

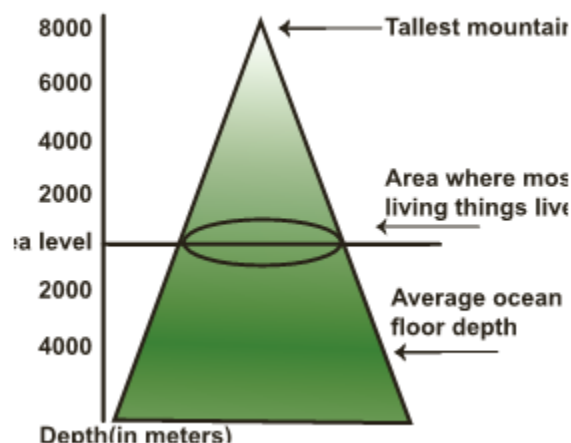
9th Social Science Lesson 23 Notes in English

23] Biosphere

Introduction

- **Biosphere**, the fourth sphere of the Earth, is a life supporting layer that exists on the earth's surface.
- This layer on earth encompasses **the Lithosphere, Hydrosphere and Atmosphere**.
- It includes **flora** and **fauna** that thrive on or near the earth's surface.
- The vertical range of the biosphere is approximately 20 km, which is measured from the ocean floor to the troposphere.
- However, most plants and animals live in a very narrow section for about 1 km above and below the **Mean Sea Level (MSL)**.
- **Biosphere** is made up of different **ecosystems** and **biomes**.
- All living things, large or small, are grouped into species.
- The area in which an animal, plant or micro organism lives is called its **habitat**.
- A wide variety of plants and animals live in a particular habitat known as **biodiversity**.

VERTICAL RANGE OF BIOSPHERE ON EARTH



Ecosystem

- An ecosystem is a community, where all living organisms live and interact with one another and also with their non-living environment such as land, soil, air, water etc.
- Ecosystems range in size from the smallest units (Eg: bark of a tree) that can sustain life to **the global ecosystem** or **ecosphere**. (Eg: Cropland, Pond ecosystem, Forest ecosystem, Desert ecosystem etc.).
- Biosphere harbours all ecosystems on the earth and sustains life forms including mankind.



Components of Ecosystem

- An ecosystem consists of three basic components, namely
 - a) Abiotic components
 - b) Biotic components and
 - c) Energy component

A) Abiotic Components

- Abiotic components include the non-living, inorganic, physical and chemical factors in the environment. Eg. Land, Air, Water, Calcium, Iron etc.

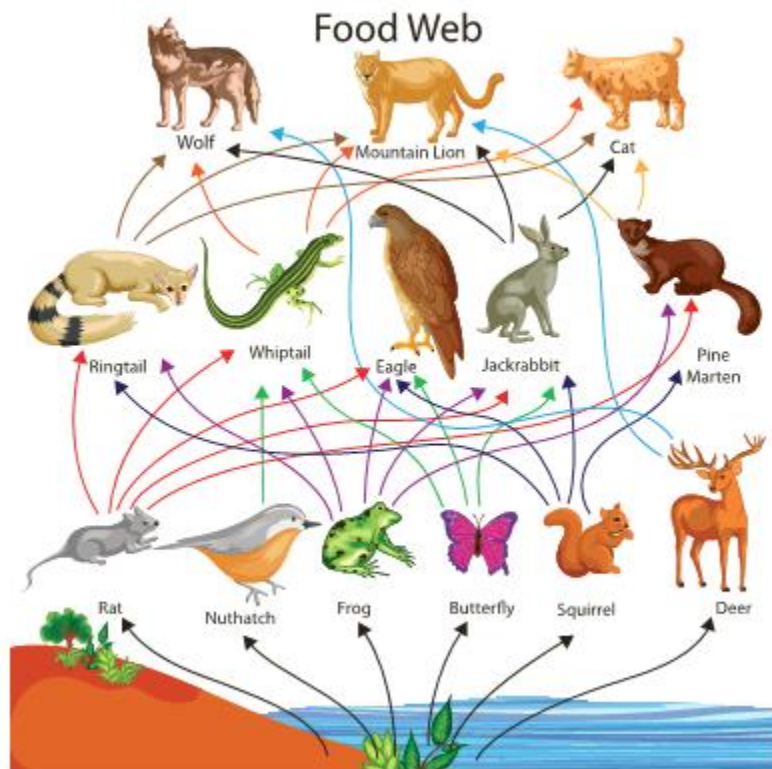
B) Biotic Components

- Biotic components include **plants, animals** and **micro organisms**.
- Biotic components can be classified into three categories :
- **Producers** are self nourishing components of the ecosystem. Hence they are called **Autotrophs**.
- They are found both on land and water. Eg. Plants, Algae, Bacteria etc.
- Consumers are those that depend on producers, directly or indirectly. Hence they are called **Heterotrophs**.
- The common category of consumers are:
 - **Primary consumers** depend on producers for their food.
 - They are exclusively herbivores. Eg. zebra, goat etc.
 - **Secondary consumers** are small carnivores i.e., they consume herbivores. Eg. lion, snake etc.
 - **Tertiary consumers** are top carnivores that prey on both **herbivores** and **carnivores**. Eg. owl, crocodile etc.
- Decomposers are some organisms that are incapable of preparing its own food.
- They live on dead and decaying plants and animals.
- Hence they are called **Saprotrophs**. Eg. fungus, mushrooms etc.

C) Energy Components

- All organisms in the biosphere use energy to work and convert one form of energy into another.
- **The Sun** is the ultimate source of energy for the biosphere as a whole.
- **The solar energy** gets transformed into other forms of energy through the various components in the ecosystem.
- The producers, consumers and the decomposers contribute a lot to the energy flow in an ecosystem.

Functions of an ecosystem



- The living organisms form an interacting set of **flora** and **fauna** which are organized into trophic levels, food chains and food webs.
- The functioning of an ecosystem depends on **the pattern of the energy flow**, as it helps in the **distribution** and **circulation** of the **organic** and **inorganic** matter within an ecosystem.
- Energy flow generally takes place in a hierarchical order in an ecosystem through various levels.
- These levels are called **trophic levels**.
- The chain of transformation of energy from one group of organisms to another, through various trophic levels is called a **food chain**.
- A system of interlocking and interdependent food chains is called a **food web**.

Biodiversity

- **Biodiversity** or **biological diversity** refers to a wide variety of living organisms (plants, animals and other micro organisms) which live in a **habitat**.
- It is highly influenced by topography, climate as well as human activities.
- It represents the strength of the biological resources of a place on earth.
- In biodiversity, each species, no matter how big or small, has an important role to play in the ecosystem.
- It maintains the ecological balance and facilitates social benefits such as tourism, education, research etc. over an area.

Loss of biodiversity

- **The extinction of species** (flora and fauna) due to human and natural influences is called **loss of biodiversity**.
- A healthy eco system provides clean water, pure water, enriched soil, food, raw materials, medicines etc.
- Hence stable biosphere has to be conserved.

Biomes

- A biome is a **geographically extensive ecosystem** where all flora and fauna are found collectively.
- It is the total assemblage of plant and animal life interacting within the biosphere. Biomes are defined by **abiotic factors** like, relief, climate, soils and vegetation.
- They are classified into two broad categories, **terrestrial biomes** and **aquatic biomes**.

Terrestrial Biomes

- Terrestrial biomes is a group of living organisms that live and interact with one another on land.
- They are mainly determined by **temperature** and **rainfall**. Some of the major terrestrial biomes of the world are

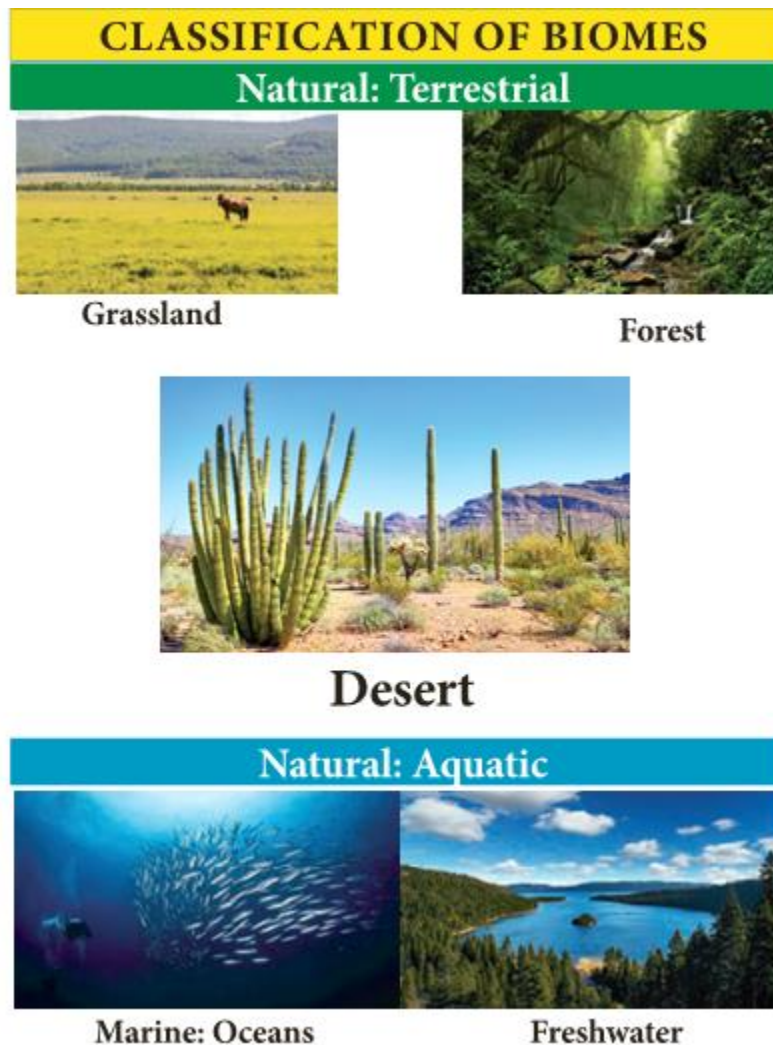
A. Tropical Forest Biomes

B. Tropical Savanna Biomes

C. Desert Biomes

D. Temperate Grassland Biomes

E. Tundra Biomes



A. Tropical Forest Biomes

- The tropical forest biome is comprised of several sub-biomes, including **evergreen rainforest**, **seasonal deciduous** forest etc.
- Tropical forests have the **highest biodiversity** and **primary productivity** of any of the terrestrial biomes.
- **The Amazon basin, Congo basin and Indonesian** islands are the major regions of this biome.
- These regions have very dense forests and so have great economic importance.
- **Human settlements** are found scattered here.
- They sustain their livelihood through food gathering, fishing, lumbering and shifting cultivation.
- Due to the humid nature of this biome, the people get afflicted to tropical diseases like malaria, yellow fever etc.
- The chief trees found here are rubber, bamboo, ebony, etc.
- Bats, pheasants, jaguars, elephants, monkeys etc. are the important birds and animals found here.

B. Tropical Savanna (Grasslands) Biomes

- Tropical grasslands are generally found between tropical forests and deserts.
- **Tropical Savanna biomes** are found between **10 deg to 20 deg North and South latitudes**.
- These **grasslands** are generally flat and are found in the Sahel, south of Sahara in East Africa and in Australia.
- This biome is generally hot and dry and experiences **moderate to low rainfall**.
- So, the grass which grow here are tall and sharp. Hence the chief occupation of the people found here is **herding**.
- The primitive people living here are **nomadic**.
- The common animals found here are the lion, leopard, tiger, deer, zebra, giraffe etc.
- **Flora** such as Rhodes grass, red oats grass, lemon grass etc... are found in this biome.

C. Desert Biomes

- Deserts are usually found on the western margins of the continents between **20° and 30° North and South latitudes**.
- The annual rainfall is less than 25 cm in these regions.



- Due to the lack of rainfall and arid conditions, these regions do not possess any vegetation but have special vegetation type called **Xerophytes**.
- As the soil is sandy and saline, deserts remain **agriculturally unproductive**.
- **Drought** resistant thorny scrubs and bushes, palms are found here.
- Tribal people who live here practice **food gathering** and **hunting**.
- They move their temporary settlements frequently in search of pastures.
- **Transportation** becomes very difficult here and is carried on by **camels**.
- **Reptiles** like snakes, lizards, scorpions etc., are most commonly found here.

D. Temperate Grassland Biomes

- **Temperate Grasslands** are usually found in the interior of the continents and are characterized by large seasonal temperature variations, with warm summer and cold winter.
- The type of grassland in these regions strongly depends upon precipitation.
- **Higher precipitation** leads to tall and soft grass and lower precipitation leads to short and soft grass.
- These regions favour wheat cultivation.
- **Extensive mechanised agriculture** is practised due to lack of farm labour.
- **Pastoral industry** becomes the main occupation, thereby facilitating slaughtering of animals, packing of raw and processed meat, dairy products etc.
- The common birds and animals are grasshopper, wolf, bison, prairie dog etc.
- **Temperate grasslands** are called differently in different parts of the world.

Prairies -- North America

Steppes -- Eurasia

Pampas -- Argentina and Uruguay

Veld -- South Africa

Downs -- Australia

Canterburg -- Newzealand

Manchurian -- China

E. Tundra Biomes

- These **vast lowlands** are found where the ground remains **frozen**.
- Greenland, Arctic and Antarctic regions and Northern parts of Asia, Canada and Europe fall in this biome.



- These regions are also called **Barren lands**.

- This biome experiences long severe winter and short cool summer.
- Due to the prevailing of low temperature and short growing seasons, the net primary productivity is **very low in tundra**.
- People are **nomadic**. **Hunting** and **fishing** are their major occupations.
- The population here is extremely sparse and the harsh environment makes them change their settlement frequently.
- They live in **igloo** in winter and in **tents** during summer.
- **Arctic moss, Arctic willow, lichens** etc. grow here.
- **Fauna** like the polar bear, wolverine, reindeer, snowy owl are found here.

Aquatic Biomes

- Aquatic biome is a **group of living organisms** that live and interact with one another and its aquatic environment for nutrients and shelter.



- Like terrestrial biomes, aquatic biomes are influenced by a series of **abiotic factors**.
- It is broadly classified as **fresh water biomes** and **marine biomes**.

A. Fresh water Biomes:

- It comprises lakes, ponds, rivers, streams, wetlands etc.
- It is influenced by various **abiotic components** such as the volume of water, water flow, composition of oxygen, temperature, etc.
- Humans rely on **freshwater biomes** for drinking water, crop irrigation, sanitation and industry.
- Water lily, lotus, duck weeds etc. are the common plants found here.
- Trout, salmon, turtles, crocodiles etc. are the animals found here.

B. Marine Biomes:

- They are **the largest aquatic biomes** on earth.

- They are **continuous bodies of salt water** and provide a wide range of habitats for marine plants and animals.
- **Coral reefs** are a second kind of marine biomes within the ocean.
- Estuaries, coastal areas where salt water and fresh water mix, form a third unique marine biome.



- As water provides maximum **mobility to marine organisms**, nutrients are circulated more quickly and efficiently here than the terrestrial biomes.
- Apart from animals, plants such as kelp, algae, phytoplankton etc. also grow in water.
- **Aquatic biomes** are not only important for plants and animals, but also for humans.
- Humans use aquatic biomes for water, food and leisure activities.
- Some of the threats and issues to aquatic biomes are overfishing, pollution and rise in sea level.

Conservation

- The biosphere extends from **the deep ocean trenches to lush rain forests**.
- People play an important role in maintaining **the flow of energy** in the biosphere.
- At the same time, the primary cause of today's loss of biodiversity is habitat alteration caused by human activities.
- The ever **increasing population** results in **over exploitation of biological resources**.
- This has an adverse impact on flora and fauna on earth.
- There are places on earth that are both biologically rich and deeply threatened.
- Hence it is man's duty to conserve and care for the earth and make it a better place to live in.

MORE TO KNOW:

Ecology

- The branch of science that deals about ecosystem is called **Ecology**.
- A person who studies ecology is referred to as an **Ecologist**.

Biodiversity Hotspots

- An ecological region that has lost more than **70% of its original habitat** is considered a hotspot.
- **Hotspots in India** are the Himalayas, Western Ghats, Indo Burma Region and Sundaland.
- There are 34 areas around the world which are qualified as **biodiversity hotspots**

The wide range of fauna

- Of late, parts of **the Savanna grasslands** are being converted into farmlands, which pose a great threat to the wide range of fauna.
- For Eg. The population of **the big cats** like cheetah, lion etc. are dwindling drastically.

National Cancer Institute



- The U.S. National Cancer Institute has identified about 70% of the plants used for **treating cancer**.
- Which are found only in **rain forests**. Eg. **Lapacho**.

An oasis



- An oasis is a **fertile fresh water source** found in deserts and semi-arid regions.
- **Oases** are fed by **springs**.
- Crops like date palms, figs, citrus fruits, maize etc. are cultivated near these oases.

A Biosphere Reserve

- A Biosphere Reserve is a **special ecosystem** or **specialized environment** with flora and fauna that require protection and nurturing.
- There are **18 Biosphere Reserves** in India.