an Ecosystem:**
 - 1. Biotic Components (living)
 - 2. Abiotic Components (non-living)

1. Biotic Components (living)

- **Producers:** Autotrophs like green plants and algae that produce energy via photosynthesis.
- **Consumers:**
 - Primary consumers: Herbivores (e.g., deer, grasshoppers)
 - Secondary consumers: Carnivores that eat herbivores (e.g., frogs)
 - Tertiary consumers: Top predators (e.g., eagles, lions)
- **Decomposers:** Fungi and bacteria that break down dead organic matter.

2. Abiotic Components (non-living)

- Sunlight
- Temperature
- Water
- Soil
- Nutrients
- Air (oxygen, carbon dioxide)

Functions of an Ecosystem:

- **Energy Flow:**

- Movement of energy from the sun through producers to consumers and decomposers.

- **Nutrient Cycling:**

- Movement and recycling of nutrients like nitrogen and phosphorus.

- **Regulation of Climate and Gases**

- **Support for Biodiversity**

2. Ecological Niche

- An ecological niche refers to the role and position a species has in its environment — how it meets its needs for food and shelter, how it survives, and how it reproduces.
- **Components of a Niche:**
- **Habitat:** The physical space a species occupies.
- **Trophic level:** The position of the species in the food chain (producer, herbivore, carnivore, etc.).
- **Behavior:** Feeding habits, mating behavior, activity time (diurnal/nocturnal).
- **Interactions:** With other species (competition, predation, symbiosis).

Types of Niches:

- **Fundamental Niche:** The full range of environmental conditions under which a species can survive.
- **Realized Niche:** The conditions under which a species actually exists due to competition and other biotic factors.
- **Importance:**
 - Reduces direct competition by allowing species to occupy different roles.
 - Maintains biodiversity by enabling coexistence.

3. Basic Concepts in Ecology Related to Ecosystem

- **a. Food Chain and Food Web**

- **Food Chain:**

- A linear sequence showing who eats whom.

- **Food Web:**

- A more complex network of interconnected food chains.

- **b. Trophic Levels**

- Each step in the food chain (e.g., producers, primary consumers, etc.)

3. Basic Concepts in Ecology Related to Ecosystem

- **c. Energy Pyramid**

- Visual representation of energy flow: energy decreases as it moves up levels.

- **d. Biogeochemical Cycles**

- Cycles like the carbon cycle, nitrogen cycle, and water cycle that recycle essential elements.

- **e. Homeostasis**

- Ecosystem's ability to maintain balance and stability.



4. Types of Ecosystems

- **A. Natural Ecosystems**

- 1. Terrestrial Ecosystems

- **Forest:** High biodiversity, dense vegetation.
- **Grassland:** Dominated by grasses, fewer trees.
- **Desert:** Low rainfall, extreme temperatures.
- **Tundra:** Cold, permafrost, limited vegetation.



4. Types of Ecosystems

- **2. Aquatic Ecosystems**
- **Freshwater:** Lakes, rivers, ponds.
- **Marine:** Oceans, coral reefs, estuaries.
- **B. Artificial (Man-made) Ecosystems**
- Created or heavily modified by humans.
- Example: Farmlands, urban parks, aquariums, reservoirs.



Summary

- An ecosystem is an interaction network of living and non-living things.
- Ecological niche defines a species' role and how it fits into the ecosystem.
- Key concepts include energy flow, food chains/webs, and nutrient cycles.
- Ecosystems vary in type — terrestrial, aquatic, and artificial — each with unique features.

THANK YOU