

ecology

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Types of ecosystem

- Ecosystem: interaction of populations in a community and nonliving (physical) surroundings
- Ecosystems: components, structure and functions.
- Ecosystems are classified as **natural and human modified** depending upon whether they are fully dependent on the solar radiation and other natural sources of energy or on fertilizers and fossil fuels.

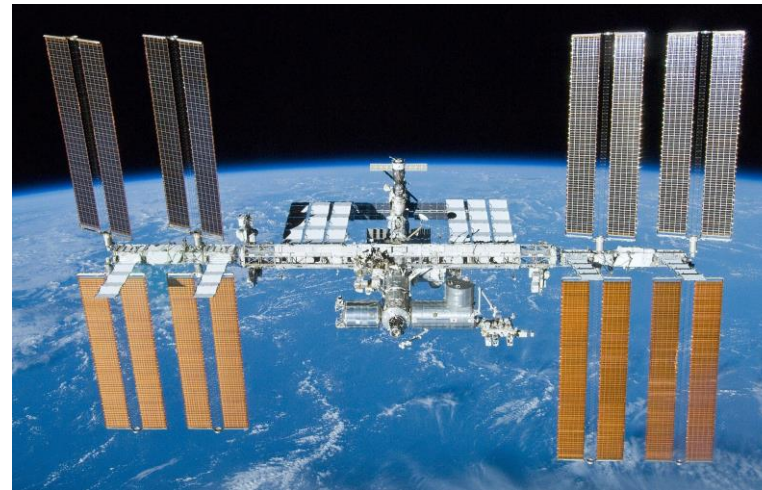
Types of ecosystem

- **Natural ecosystems ecosystems** are such as ponds, lakes, meadows, marshlands, grasslands, desert and forests.
- They are our natural resources and provide us food, fuel, fodder and medicines.



Types of ecosystem

- **Human modified ecosystem** are made and managed by human beings for their better living. Urban ecosystem, rural ecosystem, agro-ecosystems, aquaculture and spaceship are some examples of the human modified ecosystems.



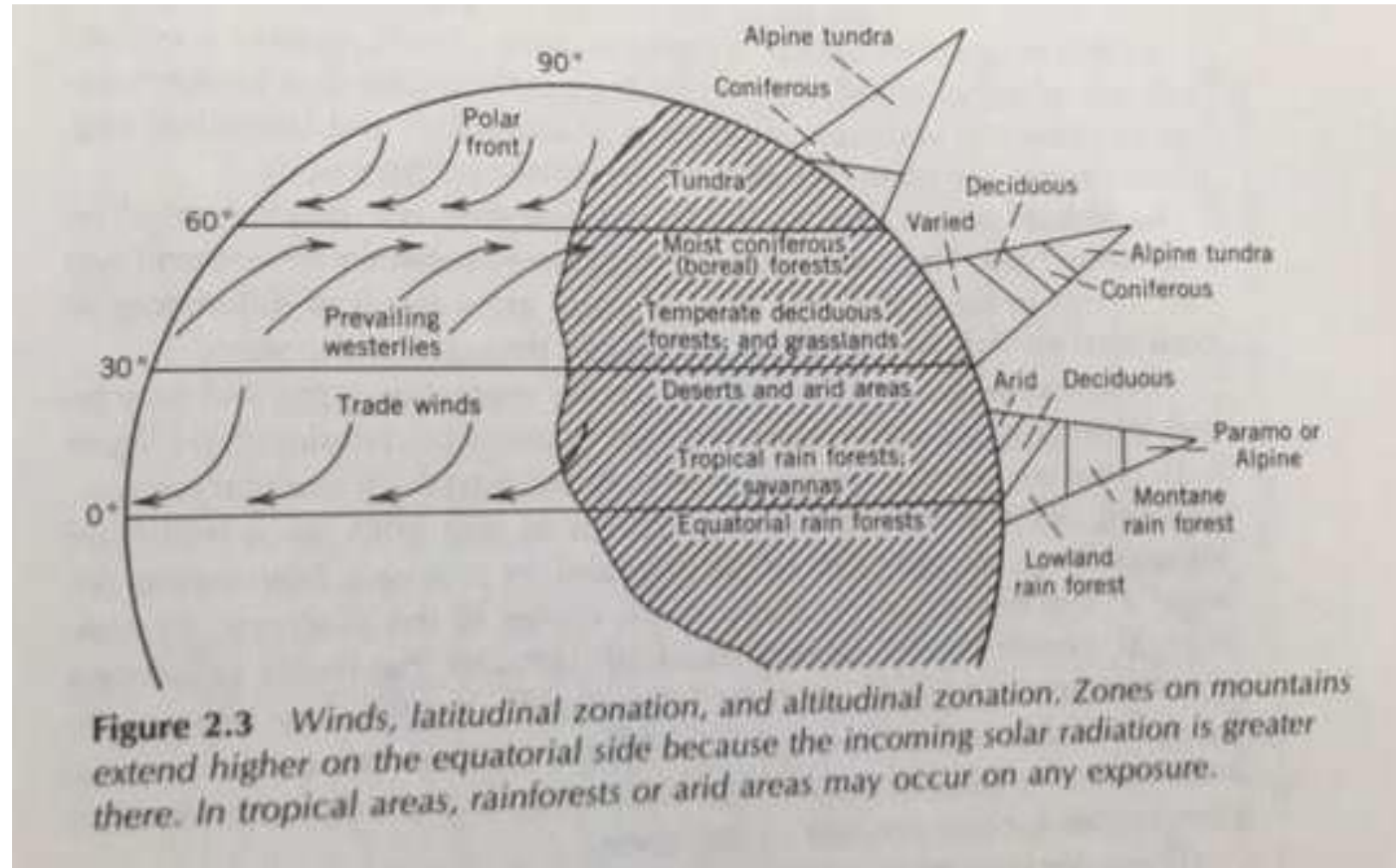
BIOMES

- **Biomes:** are the natural broad biotic zones of the biosphere. A Biome is a large ecosystem which is embracing the large landscape, characterized by specific flora and fauna. Each biome is characterized by uniform life form of vegetation such as grass, desert plants, deciduous trees or coniferous trees.
- Biomes can be classified as :
- **A. Terrestrial :** These are the biomes found on land e.g,, Tundra, forest, deserts, grasslands
- **B. Aquatic.** These are the biomes found in water. These can be :
 - (i) Fresh waters, such as pond, lake and river
 - (ii) Marine as oceans, shallow sea

Climate

Terrestrial

- Forests
- Grasslands
- Deserts
- Tundra



Forests

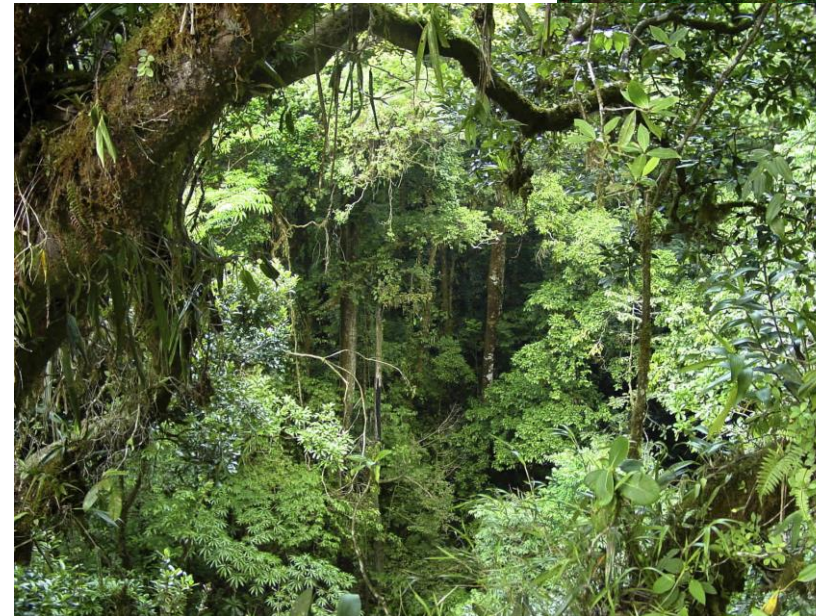
- **Forests** are one of the largest plant formations, densely packed with tall and big trees. Forests are of many different types, depending on the climatic regime in which they are found. Three main forest types are:
 - Tropical rain forests
 - Temperate deciduous forests
 - Boreal or north coniferous forests

Tropical Rain (Evergreen) Forest

- **Tropical Rain (Evergreen) Forest** : These are in the tropical region showing very high rain fall. These forests occur between tropics of Cancer and Capricorn. Such forests are well developed over the western coast of India and North eastern Himalayas and scattered in south east Asia, west Africa and north cost of South America.

Main characteristics

- Temperature and light intensity are very high.
- Rain fall is greater than 2000 mm. per year.
- Soil of these regions is rich in humus,
- The rate of **turn over** of the nutrients is very high leading to high productivity and have highest standing crop and biomass.
- The vegetation includes brood evergreen trees of about 200 feet like bamboos, ferns, shrub etc. Epiphytes (متطفلة) are also abundant. Many tree species show buttresses (swollen stem bases) and leaves with drip tips.



Tropical Rain forest

- These forests have rich invertebrate **فقاريات** and vertebrate **لافقاريات** fauna.
- Snails, centipedes, millipedes and many insect species are common near the forest floor.
- *Rhacophorus* (lying frog), aquatic reptiles, *Chameleon* and many birds are common in these forests.
- Mammals of these forests are sloths , monkeys, ant eaters, leopards, jungle cats and giant flying squirrels.



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Temperate Deciduous Forests

- **Temperate Deciduous Forests** : Trees of deciduous forests shed their leaves in autumn and a new foliage grows in spring.
- They occur mostly in northwest, central and eastern Europe, eastern north America, north China, Korea, Japan, far eastern Russia and Australia.
- **Climate** : These forests occur in the areas of moderate climatic conditions such as
 - Annual rainfall is 750 to 1500 mm
 - Winter lasts for four to six months.
 - Temperature ranges between 10 to 20°C.
 - Soil is brown and rich in nutrients.

Temperate Deciduous Forests

- **Flora** : Commonly found trees in this ecosystem are oak, birch, hickory, bass wood (Tilia), chest nuts, pitch pine, cypress.
- **Fauna**: Invertebrate fauna comprises green oak moth, bark beetle, green flies, aphids, sap flies, moths and butterflies.
 - Prominent grazers are grass eating rodents, deer and bison. Rodents play a very important role in these forests. They feed on the seeds, fruits and leaves of the trees and consume much more food than the large sized grazers.
 - Common carnivores in temperate forests are wild cat, wolves, foxes, tawny owl and sparrow hawk.
 - Black bear, raccoons and skunks are the omnivorous animals of these forests.

Coniferous forests

- **Coniferous forests** : Coniferous forests are also known as **Taiga** or **Boreal** forests. They extend as a continuous belt across north America and north Eurasia below the arctic tundra. In the Himalayas, these are distributed above 1700 to 3000 metre altitude. They also occur at high altitude below the alpine tundra and tree line.
- **Climate** : Climate is cold.
 - Long and harsh Winters is for more than six months.
 - Mean annual temperature is below 0°C,
 - Soil is poor in nutrients and acidic in nature.



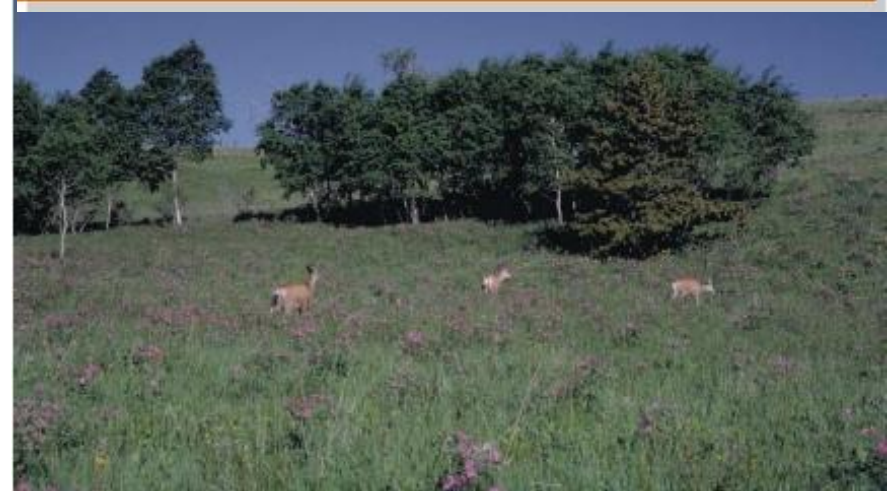
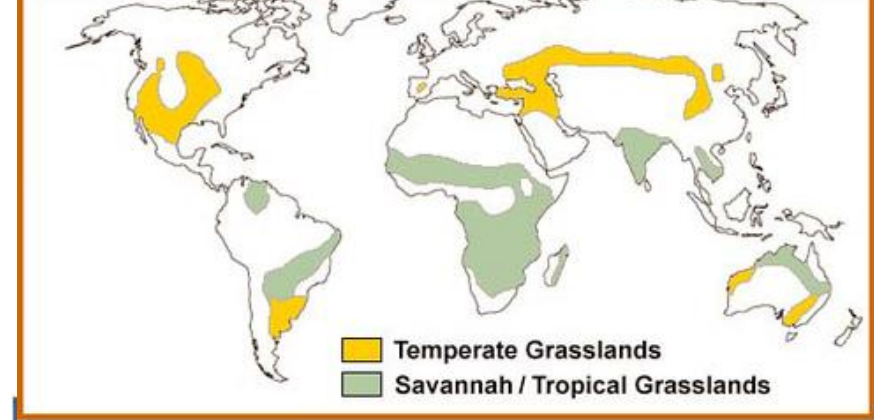
Coniferous forests

- **Flora and fauna** : Coniferous forests are characterized by conifers.
- They are evergreen, drought resistant and woody.
- In many species the canopy is cone shaped.
- The common species of trees of these forests are Spruce, fir and pine trees.
- The productivity is much less than other ecosystem.
- There are very few animals in these forests.
- The herbivores are red squirrel, deer, goat, mule, moose etc.
- The carnivores are timber wolves, lynxes, wolverine, weasels mink and bear.
- Some common birds are cross bill, thrushes, warblers, flycatchers, robin and sparrow.

Grasslands (savanas)

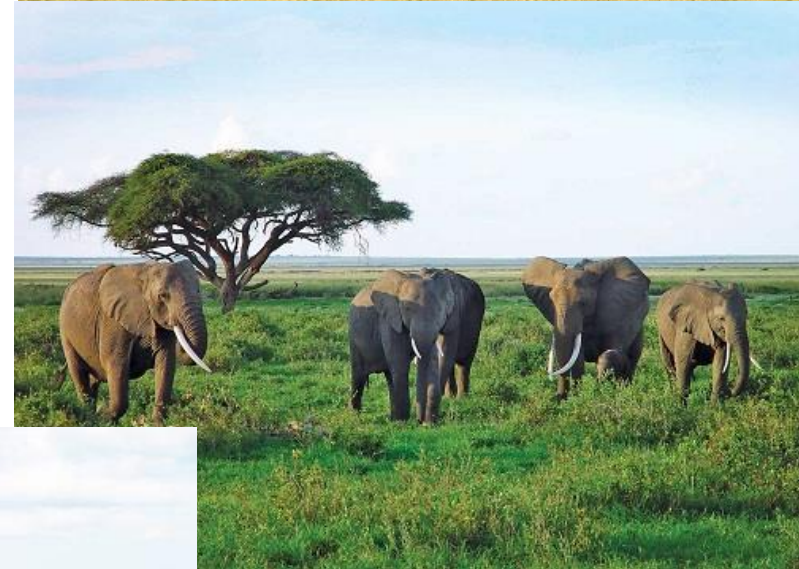
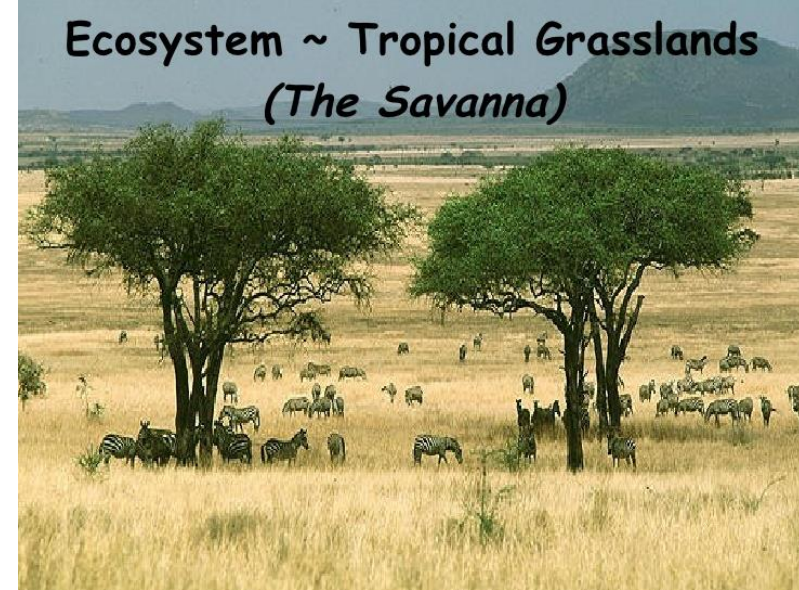
- **Distribution :**

- Grasslands are dominated by the grasses.
- They occupy about 20% of the land on earth's surface.
- They occur in both tropical and temperate regions where environmental conditions are better than that of the desert but rainfall is not enough to support the growth of trees.
- Grasslands represent an ecotone (a zone in between two ecosystems) and are found between forest on one side and deserts on the other.
- They are subjected to greater variation of temperature, moisture, wind and light intensity of the sun..
- Grasslands are known by various names in different parts of the world. For example they are called prairies, steppes, savannas and pampas.



Ecosystem ~ Tropical Grasslands
(The Savanna)

- Tropical grasslands are commonly called Savannas. They occur in eastern Africa South America, Australia and India. Savannas form a complex ecosystem as they contain grasses with groups of trees. Soil of grassland is rich and fertile.



- **Flora and fauna**

- Grasses are the dominating plants with scattered drought resistant trees in the tropical grasslands. The height of grasses ranges from 0.2 to 3 meters depending upon the annual rain fall Trees are less than 10 m in height.
- Animals are very much reduced in grasslands because there is no shelter. The large herbivores of this biome are bison, proghorn (North America) wild horse, ass, saiga (Eurasia) , zebra and antelope (South Africa). Carnivores are quite small in number and size They are coyotes, weasels, badgers foxes and ferrets . Hawks, lark sparrows, warblers, Great Indian Bustard and peafowl are the common birds found in grassland. Grasslands are very rich in reptilian and insect fauna.

desert



Distribution :

- Deserts are waterless barren regions of the earth.
- They occupy about one-seventh of the land on earth's surface.
- Deserts form an extreme condition in sequence of ecosystems with respect to the climatic condition .
- They occur in two belts that encircle the northern and southern hemispheres roughly centered over the tropics of Cancer and Capricorn. Sahara deserts of Africa are the largest. Indian Thar deserts are an extensions of Sahara deserts through Arabian and Persian deserts.

Climate:

- Annual rain fall is very little. It may be less than 25 cm per annum. At some places if it is high it is unevenly distributed.
- Temperature may be very high in subtropical deserts and very low in cold deserts e.g. Ladakh.
- Winds have high velocity.

Desert

Flora and fauna :

- Cacti, *Acacia*, *Euphorbia* and prickly pears are some of the common desert plants.
- Desert animals are insects, reptiles, and burrowing rodents. Desert shrew, fox, kangaroo, wood rat, rabbit, armadillo are common mammals in desert. Camel is known as the ship of the desert as it can travel long distances without drinking water for several days.



desert



Tundra

- The word tundra means a “barren land” since they are found in those regions of the world where environmental conditions are very severe. There are two types of tundra **arctic** and **alpine**.

Distribution

- **Arctic tundra** extend as a continuous belt below the polar ice cap and above the tree line on the northern hemisphere. It occupies the northern fringe of Canada Alaska, European Russia, Siberia and island group of arctic ocean.
- **Alpine tundra** occur at high mountain peaks above the tree line. Since mountains are found at all latitudes therefore alpine tundra show day and night temperature variations
- **Climate**
- A permanently frozen subsoil called **permafrost** is found in the arctic and antarctic tundra. The summer temperature may be around 15°C and in winter it may be as low as -57°C in arctic tundra
A very low precipitation of less than 400 mm per year
- A short vegetation period of generally less than 50 days between spring and autumn frost
- Productivity is low

Tundra

Flora and fauna :

- Typical vegetation of arctic tundra is cotton grass, sedges, dwarf heath, willows birches, and lichens.
- Animals of tundra are hurepian reindeer, musk ox, arctic hare, caribous, lemmings and squirrel.
- Their body is covered with fur for insulation,
- Insects have short life cycles which are completed during favorable period of the year.



Tundra



Aquatic Biome

- Aquatic ecosystems are constituted by water bodies .
- Origin of life took place in aquatic ecosystem. Therefore, these ecosystems make an important component of our biosphere. Aquatic ecosystems are classified on the basis of salinity into following two types:
 - 1. Freshwater
 - 2. Marine

Aquatic Biome

- **1. Fresh Water Ecosystem**

- Water on land which is continuously cycling and has low salt content is known as fresh water. The study of fresh water ecosystem is known as **limnology**. Fresh waters are classified into two types:
 - (i) Standing or still water (**Lentic**) e.g. pond, lake, bogs and swamps.
 - (ii) Running water (**Lotic**) e.g.. springs, mountain brooks, streams and rivers.
- **Commonly found flora in ponds and lakes include**
 - (i) Phytoplankton (freely floating microscopic plants) such as algae, diatoms
 - (ii) Floating plant : *Pistia*, water hyacinth, *lemma*, *Azolla*
 - (iii) Rooted plant : Hydrilla, vallisnaria, lotus, trapa and water lily.

Aquatic Biome

- **The common animals in ponds and lakes include**
- (i) Zooplankton (freely floating microscopic animals) such as protozoans and crustaceans;
- (ii) Actively swimming fishes, frogs, tortoises.
- (iii) Bottom dwellers like hydra, worms, prawns crabs, snails.
- (iv) Birds such as herons, water fowls and ducks occurs in and around water.

Aquatic Biome

- **Wetlands** are between aquatic and terrestrial ecosystem *They show an edge effect and form a ecotone. Ecotone is a transitional zone between two ecosystems like terrestrial and land.* Examples of wet zone are swamps, marshes and mangroves.

Aquatic Biome

Marine Ecosystem

- **Distribution** : Marine ecosystem covers nearly 71 % of the earth's surface with an average depth of about 4000 m. Fresh water rivers eventually empty into ocean. Salinity of open sea is 3.6 percent and is quite constant Sodium and chlorine make up nearly 86 percent of the sea salt and the rest is due other elements such as sulphur, magnesium, potassium and calcium
- **Temperature** : The range of temperature variation is much less in sea than on the land although near the surface it is considerable from -2°C in antarctic ocean to 27°C in the warmer waters of pacific ocean. In the deeper layers temperature is constant at about 2°C .
- **Light** : The light reaches upto a certain depth only. Deeper regions are permanently dark.
- **Tides** : The gravitational pulls of the sun and the moon cause tides in oceans. At the time of full moon and new moon tides are high and are called **spring tides**. At quarter moon the tides are exceptionally low and are known as low tide or **neap tides**
- **Flora and fauna** : Life in the oceans is limited but its biodiversity is very high as compared to terrestrial ecosystems. Almost every major group of animals occur somewhere or the other in the sea. except for insects and vascular plant which are completely absent in marine ecosystem.