

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

Terrestrial Ecosystems
(Forest Ecosystem)

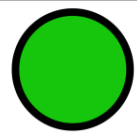
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Forest Ecosystem:

- **1. What is a Forest Ecosystem?**
- A forest ecosystem is a complex, self-sustaining system where trees are the dominant life form, along with a wide variety of plants, animals, microorganisms, and abiotic (non-living) components. It is one of the most biodiverse and productive ecosystems on Earth.
- **2. Structure of a Forest Ecosystem**
- A forest ecosystem is made up of biotic (living) and abiotic (non-living) components:



A. Biotic Components

- These include all living organisms in the forest.
- **i. Producers (Autotrophs):**
 - Mainly green plants, especially trees (e.g., oak, pine, teak)
 - Convert sunlight into energy via photosynthesis
- **ii. Consumers:**
 - Primary Consumers (herbivores): Deer, insects, monkeys, etc.
 - Secondary Consumers (carnivores): Foxes, snakes, birds
 - Tertiary Consumers (top carnivores): Tigers, eagles, leopards
- **iii. Decomposers (Detritivores):**
 - Fungi, bacteria, earthworms
 - Break down dead organic matter and recycle nutrients into the soil

○ B. Abiotic Components

- Sunlight
- Water (rainfall)
- Soil (nutrient-rich or poor depending on forest type)
- Temperature and climate
- Air and minerals

3. Vertical Layers of a Forest

- Forests are structured vertically in layers, each supporting different forms of life:
- **1. Emergent Layer:**
- Tallest trees that rise above all others
- Birds of prey and some monkeys live here
- **2. Canopy Layer:**
- Dense layer of mature tree crowns
- Acts like an umbrella, limiting sunlight below
- Houses many birds, insects, and monkeys

3. Vertical Layers of a Forest

- **3. Understory Layer:**

- Small trees, shrubs, and vines
- Lower light, very humid
- Habitat for reptiles, insects, and small mammals

- **4. Forest Floor:**

- Dark, damp, and rich in decomposing matter
- Fungi, insects, and ground animals thrive
- Rapid decomposition occurs here

4. Types of Forest Ecosystems

-  **A. Tropical Rainforest**
- **Location:**
- Near the equator (e.g., Amazon, Congo)
- **Climate:**
- Hot and wet year-round
- **Biodiversity:**
- Extremely high
- **Soil:**
- Nutrient-poor (rapid decomposition and leaching)

4. Types of Forest Ecosystems

-  **B. Temperate Forest**
- **Location:**
- North America, Europe, East Asia
- **Climate:**
- Four seasons, moderate rainfall
- **Types:**
- **1. Deciduous Forests:**
- Trees shed leaves annually (e.g., maple, oak)
- **2. Coniferous Forests:**
- Evergreen trees (e.g., pine, fir)

4. Types of Forest Ecosystems

-  C. Boreal Forest (Taiga)
- **Location:**
 - Canada, Russia, Scandinavia
- **Climate:**
 - Cold, long winters and short summers
- **Vegetation:**
 - Coniferous trees
- **Soil:**
 - Acidic and low in nutrients

5. Functions of a Forest Ecosystem

- Forests play numerous ecological, economic, and social functions:
-  **Ecological Functions**
- Carbon sink: Absorbs atmospheric CO_2 → mitigates climate change
- Oxygen production: Major source of global oxygen
- Water cycle: Maintains rainfall patterns and groundwater recharge
- Soil conservation: Prevents erosion with roots holding soil
- Habitat: Supports 80% of terrestrial biodiversity

5. Functions of a Forest Ecosystem

-  **Economic Functions**
- Source of timber, fuelwood, paper
- Non-timber products: Fruits, nuts, medicinal plants, resin
- Livelihoods for millions (especially indigenous and rural communities)
-  **Social & Cultural Functions**
- Sacred groves and cultural rituals
- Ecotourism and recreation
- Educational and scientific research value

6. Threats to Forest Ecosystems

- Despite their importance, forests are under severe threat:
- Deforestation: Logging, agriculture, and urban expansion
- Forest fires: Often worsened by climate change and mismanagement
- Illegal logging and poaching
- Climate change: Alters rainfall and temperature patterns
- Invasive species: Disrupt native biodiversity

7. Conservation and Sustainable Management

- To protect forests and ensure their long-term viability:
- Afforestation and reforestation
- Agroforestry: Integration of trees into farming systems
- Protected areas (national parks, wildlife sanctuaries)
- Community forestry: Involving locals in forest management
- Forest certification (e.g., FSC – Forest Stewardship Council)
- Sustainable logging practices

THANK YOU