

Chapter 7

ecosystem and management

Guide

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what is ecosystem ?

- ❖ The word ecosystem means ecological systems. Ecology is the study of ecosystems.
- ❖ An ecosystem includes all the living things (plants, animals and organisms) in a given area, interacting with each other, and with their non-living environments (weather, earth, sun, soil, climate, atmosphere).
- ❖ The term `eco' refers to a part of the world and `system' refers to the coordinating units. An ecosystem is a community of organisms and their physical environment interacting together.
- ❖ The living and physical components are linked together through nutrient cycles and energy flows.
- ❖ The term “Ecosystem” was first coined by A.G.Tansley, an English botanist, in 1935.



Structure of ecosystem

- * The structure of an ecosystem can be split into two main components, namely:

Biotic

Abiotic

Abiotic

Air, water

temperature

Nutrients , sunlight
etc

Function of ecosystem

- **Provides a habitat** – It gives plants and animals a place to live and grow. **Maintains balance** – It keeps nature balanced by maintaining the right number of plants, animals, and other living things.
- **Flow of energy** – Energy from the Sun passes to plants, then to animals through the food chain.
- **Nutrient cycling** – Nutrients are recycled in nature when decomposers break down dead plants and animals.
- **Produces oxygen and food** – Green plants make food by photosynthesis and release oxygen, which is essential for life.
- **Supports biodiversity** – It provides a home for many different kinds of plants, animals, and microorganisms.
- **Purifies air and water** – Trees and plants help clean the air, and ecosystems help keep water clean.

Types of ecosystem

ecosystem

Terristerial

Aquatic ecosystem

**Forest
Ecosyste
ms:**

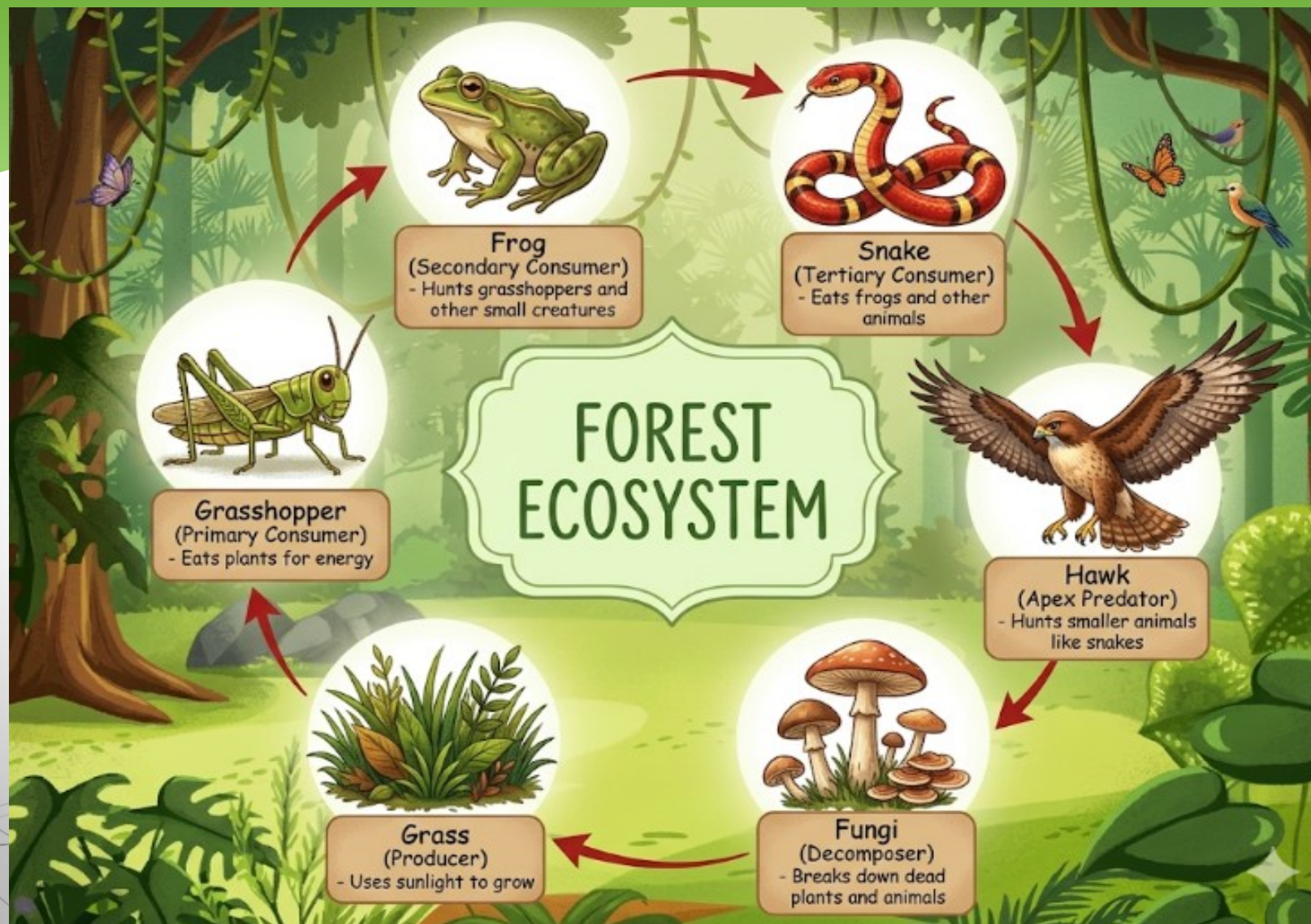
**Grassland
ecosystem**

**Desert
Ecosyste
ms:**

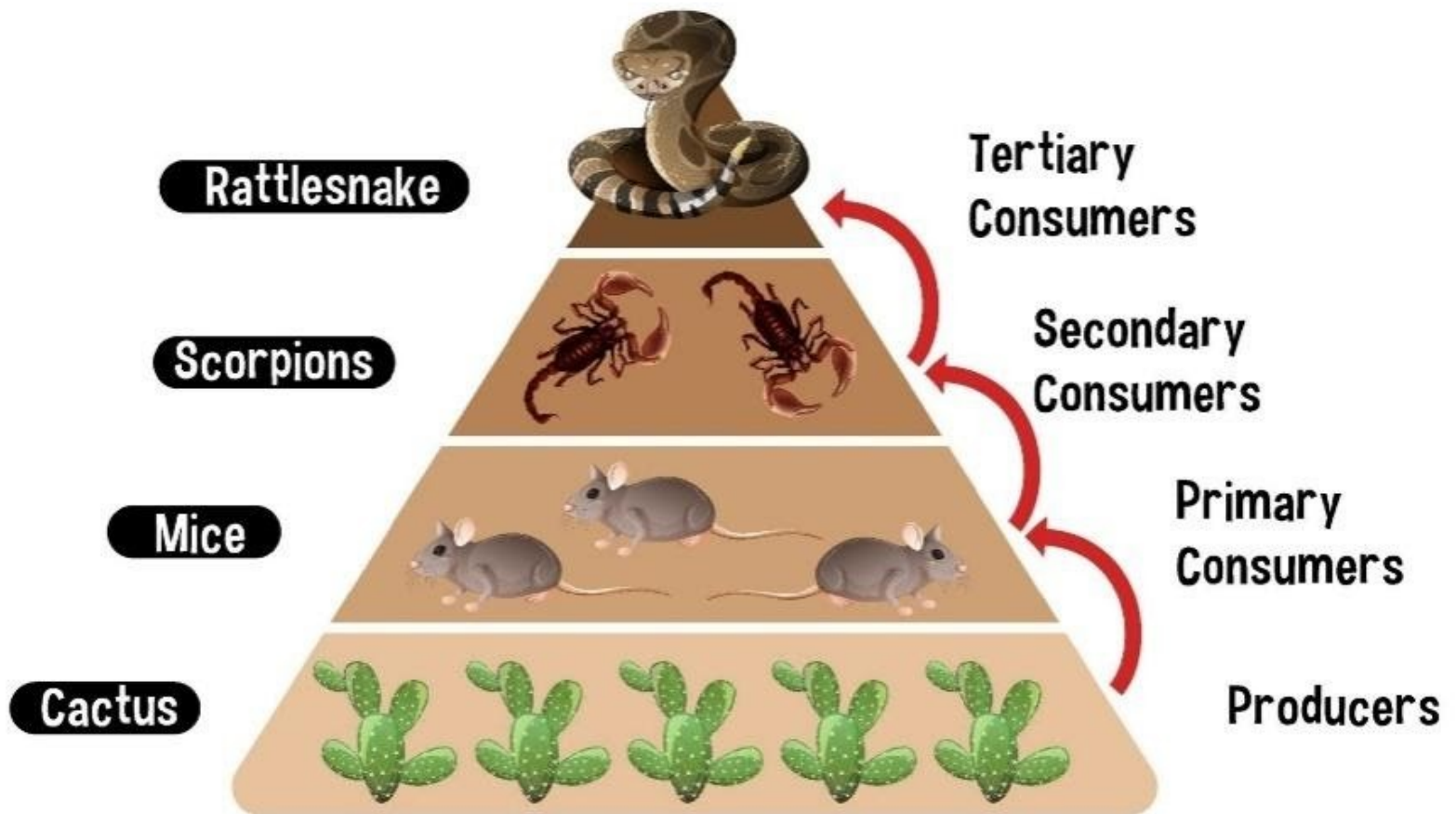
**Tundra
ecosyste
m**

**Marine
ecosystem**

**Freshwater
Ecosystems
:**



DESERT FOOD CHAIN

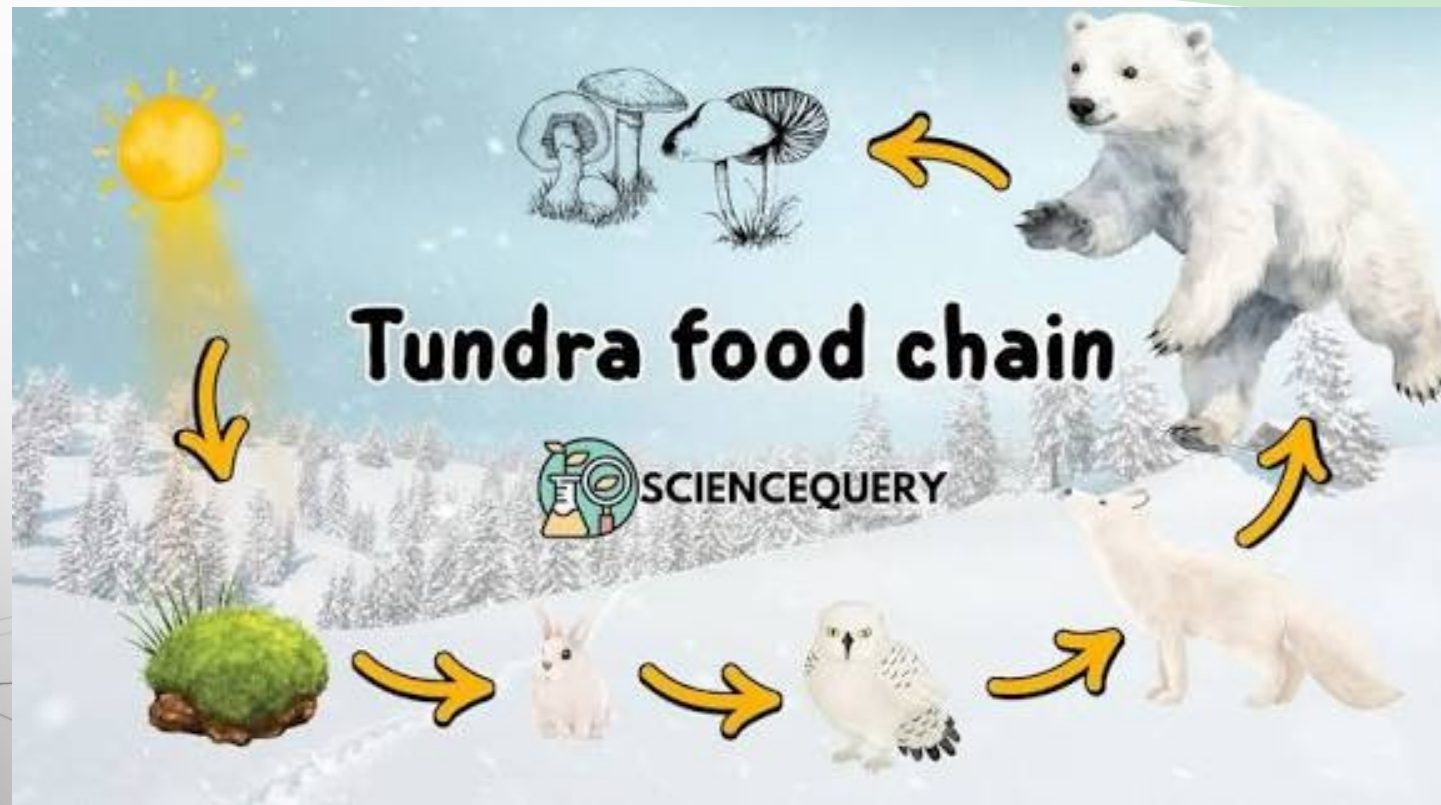


Tundra ecosystem

- ❖ Tundra ecosystem are treeless found in arctic and the top of mountain
- ❖ Tundra land are snow covered for much of the year until summer bring a burst wildflower
- ❖ Snow fall occurs very frequently



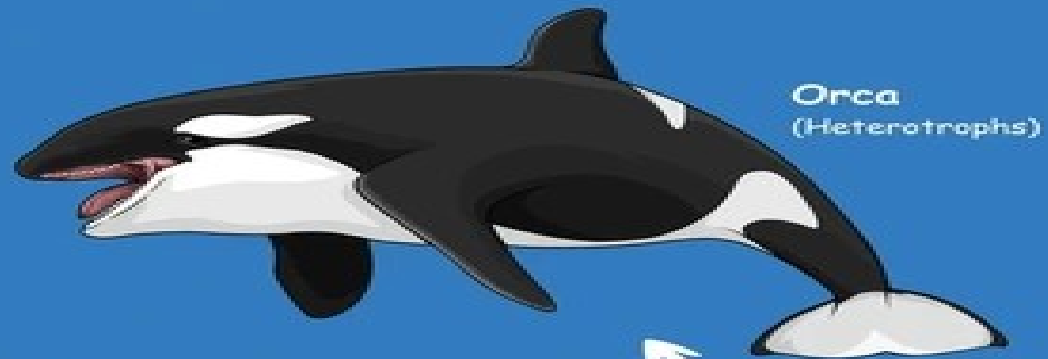
Tundra food chain



Marine ecosystem

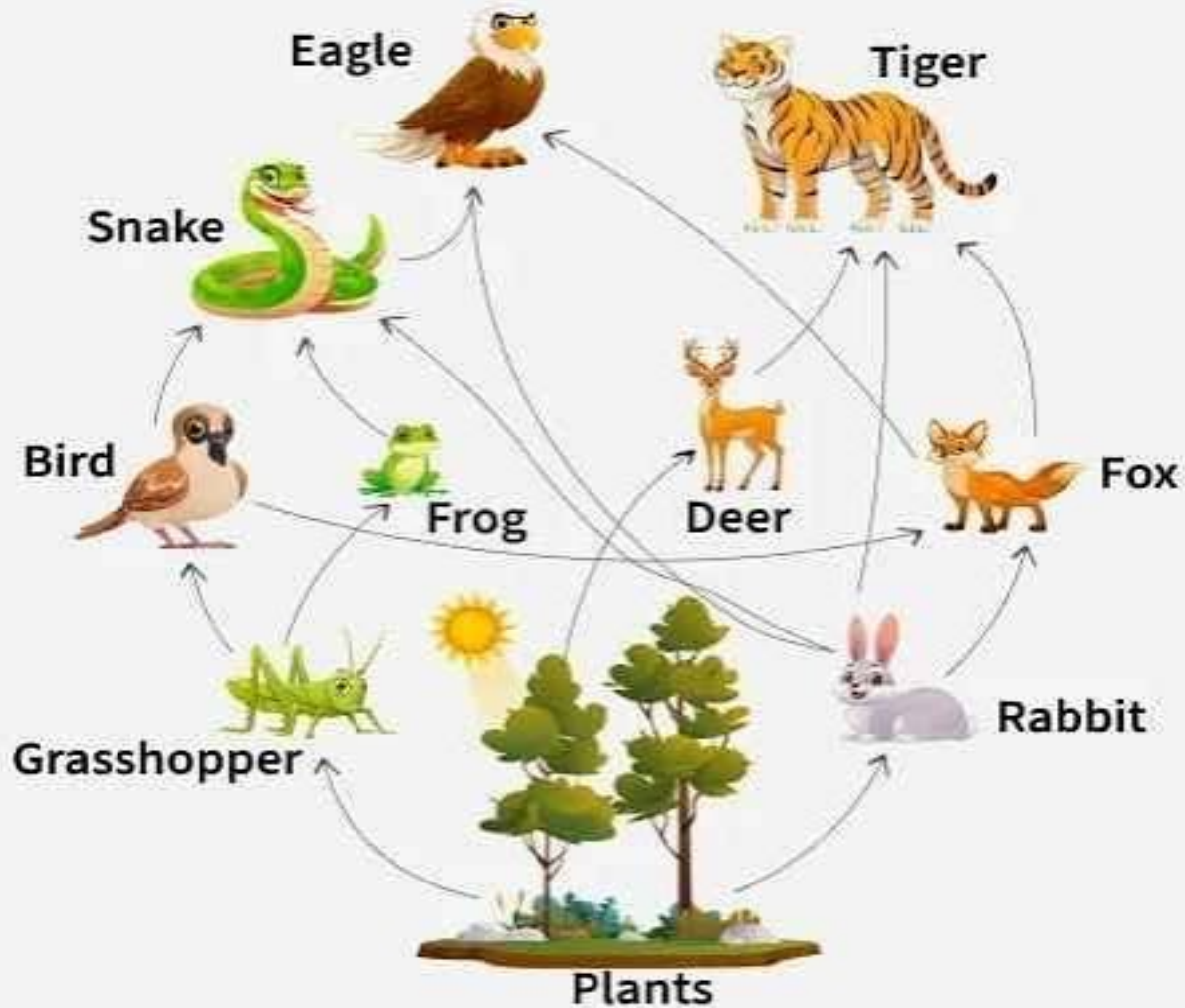
- Marine ecosystem is the laeget amonge the earth aquatic system .
- As 71% of earth surface covered with water and ocean occupy 97%of water on earth .
- Marine ecosystem has a wide habitat and rich diversity of species .

Marine food chain



Food web

- ★ Food web can be defined as, “a network of food chain which are interconnected at various trophic level, so as to form a number of feeding connections amongst different organisms of a biotic community”.
- ★ It is also known as consumer-resources system.
- ★ It is a graphical description of feeding relationships among species in an ecological community.



<https://youtu.be/2jjanDNyUTc>

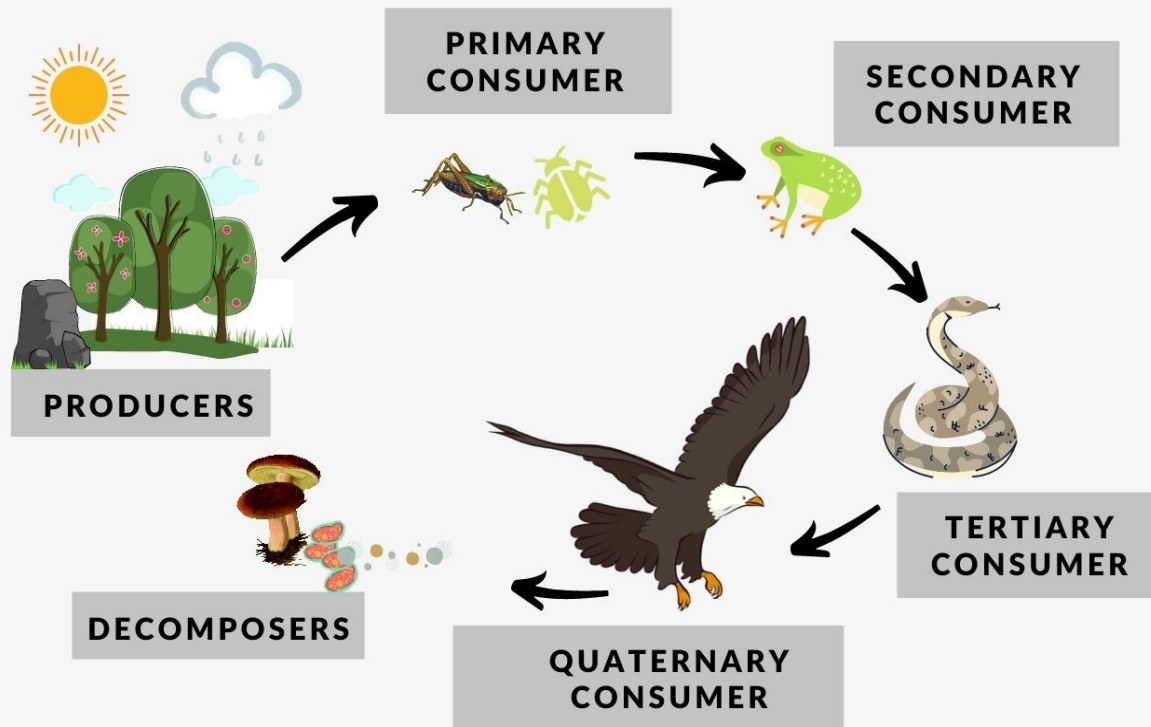
The energy pyramid

- ★ Ecological pyramid are the graphical representation of the trophic structure of ecosystem .
- ★ Trophic structure refer to the way in which organism use food resources . To get their energy for growth and reproduction .
- ★ Trophic level : the trophic structure is organized into specific trophic level , which represented each organism feeding position in a food chain or food web .

Trophic level



Trophic level



A trophic level is a position in a food chain, a food web, or an ecological pyramid that is occupied by a group of organisms having a similar feeding mode.

Types of ecological pyramid

★ There are three types of ecological pyramid :

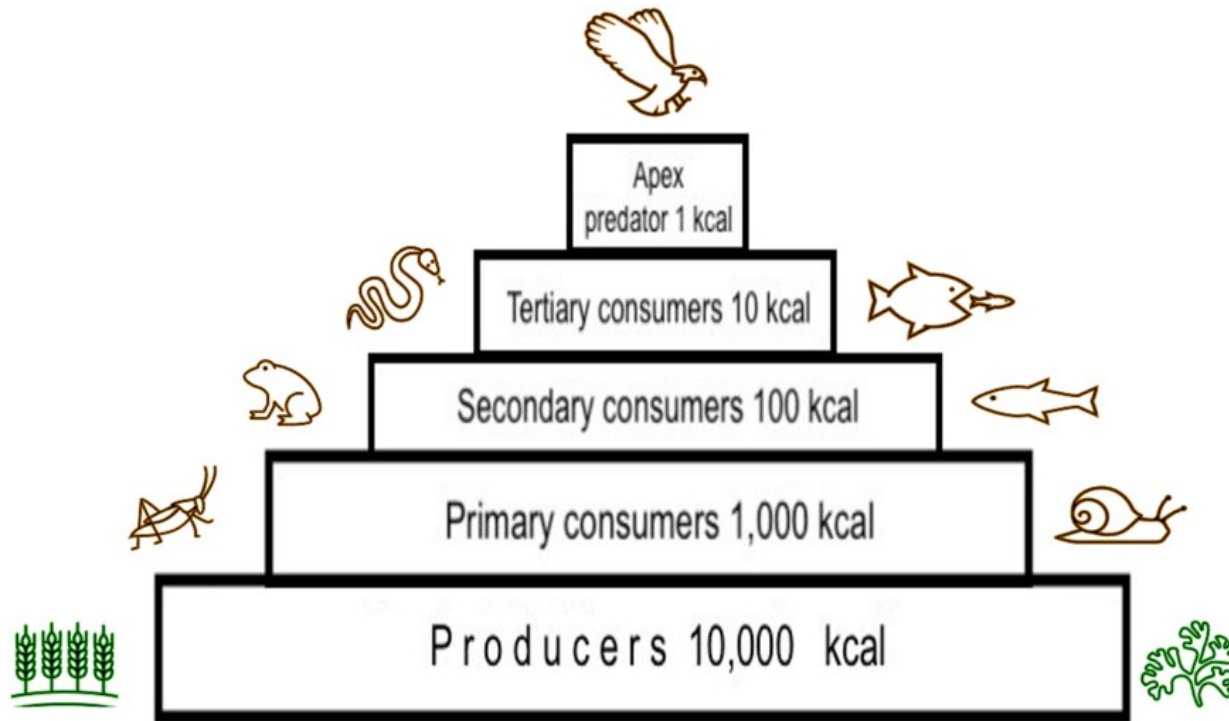
1. Pyramid of number .
2. Pyramid of biomass .
3. Pyramid of energy .

but according to our syllabus we learn about pyramid of energy :

Pyramid of energy

- ★ It is graphical representation of the flow of energy through each trophic level of food chain over a fixed time period .
- ★ It is also known as the “ pyramid of productivity ”.
- ★ It is always upright as the energy flow in a food chain is always unidirectional.
- ★ Also, with every increasing trophic level, some energy is lost into the environment.

Pyramid of energy

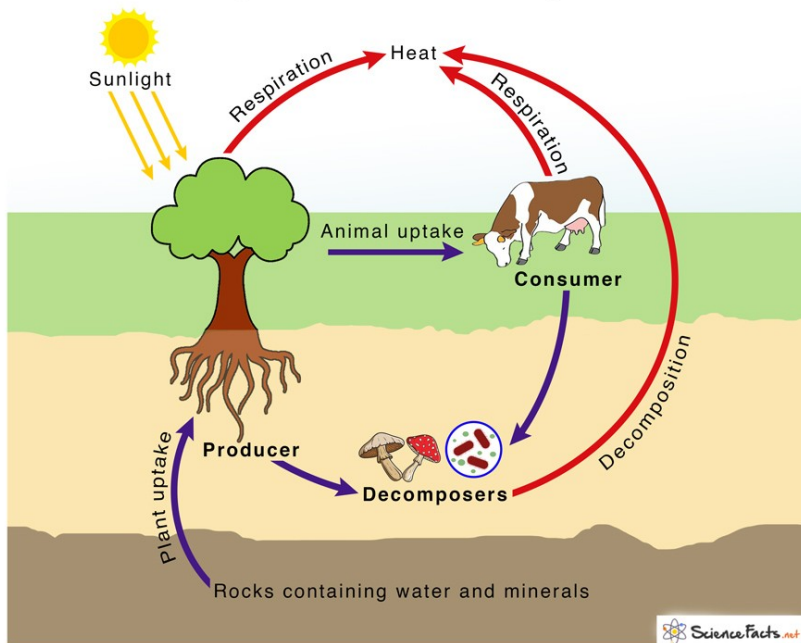


What is the 10% law?

The 10% law was given by Raymond Lindeman. This law states that when energy is transferred from one trophic level to the other, only 10% energy from the organic matter is passed on.

BIO-GEO-CHEMICAL CYCLE

Biogeochemical Cycles

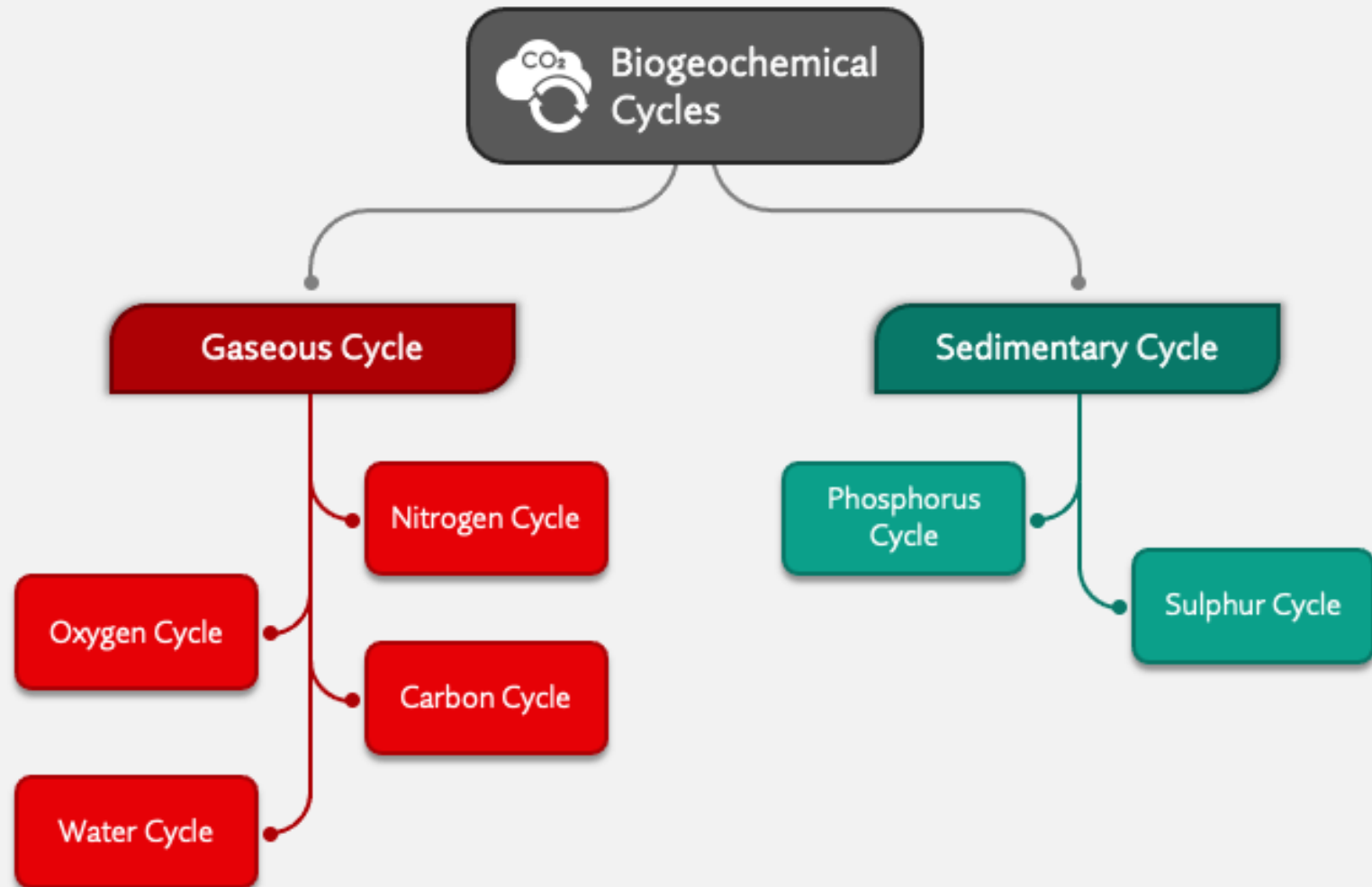


The Biogeochemical Cycle refers to the natural movement of nutrients and elements between living organisms (plants, animals) and the non-living environment (air, water, and soil). These cycles are important because they keep the ecosystem balanced and help support and sustain life on Earth/

Types of biogeochemical cycle

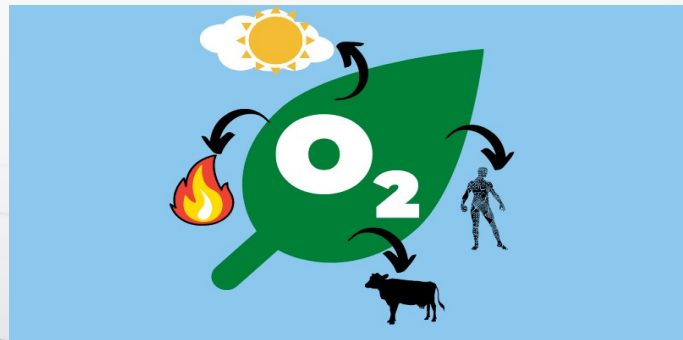
- ★ There are two types of biogeochemical cycle :
 1. Gaseous nutrient cycle : these cycles involve the movement of gases or volatile substances between the atmosphere, terrestrial ecosystems, and aquatic ecosystems.
 2. Sedimentary Biogeochemical Cycles : These cycles are slow and involve the movement of nutrients between land, water, and living organisms through processes like weathering, erosion, and sedimentation .

TYPES OF BIOGEOCHEMICAL CYCLE



Oxygen cycle

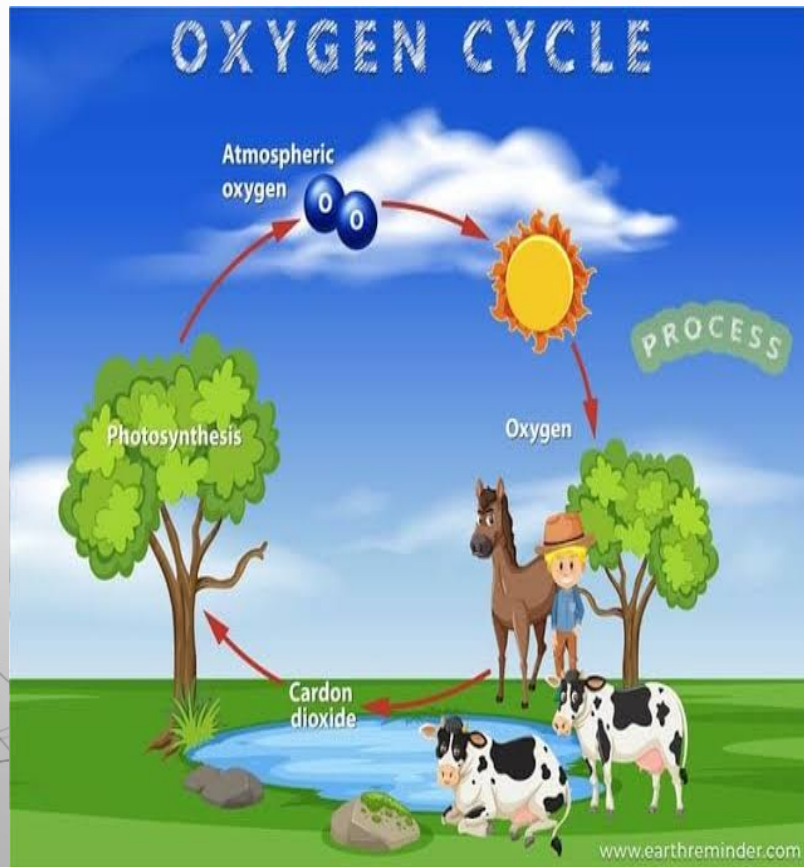
- ★ The oxygen cycle is the path that oxygen takes through the air, water, and living things on Earth. Plants make oxygen during photosynthesis, and animals use that oxygen to breathe.



Oxygen cycle

- * Animal take in oxygen through the process of respiration .
- * Carbondioxide is released by the animals and used in plant in photosynthesis .
- * **Biological importance of oxygen :**
- * Human need it to breathe .
- * Needed for decomposition of organic waste .
- * Water can desolve oxegen and it is this dissolved oxegen that support aquatic life .

Oxygen cycle



- ★ Carbon dioxide is released by animals and used in plants in photosynthesis .
- ★ Oxygen is balanced between the atmosphere and the ocean

Oxygen cycle

- ★ **Biological importance of oxygen**

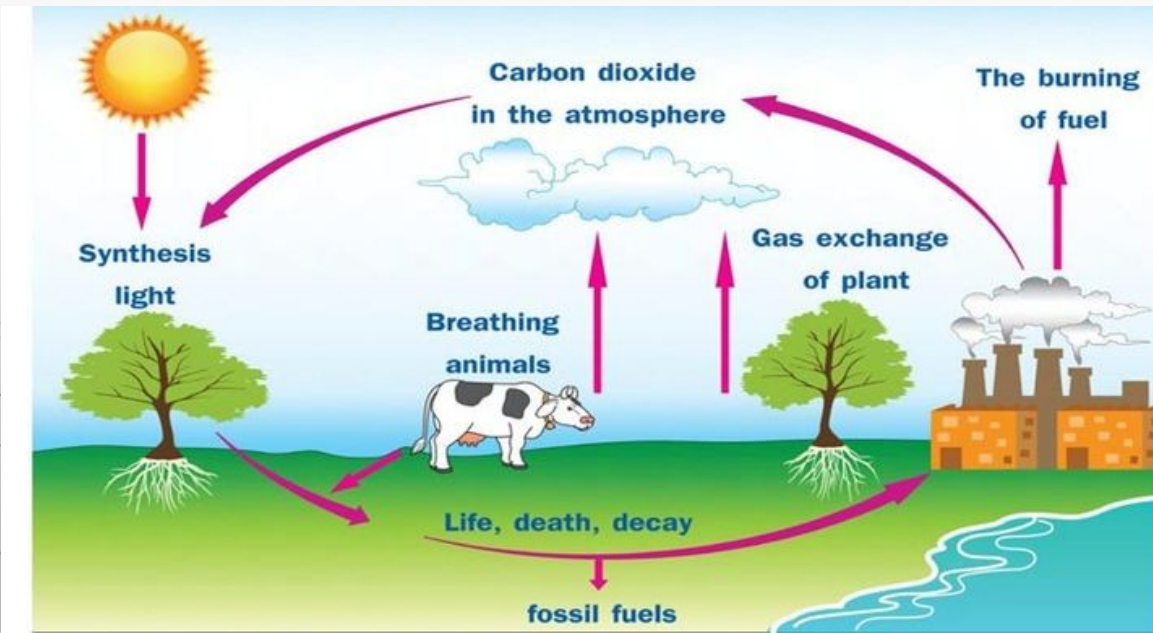
- ★ Humans need it to breathe.
- ★ Needed for decomposition of organic waste .
- ★ Water can dissolve oxygen and it is this dissolved oxygen that supports aquatic life .

- ★ **Ecological importance of oxygen**

- ★ Without oxygen at the bottom of the water body, anaerobic bacteria produce acid .these acids not only increase acidity , but also cause a massive release of phosphorus and nitrogen , two major fertilizer from the organic sediment and into the water column .
- ★ These same anaerobic bacteria put toxic gases in the water .
- ★ Lack of bottom oxygen in the cause of odors produced by anaerobic bacteria .

Carbon cycle

- ★ The global movement of carbon between the abiotic environment, including the atmosphere and organism is known as the



Carbon Cycle Steps

Following are the major steps involved in the process of the carbon cycle:

- ❑ Carbon present in the atmosphere is absorbed by plants for photosynthesis.
- ❑ These plants are then consumed by animals and carbon gets bio accumulated into their bodies.
- ❑ These animals and plants eventually die, and upon decomposing, carbon is released back into the atmosphere.
- ❑ Some of the carbon that is not released back into the atmosphere eventually become fossil fuels.
- ❑ These fossil fuels are then used for man-made activities, which pump more carbon back into the atmosphere.

Why carbon cycle is important?

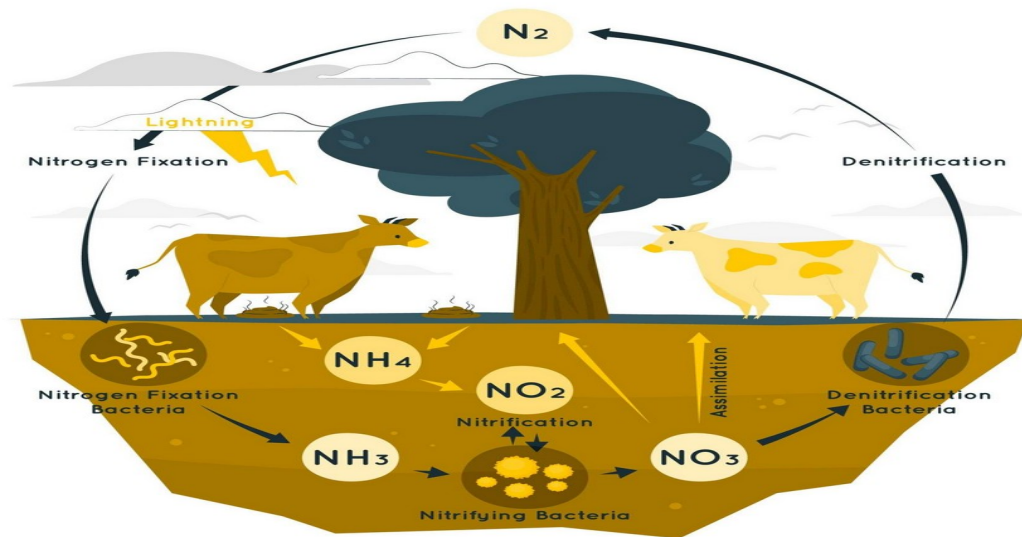
- * Many elements have cycles, but the cycling of carbon is particularly important because:
- * Through photosynthesis and respiration, it is the way the earth produces food and other renewable resources.
- * CO_2 plays a key role in trapping heat in the atmosphere – one of the basic mechanisms behind the greenhouse effect.
- * Carbon plays a central role in combustion.
- * Through decomposition, it serves as the earth's waste disposal system.

Why carbon cycle is important

- ★ In addition the carbon cycle is important because carbon cycle is important because carbon -containing gases in the atmosphere affect the earth's climate .
- ★ Increased CO_2 in the atmosphere has been responsible for more than half of the climate warming observed in recent decades .

Nitrogen cycle

- * The nitrogen cycle is the process by which nitrogen is converted between its various chemical forms . This transformation can be carried out through both biological and phy



Nitrogen Cycle Explained - Stages of Nitrogen Cycle

- ★ Nitrogen fixation :
- ★ The conversion of free atmospheric nitrogen into the biologically acceptable form or nitrogen compound .
- ★ In this stage, nitrogen moves from the atmosphere into the soil.
- ★ Nitrogen assimilation : in this process inorganic nitrogen in the form of nitrates , nitrites and ammonia is absorbed by the green plant via their roots and then it is converted into nitrogenous organic compound.

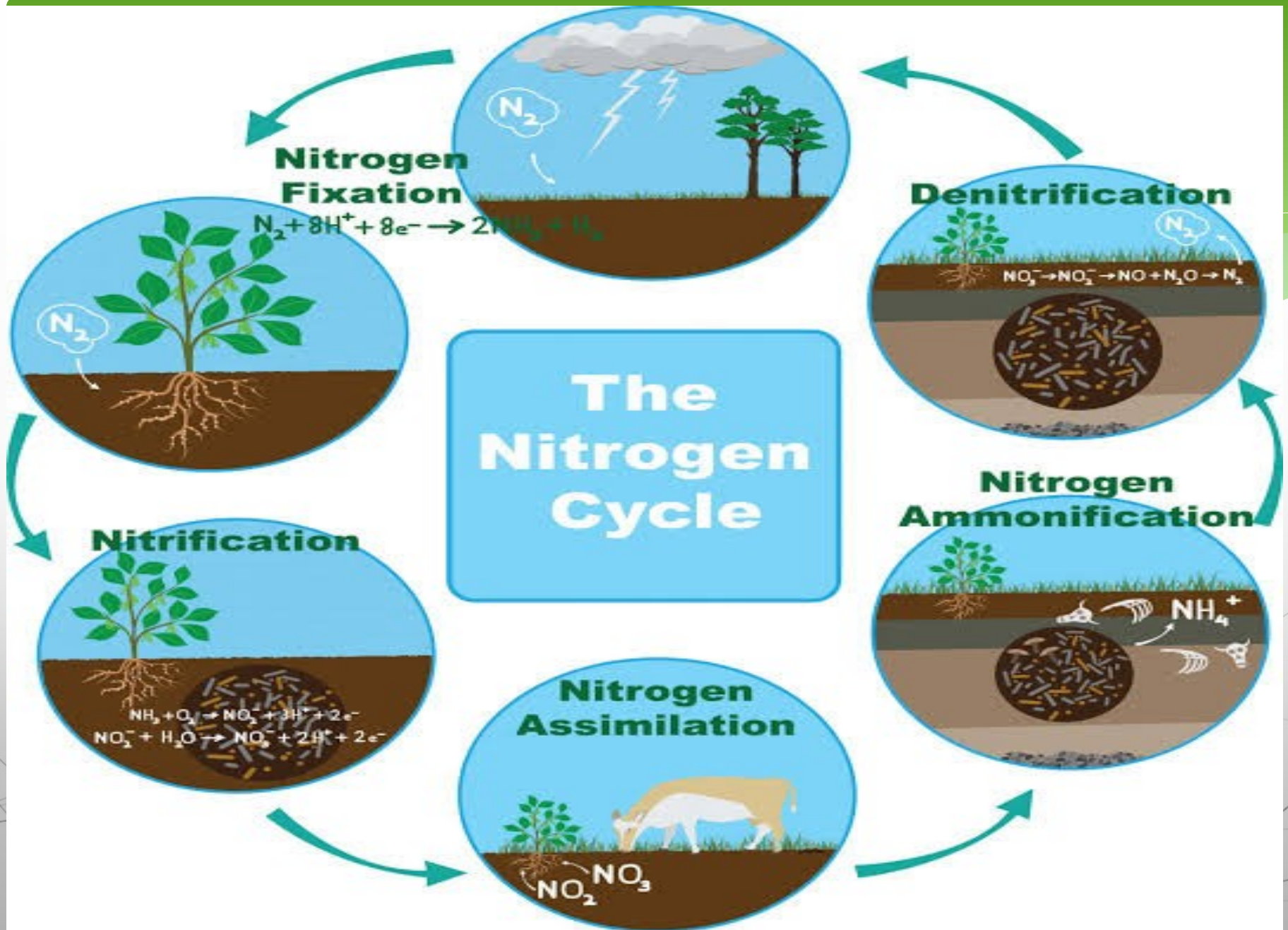
Nitrogen Cycle Explained - Stages of Nitrogen Cycle

- ★ Nitrate are first converted into ammonia which combine with organic acid to form amino acids . amino acids are used in the synthesis of proteins , enzymes chlorophylls nucleic acid etc .
- ★ Ammonification it is process of releasing ammonia by certain microorganism utilizing organic compound derived from the dead organic remain of plant and animals .
- ★ The microorganism especially involved are :
 - ★ Actinomycetes and bacilli
 - ★ (bacillus ramosus , b. vulgaris , b. mesentericus)

Nitrogen Cycle Explained - Stages of Nitrogen Cycle

★ Nitrification

- ★ The third stage, nitrification, also occurs in soils. Nitrification is the conversion of ammonia into nitrites and then nitrates by Nitrosomonas and Nitrobacter bacteria in the presence of oxygen .
- ★ During nitrification the ammonia in the soils, produced during mineralization, is converted into compounds called nitrites, NO_2^- , and nitrates, NO_3^- . Nitrates can be used by plants and animals that consume the plants. Some bacteria in the soil can turn ammonia into nitrites.
- ★ • Two important bacteria are involved:
- ★ **Nitrosomonas** → changes **ammonia** (NH_3) into **nitrites** (NO_2^-).
- ★ **Nitrobacter** → changes **nitrites** (NO_2^-) into **nitrates** (NO_3^-).



THANK
you