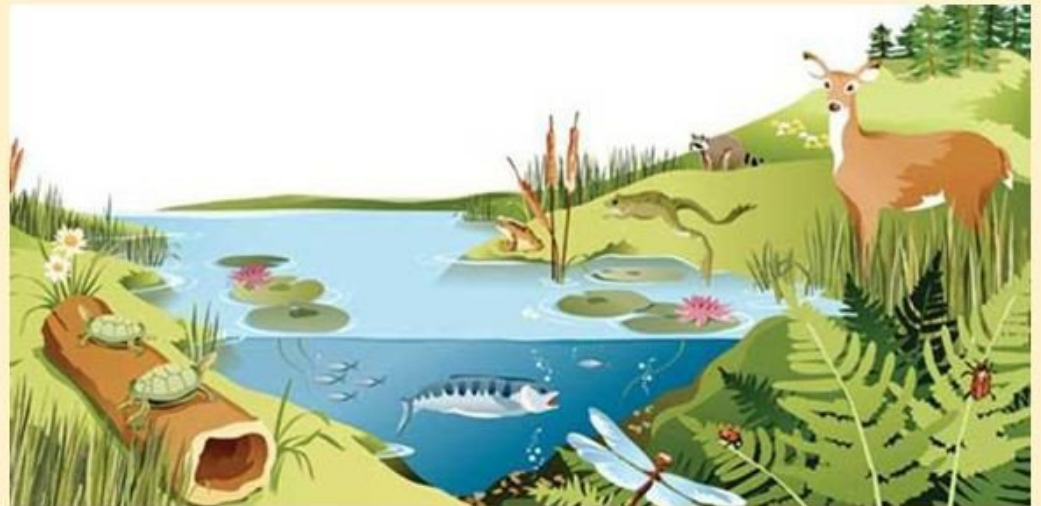


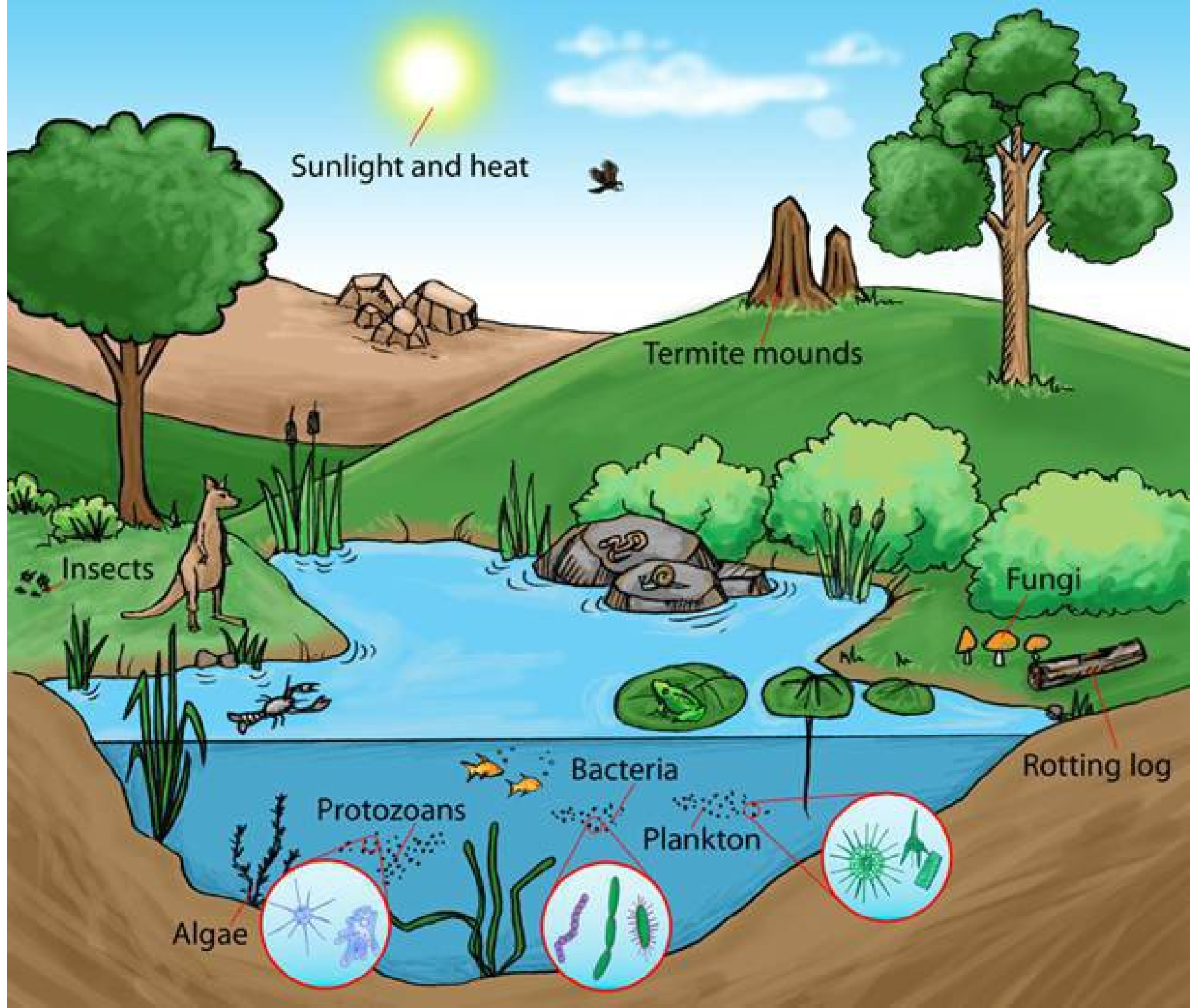
WHAT IS AN ECOSYSTEM?

An ecosystem is a community of living organisms interacting with each other and their non-living environment.

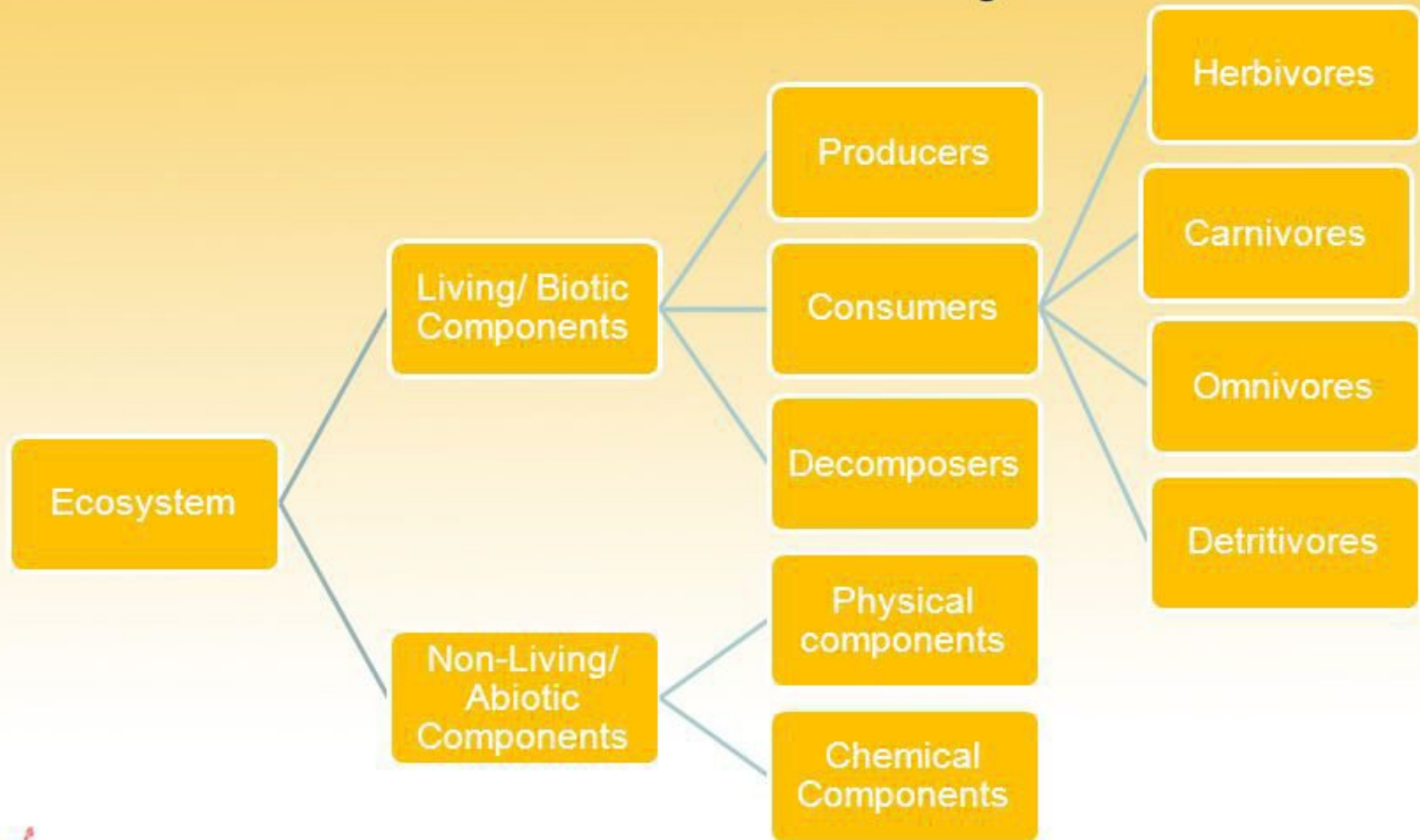
What makes up an ecosystem?

- All living things (plants, animals, and bacteria)
- Non living things (the sun, rocks, and soil)











Structure of Ecosystem

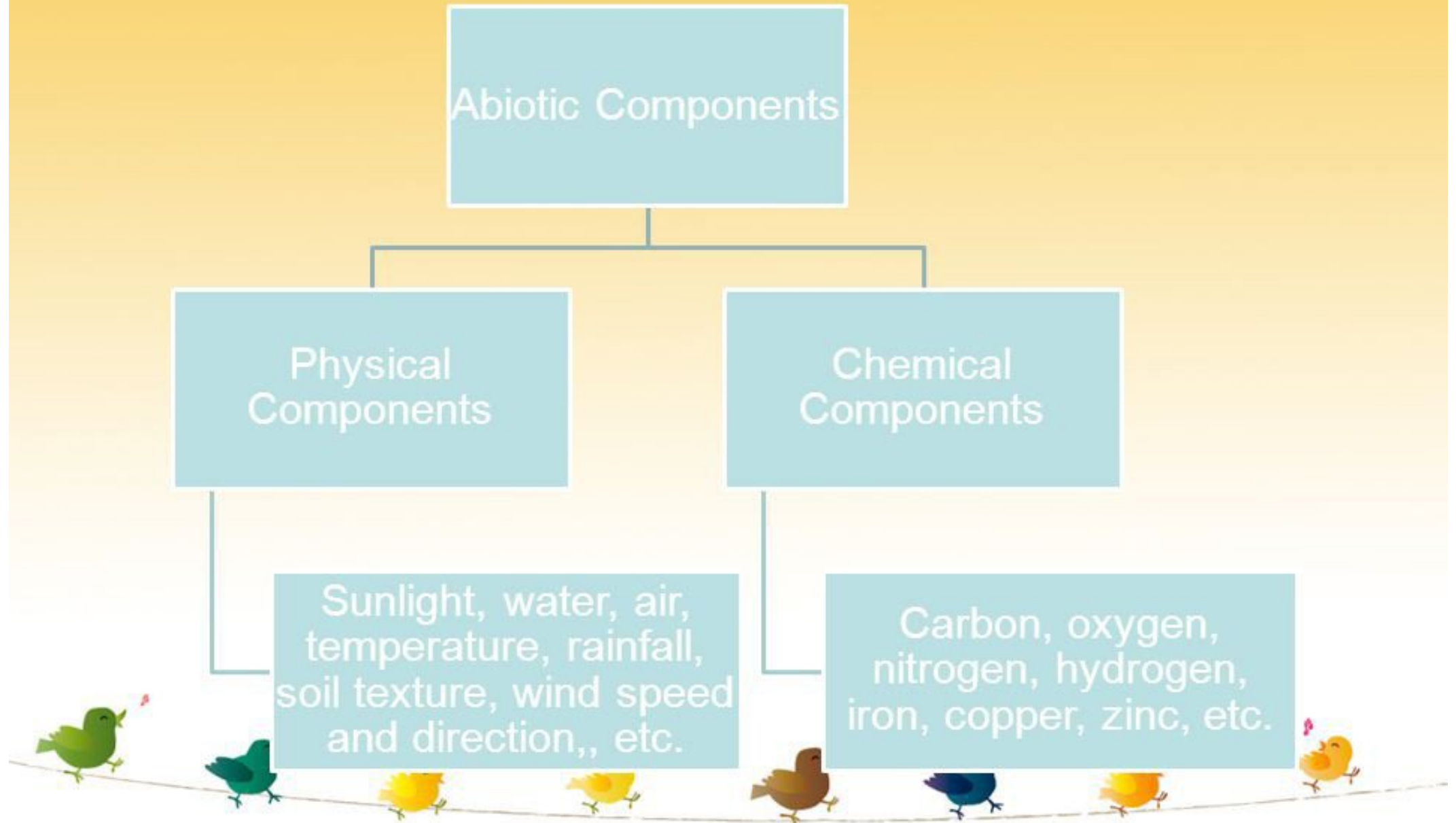


Living organisms in ecosystems are called **biotic**

Grouped as:

Producers	Consumers	Decomposers
Make their own food	Eat other organisms for food	Break down dead material
 	 	 

Abiotic Components of Ecosystem



3.3.2. Abiotic (non-living) components

The non-living components (physical and chemical) of ecosystem collectively form a community called abiotic components (or) abiotic community.

Examples

Climate, soil, water | air, energy, nutrients, etc.,

1. Physical components

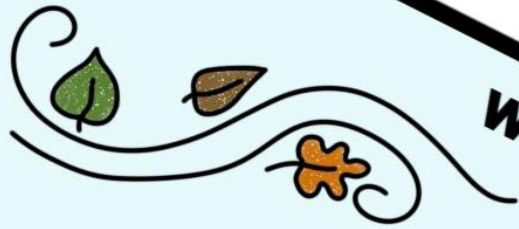
They include the energy, climate, raw materials and living space that the biological community needs. They are useful for the growth and maintenance of its member.

Example

Air, water, soil, sunlight, etc.,

ABIOTIC FACTORS

these are the non-living components
of the ecosystem



wind



water

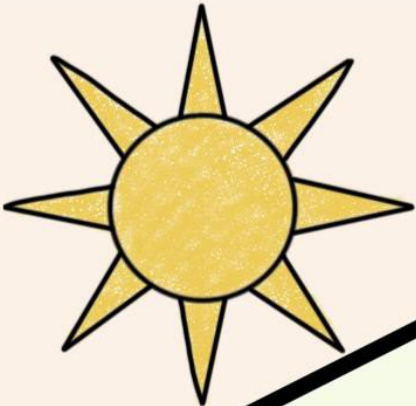
atmosphere



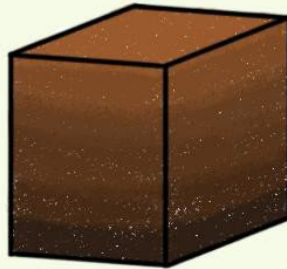
temperature



sunlight



soil



2. Chemical Components

They are the sources of essential nutrients

Examples

- Organic substances : Protein, lipids, carbohydrates, etc., (ii) Inorganic substances:
- All micro (Al, Co, Zn, Cu) and macro elements (C, H, O, P, N, P, K) and few other elements.

Functions of an ecosystem



Functions of ecosystem

- Regulatory functions: ecosystem regulates essential ecological processes and life support systems and renders stability. Responsible for cycling of nutrients between biotic and abiotic components(biogeochemical cycles). Also, it provides many services that have direct and indirect benefits to humans (i.e., clean air, water and soil). Soil formation, climate regulation, etc.
- Every ecosystem regulates and maintains itself and resists any stresses or disturbances upto a certain limit. This is known as cybernetic system.

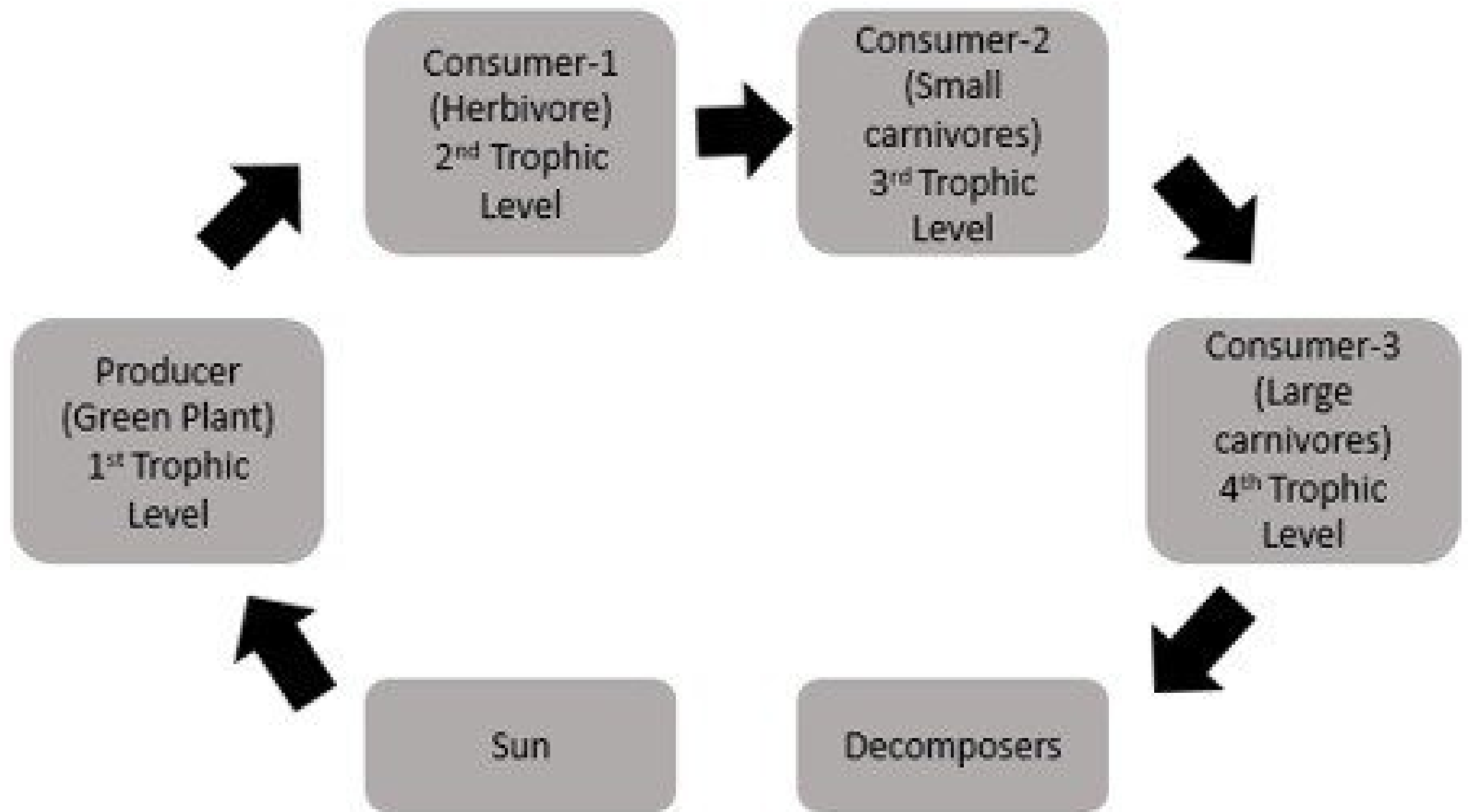


1. It regulates the essential ecological processes, supports life systems and renders stability.
2. It is also responsible for the cycling of nutrients between biotic and abiotic components.
3. It maintains a balance among the various trophic levels in the ecosystem.
4. It cycles the minerals through the biosphere.

5. The abiotic components help in the synthesis of organic components that involves the exchange of energy.

So the functional units of an ecosystem or functional components that work together in an ecosystem are:

- **Productivity** – It refers to the rate of biomass production.
- **Energy flow** – It is the sequential process through which energy flows from one trophic level to another. The energy captured from the sun flows from producers to consumers and then to decomposers and finally back to the environment.



- **Decomposition** – It is the process of breakdown of dead organic material. The top-soil is the major site for decomposition.
- **Nutrient cycling** – In an ecosystem nutrients are consumed and recycled back in various forms for the utilisation by various organisms.

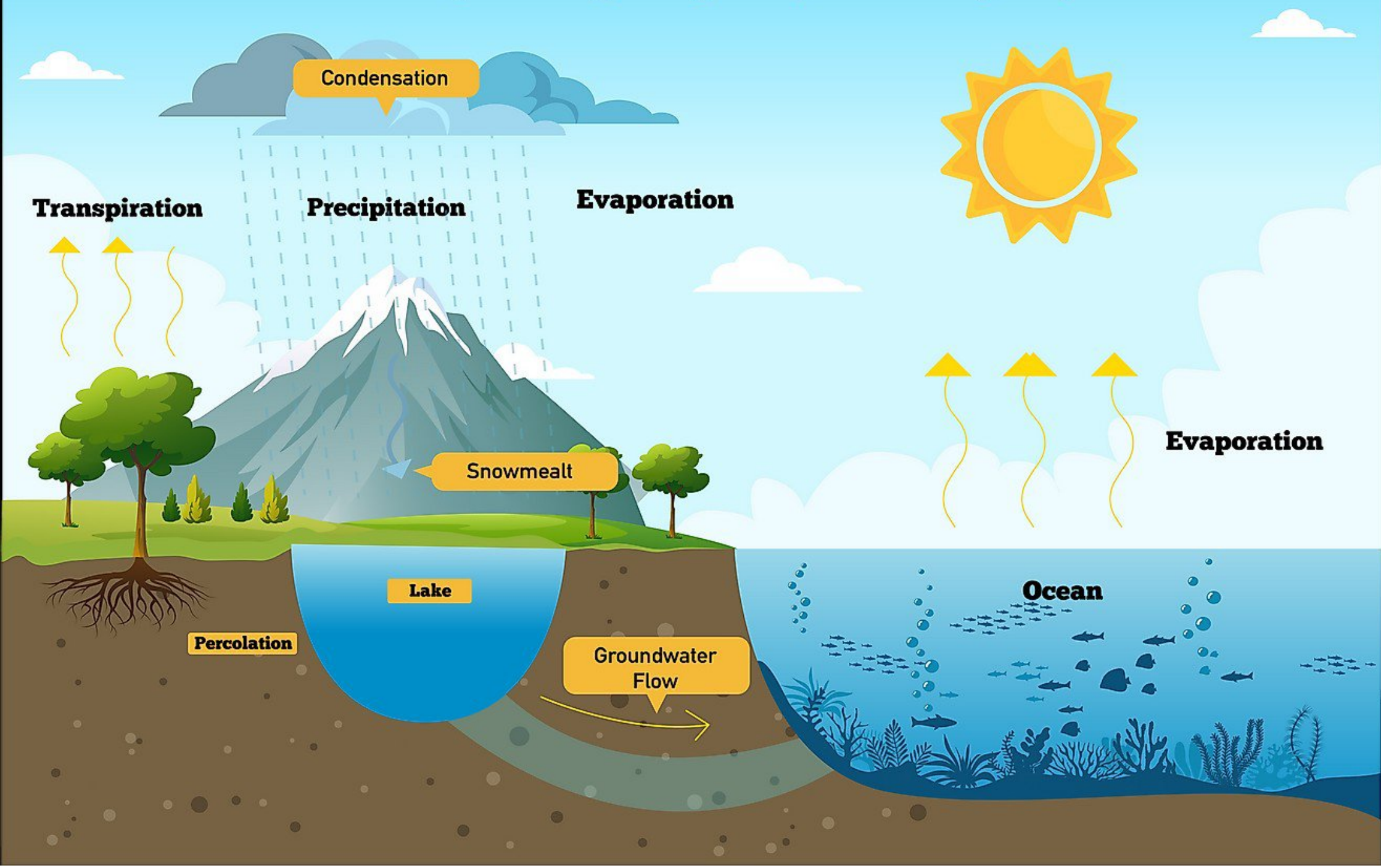
Bio-geological cycles

- Biogeological cycle refers to the elements that move from geosphere to biosphere and back to geosphere.
- Each cycle may have a corresponding link in the atmosphere and hydrosphere
- Most important 4 are the:
 - Carbon cycle
 - Nitrogen cycle
 - Phosphorus cycle
 - Water cycle.

WATER CYCLE

- Continuous circulation of water in Earth- atmosphere system
- Driven by solar energy
- The major reservoirs of water are ~ atmosphere, ocean , lakes, rivers, soils, glaciers, snow-fields and groundwater.
- Water moves from one reservoir to other.
- The processes involved are- evaporation, transpiration, condensation, precipitation, deposition, runoff, infiltration, and ground water flow.

The Hydrologic Cycle (Water Cycle)

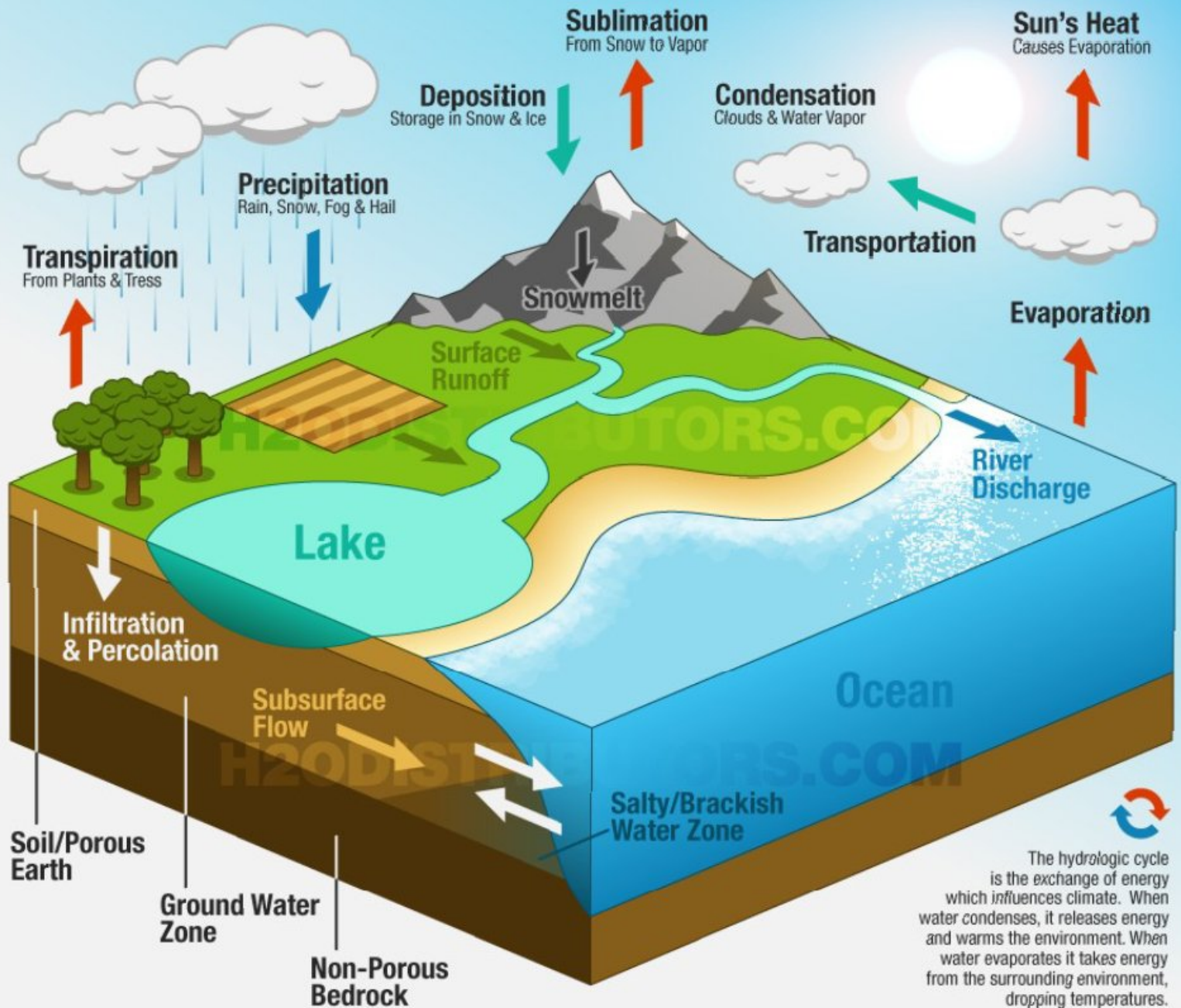


Hydrologic Cycle

The Hydrologic Cycle (also called the Water Cycle) is the continuous movement of water in the air, on the surface of and below the Earth.

Human activities that alter the water cycle:

- Alteration of Atmosphere
- Construction of Dams
- Deforestation and Afforestation
- Water Abstraction from Rivers
- Agriculture
- Industry
- Urbanization



The hydrologic cycle is the exchange of energy which influences climate. When water condenses, it releases energy and warms the environment. When water evaporates it takes energy from the surrounding environment, dropping temperatures.

Process Definitions:

Condensation

The transformation of water vapor to liquid water droplets in the air, creating clouds and fog.

Deposition

Also known as desublimation, is a thermodynamic process, a phase transition in which gas (vapor) transforms into solid (ice).

Evaporation

The transformation of water from liquid to gas phases as it moves from the ground or bodies of water into the overlying atmosphere.

Percolation

Water flows horizontally through the soil and rocks under the influence of gravity.

Precipitation

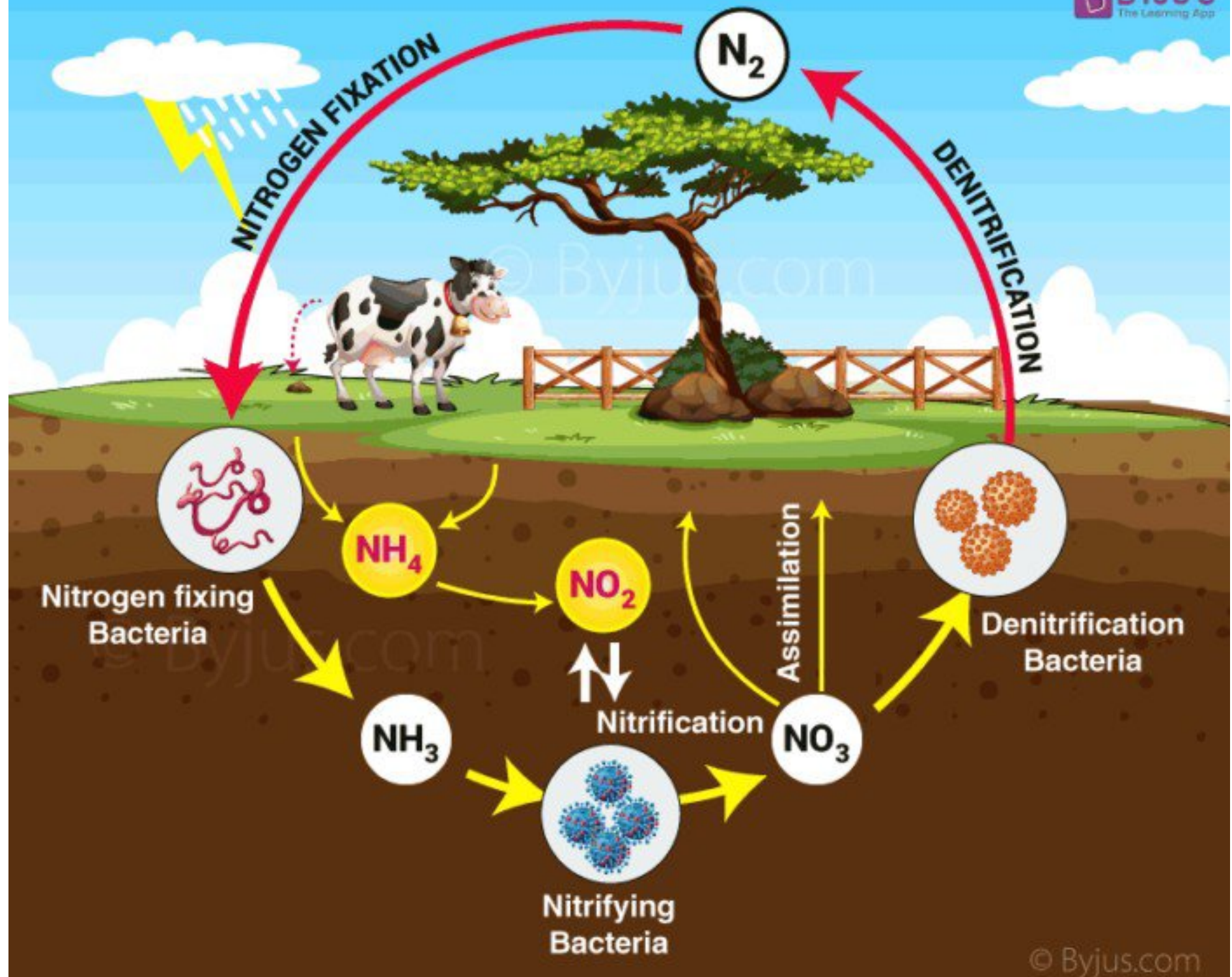
Condensed water vapor that falls to the Earth's surface. Most precipitation occurs as rain, but also includes snow, hail, fog drip, graupel, and sleet.

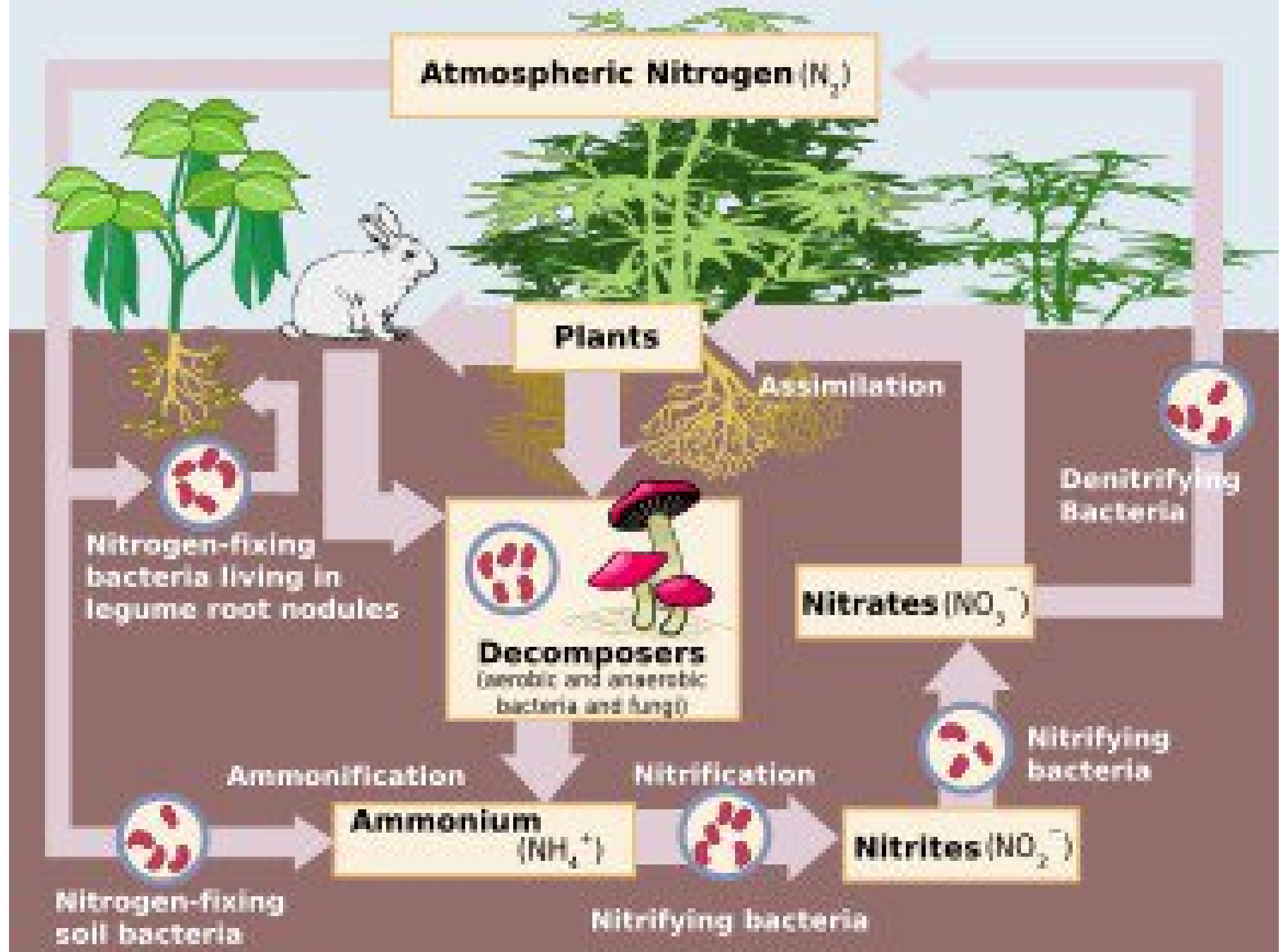
Sublimation

The state change directly from solid water (snow or ice) to water vapor.

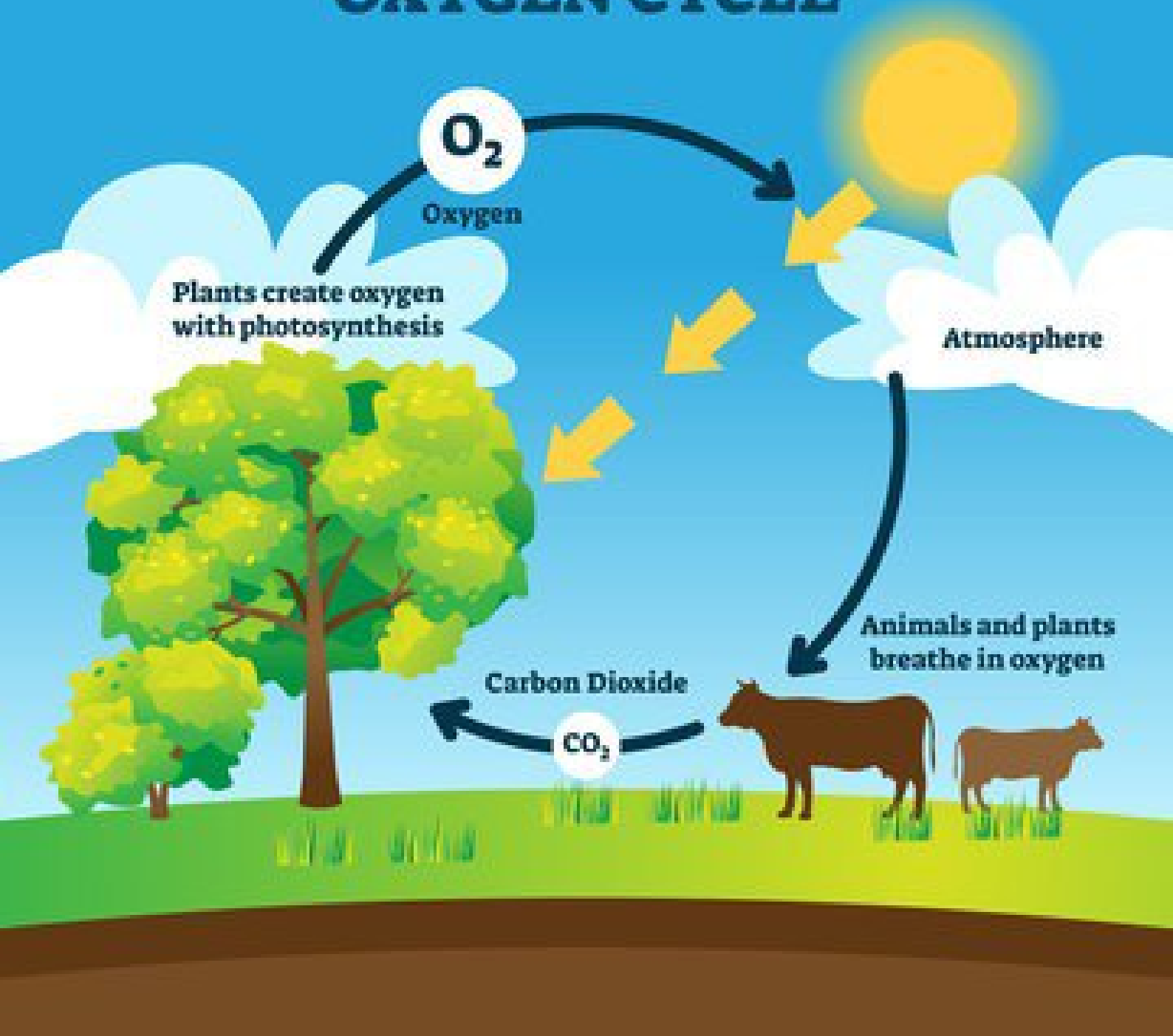
Transpiration

The release of water vapor from plants and soil into the air. Water vapor is a gas that cannot be seen.





OXYGEN CYCLE



The Carbon Cycle

- Plants take in CO_2 because they need carbon and oxygen to use in **photosynthesis**
- Through photosynthesis plants make **glucose (carbohydrate)** and other substances
e.g. protein
- When animals eat plants they use some of the carbon containing compounds to grow
- Some carbon-containing compounds are used to release energy by **respiration**.

Processes in the carbon cycle

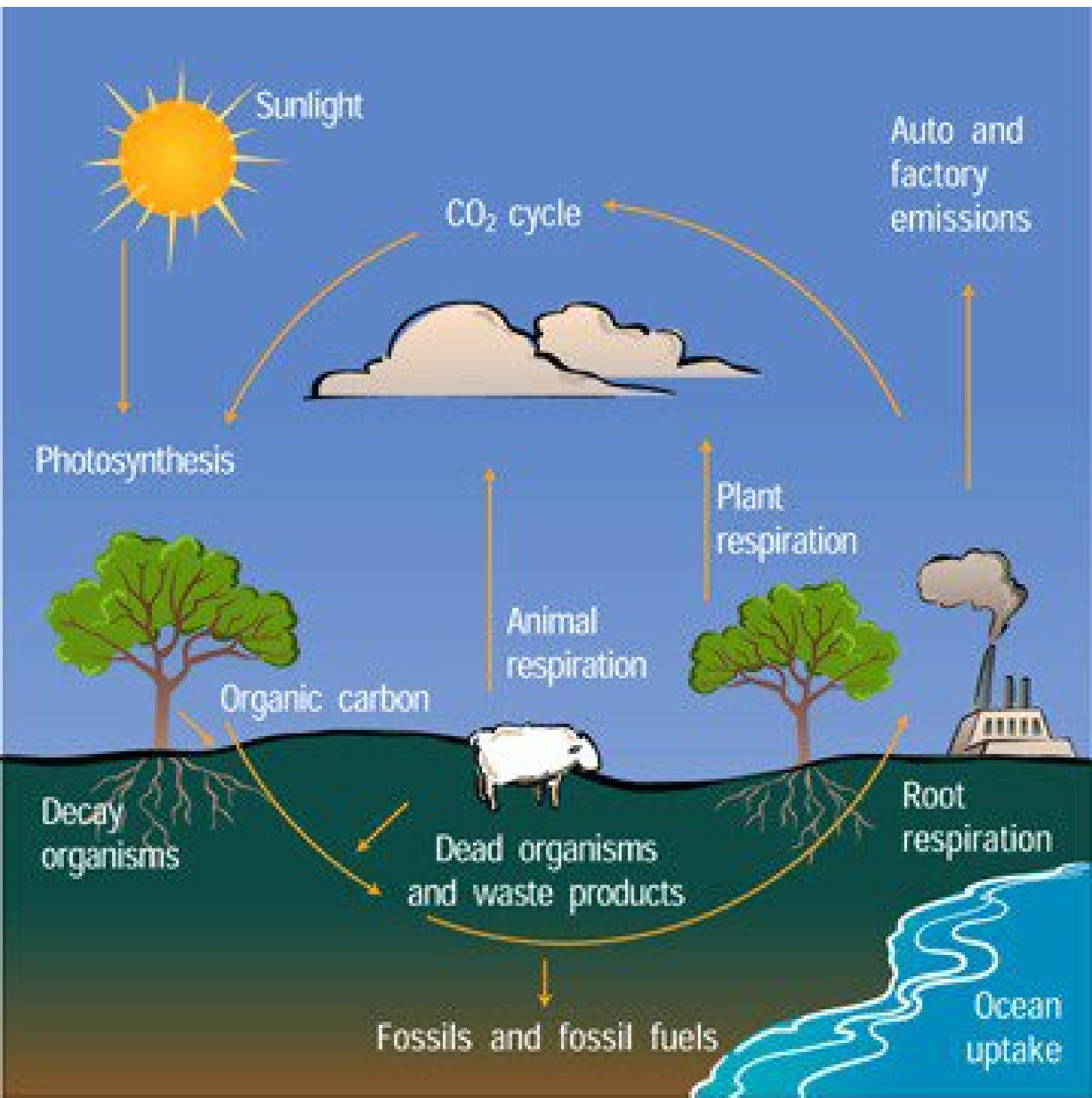
The carbon cycle is easiest to understand in terms of its processes and how carbon is converted. The three key processes and the conversions are shown in the table below.

Process	Photosynthesis
Carbon starts as	Respiration
Carbon ends as	Combustion (burning)

Process	Carbon dioxide
Carbon starts as	Glucose
Carbon ends as	Fuel (eg methane or wood)

Process	Glucose
Carbon starts as	Carbon dioxide
Carbon ends as	Carbon dioxide

1. Carbon enters the atmosphere as carbon dioxide from respiration and combustion.
2. Carbon dioxide is absorbed by producers to make glucose in photosynthesis.
3. Animals feed on the plant passing the carbon compounds along the food chain. Most of the carbon they consume is exhaled as carbon dioxide that was formed during aerobic respiration. The animals and plants eventually die.
4. Decomposers break down the dead organisms and return the carbon in their bodies to the atmosphere as carbon dioxide by respiration. In some conditions, decomposition is blocked. The plant and animal material may then be available as fossil fuel in the future for combustion.



FUNCTION OF AN ECOSYSTEM

To understand clearly the nature of ecosystem its functioning should be thoroughly understood. The function of an ecosystem is to allow flow of energy and cycling of nutrients

3.4.1 Types of Functions

Functions of an ecosystem are of three types.

1. Primary function

The primary function of all ecosystem is manufacture of starch (photosynthesis).

2. Secondary function The secondary function of all ecosystem is distribution energy in the form of food to all consumers.

Tertiary Function

All living systems die at a particular stage. These dead systems are decomposed to initiate third function of ecosystems namely “cycling”.

The functioning of an ecosystem may be understood studying the following terms.

- Energy and material flow.
- Food chains
- Food webs
- Food pyramids