

# 12

## Chapter

# Forest: Our Lifeline

We'll cover the following key points:

- Forest Layers
- Forest as a System



Hi, I'm EeeBee

Do you Remember:

Fundamental concept in previous class.

In class 5<sup>th</sup> we learnt

- Environment and its Components

Still curious?

Talk to me by scanning the QR code.



## Learning Outcomes

**By the end of this chapter, students will be able to:**

- Understand the various layers of a forest and their significance.
- They will identify important forest produce and its uses in daily life.
- Students will learn about forests as ecosystems and their role in maintaining environmental balance.
- They will gain insights into how forests contribute to the preservation of biodiversity and climate regulation.

## Guidelines for Teachers

To introduce the chapter, the teacher can begin by asking students to share their experiences of visiting a forest or a park. This can lead to a discussion about the layers of a forest and the various plants and animals found there. The teacher can use visuals or diagrams to explain forest layers (canopy, understory, forest floor) and highlight important forest produce.

To explain forests as a system, the teacher can demonstrate how all elements—plants, animals, soil, and climate—are interconnected. Using examples like the water cycle or food chains can make the concept relatable. Discussing real-life cases of deforestation and conservation efforts can inspire students to think about sustainable practices.

## NCF Curricular Goals and Competencies

**This chapter addresses the following curricular goals and competencies:**

- **CG-7 (C-7.1):** Students communicate their own questions, observations, and conclusions related to science.



## Mind Map

# FOREST – OUR LIFELINE

## Types of Plants in forest

Teak, Peepal, Sandalwood, Neem etc.



**Note :**

i. **Crown :**



ii. **Canopy**



## Living Organisms In Forest

### ❖ Consumer

- ✓ **Herbivore** : Animals which eat plants
- ✓ **Carnivore** : Which feed on other animals.

### ❖ Producer

Plants which synthesize their own food.

### ❖ Decomposer

Which feed on dead and decay matter.

**Note:-** They feed upon the dead plant and animal tissue and convert them into a dark coloured substance humus.

## Transportation and Evaporation

### ❖ Root System

Helps water to seep down inground.

### ❖ Canopy

Slow down the speed of raindrops.

### ❖ Covered Ground

Acts like a sponge for decaying material.



## Function

### ❖ Dynamic living entity

Wide variety of animals help the forest to regenerate and grow.

### ❖ Equilibrium

Maintain balance between biotic and abiotic factors.

### ❖ Covered Ground

Provide oxygen through photosynthesis for animals.

## Forest Floor

Dark coloured layer of dead and decaying leaves, fruits, seeds, twigs and Small herbs.



## Deforestation

❖ **Endangered Species** : Threat to living species

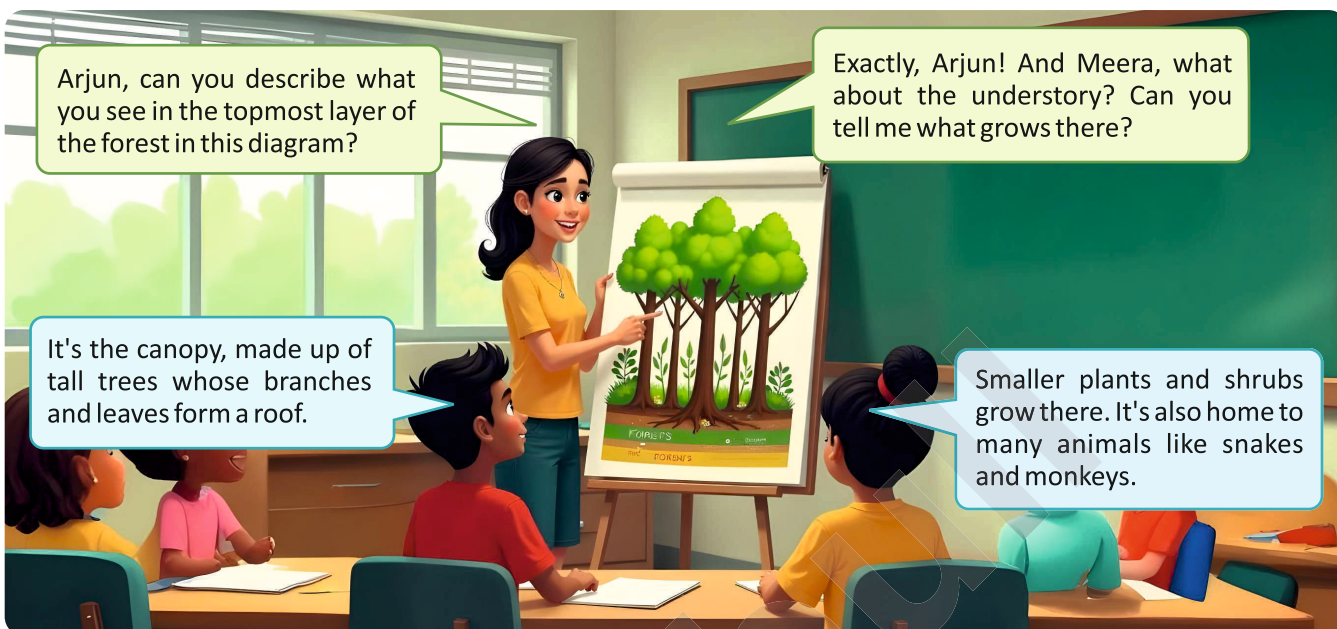
❖ **Habitat** : Provide shelter to animals

❖ **Carbon dioxide** : This results in increase in temperature.

❖ **Floods** : Soil will not hold water in absence of trees.

## Forest Layers

The teacher is holding a diagram of a forest showing different layers: canopy, understory, and forest floor.



An area with high density of trees is known as a forest. A forest is a system which is composed of plants, animals and microorganisms. Forest is the habitat for a variety of living beings. Many plants, animals and microbes live in the forest.

### In History...

- **Theophrastus:** Known as the father of botany, studied plants, including forest ecosystems.
- **Alexander von Humboldt:** Explored biodiversity in tropical forests and emphasized their importance in environmental systems.
- **John Muir:** Advocated for forest conservation and founded the Sierra Club to protect wilderness areas.
- **Amrita Devi Bishnoi:** Sacrificed her life to protect trees, inspiring forest conservation movements in India.
- **Wangari Maathai:** Initiated the Green Belt Movement, planting trees to restore degraded forests and empower communities.

### KEYWORDS

**Biodiversity:** It refers to the variety of life forms, including plants, animals, and microorganisms, in a particular habitat or ecosystem.

**Habitat:** A habitat is the natural environment where an organism lives and thrives, providing the resources necessary for its survival.

A forest consists of different layers of vegetation (trees and plants). The main tree layers of a forest starting from top to the ground are canopy, under storey and forest floor. The amount of sunlight available in each layer of the forest decides which type of plant grows and survives there. It also decides the habitat of various animals. Let us study all the layers of vegetation in a forest.

### 1. Emergent layer

The tallest trees in the forest may reach a height of up to 200 feet and form the emergent layer. Trees of this height are rare and are found occasionally in the dense rainforests of Asia and the East Indies. Most of these trees are broad-leaved and evergreen. There is plenty of sunlight in this layer. Hornbills, butterflies, and bats are found here.

### 2. Canopy Layer

The forest's top layer consist of the branches and leaves of tall trees forming a kind of roof or umbrella over the smaller trees and other plants in the forest. The uppermost branches and leaves of tall trees which act like a roof or umbrella over the smaller trees in the forest is called canopy. It has tall evergreen trees. The branches overlap each other. This layer is so dense that very little sunlight penetrates and reaches the lower layers of the forest.



Vegetation in a tropical rainforest, showing canopy and under storey

### 3. Understorey Layer

The layer of vegetation in a forest which is just below the canopy is called understorey. It mainly has plants with large leaves and small trees that are able to survive in less sunlight. Plants such as orchids, palms and ferns belong to this region. A large variety of insects, birds, snakes, lizards and carnivorous predators such as jaguars, phythons and leopards live here.

### 4. Forest Floor

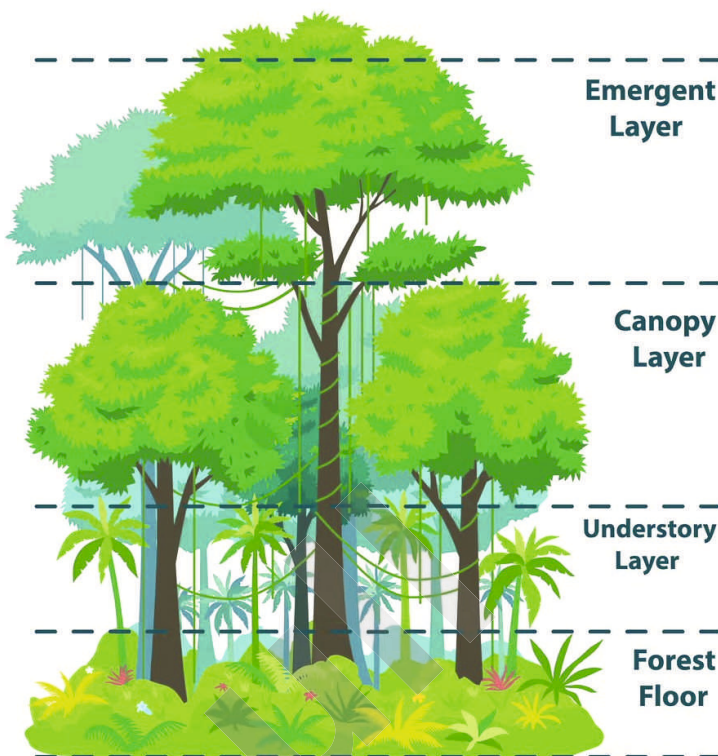
This region receives very little amount of sunlight. Only plants adapted to grow with very less light can survive in this damp, warm and dark region of the forest. The forest floor has many kinds of small leafless plants such as mosses and lichens. The floor is covered with a layer of dead and decaying leaves, fruits, seeds, twigs and small worms. A large variety of insects, millipedes, ants and beetles are found on the forest floor. The large animals in the forest such as tigers, lions, deer, bear, etc, live on the forest floor.



## Key Forest Resources

Forests are an important natural resource. They are essential for the preservation of environment and survival of all the animals including man.

- Forests control and prevent flood by holding water and not allowing its free flow.
- Trees bind the soil and control soil erosion.
- Forests regulate climate by reducing temperature and help in rainfall.
- Forests purify air and provide clean and fresh air for breathing to all living beings.
- Forests help in reducing pollution.
- Trees make the soil fertile by recycling the nutrients.
- Forests provide us food, wood, rubber, gum, resin, nonedible oils, honey, beeswax, lac, bamboo, fuel, etc.



## Let's recall what we know

### Apply Concept in Context

Apply

- How do the layers of a forest support different types of plants and animals? Provide examples from each layer.
- If one layer of the forest is destroyed, how might it affect the entire ecosystem?

**Skills Covered:** Critical thinking, Applicative thinking, Brainstorming

### Examine Further

Analyse

What will happen if the canopy layer is removed due to deforestation? Discuss its impact on the forest floor and understory layers.

**Skills Covered:** Critical thinking, Analytical thinking, Brainstorming, Research, Investigation

SCAN TO ACCESS



Take a Task



Watch Remedial

## Self-Assessment Questions

Evaluate

- What are the three main layers of a forest, and what characterizes each layer?
- How do forests produce essential goods like timber, fruits, and medicinal plants?
- What is the role of the forest floor in the ecosystem?
- What are the advantages of forests having distinct layers?

**Skills Covered:** Research, Observation, Recall

## Bloom's Taxonomy

## Creative Insight

Create

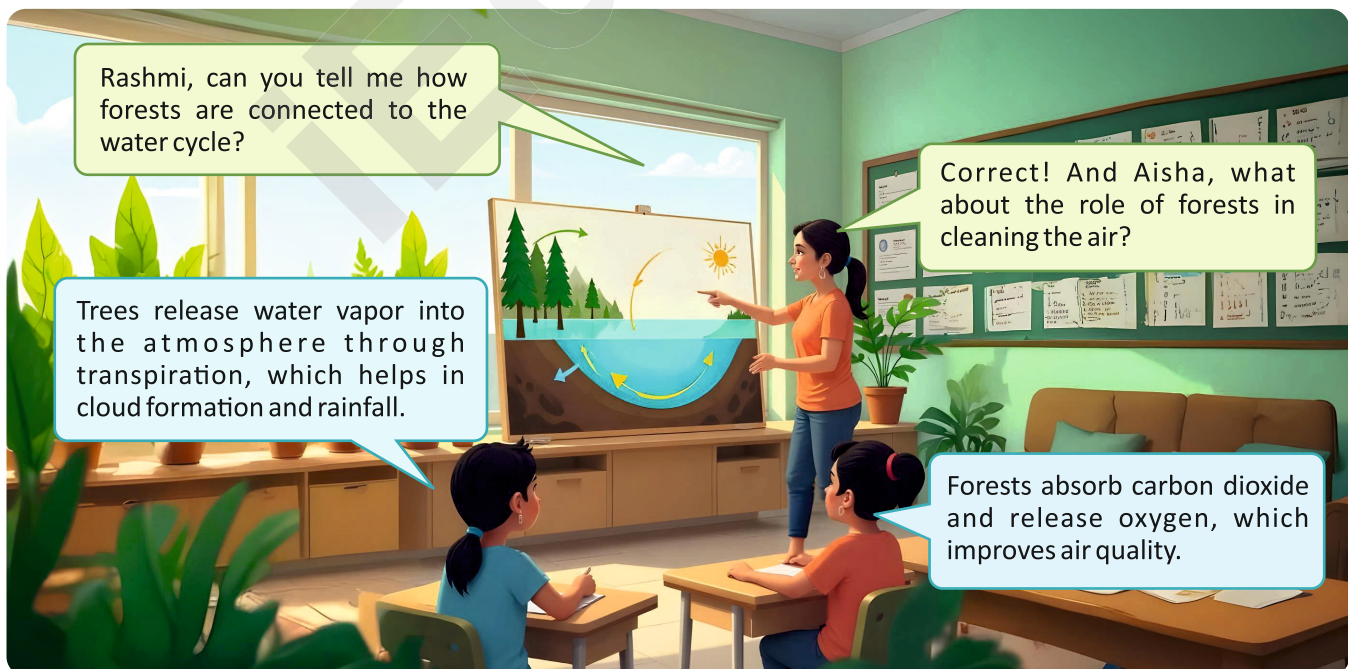
Forests have multiple layers, each with its own unique role. These layers ensure the survival of diverse plants and animals, contributing to the forest's overall health.

**Task:** Create a diagram of a forest showing its layers (canopy, understory, and forest floor). Label each layer and provide examples of plants and animals found in them.

**Skills Covered:** Research, Creativity, Observation, Brainstorming

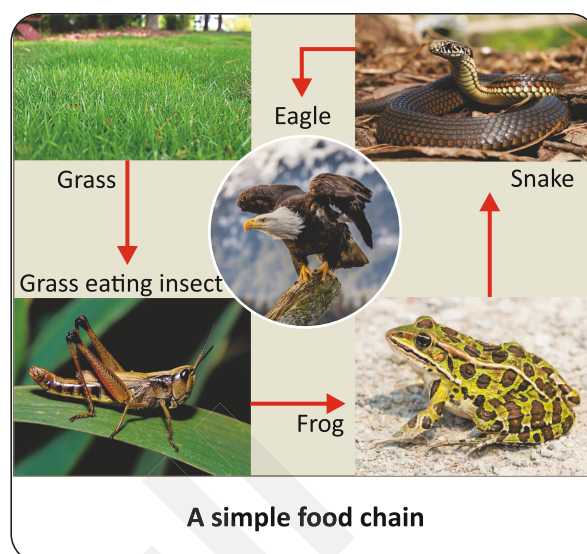
## Forest as a System

Teacher is using a water cycle diagram to explain the role of forests.

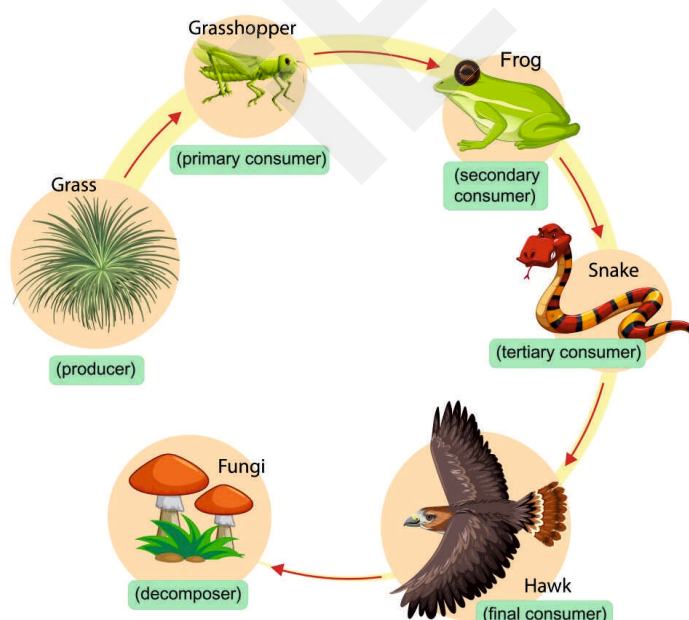


## Important Forest Produce

Forest is a system comprising various plants, animals and microorganisms. For a sustainable forest ecosystem, there has to be variety of animals and plants in a forest. The various components of the forest are interdependent on one another. In the forest, there is interaction between soil, water, air and the living organisms. Different layers of vegetation provide food and shelter for animals, birds and insects. By harbouring greater variety of plants, the forest provides greater opportunities for food and habitat for the herbivores. Larger number of herbivores means increased availability of food for a variety of carnivores. Not only this decaying heap of animal dropping is a source of food to various insects or decomposers which ultimately enrich the soil with nutrition in the form of humus. The animals also disperse the seeds of certain plants and help the forest to grow.



Every part of the forest contributes in making a self-sustaining system. The green plants prepare food through photosynthesis. The wide variety of animals helps the forest to regenerate and grow. Organisms which feed on plants often get eaten by other organisms, and so on. For example, grass is eaten by insects, which in turn, is taken by the frog. The frog is consumed by snakes. This is said to form a food chain. Many food chains can be found in the forest. All food chains are linked. The forests are perfect recycling factories of nature and all the nutrients are recycled. Here nothing goes waste.



## Role of Forests in Preserving The Environment

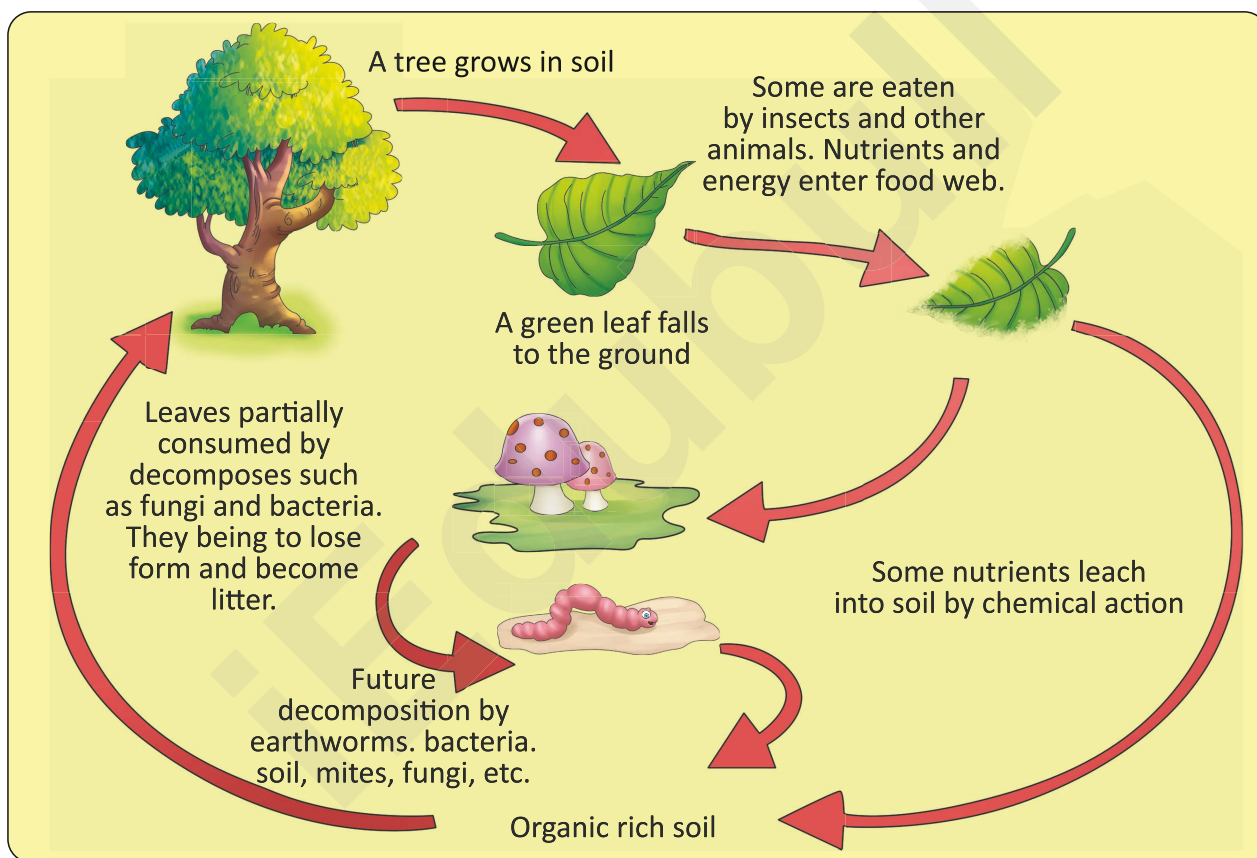
Forest plays an important role in preserving the environment. Green plants take solar energy and convert it into chemical energy while making food. Thus, solar energy is transferred to other living beings through the green plants. Green plants utilise carbon dioxide during photosynthesis and release oxygen. That is how the green plants maintain the balance of carbon dioxide and oxygen in the environment.



The different roles played by the nature are listed below:

- **Role of forest in water cycle:** The roots of the trees make the soil porous. Rainwater seeps through these pores and recharge groundwater. Forests prevent wastage of rainwater in the form of runoff. Forests also prevent flash floods by slowing down the movement of water.
- **Role of forest in soil conservation:** The roots of the trees hold the topsoil in place. This prevents soil erosion by wind or by running water. Forests influence climate, water cycle and air quality of planet Earth in a big way.

Forests provide us with oxygen. If forests disappear, the amount of carbon dioxide in air will increase, resulting in the subsequent increase in the Earth's temperature. They provide habitat to a large number of animals. In the absence of trees and plants, the animals will not get food and shelter.



## Deforestation

As you know, deforestation is the large-scale felling of trees. It is the permanent destruction of forests and woodlands. The forests are being destroyed to get more land for agriculture, industries, housing, roads, railway tracks and places of recreation.

### Causes of Deforestation

- Increased demand of land for industries, houses, roads, agriculture and railway tracks.
- Increased demand of fuel wood, paper and timber.
- Lowering of water table causes plants and trees to wilt and die.



## Consequences of Deforestation

- Reduced forest cover has disturbed the natural process of recharging of groundwater. This has resulted in shortage of drinking water at many places.
- Reduced forest cover means there is higher percentage of carbon dioxide in the atmosphere. This is leading to global warming. The average temperature of the Earth is on the rise.
- Reduced forest cover has led to soil erosion and loss of soil fertility at many places.

We can thus conclude that the forest is a dynamic system full of plants, animals, and microorganisms. It is everybody's duty to conserve this natural resource.

### Let's recall what we know

#### Apply Concept in Context

Apply

- How do forests contribute to reducing global warming? Explain with examples.
- What will happen if forests are destroyed in large numbers? Discuss its effect on climate and biodiversity.

**Skills Covered:** Critical thinking, Applicative thinking, Brainstorming

#### Examine Further

Analyse

What will happen if one component of the forest ecosystem, such as soil or water, is disturbed? Discuss its impact on the other components.

**Skills Covered:** Critical thinking, Analytical thinking, Brainstorming, Research, Investigation

#### Self-Assessment Questions

Evaluate

- What is a forest ecosystem, and what are its main components?
- How do forests help preserve biodiversity?
- What role do forests play in the water cycle?

**Skills Covered:** Research, Observation, Recall

#### Creative Insight

Create

Forests act as systems where every component—trees, animals, soil, and water—works together to maintain balance. They provide clean air, water, and a habitat for countless species.

**Task:** Create a flowchart showing how forests contribute to the environment (e.g., water cycle, air purification, climate regulation). Highlight their role in supporting life on Earth.

**Skills Covered:** Research, Creativity, Observation, Brainstorming

SCAN TO ACCESS



Take a Task



Watch Remedial

**Bloom's  
Taxonomy**

# SUMMARY



## Forest Layers

**Definition:** Forests consist of distinct layers, each with unique characteristics and functions. These layers contribute to the bio-diversity and ecological balance of the forest ecosystem.

### Key Layers

#### 1. Emergent Layer:

- Tallest trees that rise above all others, receiving direct sunlight.
- Habitat for birds, insects, and some mammals like monkeys.

**Examples:** Kapok trees.

#### 2. Canopy Layer:

- Dense layer of trees forming a roof-like structure.
- Absorbs most sunlight and provides habitat for numerous species, including birds and insects.
- Regulates temperature and prevents soil erosion.

#### 3. Understory Layer:

- Consists of shrubs, small trees, and plants adapted to low light.
- Habitat for reptiles, amphibians, and insects.

#### 4. Forest Floor:

- Dark, damp, and nutrient-rich layer.
- Contains decomposed organic matter and supports fungi, microorganisms, and ground-dwelling animals like tigers and snakes.

### Important Forest Produce

- Forests provide resources like timber, fruits, medicinal plants, latex, and bamboo.

- Non-timber products include honey, resins, and essential oils.
- These products support livelihoods and industries, emphasizing the need for sustainable harvesting.

## Forest as a System

**Definition:** Forests function as dynamic systems that interact with the environment, supporting life and maintaining ecological balance.

### 1. Components of Forest Systems:

- **Biotic Components:** Include plants, animals, microorganisms, and humans.
- **Abiotic Components:** Include soil, water, air, sunlight, and nutrients.

### 2. Climate Regulation:

- Absorb carbon dioxide and release oxygen, reducing greenhouse gases.
- Influence rainfall patterns and mitigate global warming.

### 3. Soil Conservation:

- Roots bind the soil, preventing erosion and landslides.
- Decomposed organic matter enriches the soil.

### EeeBee: Your AI Buddy

Explore! **Forests: Our Lifeline** with EeeBee AI Buddy.

Hi Friend! Use prompts to ask me questions about the chapter we just finished! eeee, lets go!

Start by Scanning this QR Code:





Gap Analyzer™  
Take a Test



# EXERCISE

That turn curiosity into confidence—let's begin!



## A. Choose the correct answer.

- Which layer of the forest forms a roof-like structure?
 

(a) Understory	<input type="checkbox"/>	(b) Canopy	<input type="checkbox"/>
(c) Forest Floor	<input type="checkbox"/>	(d) Roots	<input type="checkbox"/>
- Which of the following is an important forest produce?
 

(a) Plastic	<input type="checkbox"/>	(b) Timber	<input type="checkbox"/>
(c) Concrete	<input type="checkbox"/>	(d) Glass	<input type="checkbox"/>
- How do forests help regulate the climate?
 

(a) By releasing oxygen	<input type="checkbox"/>	(b) By absorbing water	<input type="checkbox"/>
(c) By storing carbon dioxide	<input type="checkbox"/>	(d) Both (a) and (c)	<input type="checkbox"/>
- Which layer of the forest is home to decomposers?
 

(a) Canopy	<input type="checkbox"/>	(b) Forest Floor	<input type="checkbox"/>
(c) Understory	<input type="checkbox"/>	(d) All layers	<input type="checkbox"/>
- What is the role of forests in the water cycle?
 

(a) They absorb rainwater	<input type="checkbox"/>	(b) They release water vapour through transpiration	<input type="checkbox"/>
(c) They store groundwater	<input type="checkbox"/>	(d) They block rainfall	<input type="checkbox"/>

## B. Fill in the blanks.

- The uppermost layer of a forest is called the \_\_\_\_\_.
- Forest floors are rich in \_\_\_\_\_ due to the decomposition of organic material.
- \_\_\_\_\_ is an important forest produce used for making medicines.
- Forests release \_\_\_\_\_ into the atmosphere, which helps in cloud formation.
- Forests act as \_\_\_\_\_ by absorbing carbon dioxide from the atmosphere.

## C. Write True or False.

- The canopy layer is found at the bottom of the forest. \_\_\_\_\_
- Forests help regulate the climate by storing carbon dioxide. \_\_\_\_\_
- Forest floors are barren and lack organic material. \_\_\_\_\_
- Timber is an example of an important forest produce. \_\_\_\_\_
- Forests play no role in the water cycle. \_\_\_\_\_

#### D. Define the following terms.

1. Canopy
2. Forest ecosystem
3. Forest floor
4. Transpiration
5. Carbon sink

#### E. Match the columns.

##### Column A

1. Canopy
2. Understory
3. Forest floor
4. Transpiration
5. Carbon sink

##### Column B

- (a) Rich in decomposed material
- (b) Uppermost forest layer
- (c) Shrubs and small plants
- (d) Release of water vapour
- (e) Absorbs carbon dioxide

#### F. Give reasons for the following statements.

1. Forests are essential for maintaining biodiversity.
2. The canopy layer supports many arboreal animals.
3. Forest floors are vital for nutrient recycling.
4. Forests help in reducing global warming.
5. Sustainable forest practices are necessary for human survival.

#### G. Answer in brief.

1. What is the role of the understory in a forest ecosystem?
2. How do forests regulate the water cycle?
3. What is the significance of the forest floor?
4. How do forests act as carbon sinks?
5. What are some examples of forest produce?

#### H. Answer in detail.

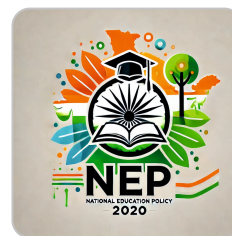
1. Explain the three layers of a forest and their significance.
2. Describe how forests contribute to environmental balance.
3. Discuss the importance of forest produce in human life.
4. What are the consequences of deforestation on biodiversity and climate?
5. How can sustainable practices ensure the preservation of forests?





**Focus on Mental Health!**

NEP promotes wellness programs to support emotional and mental well-being.



## Skill-based Activity



### Explore Forest Layers

**STEM**

Perform the given activity at your home to understand forest layers and their produce.

- Collect leaves, bark, and small branches from your surroundings.
- Identify their origin based on forest layers (e.g., large leaves from the canopy, small shrubs from the understory).
- Compare their features and functions.
- Research their uses (e.g., medicinal or industrial applications).

**Questions:**

- What are the four layers of a forest, and what role does each play in the ecosystem?
- How do non-timber products contribute to local economies?
- Why is sustainable harvesting important for forest management?

**Skills Covered:** Observation, Analytical thinking, Logical thinking, Brainstorming

### Forest Ecosystem Model

**Art**

Create a 3D model of a forest ecosystem using clay and craft materials:

- Include forest layers: emergent, canopy, understory, and forest floor.
- Show interactions like animal movement and nutrient cycles.
- Add components of forest produce, labeling their sources and uses.

**Skills Covered:** Creativity, Analytical thinking, Organization, Brainstorming

### Human Dependence on Forests

**Group Activity**

Students can explore their locality to identify products derived from forests. Classify these products as timber or non-timber and investigate their sources and uses. Create a presentation to showcase the findings and suggest sustainable alternatives.

**Skills Covered:** Critical thinking, Logical thinking, Brainstorming, Collaboration, Social skills, Networking

## Factors Influencing Forest Ecosystems

### Case to Investigate

Investigate how the following factors affect forest ecosystems. Talk to your teacher and collect data based on observations or experiments.

Factors	Data Collected
Climate and rainfall	
Human activities	
Wildlife diversity	
Availability of resources	

Compile your findings and present them as a report.

**Skills Covered:** Critical and analytical thinking, Research, Brainstorming, Investigation, Communication

## Sustainable Forestry Practices

### Aligning with SDGs

Discuss modern techniques like agroforestry, reforestation, and forest management plans. Reflect on how these practices combat deforestation, soil erosion, and biodiversity loss.

**Aligned with SDG 15:** Life on Land

**Skills Covered:** Global awareness, Critical thinking, Research, Analytical thinking, Problem-based thinking

## Personalized Forest-Based Garden Design

### Integrated Learning

Using your knowledge of forests, design a garden that mimics a small forest ecosystem. Include plants representing different layers and suggest methods to encourage biodiversity and water conservation. Consider the space, climate, and preferences of the landowner.

**Skills Covered:** Applicative thinking, Critical thinking, Research, Brainstorming, Empathy, Emotional intelligence