Ecosystem

- **Ecosystem** includes the biological community and the non-living components of an area. Example, forest, grassland, pond

- **Components of ecosystem:**

  - **Abiotic or non-living** components include light, temperature, water and air.
  - **Biotic or living** components include producers, consumers and decomposers.

- Aspects of ecosystem are –

  - **Productivity**

  - It is the rate of production of organic matter by producers.

  - **Primary productivity**: It is the amount of organic matter produced by producers per unit area over a period of time.

  - **Secondary productivity:** It is the rate of production of organic matter by consumers over a period of time.

  - **Net primary productivity** (NPP): Gross primary productivity – Respiration

    NPP = GPP – R

  - **Decomposition**

  - It involves the breakdown of organic matter or biomass from the body of dead plants and animals with the help of decomposers, into inorganic raw materials such as CO_2 and H_2O, and some nutrients.
  - The raw material for decomposition is detritus.

- **Energy flow:** It involves the unidirectional flow of energy from the producers to the next trophic level.

- **Food chain** – The energy flow among the various constituent animals is known as the food chain.

- **Food web** is the interconnected network of food chains that forms a multitude of feeding connections among different organisms of a biotic community.

- **Ten percent law:**

- According to the ten percent law, only ten percent of energy gets transferred from one trophic level to the next.

- The base of the pyramid of energy represents the amount of energy present at the producer level and the top of the pyramid represents the amount of energy present at the top carnivore level.

- The energy relationship between the different trophic levels is represented by the **ecological pyramids**.

- Their base represents the producers or the first trophic level while the apex represents the tertiary or top level consumer.

- Ecological pyramids are of 3 types:

- Pyramid of number
- Pyramid of biomass
- Pyramid of energy

- The pyramid of energy is always upright while the pyramid of numbers can be inverted for a ecosystem when, say, a large tree is eaten by small insects.

- The pyramid of biomass is upright with an exception of the pyramid of biomass in sea. The pyramid of biomass is inverted in an ocean ecosystem since a small standing crop of phytoplankton supports a large number of zooplankton.

- **Ecological succession:** It is the gradual, predictable change in the species composition of an area.

- Two types of succession can be seen in an area –

- **Primary succession:** It occurs in an area where no life forms have ever existed, such as bare rocks or sand dunes.

- **Secondary succession:** It occurs in an area where soil is intact.

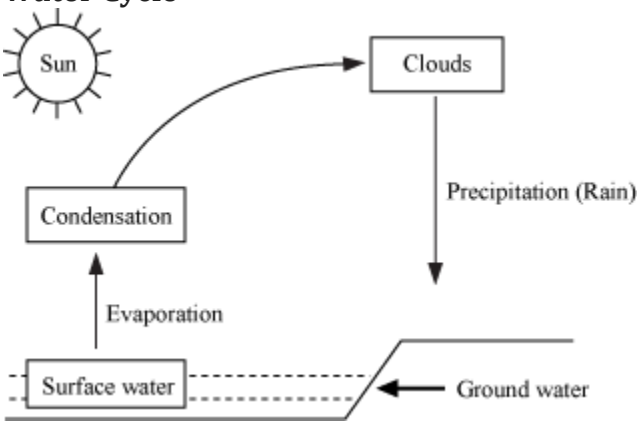
- Xerarch succession takes place in dry areas while the process of Hydrarch succession occurs in water.

- Xerarch succession: xeric condition → mesic condition

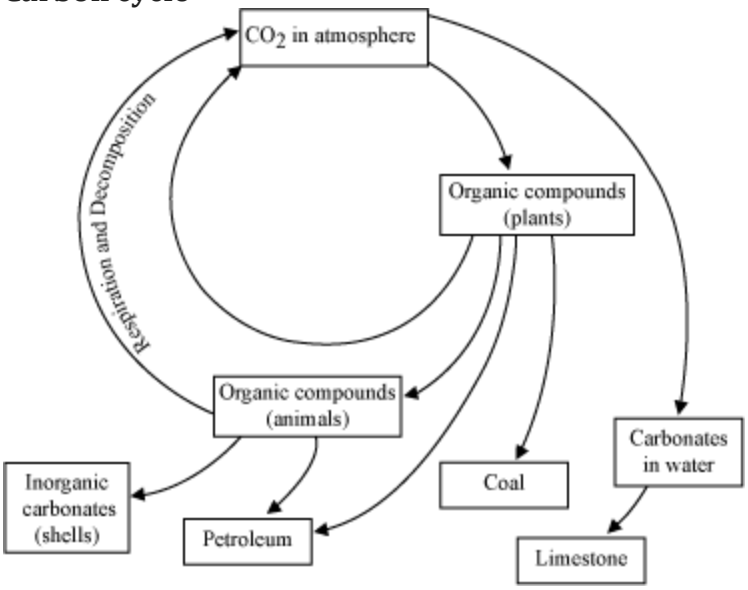
- Hydrarch succession: hydric condition → mesic condition

- The first community of organisms that invade bare rocks is known as the **pioneer community**.

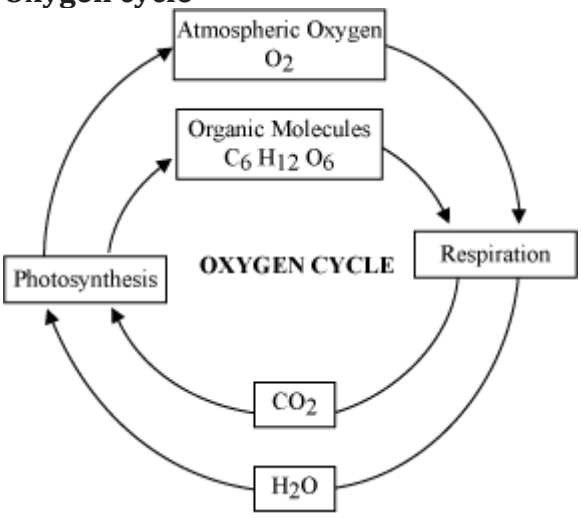
- **Water Cycle**

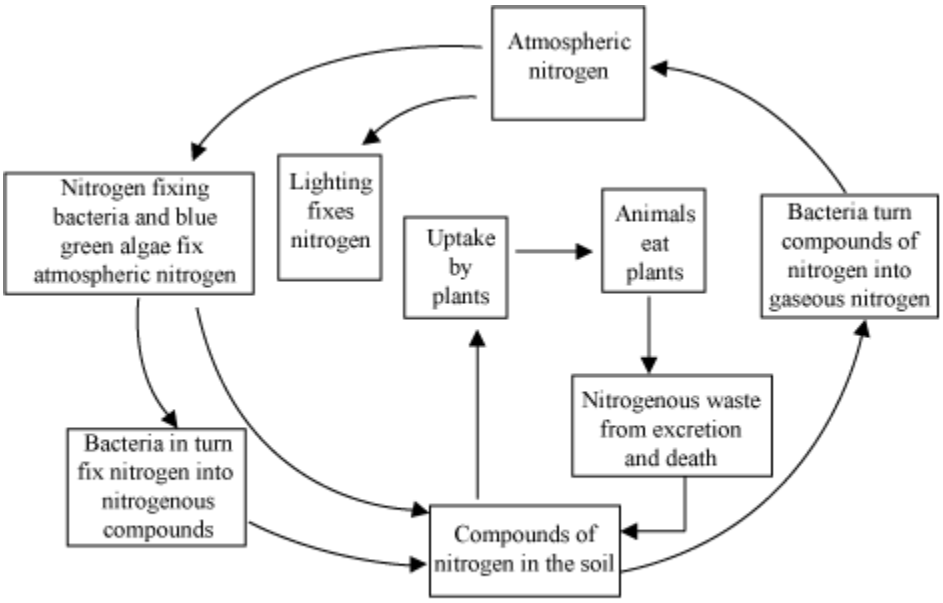


- **Carbon cycle**



- **Oxygen cycle**





Nitrogen cycle

Phosphorus cycle is a sedimentary cycle.

Phosphorus Cycle

- Phosphorus is an important constituent of cell membranes, nucleic acids, and cellular energy transfer systems.
- Rocks contain phosphorus in the form of phosphate.
- When rocks are weathered, some of the phosphate gets dissolved in the soil solution and is absorbed by plants.
- The consumers get their phosphorus from the plants.
- Phosphorus returns back to the soil by the action of phosphate-solubilising bacteria on dead organisms.