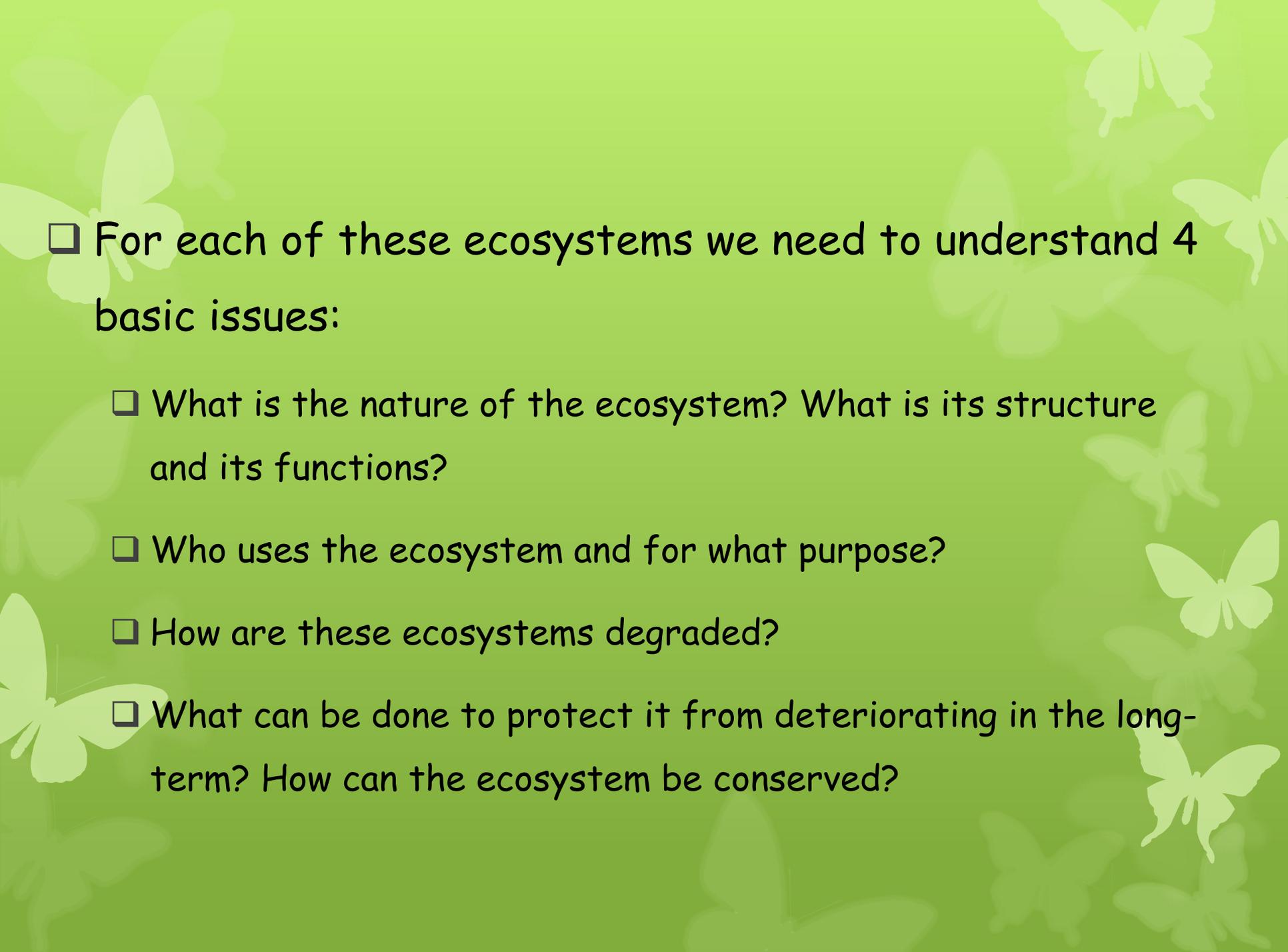


Types of Ecosystems

- Terrestrial Ecosystems
- Forest
- Grassland
- Semi arid areas
- Deserts
- Mountains
- Islands
- Aquatic Ecosystems
- Pond
- Lake
- Wetland
- River
- Delta
- Marine



❑ For each of these ecosystems we need to understand 4 basic issues:

- ❑ What is the nature of the ecosystem? What is its structure and its functions?
- ❑ Who uses the ecosystem and for what purpose?
- ❑ How are these ecosystems degraded?
- ❑ What can be done to protect it from deteriorating in the long-term? How can the ecosystem be conserved?

FOREST ECOSYSTEM

❖ Forest Ecosystem:

- ❖ A forest is an area with a high density of trees and undisturbed areas.
- ❖ **Receives high annual rain fall.**
- ❖ **We can observe wide variety of plants and animals.**
- ❖ **World's total land area is 13,076 million hectares - (Source: FAO; 1989)**
- ❖ **Of which total forests account for about 31% of the world's land area.**
- ❖ **In India, the forest cover is roughly 11% of the total land area.**
- ❖ **The forest ecosystem are of great concern from the environmental point of view.**

Forest types in India

- The forest type depends upon the abiotic factors such as climate and soil characteristics of a region.
- Forests in India can be broadly divided into:
 - Coniferous forests
 - Broadleaved forests.
- They can also be classified according to the nature of their tree species -
 - evergreen,
 - deciduous,
 - xerophytic or thorn trees,
 - mangroves, etc.
- They can also be classified according to the most abundant species of trees such as Sal or Teak forests

- **Coniferous forests** grow in the Himalayan mountain region, where the temperatures are low.
- These forests have tall stately trees with needlelike leaves and downward sloping branches so that the snow can slip off the branches.
- **Broadleaved forests** have several types, such as evergreen forests, deciduous forests, thorn forests, and mangrove forests.
- Broadleaved forests have large leaves of various shapes.

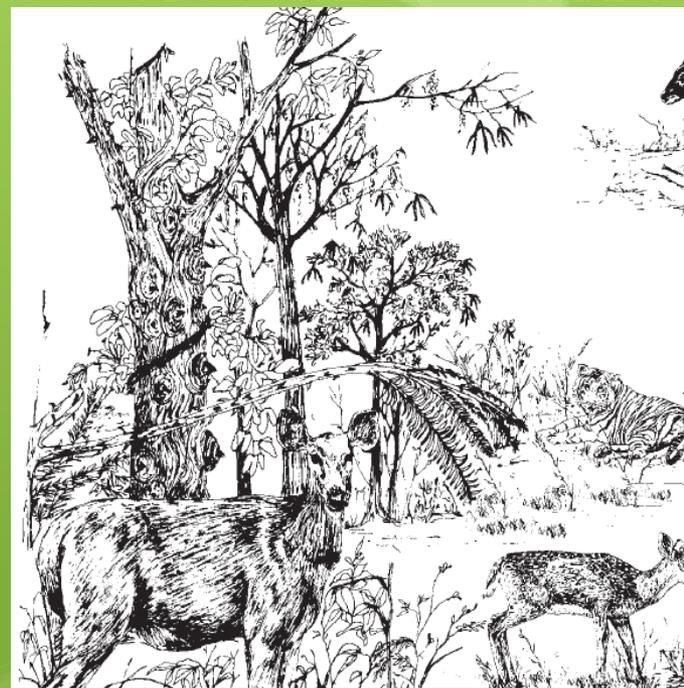
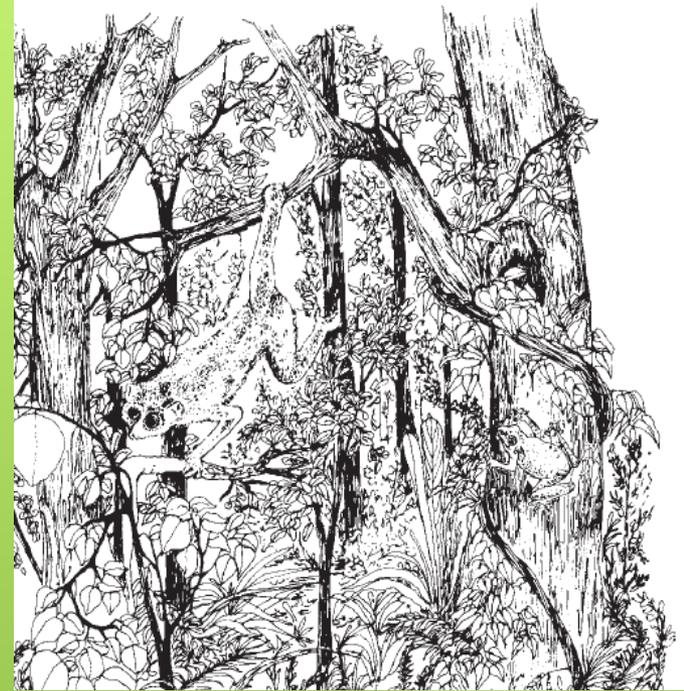


Coniferous forest



Broadleaved forest

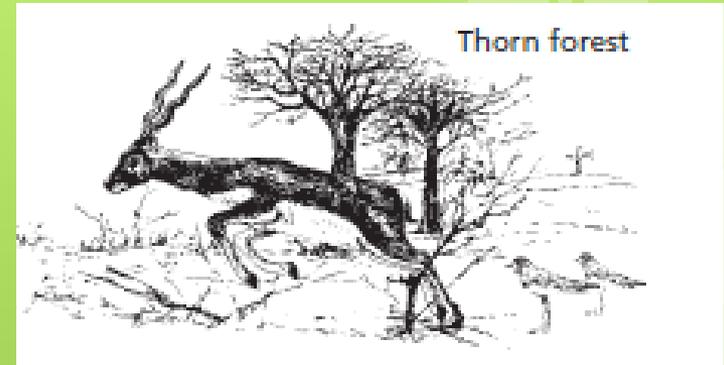
- **Evergreen forests** grow in the high rainfall areas of the Western Ghats, North Eastern India and the Andaman and Nicobar Islands.
- These forests grow in areas where the monsoon lasts for several months. Some even get two monsoons, such as in Southern India.
- Evergreen plants shed a few of their leaves throughout the year.
- **Deciduous forests** are found in regions with a moderate amount of seasonal rainfall that lasts for only a few months.
- Most of the forests in which Teak trees grow are of this type.
- The deciduous trees shed their leaves during the winter and hot summer months. In March or April they regain their fresh leaves just before the monsoon, when they grow vigorously in response to the rains.



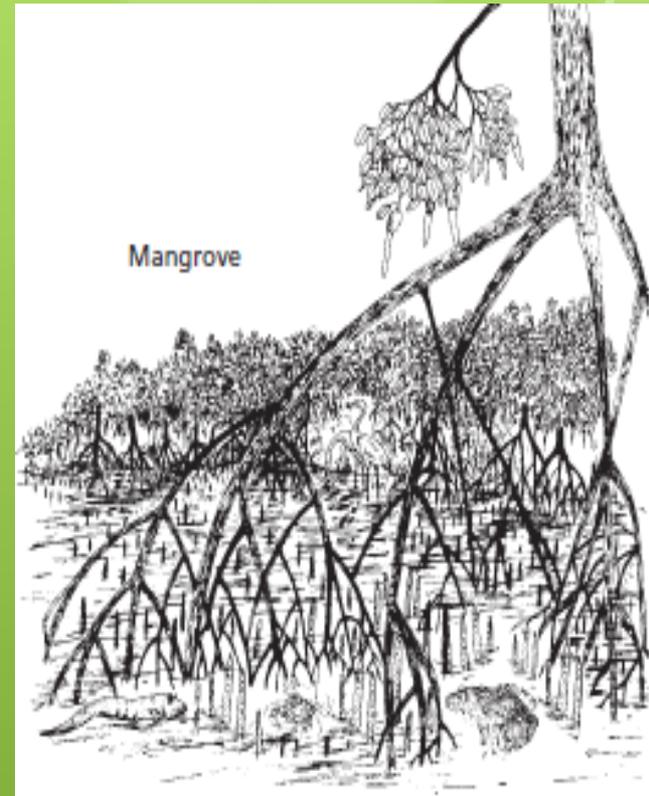
Thorn forests

found in the semi-arid regions of India. The trees, which are sparsely distributed, are surrounded by open grassy areas.

- Thorny (stiff sharp-projected woody projection on the stem or other part of a plant) plants are called xerophytic species and are able to conserve water.
- Some of these trees have small leaves, while other species have thick, waxy leaves to reduce water losses during transpiration.
- Thorn forest trees have long or fibrous roots to reach water at great depths. Many of these plants have thorns, which reduce water loss and protect them from herbivores.



- ❑ **Mangrove forests** grow along the coast especially in the river deltas. These plants are able to grow in a mix of saline and fresh water.
- ❑ They grow luxuriantly in muddy areas covered with silt that the rivers have brought down.
- ❑ The mangrove trees have breathing roots that emerge from the mudbanks.



Characteristic Features

❖ The various components of a Forest Ecosystem are:

❖ Biotic components: The various biotic components, representatives from the three functional groups, of a forest ecosystem are:

1) Producer Organisms:

- ❖ In a forest, the producers are mainly trees.
- ❖ Trees are of different kinds depending upon the type of forest developed in that climate.

- ❖ Apart from trees, climbers, epiphytes, shrubs and ground vegetation.
- ❖ Dominant species of trees in major types of forest ecosystems are:
 - ❖ *Tectona grandis*, Acer, Betula, Picea, Pine, Cedrus.

2) Consumers:

- ❖ In a forest, consumers are of three main types;

a) Primary Consumers:

- ❖ These are Herbivores which feed directly on producers. E.g.
 - ❖ Ants, Beetles, Bugs, spiders etc. feeding on tree leaves.
 - ❖ Larger animals such as Elephants, Deer, giraffe etc. grazing on shoots and/or fruits of trees.

b) Secondary Consumers:

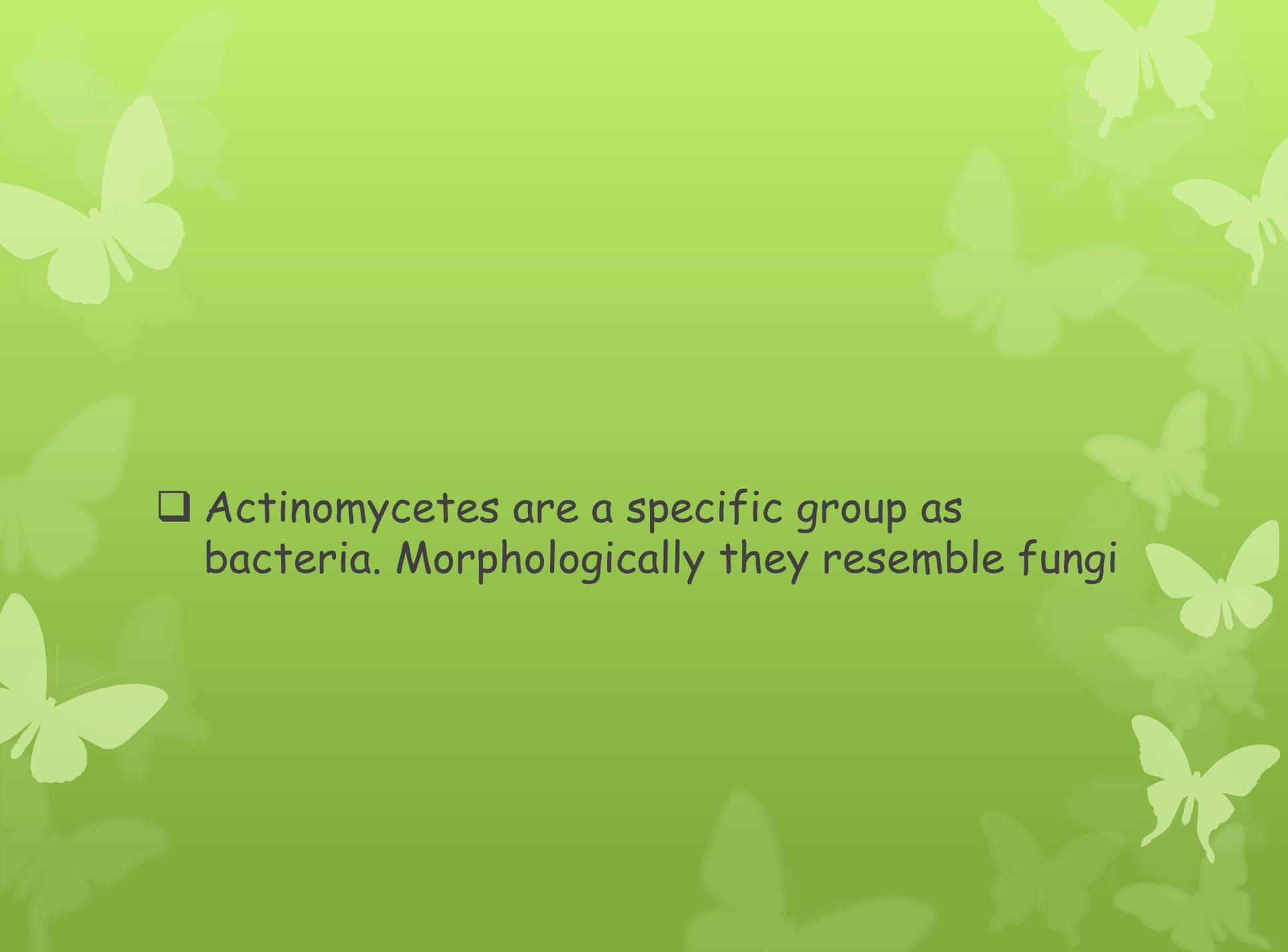
- ❖ These are carnivores and feed on primary consumers.
 - ❖ These include Birds, Lizards, Frogs, Snakes, Foxes, etc.

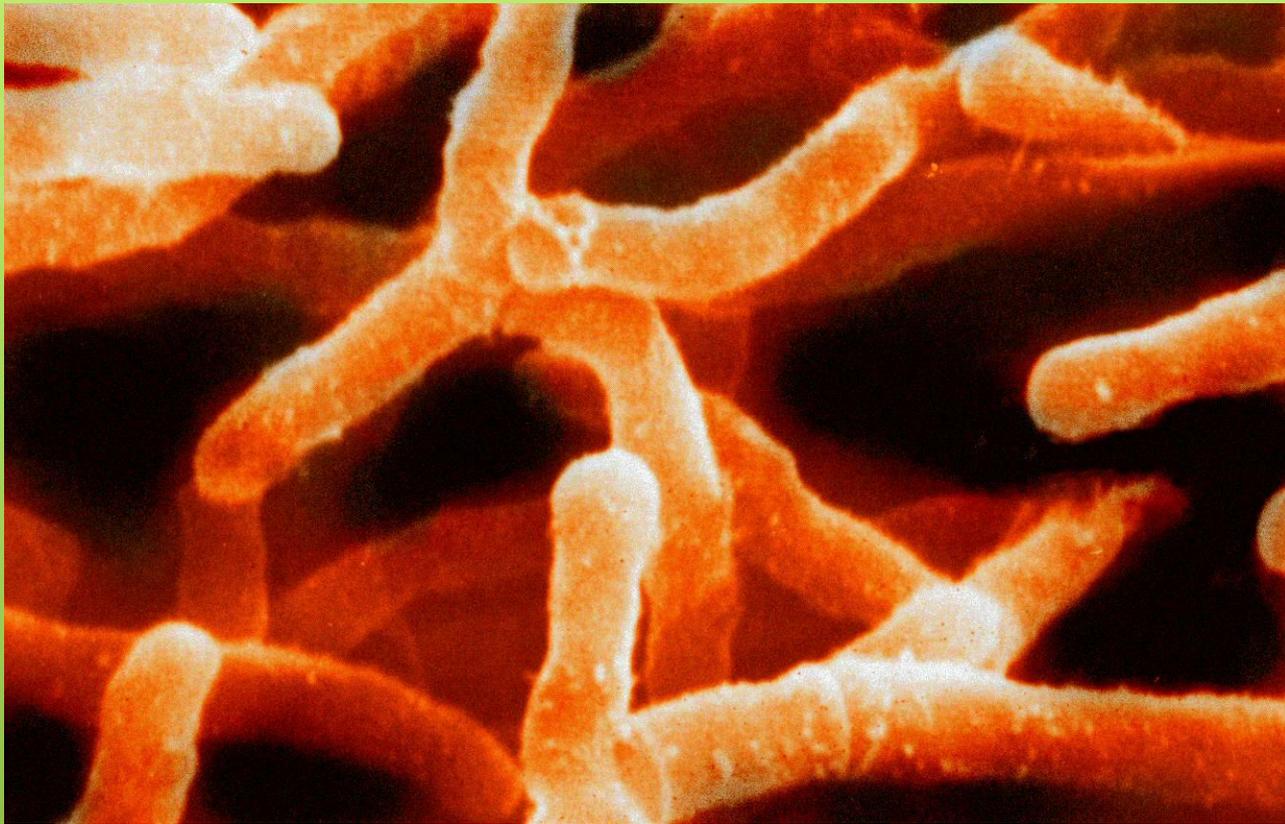
c) Tertiary Consumers:

- ❖ These are secondary carnivores and feed on secondary consumers
 - ❖ These include top carnivores like Lion, Tiger, etc.

3) Decomposers:

- ❖ These include wide variety of saprotrophic micro- organism like;
 - ❖ Bacteria (*Bacillus Sp., Clostridium sp., pseudomonas, etc.*)
 - ❖ Fungi (*Aspergillus sp., Ganoderma sp., Fusarium, etc.*)
 - ❖ Actinomyces (*Streptomyces, etc.*)
- ❖ They attract the dead or decayed bodies of organisms & thus decomposition takes place.
- ❖ Therefore, nutrients are released for reuse.
- ❖ Abiotic components:
- ❖ Depending upon the geographical features (Hills/ mountains/ river valleys etc) , climatic conditions (temperature rainfall and solar energy) and soil type will leads to different types of forest such as coniferous, broad leaf forests.

- 
- ❑ Actinomycetes are a specific group as bacteria. Morphologically they resemble fungi



□ Actinomycetes



□ *Tectona grandis*



□ *Betula*



□ Pines are conifer trees

FOREST COMMUNITIES/TYPES

TYPE OF FOREST	PLANTS	COMMON ANIMALS	RARE ANIMALS
HIMALAYAN CONIFEROUS	PINE, DEODAR	WILD GOATS AND SHEEP, HIMALAYAN BLACK BEAR	SNOW LEOPARD, MUSK DEER, HIMALAYAN WOLF
EVER GREEN NORTH-EAST, WESTERN GHATS, ANDAMAN & NICOBAR	JAMUN, FICUS	TIGER, LEOPARD, HORNBILL, TREE FROGS	RHINO, LION-TAILED MACAQUE

Components of Forest Ecosystem:



- Producers: Different tree species



- Consumers in a Forest Ecosystem



- Decomposers in a Forest ecosystem

It provides numerous environmental services like;

- ❖ Nutrient cycling
- ❖ Maintaining biodiversity
- ❖ Providing wildlife habitat
- Affecting rainfall patterns
- Regulating stream flow
- Storing water
- Reducing flooding
- Preventing soil erosion
- Reclaiming degraded land & many more....

❖ Forest Ecosystem:

- ❖ **Apart from environmental values, forest ecosystems have some traditional values as well.**
- ❖ **Examples are:**
 - **Fire Wood & Timber.**
 - **Fruits.**
 - **Gums.**
 - **Herbs & drugs.**

Threats to the forest ecosystem

- ❑ Overutilization of forest resources due to **rapid population growth, urbanization, and industrialization** in an unsustainable way leads to highly disturbed ecosystem - **unsustainable consumption pattern**.
- ❑ India's forest cover has decreased from about 33% to 11% in the last century.
- ❑ Loss of forests by mining and dam construction.
- ❑ Exploitation of forest resources beyond their production capacity - ecosystem degradation
- ❑ Extinction of plant and animal species in forest by fragmented into small patches.

Consequences of forest ecosystem degradation

- ❑ Survival of tribal people becomes difficult - they depend upon forest resources for food, fuel wood and other products.
- ❑ Agricultural and Urban people do suffer from various reasons (such as fuel wood, small timber, etc. for making houses, food from agricultural areas) which in turn depend on neighboring forest ecosystems.
- ❑ Rain fall on deforested land flows directly into nearby rivers - no ground water recharge
- ❑ Rapid soil erosion - agriculture is seriously affected.
- ❑ Wild animals lose their habitat - extinction of species.
- ❑ Reduction in the agricultural yield - loss of bees, butterflies, moths

Conservation of forest ecosystem

- ❑ Careful utilization of forest resources - alternate sources of energy instead of fuel wood.
- ❑ Afforestation - need to grow more trees than that are cut down from forests.
- ❑ Natural forests with diverse species must be protected as National Parks and Wildlife Sanctuaries.
- ❑ Scientists suggested that at least 10% of ecosystem is left as Protected area