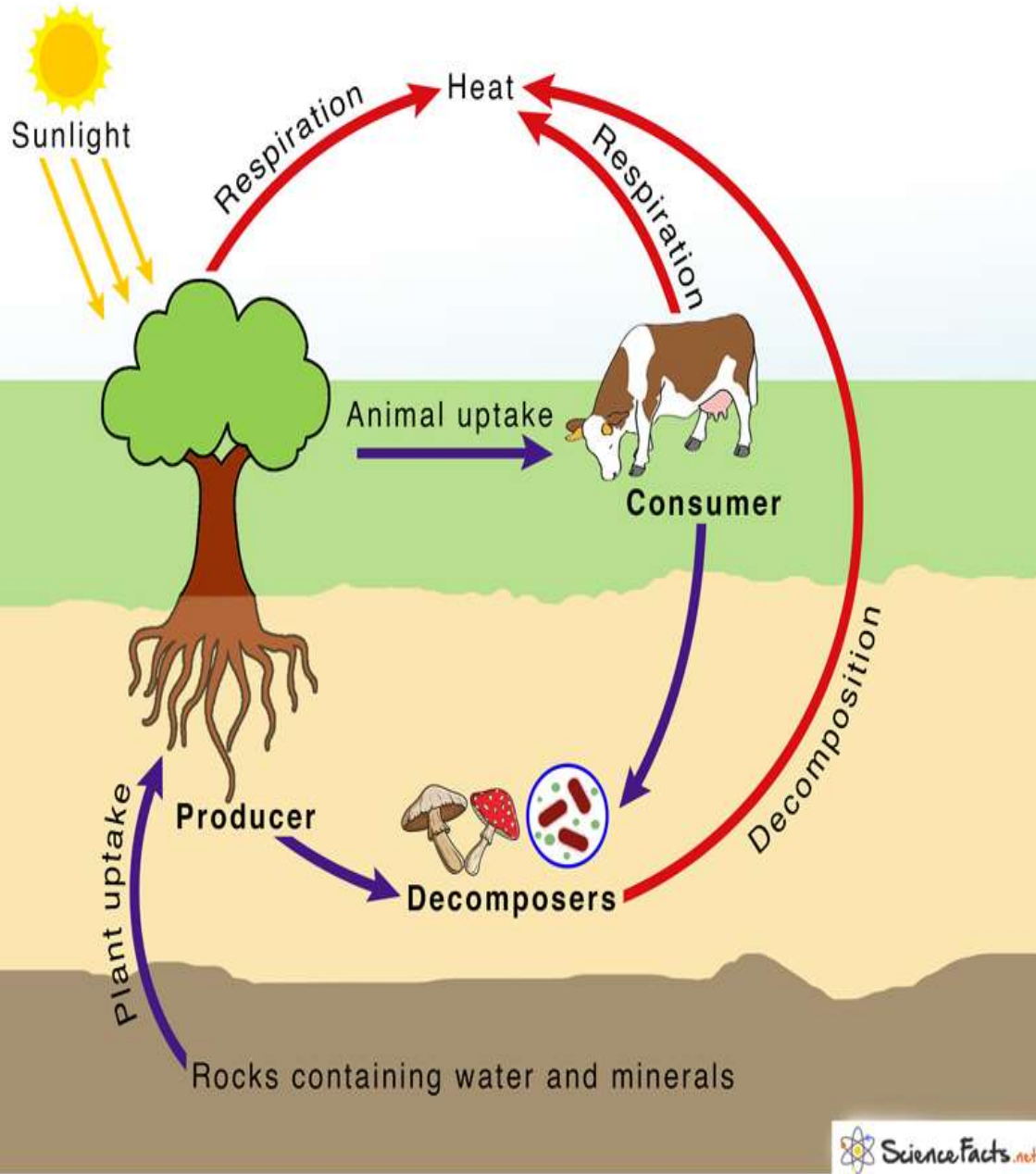


Biogeochemical Cycles



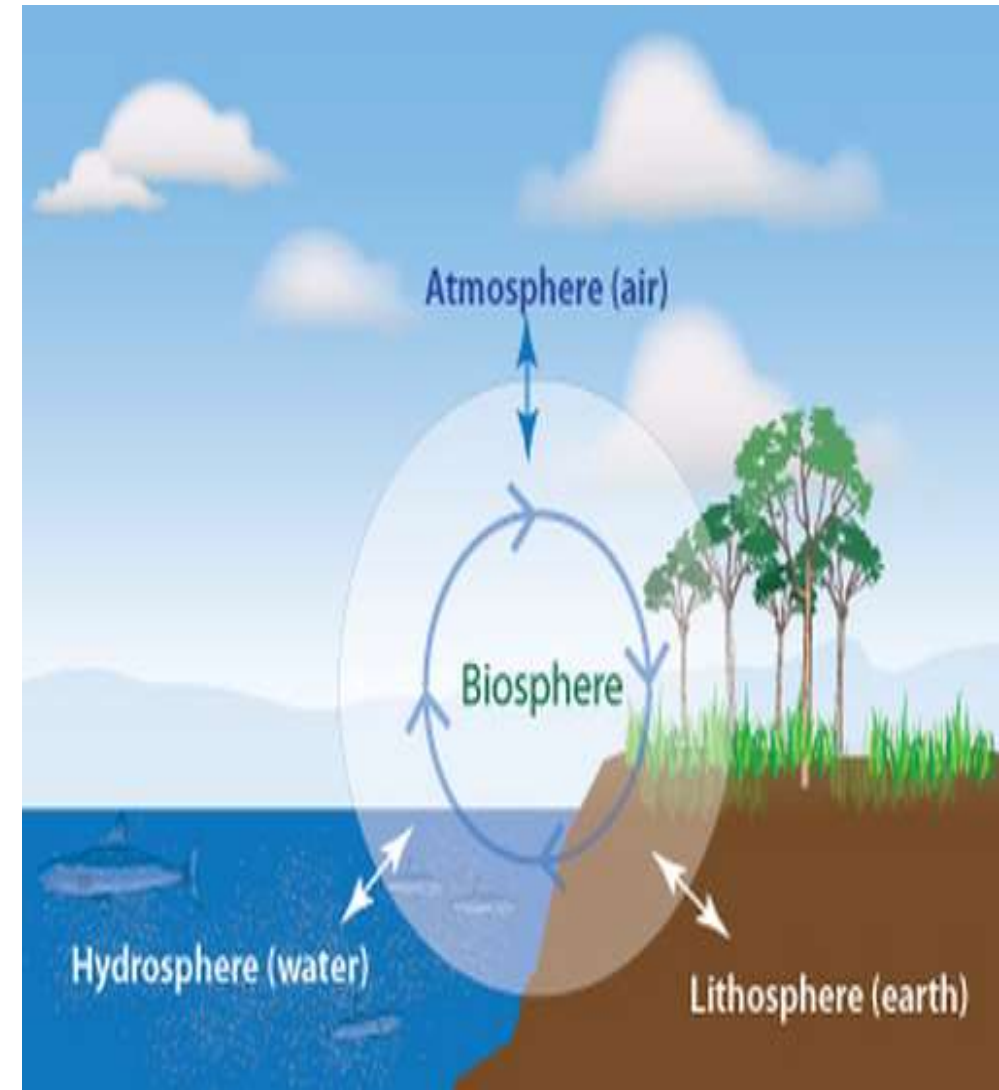
BIO-GEO-CHEMICAL CYCLE

DR . GARIMA SRIVASTAVA

What is Biogeochemical Cycle?

- **The natural pathway through which essential elements in living matters undergoes circulation** is known as a biogeochemical cycle. The natural elements in the biogeochemical cycles flow from abiotic (non-living) components to biotic (living) components. Biogeochemical, as a term, refers to three aspects in each cycle.
- An inorganic-organic cycle is a circulating or repeatable pathway by which either a chemical element or a molecule moves through both **biotic (biosphere)** and **abiotic (lithosphere, atmosphere and hydrosphere)** components of an ecosystem.
- Term biogeochemical is derived from “**bio**” meaning **biosphere**, “**geo**” meaning the **geological components** and “**chemical**” meaning the **elements that move through a cycle**.

The **geosphere** has four subsystems called the **lithosphere** (earth), **hydrosphere**(water), **cryosphere** (frozen water), and **atmosphere**(air/gaseous). Because these subsystems interact with each other and the biosphere, they work together to influence the climate, trigger geological processes, and affect life all over the Earth.

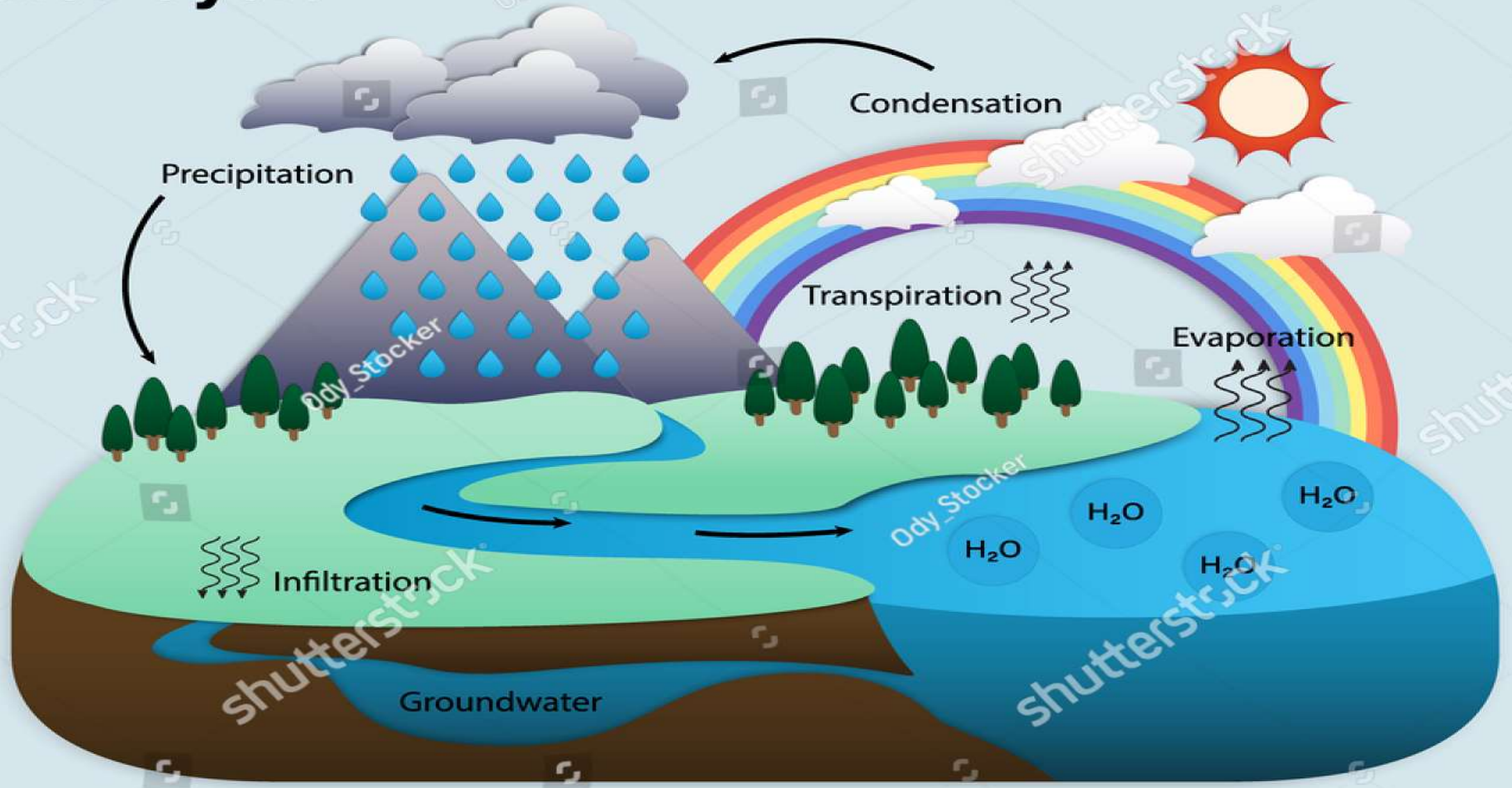


- The earth obtains energy from the sun which is radiated back as heat, rest all other elements are present in a closed system. The major elements include:
- Carbon
- Hydrogen
- Nitrogen
- Oxygen
- Phosphorus
- Sulphur
- These elements are recycled through the biotic and abiotic components of the [ecosystem](#). The atmosphere, hydrosphere and lithosphere are the abiotic components of the ecosystem.

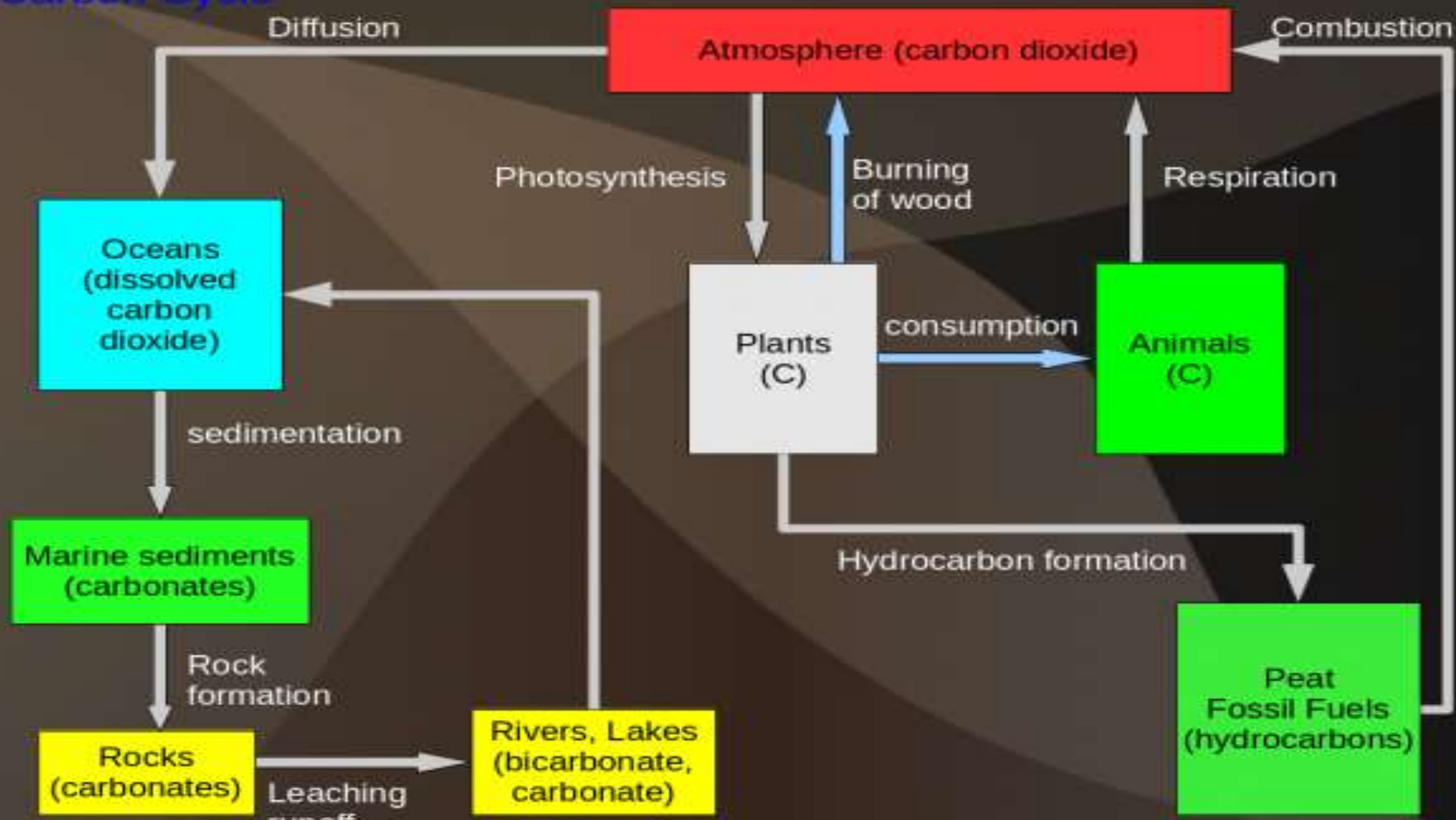
Types of Biogeochemical Cycles

- Biogeochemical cycles are basically divided into two types:
- **Gaseous cycles** – Includes Carbon, Oxygen, Nitrogen, and the Water cycle.
- **Sedimentary cycles** — Includes Sulphur, Phosphorus, Rock cycle, etc.
- **Water Cycle**
- The water from the different water bodies evaporates, cools, condenses and falls back to the earth as rain.
- This biogeochemical cycle is responsible for maintaining weather conditions.

Water Cycle



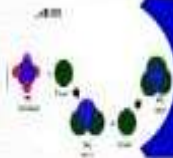
Carbon Cycle



STEPS OF NITROGEN CYCLE



Nitrogen Fixation(N_2 to NH_3/NH_4^+ or NO_3^-)



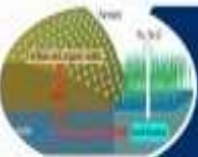
Nitrification (NH_3 to NO_3^-)



Assimilation (Incorporation of NH_3 & NO_3^- into biological tissues)



Ammonification (organic N_2 compounds to NH_3)



Denitrification(NO_3^- to N_2)

STEPS OF PHOSPHORUS CYCLE



Phosphate is released by the erosion of rocks.



Plants and fungi take up the phosphate with their roots.



Phosphorus moves from producers to consumers via food chain.



Phosphorus may seep into groundwater from soil over time forming into rock.



When these rock erode, the cycle begins again.

Why are Biogeochemical Cycles Important

- Biogeochemical cycles enable the transfer of molecules from one locality to another. ...
- Biogeochemical cycles enable the transformation of nutrients from one form to another. ...
- Biogeochemical cycles facilitate the storage of elements – Different types of nutrient reservoirs are produced by each of the different steps of the biogeochemical cycles.
- Biogeochemical cycles are important because they regulate the elements necessary for life on Earth by cycling them through the biological and physical aspects of the world.