



Forest and Grassland Ecosystem

- Introduction, types, characteristic features, structure and function of
- Forest ecosystem and
- Grassland Ecosystem.



Forest ecosystem

- Forest ecosystems mainly consist of wide variety of trees, herbs, shrubs, climbers, grass, lichens, algae
- A variety of animals, mammals, insects, reptiles, amphibians, and birds.
- Forest ecosystems have better productivity and diversity in comparison to other ecosystems. Plants make up about 99 per cent of earth's living species and the rest 1 per cent include animals.
- The composition of plant and animal species in the forests differs from place to place, even within the same type of ecosystem.
- Total forests cover in the world is about 33% of the world's land area. In India, the forest cover is about 22% of the total land area.



Forest ecosystem

Forests provide several environmental services

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



Forest ecosystem

Apart from environmental values, forest ecosystems have some traditional values as well.

Examples are:

- **Fire Wood & Timber.**
- **Fruits.**
- **Gums.**
- **Herbs & drugs**



Components of Forest Ecosystem

Biotic components

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

Producers

- 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.



Components of Forest Ecosystem

Different types of trees in forest ecosystem

- **Deciduous trees** (such trees lose their leaves in winter) are found in the region of moderate rainfall
- **Evergreen trees** are found in the regions rainfall is good
- **Coniferous trees** (trees like pine, deodar etc. having conical shape which grow in cold climate) are found in the region where temperature is low.
- **Desert trees** (thorny trees with less or no leaves) are found in the region of low rainfall.
- **Mangrove trees** can grow in water – logged soil present in coastal and river delta regions.



Components of Forest Ecosystem

The forests of the world are classified into the following broad categories:

- **Equatorial evergreen forest**
 - Evergreen broadleaf plants found near equator
- **Temperate deciduous forest**
 - Plants shedding their leaves, found in regions away from equator with moderate temperature & seasonal rainfall
- **Northern coniferous forest**
 - Coniferous plants found in cold regions



Forest ecosystem

Consumers

The consumers in a forest ecosystem are of three 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.



Forest ecosystem

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.)
 - Actinomycetes (Streptomyces, etc).
- They attract the dead or decayed bodies of organisms & thus decomposition takes place.
- Therefore, nutrients are released for reuse.



Abiotic components

Soil

Type of soil

pH

Amount of organic matter present

Moisture and Drainage

The amount of moisture available is another key determinant for the mix of species that will grow at a site. Different type of forests are found in different conditions.

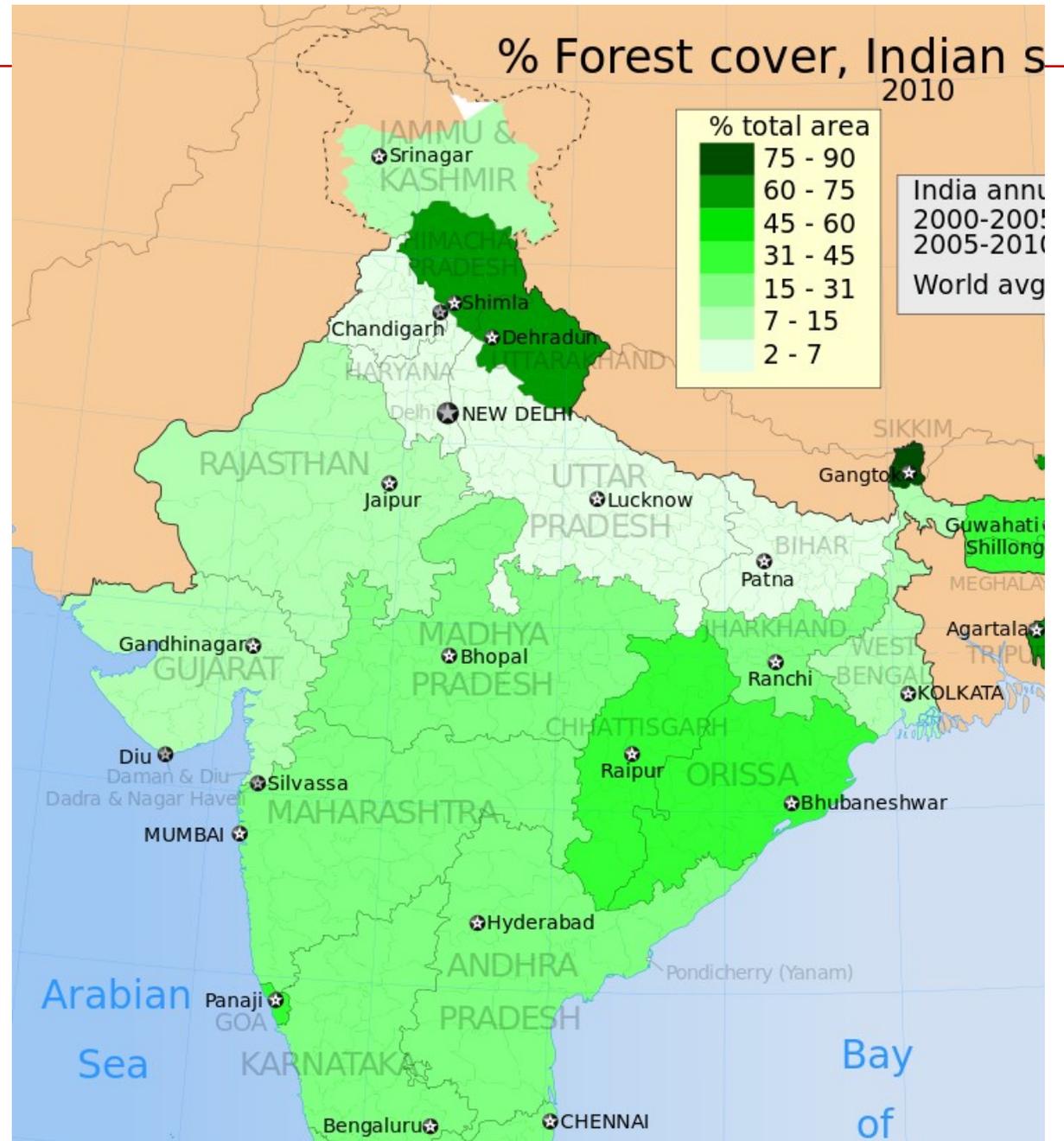
Topography

The land topography whether it is plane, hilly, upland or low-lying, influences the type of forest ecosystem.

Low areas, such as those along rivers support species adapted to wet conditions. High, dry uplands support species tolerant to drought.

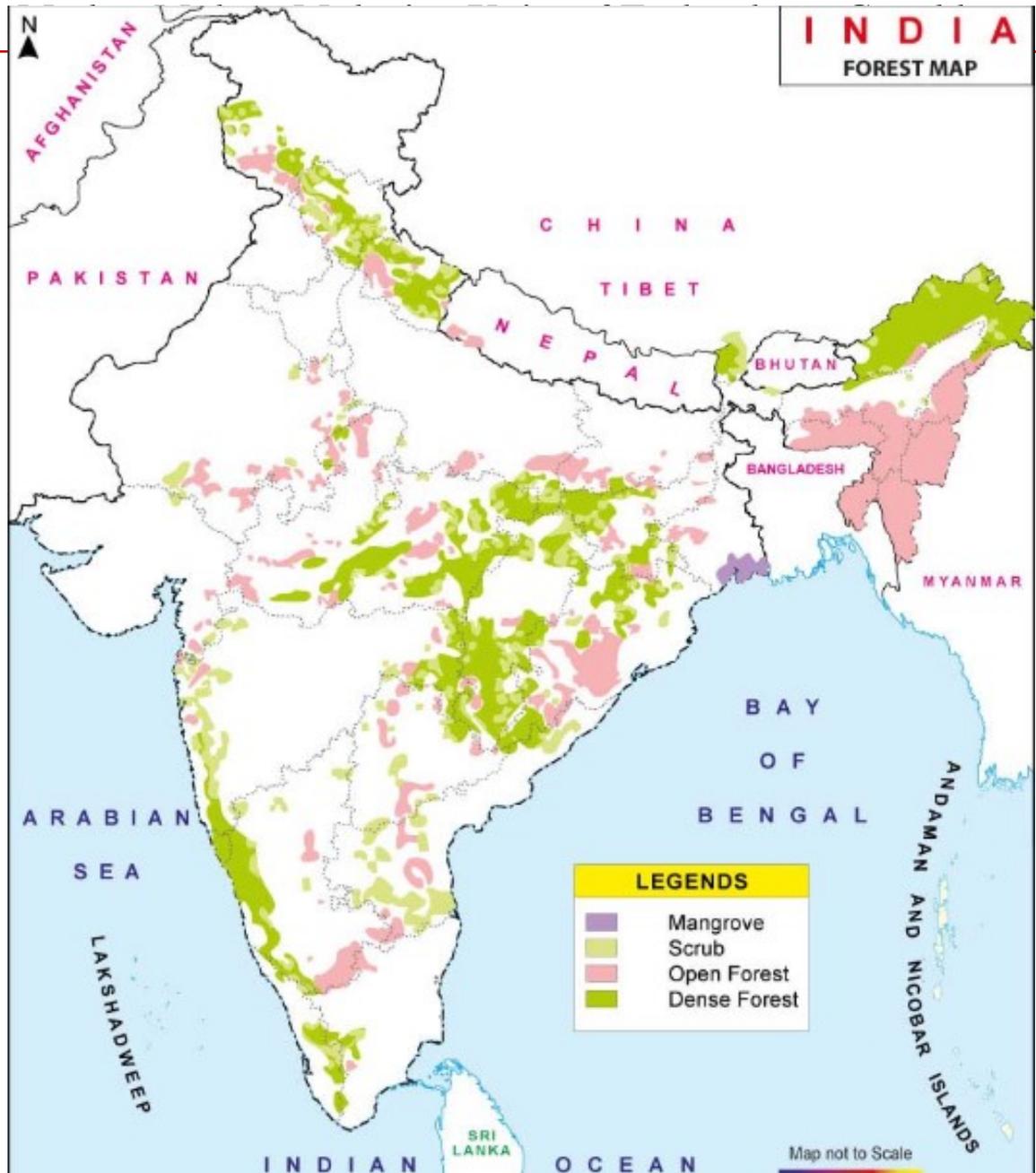


Forest Cover in India



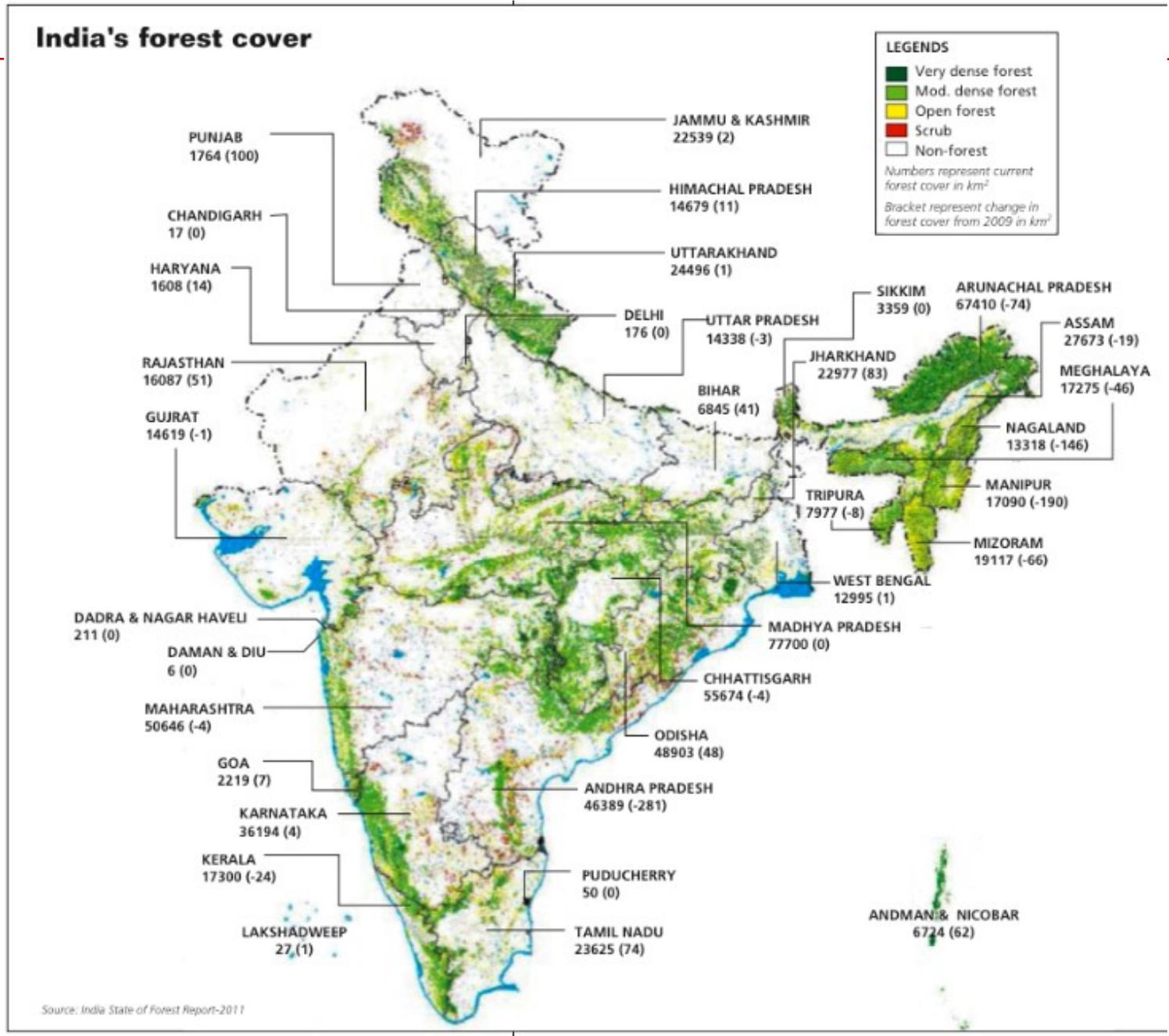


Forest Cover in India





Forest Cover in India









Insects





Deodar Tree





Pine Tree





Sheesham Tree





Sal or Teakwood Tree





Forest ecosystem





Tropical forests





Tropical scrub forests





Temperate rain forests





Temperate rain forests



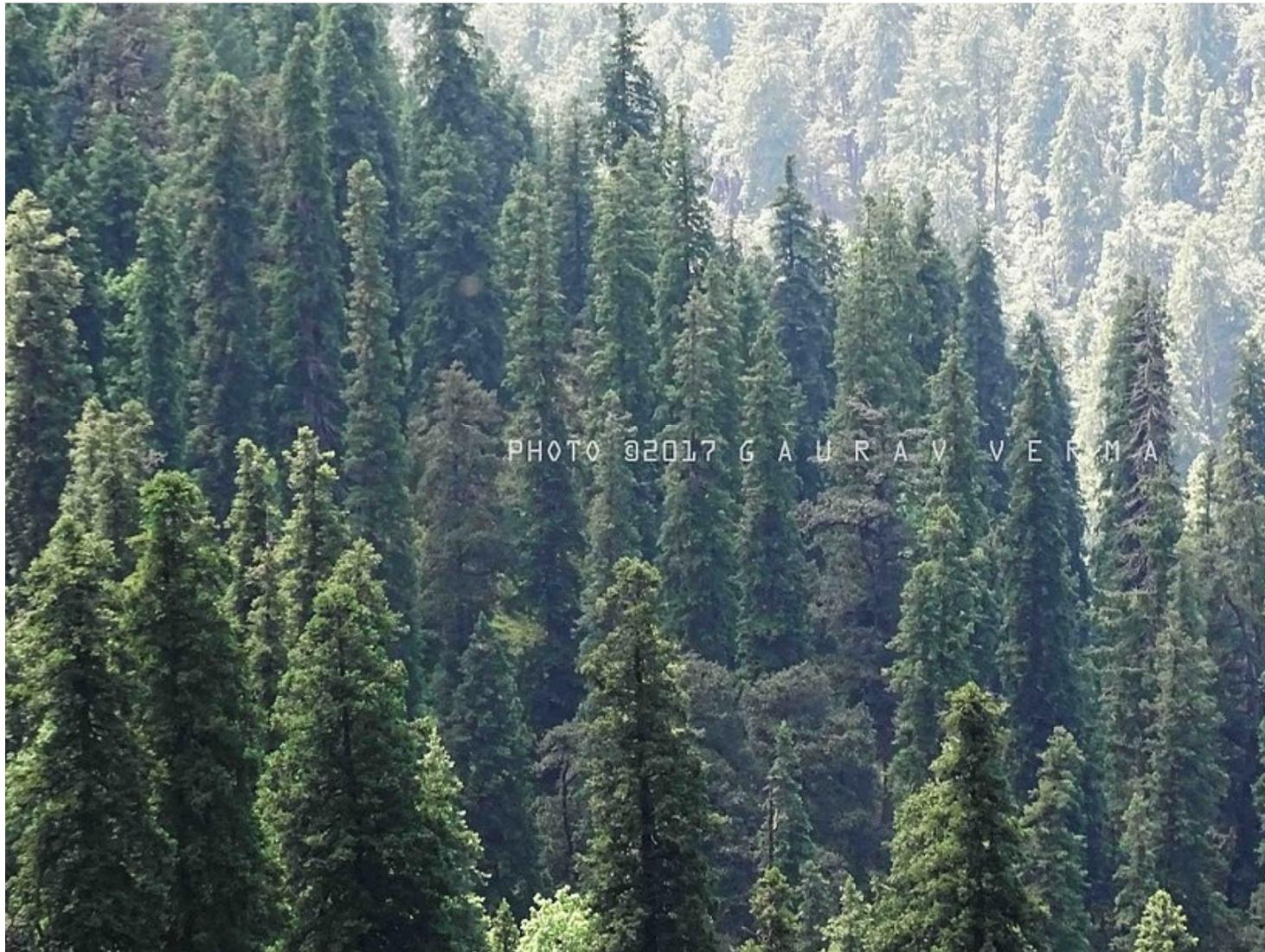


Evergreen coniferous forests





Evergreen coniferous forests





Evergreen coniferous forests





Tropical Rain Forest





Tropical Rain Forest





Tropical Rain Forest





Forest Fire





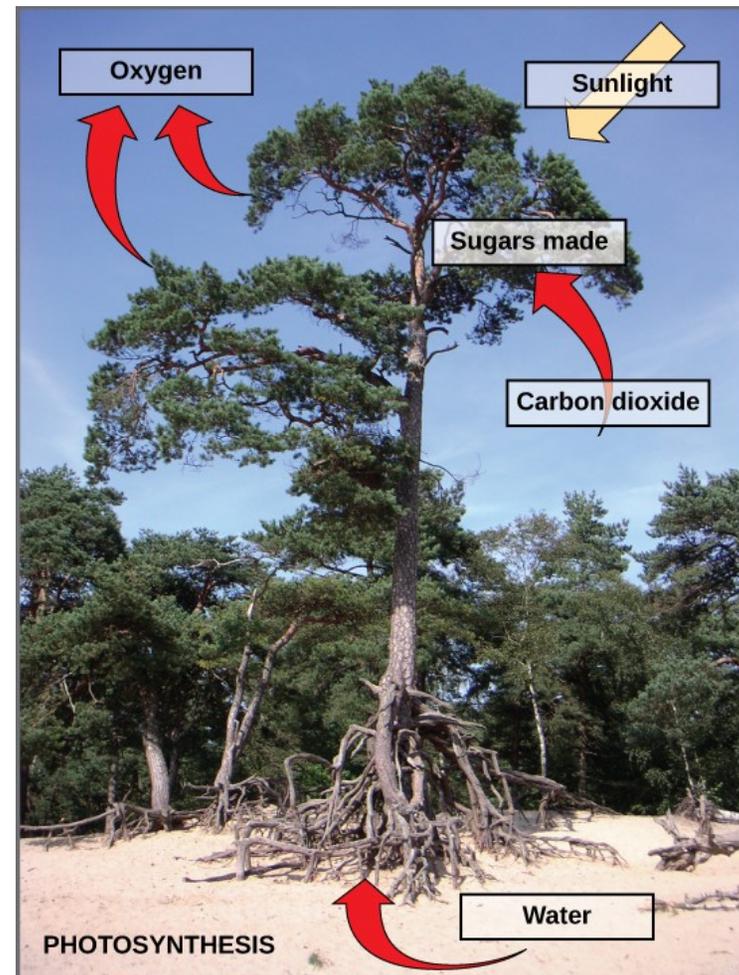
Ecological Services Provided by Forests

- Reducing global warming: The main greenhouse gas carbon dioxide (CO₂) is absorbed by the forests as a raw material for photosynthesis. Thus forest canopy acts as a sink for CO₂ thereby reducing the problem of global warming caused by greenhouse gas CO₂



Ecological Services Provided by Forests

- Production of oxygen: The trees produce oxygen by photosynthesis which is so vital for life on this earth. They are rightly called as earth's lungs.



https://upload.wikimedia.org/wikipedia/commons/b/b2/Figure_08_01_03.jpg



Ecological Services Provided by Forests

- Wild life habitat: Forests are the homes of millions of wild animals and plants. About 7 million species are found in the tropical forests alone.



Ecological Services Provided by Forests

- Regulation of hydrological cycle: Forested watersheds act like giant sponges, absorbing the rainfall, slowing down the runoff and slowly releasing the water for recharge of springs.
- About 50-80 % of the moisture in the air above tropical forests comes from their transpiration which helps in bringing rains.



Ecological Services Provided by Forests

- **Soil Conservation:** Forests bind the soil particles tightly in their roots and prevent soil erosion. They also act as wind-breaks.
- **Prevention of Soil Erosion** Water moves slowly through forested soils and stays free of sediments.
- **Control of Run-off** Leaves and branches of trees break the impact of rain, causing it to drip rather than have a strong force. Rain is absorbed by the ground, reducing surface run-off.
- **Reduction of Wind Erosion** Trees are used as windbreaks and slow down the force of wind.



Ecological Services Provided by Forests

- Pollution moderators: Forests can absorb many toxic gases and can help in keeping the air pure. They have also been reported to absorb noise and thus help in preventing air and noise pollution
- Removal of Pollutants The roots of trees absorb soil and water pollutants.
- Sulphur dioxide is used for metabolism of trees. Thus, forests aid in the cleansing of air, water and soil.



Ecological uses

- Driving energy flow and nutrient cycling.
- Provisions for Healthy Survival of Local Communities and Mankind Forests provide employment and income, aesthetic pleasure and spiritual solace. They also provide food, fibre, honey, medicinal plants and minerals.



Grassland ecosystem

- **Grasslands (also called Greenswards) are areas where the vegetation is dominated by grasses and other herbaceous (non-woody) plants.**
- **Grasslands occupy about 24% of the earth's surface.**
- **Grasslands occur in regions too dry for forests and too moist for deserts**
- **The annual rainfall ranges between 25- 75 cm, Usually seasonal**
- **The principal grasslands include:**
 - **Prairies (Canada, USA)**
 - **Pampas (South America)**
 - **Steppes (Europe & Asia)**
 - **Veldts (Africa)**



Grassland ecosystem

- **The highest abundance & greatest diversity of large mammals are found in these ecosystems.**
- **The dominant animal species include**
 - **Wild horses, asses & antelope (found in africa) Eurasia,**
 - **Herds of Bison of America; and**
 - **The antelope & other large herbivores of Africa**



Grassland ecosystem

The various components of a grassland Ecosystem are:

Biotic components: Three functional groups which are:

1) Producer Organisms:

In grassland, producers are mainly grasses; though, a few herbs & shrubs also contribute to primary production of biomass.

Some of the most common species of grasses are:

*Brachiaria sp., Cynodon sp., Desmodium sp.,
Digitaria sp.*



Grassland ecosystem

2) Consumers

- In a grassland, consumers are of three main types;

a) Primary Consumers:

- The primary consumers are herbivores feeding directly on grasses. These are grazing animals such as
 - Cows, Buffaloes, Sheep, Goats, Deer, Rabbits etc.
 - Besides them, numerous species of insects, termites, etc are also present.



Grassland ecosystem

b) Secondary Consumers

- These are carnivores that feed on primary consumers (Herbivores)
- These include;
 - Frogs, Snakes, Lizards, Birds, Foxes, Jackals etc.

c) Tertiary Consumers

- These include hawks etc. which feed on secondary consumers.



Grassland ecosystem

3) Decomposers

- These include wide variety of saprotrophic micro-organism like:
- Bacteria; Fungi; Actinomycetes
- They attract the dead or decayed bodies of organisms & thus decomposition takes place.
- Therefore, nutrients are released for reuse by producers.



Grassland ecosystem

Abiotic components

- These include basic inorganic & organic compounds present in the soil & aerial environment.
- The essential elements like C, H, N, O, P, S etc. are supplied by water, nitrogen, nitrates, sulphates, phosphates present in soil & atmosphere. Organic substances like carbohydrates, lipids and proteins, and
- Physical factors, like sun light, rainfall, soil, temperature and pH.



Functions of Grassland Ecosystem

- To increase the fertility of soil and to regulate the productivity of ecosystem.
- To give shelter and food directly and indirectly to animals, insects and birds.
- To have more cultivated grasses and grain crops.
- To reduce the leaching of minerals due to low rainfall.
- Grassland ecosystem also consists of both biotic and abiotic components interacting with each other.



Grassland Ecosystem





Grassland Ecosystem





Steppes





Veldts





Pampas





Prairies





Producers: Different grass species



Consumers of Grassland ecosystem



Decomposers in a Grassland ecosystem



Ecological Benefits of Grassland Ecosystem

- Groundwater Recharge
- Preventing floods
- Natural production of food crops and meats
- Enriching Soils
- Carbon Capturing
- Maintenance of biodiversity
- Climate regulation