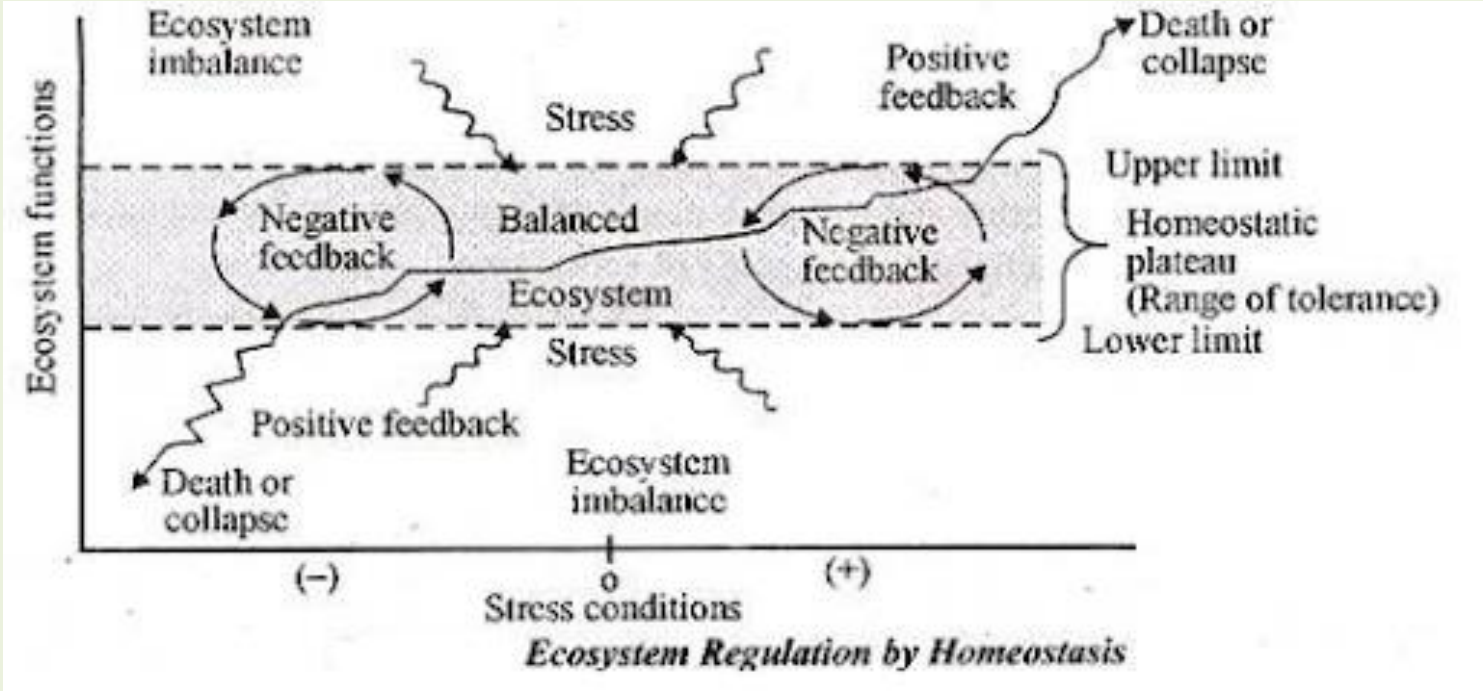
ECOLOGY (Part – 2)

Dr. Prasenjit Adak

Homeostasis

- The ecosystem , by itself, tries to resist the change and maintain itself in equilibrium.
  - Positive feedback
  - Negative feedback



Ecosystem Regulation by Homeostasis

Succession

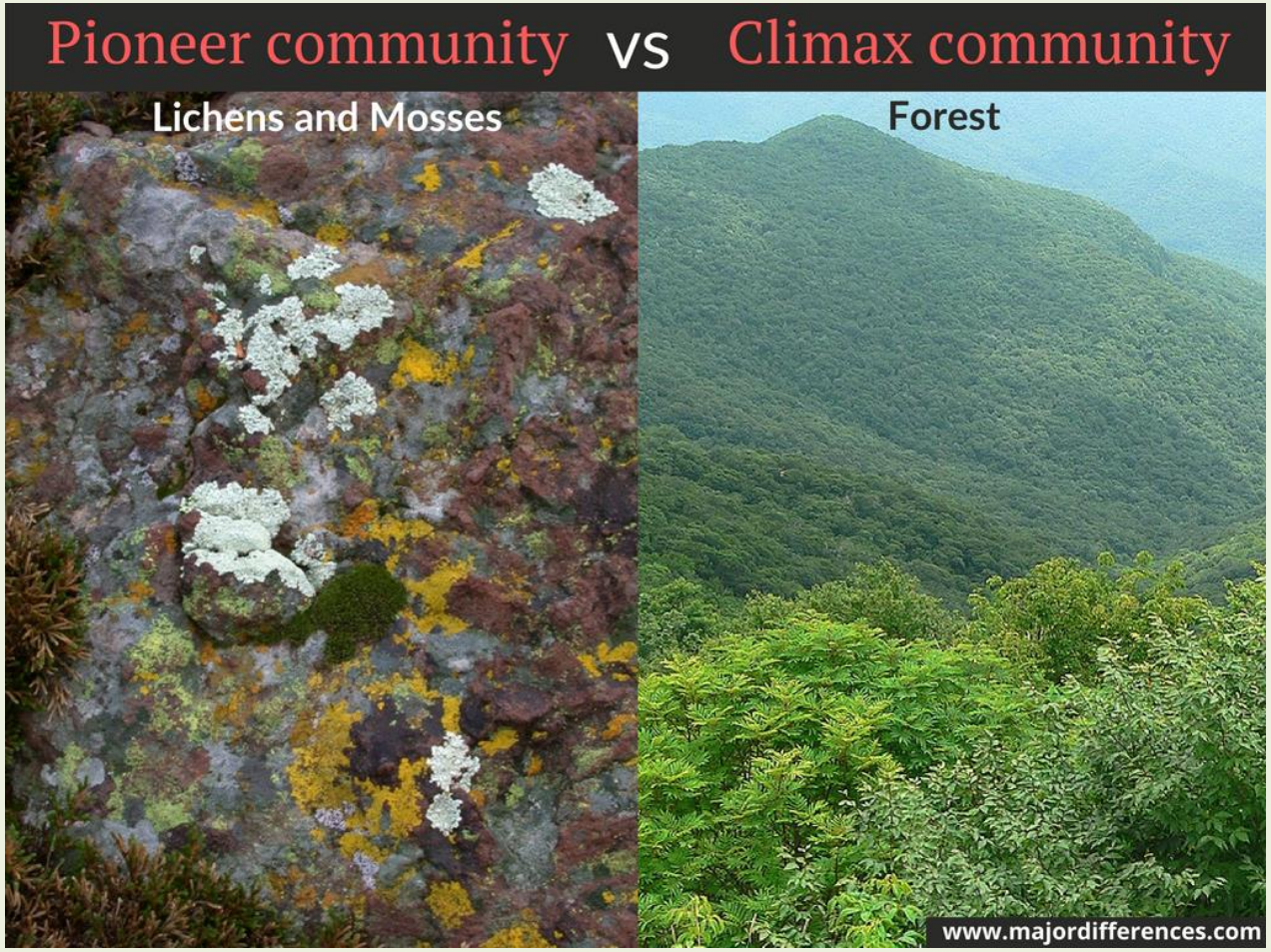
- Ecological succession is the gradual process by which ecosystems change and develop over time.
- It is therefore a series of predictable temporary communities or stages leading up to a climax community.
- Each stage/temporary community is called a successional stage or seral stage.
- Each step prepares the land for the next successional stage.
- All habitats are in the state of constant ecological succession.

Succession

- An established species and impact of external natural forces, which try to alter the environmental condition of that area. Ex. Hardwood tree replacing red pine
- Ecosystem is continuously changing and reorganizing as well as ecological succession refers to orderly that changes happening in composition or structure of ecosystem

Types of Succession

- Primary succession
  - Primary succession refers to a series of community changes which occur on an entirely new habitat which has never been colonized before. For example, a newly quarried rock face or sand dunes. (pioneer and climax community).
- Secondary succession
  - Secondary succession refers to a series of community changes which take place on a previously colonized, but disturbed or damaged habitat. For example, land obtained after felling trees in a woodland, land clearance, or fire.

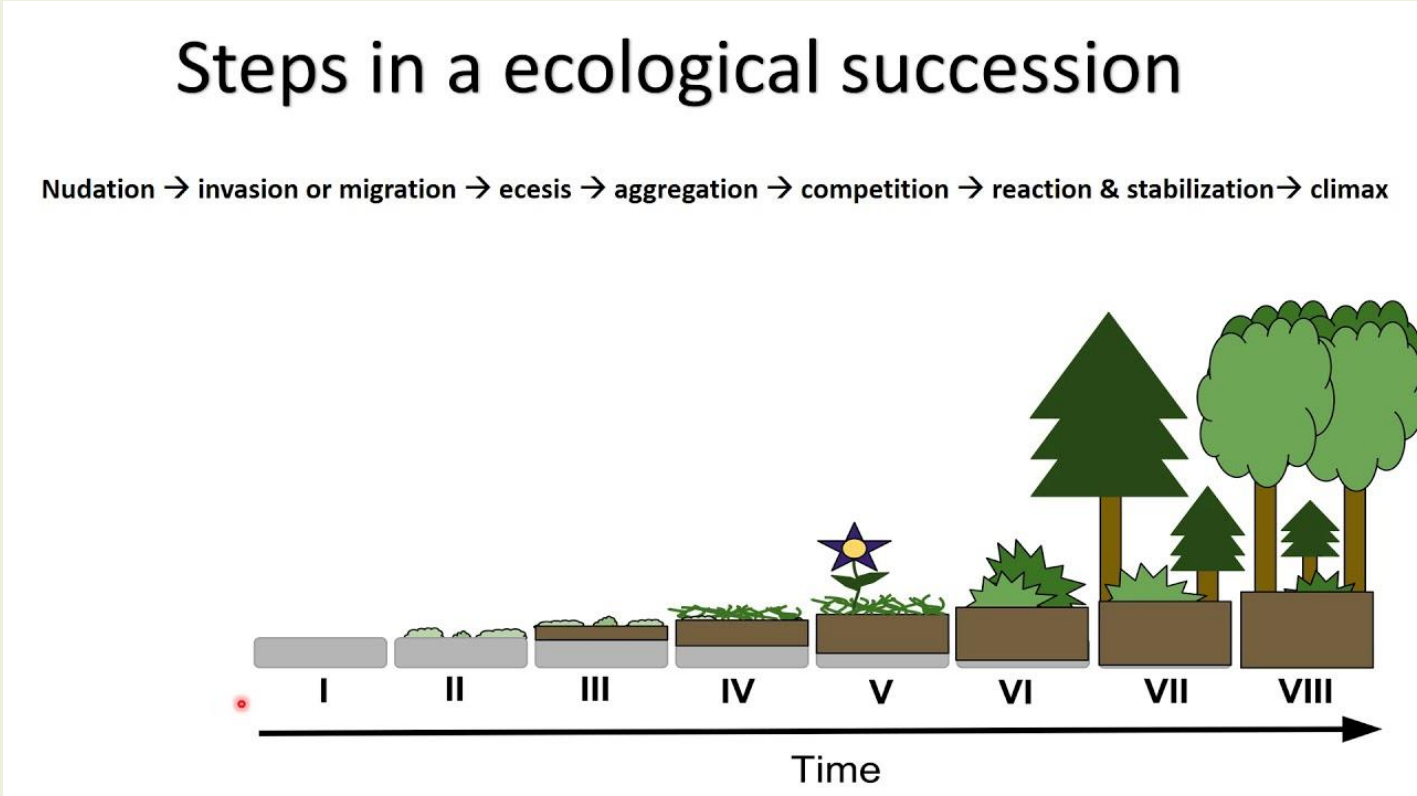


Succession starting on different types of area

- Hydrarch / Hydrosere
  - Pond, swamp, bog
- Mesarch / Mesosere
  - Area with adequate moisture
- Xerarch / Xerosere
  - Lithosere: On bare rock
  - Psammosere: On sand
  - Halosere: On saline soil

Process of ecological succession

- Nudation
- Invasion
  - Migration (dispersal)
  - Ecesis (establishment)
  - Aggregation
- Competition
- Reaction
- Stabilization

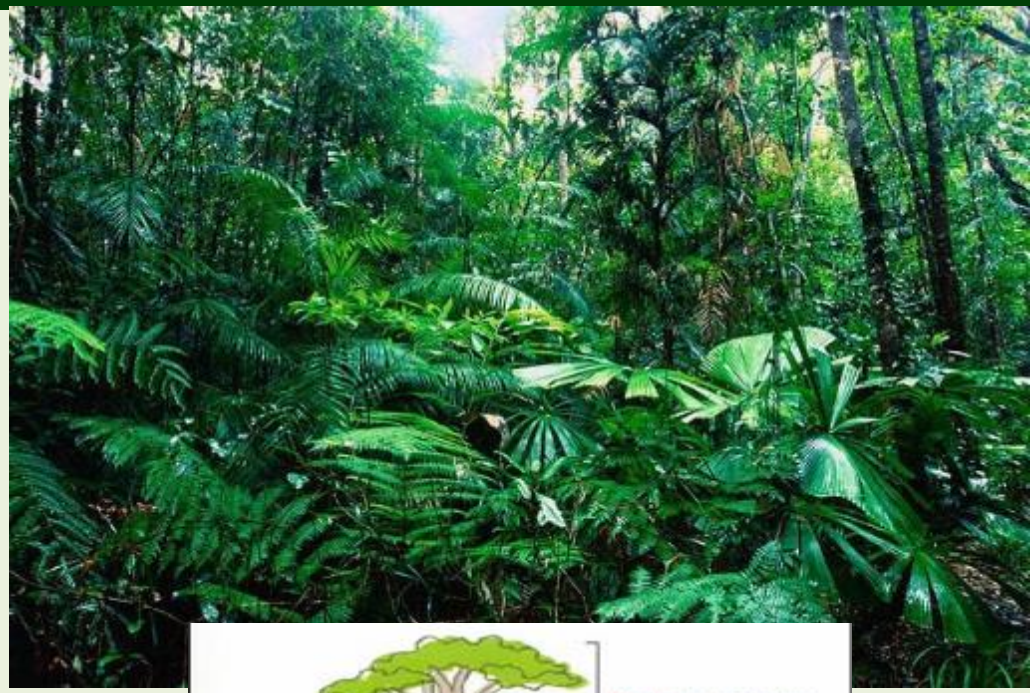


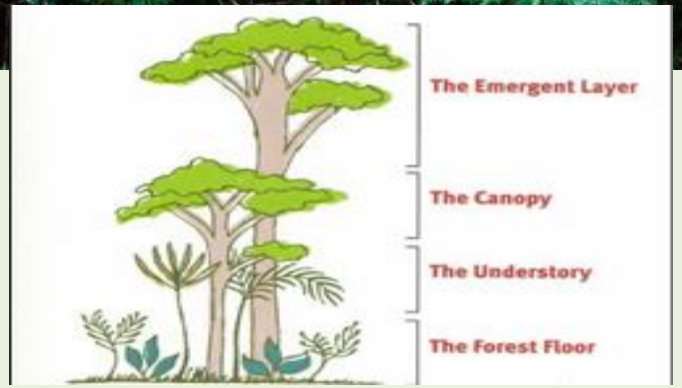
Forest ecosystem

- Abiotic Components
  - Inorganic and organic substances found in soil
  - Temperature, humidity, rainfall, light
  - Biogenic gases (CO_2, O_2)
- Biotic components
  - Producers: Large trees, herbs, lianas (climbers), Orchids
  - Primary consumer: Deer, Elephant, moles etc.
  - Secondary consumer: Snake, Lizards etc.
  - Tertiary consumers: Tiger, Lion etc.
  - Decomposers

Tropical rain forest

- Notable features:
  - Found in tropical region (near the equator).
  - High rainfall, humidity and temperature
  - Large leaves
  - Rich in biodiversity
  - Fauna of these rainforests includes the jaguar, tapir, okapi, boa constrictor, African grey parrot, keel-billed toucan, crowned eagle, three-toed sloth, spider monkey, large flying fox and more.
- Layers
  - Emergent layer
  - Canopy
  - Understory
  - Forest floor
- Example: Amazon Rainforest, Congo Rainforest, Southeast Asian Rainforest etc.





Tropical deciduous forest

- Notable features:
  - Tropical deciduous forests form a natural cover almost all over India.
  - They are of two types-moist and dry. Moist forests are found on the eastern slopes of Western Ghats, North eastern parts of the Peninsular Chhota Nagpur plateau and along the Shiwaliks.
  - They shed there leaves for a particular period of time.
  - They are economically very important because of timber like sal and teak.
  - The animals found here are tiger, wolves, rabbit etc.

Sub-tropical forest

- Notable features:
  - Subtropical forests are within or bordering the tropical zone.
  - temperatures may vary only slightly over a year
  - Subtropical rainforests occur in Central America, the West Indies, India, Madagascar, mainland Southeast Asia, and the Philippines.
  - Small deciduous trees and shrubs are found.

Temperate rain forest

- Notable features:
  - The world's largest temperate rain forests are found on the Pacific coast of North America.
  - Temperate rain forests are also found in coastal Chile, Norway, the United Kingdom, Japan, Australia and New Zealand.
  - The mild weather conditions
  - Adequate rainfall
  - Coniferous trees dominate the forest
  - tall evergreen trees are also found
  - Animals: black bears, lynx, wolves etc.

Temperate deciduous forest

- Notable features:
  - Located in the mid-latitude areas (between the polar regions and the tropics). E.g.- Northeast China Plain (China), The Manchurian mixed forest (Asia), The European Temperate Deciduous Broadleaf Forest (Europe)
  - The temperature varies widely from season to season with cold winters and hot, wet summers.
  - During the fall, trees change color and then lose their leaves.
  - Most of the trees are broadleaf trees such as oak, maple, beech, hickory and chestnut.
  - Animals: toad, chipmunk, gray squirrel, Yellow-breasted chat etc.

Evergreen coniferous forest

- Notable features:
  - They are found just in south of arctic tundra
  - Winters are long, cold and dry
  - Sunlight is available for few hours only
  - Soil has less nutrient and acidic
  - Major trees are Pine, Fir, Cedar etc.
  - Animals: moose, deer, reindeer, squirrels, wolves, bears, foxes, owls, woodpeckers hawks etc.

Grassland ecosystem

- Abiotic components:
  - Inorganic elements (C, H, O, N, P, S)
  - Temperature, humidity, rainfall, light
- Biotic components:
  - Producers: Some scattered trees, Grass
  - Primary consumers: Grazing animals,

Tropical grassland

- Notable features:
  - Located near the equator, between the Tropic of Cancer and the Tropic of Capricorn.
  - Although these areas are overall very dry, they do have a season of heavy rain.
  - Dominated by grasses
  - May have some drought-resistant, fire-resistant trees
  - Animals: giraffes, zebras, buffaloes, kangaroos, mice, moles, gophers, ground squirrels, snakes, worms, termites, beetles, lions, leopards, hyenas, and elephants.
- Examples:
  - Savannas

Temperate grassland

- Notable features:
  - Trees and shrubs are completely absent or rare.
  - cold winters (-40°C) and hot summers (38°C)
  - Gentle slope
  - Animals: Rodents, bisons, wolves, hawks, owls etc.
- Examples:
  - Prairies (South America)
  - Pampas (Africa)
  - Velds (Central Europe)
  - Steppes (Asia)

Polar grassland

- Notable features:
  - Severe cold and strong wind
  - Arctic wolf, arctic fox, reindeer, migratory birds and insects are found.
- Examples:
  - Arctic Tundra
  - Permafrost: Permafrost is soil, rock or sediment that is frozen for more than two consecutive years. In areas not overlain by ice, it exists beneath a layer of soil, rock or sediment.

Desert ecosystem

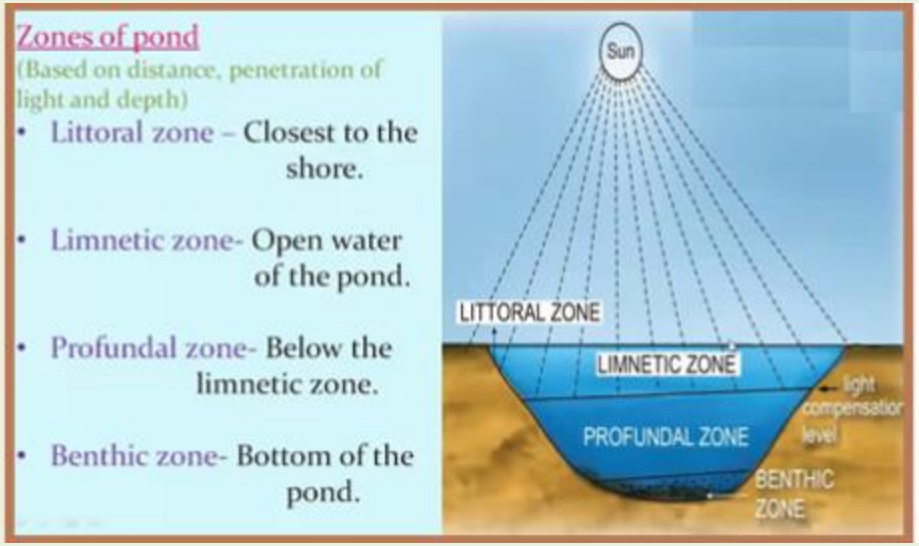
- About 1/3rd of the worlds' land area is covered with desert
- Tropical desert
  - Notable features:
    - It is the driest and hottest place on earth.
    - Rainfall is sporadic and in some years no measurable precipitation falls at all.
  - Examples: Sahara, Kalahari, Thar, Mexican deserts, Great Australian desert.
- Temperate desert
  - Notable features:
    - Temperate deserts can be much colder than tropical deserts
    - The floor of the temperate desert is often covered by rocks and small pebbles
  - Examples: Mojave, Sonoran Deserts
- Cold desert
  - Notable features:
    - cold deserts occur in temperate regions at higher latitudes
    - hot summers but extremely cold winters.
  - Examples: Atacama,
  - Gobi, Great Basin, Namib, Iranian, Takla Makan, and Turkestan

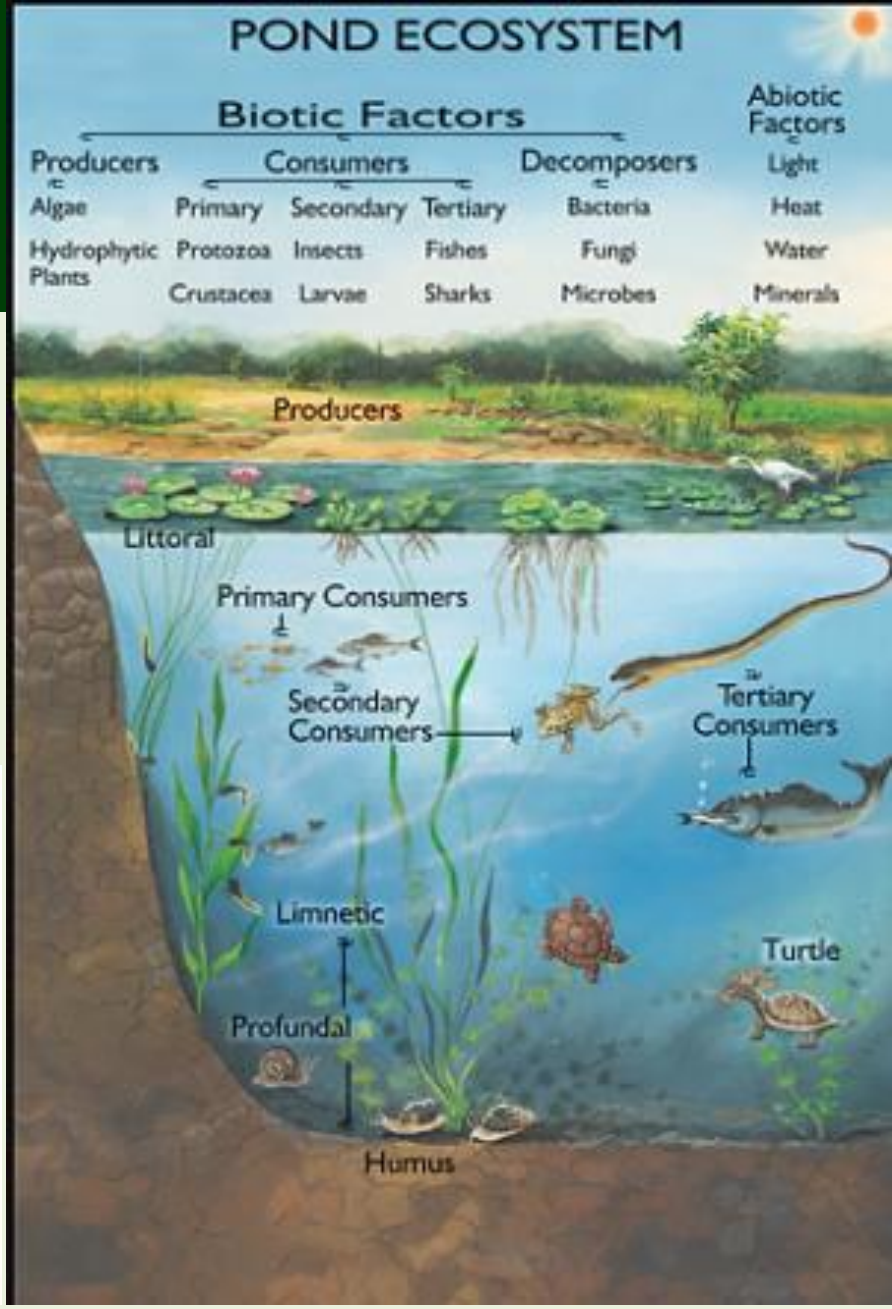
This PPT should be used as reference only. Reading books (mentioned in syllabus) is mandatory for the preparation of the examinations.

Pond ecosystem

- A pond ecosystem refers to the freshwater ecosystem where there are communities of organisms that are dependent on each other and with the prevailing water environment for their nutrients and survival.

- Notable features:
  - Small freshwater ecosystem
  - Water is stagnant
  - Can be seasonal
  - Exposed to anthropogenic activities

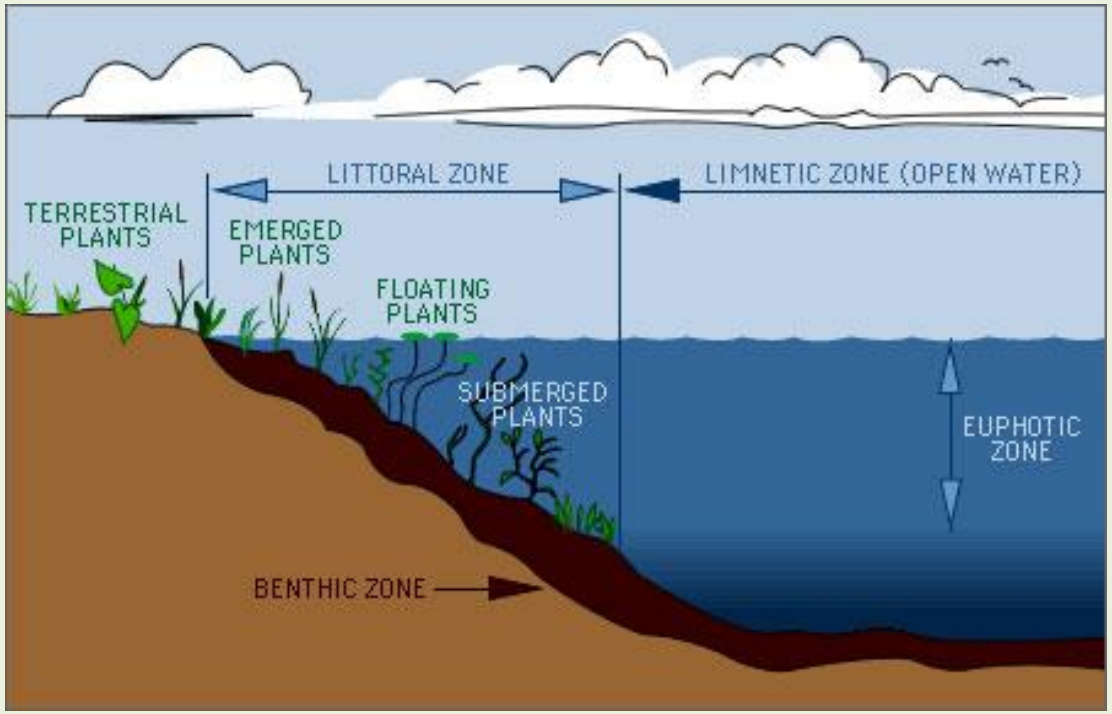




This PPT should be used as reference only. Reading books (mentioned in syllabus) is mandatory for the preparation of the examinations.

Lake ecosystem

- Organisms of aquatic ecosystem
  - Planktons (Algae, rotifers)
  - Nektons (Fishes)
  - Neustons (Water flea)
  - Benthos (Snail)
  - Periphytons (Crustaceane)
- Zonation (Stratification)
  - Epilimnion (Warm, lighter, circulating surface layer)
  - Hypolimnion (Cold, viscous, non-circulating bottom layer)



This PPT should be used as reference only. Reading books (mentioned in syllabus) is mandatory for the preparation of the examinations.

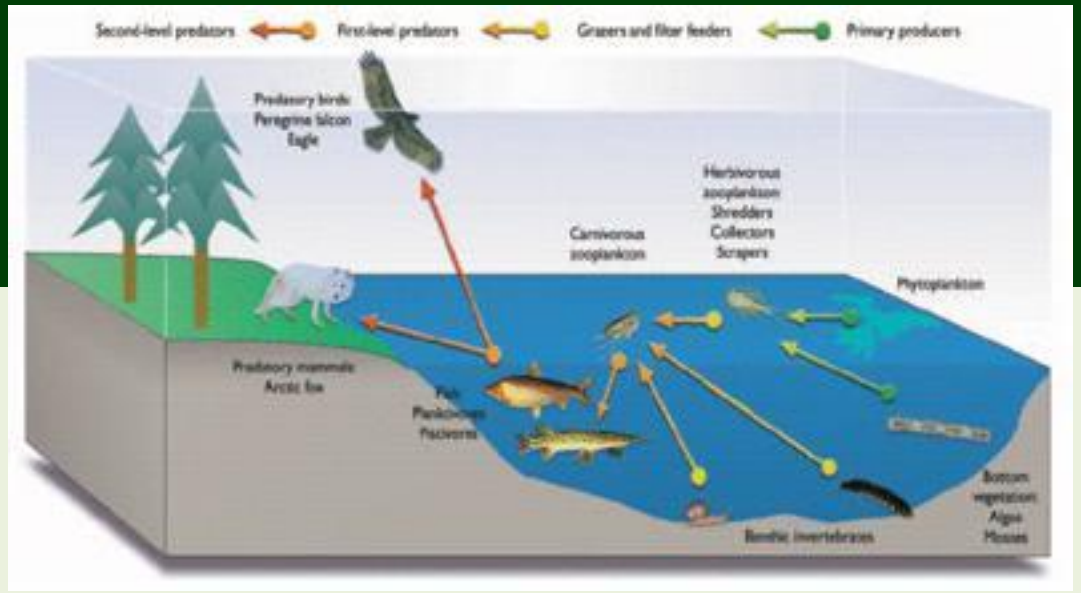
Types of lakes

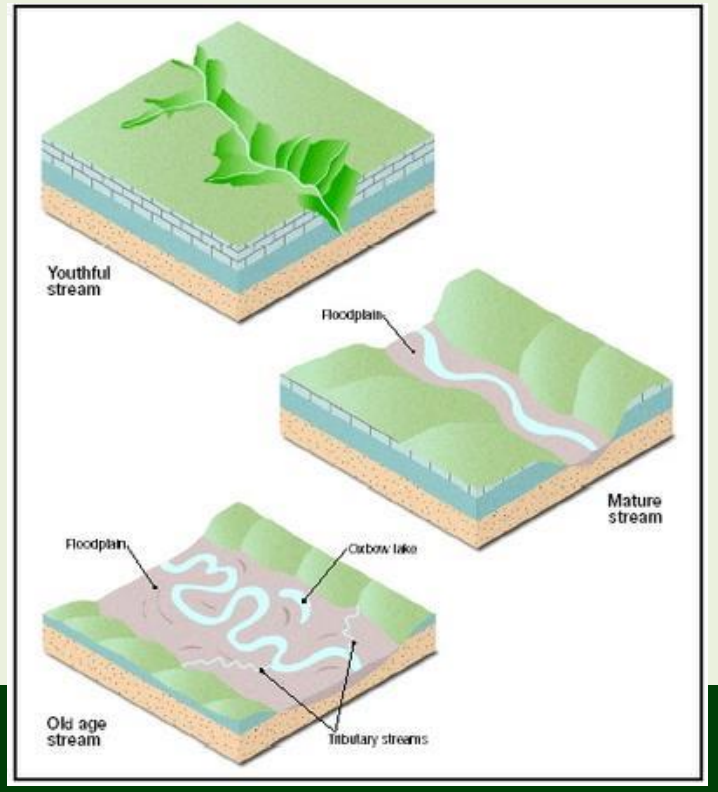
- Oligotrophic lakes (Low nutrient content)
- Eutrophic lake (High nutrient content)
- Dystrophic lake (Low pH)
- Endemic lakes (Ancient, deep, having endemic fauna)
- Desert salt lakes (High salt content)
- Volcanic lakes
- Mermictic lakes (Permanently stratified)
- Artificial lakes

This PPT should be used as reference only. Reading books (mentioned in syllabus) is mandatory for the preparation of the examinations.

Streams

- Notable features:
  - flowing water that is mostly unidirectional
  - a state of continuous physical change
  - many different (and changing) microhabitats
  - variability in the flow rates of water
  - plants and animals that have adapted to live within water flow conditions.
  - Stages
    - Mountain highland (Young River)
    - Second phase (Middle Aged River)
    - Third phase (Old River)

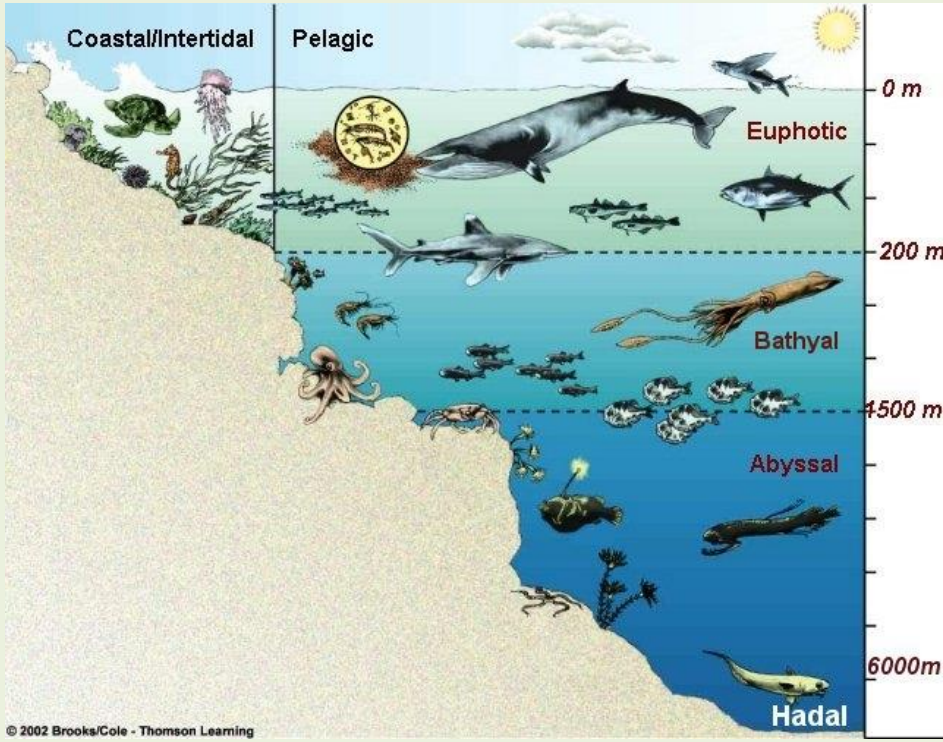




This PPT should be used as reference only. Reading books (mentioned in syllabus) is mandatory for the preparation of the examinations.

Oceans

- Notable features:
  - Marine ecosystems support a great diversity of life and variety of habitats.
  - The ocean is a major influence on weather and climate.
  - Plants: seaweeds, or marine algae (brown, green, red), sea grasses, phytoplankton
  - Animals: protozoans, marine invertebrates (echinoderms, mollusks, segmented and non-segmented worms, jellies, coral, sea anemones, hyroids) marine vertebrates (fishes, birds, mammals), and zooplankton.
- Zones
  - Coastal zone
  - Open sea
    - Euphotic zone (Abundant sunlight, high photosynthetic activity)
    - Bathyal zone (Dim light)
    - Abyssal zone (Dark zone)



This PPT should be used as reference only. Reading books (mentioned in syllabus) is mandatory for the preparation of the examinations.

Thank You

This PPT should be used as reference only. Reading books (mentioned in syllabus) is mandatory for the preparation of the examinations.