BIOTIC INTERACTION

The interaction between the organisms is fundamental for its survival and functioning of the ecosystem as a whole.

Type of Biotic Interaction

1. Mutualism: both species benefit.

Example: in pollination mutualisms, the pollinator gets food (pollen, nectar), and the plant has its pollen transferred to other flowers for cross-fertilization (reproduction).

2. Commensalism: one species benefits, the other is unaffected.

Example: cow dung provides food and shelter to dung beetles. The Beatles have no effect on the cows.

3. Competition: both species are harmed by the interaction.

Example: if two species eat the same food, and there isn't enough for both, both may have access to less food than they would if alone. They both suffer a shortage of food

4. Predation and parasitism: one species benefits, the other is harmed.

Example: predation—one fish kills and eats .

parasitism: tick gains benefit by sucking blood; host is harmed by losing blood.

5. Amensalism : One species is harmed, the other is unaffected.

Example: A large tree shades a small plant, retarding the growth of the small plant. The small plant has no effect on the large tree.

6. Neutralism : There is no net benefit or harm to either species.

Interactions	Species A	Species B	Examples
Mutualism/ Symbiotic	+	+	• Leguminous plants and nitrogen fixing bacteria • Process of pollination in plants.
Commensalism	+	0	• Remoras eating leftover food of the shark without depleting shark's resources.
Amensalism	-	0	• Shading out of one plant by a taller and wider one. • Allelopathy - inhibition of one plant by the secretions of another.
Parasitism	+	-	• Mosquitoes, ticks, and the protozoan that causes malaria.
Competition	-	-	• Lion and tiger in the same niche.
Predation	+	-	• Lion and zebra, bear and fish, and fox and rabbit.

ECOLOGICAL SUCCESSION

A process of directional change in vegetation on an ecological time scale. In this process, a series of communities replace one another due to large scale natural or anthropogenic destructions.

Stages of Ecological Succession:

Pioneer community —> Seres (or) Seral Stage —>Climax Community

Pioneer Community:

- The first group of organism which establish theircommunity in the area is called 'Pioneer' Community. Ex: Lichen, Moss and Microbes

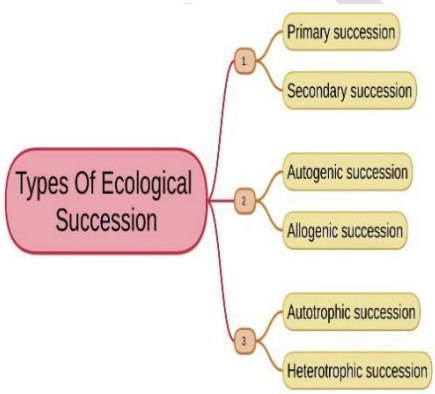
Seral Stage:

- The various developmental stage of a community is called 'seres'.
- **Herbs and Shrubs** usually grow after furtherweathering, increase in moisture and soil.

Climax Community:

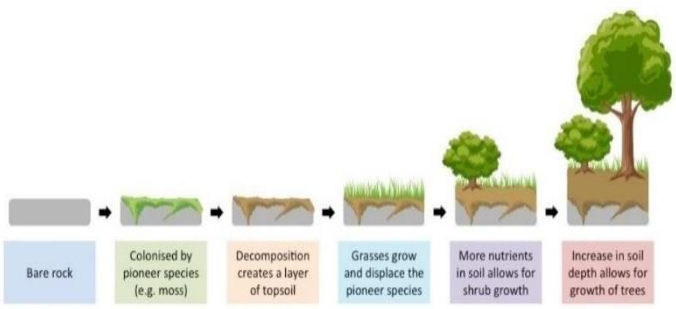
- The final stage of succession which leads to stable community.

Types of Succession:



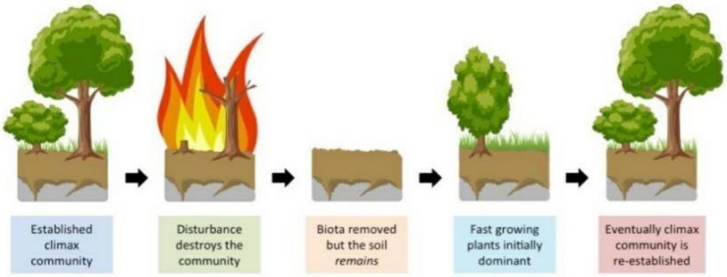
- **Primary Succession:**

It involves the gradual establishment of bioticcommunities on a lifeless ground.



- **Secondary Succession:**

It involves the establishment of biotic communities in an area, where some type of biotic community is already present.



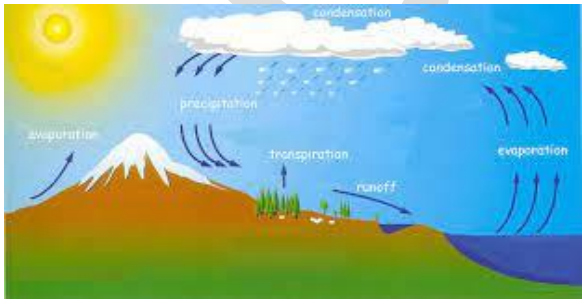
- **Autogenic Succession** – Succession brought about byliving inhabitants of that community itself.
- **Allogenic Succession** – Succession brought about byoutside forces.
- **Autotrophic Succession** – Succession in which initiallygreen plants are much greater in quantity
- **Heterotrophic Succession** – Succession in whichheterotrophs are much greater in number.

NUTRIENT CYCLE

- The cyclic flow of nutrients between the biotic and abiotic components is known as **nutrient cycle** (or) **biogeochemical cycles.**
- The nutrients enter into producers and move through the food chain and ultimately reach the consumer. The bound nutrients of the consumers, after death, are decomposed and converted into inorganic substances, which are readily used up by the plants (producers) and again the cycle starts.
- The major nutrients like C, H, O, and N are cycledagain and again between biotic and abiotic components of the ecosystem.

GASEOUS CYCLE

WATER CYCLE



- Movement of water in a cyclical manner is known as hydrological cycle.

- The **hydrologic cycle** begins with the evaporation of **water** from the surface of the ocean. As moist air is lifted, it cools and **water** vapour condenses to form clouds. Moisture is transported around the globe untilit returns to the surface as precipitation.

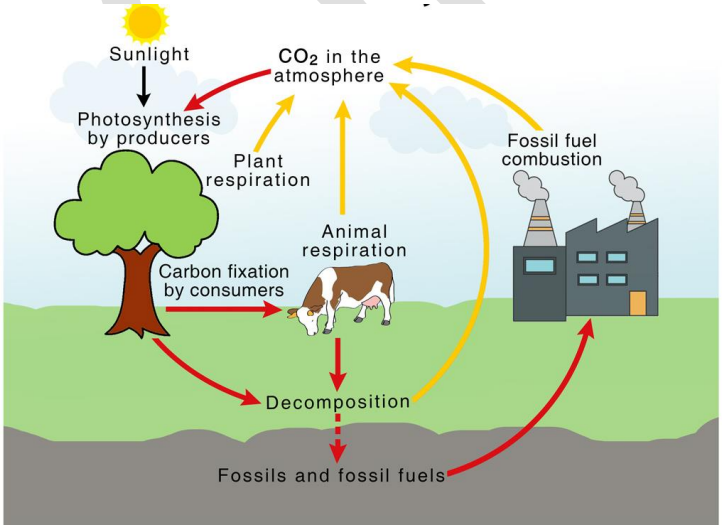
CARBON CYCLE

Taking Carbon out of the Atmosphere:

- Nature is constantly taking carbon out of the atmosphere. These processes are sometimes called carbon sinks.
- **Photosynthesis** - Plants use photosynthesis to make energy and grow. They take carbon dioxide (CO_2), sunlight, and water and turn it into oxygen and sugar. Large areas of plants like the rainforest help to remove lots of carbon from the atmosphere.
- **The ocean** - Ocean water does a lot to remove excess carbon from the atmosphere. Carbon dioxide in theair reacts with the sea water to make **carbonic acid** in the ocean. If there is too much carbonic acid, it may lead to **acid rain**. However, **some** carbonic acid is **good** as it is used by sea organisms to make their **shells.** These shells will eventually become sedimentary rock like limestone.

Moving Carbon into the Atmosphere:

- At the same time that some processes of nature are removing carbon from the air, other processes areadding more carbon to the air. These processes are called sources.
- **Decay** - When plants and animals die they decay. When this happens, the carbon in their body will either be released into the atmosphere or stored in ground as fossil fuels.
- **Respiration (breathing)** - Every time you breathe you turn oxygen into carbon dioxide. This is true of every animal on Earth.
- **Combustion (burning)** - When plants, trees, or fossil fuels are burned, carbon is released into the atmosphere.



NITROGEN CYCLE

- **Why is nitrogen important to life?**

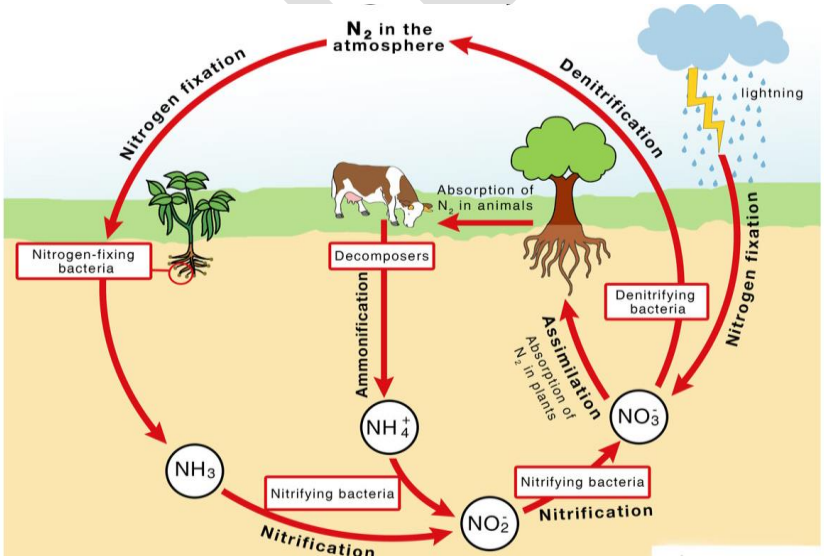
Plants and animals could not live without nitrogen. It is an important part of many **cells and processes** such as **aminoacids, proteins, and even our DNA**. It is also needed to make **chlorophyll** in plants, which plants use in photosynthesis to make their food and energy.

Process of Nitrogen Cycle:

This picture shows the flow of the nitrogen cycle. The most **important** part of the cycle is **bacteria**. Bacteria helpthe nitrogen change between states so it can be used.

When nitrogen is absorbed by the soil, different bacteria help it to change states so it can be absorbed by plants. Animals then get their nitrogen from the plants.

- **Fixation** - Fixation is the first step in the process of making nitrogen usable by plants. Here bacteria change nitrogen into ammonium.
- **Assimilation** - This is how plants get nitrogen. They absorb nitrates from the soil into their roots. Then the nitrogen gets used in amino acids, nucleic acids, and chlorophyll.
- **Ammonification** - This is part of the decaying process. When a plant or animal dies, decomposers like fungi and bacteria turn the nitrogen back into ammonium so it can reenter the nitrogen cycle.
- **Nitrification** - This is the process by which ammonium gets changed into nitrates by bacteria. Nitrates are what the plants can then absorb.
- **DE Nitrification** - Extra nitrogen in the soil gets put back out into the air. There are special bacteria that perform this task as well



SEDIMENTARY CYCLE

SULPHUR CYCLE

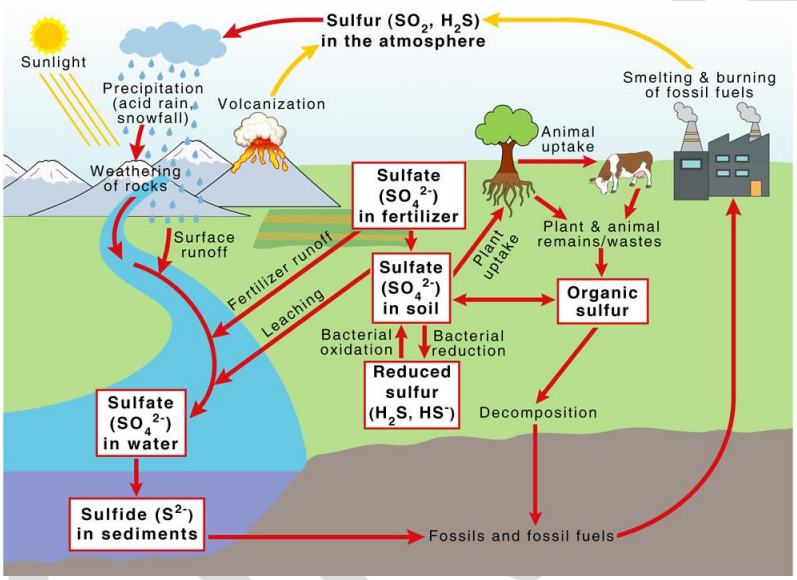
- Sulphur (S) is an element important to ecosystems and the climate. The **majority** of sulphur is stored**underground**, for example under the **ocean or in rocks**. It also occurs **naturally** in places like

swamps (where organisms have decomposed) and **volcanoes.** Humans add excess sulphur into this cycle, usuallythrough atmospheric pollution caused by fossil fuel combustion.

Steps of the Sulphur Cycle:

- As rocks are worn down by erosion they release sulphur that was once stored, becoming Sulphate once it touches the air.
- Plants absorb this sulphur through photosynthesis and make this sulphur organic.
- Animals, specifically herbivores and omnivores consume the sulphur when they eat the plants.
- Sulphur moves through the food chain as secondary consumers and tertiary consumers eat the primaryconsumers.
- When animals and plants die, the sulphur dissipates into the atmosphere as sulphate and also through the body of the decomposers.

The sulphur in the atmosphere is returned to the soil and water cycle when it rains.



PHOSPHORUS CYCLE

- Phosphorus is an essential nutrient for animals and plants. It plays a **critical role in cell development** and is a key component of molecules that **store energy, such as ATP (adenosine tri-phosphate), DNA andlipids (fats and oils).** Insufficient phosphorus in the soil can result in a decreased crop yield.
- Here are the key steps of the phosphorus cycle,
- Over time, rain and weathering cause rocks to release phosphate ions and other minerals.
- This inorganic phosphate is then distributed in soilsand water.
- Plants take up inorganic phosphate from the soil. The plants may then be consumed by animals. Once in theplant or animal, the phosphate is incorporated into **organic molecules such as DNA**. When the plant or animal dies, it decays, and the organic phosphate isreturned to the soil.

- Within the soil, organic forms of phosphate can be made available to plants by **bacteria that break down organic matter to inorganic forms of phosphorus**. This process is known as **mineralisation**.
- Phosphorus in soil can end up in waterways and eventually oceans. Once there, it can be incorporated into sediments over time.