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Biosphere as a global one Earth's ecosystem

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Introduction

BIOSPHERE

The Biosphere is a very diverse subsystem the Earth.

From the ocean trenches, deep root systems, mountain tops, lush rain forests and deserts is where the Biosphere extends.

Basically, the Biosphere is a subsystem wherein life exists.

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HISTORY

Vladimir I.
Vernadsky

The development of the term is attributed to the Austrian geologist Eduard Süss (1831-1914) and the Russian scientist Vladimir I. Vernadsky (1863-1945). The biosphere is one of the four layers that surround the Earth along with the lithosphere (rock), hydrosphere (water) and atmosphere (air) and it is the sum of all the ecosystems.

Eduard Süss

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The biosphere is the sum of all ecosystems. Doctrine of biosphere. The term was introduced by Eduard Suess, the Austrian geologist in 1875 in his work on geology of the Alps. However, he did not disclose the content of the concept of biosphere. Only V.I. Vernadsky created an orderly doctrine of biosphere. V.I. Vernadsky understood a thin mantle of the Earth at the interface of three geological spheres – the lithosphere, the atmosphere and the hydrosphere, where all process take place under direct impact of living organisms, to mean the biosphere.

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Functions of living matter in the biosphere

The functions of living matter were developed and indicated by Vernadsky. He assigned the following role to organisms:

1. Oxidation-reduction
2. Destructive
3. Transport
4. Habitat-forming
5. Gas
6. Power
7. Informational
8. Concentration

The most basic functions of living matter of the biosphere -gas, energy and oxidation-reduction. However, the others are also important, providing complex processes of interaction between all parts and elements of the living shell of the planet.

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I. Levels of Living Matter Organization

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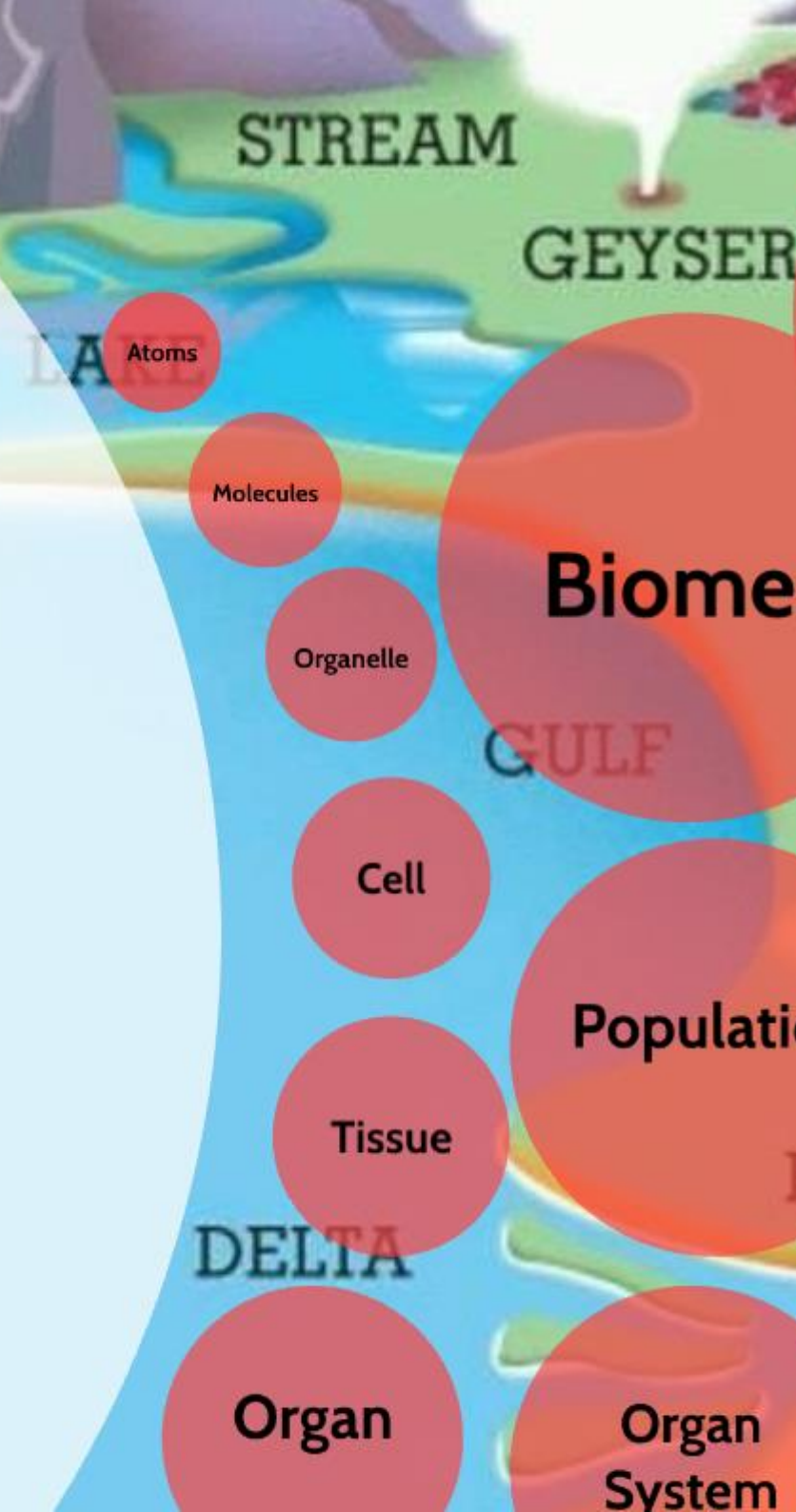
Biological Organization

It is the hierarchy of biological structures wherein, as it states, everything is composed of the tiniest of atoms, grouped together to form a molecule until to the biggest structure, the Biosphere.

The following are Biological Organization in increasing order according to size:



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1. Atoms

The smallest structures of matter, including biological structures (Life).

Atoms are further subdivided into subatomic parts: Protons, Electrons, and Neutrons.

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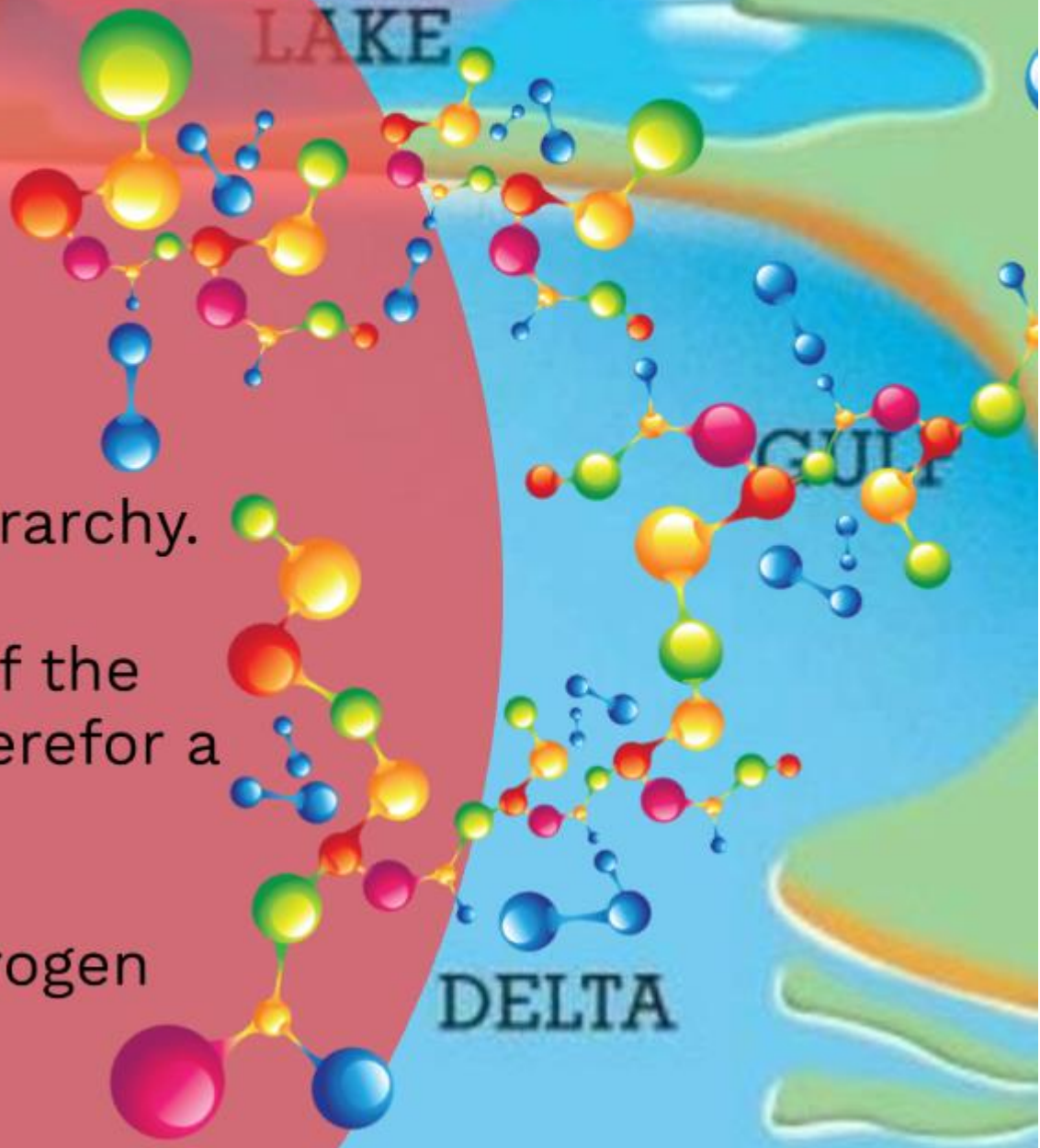
2. Molecules



The second smallest in the hierarchy.

In relevance to the definition of the Biological Organization, it is therefor a group of atoms.

Examples are Carbon and Hydrogen molecules.

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3. Organelles

The third smallest in the hierarchy.

A group of organic molecules that performs a specific task and it is what makes up a cell; the next level in the hierarchy.

Examples are Ribosomes, chloroplasts, lysosomes, Golgi Apparatus, etc.

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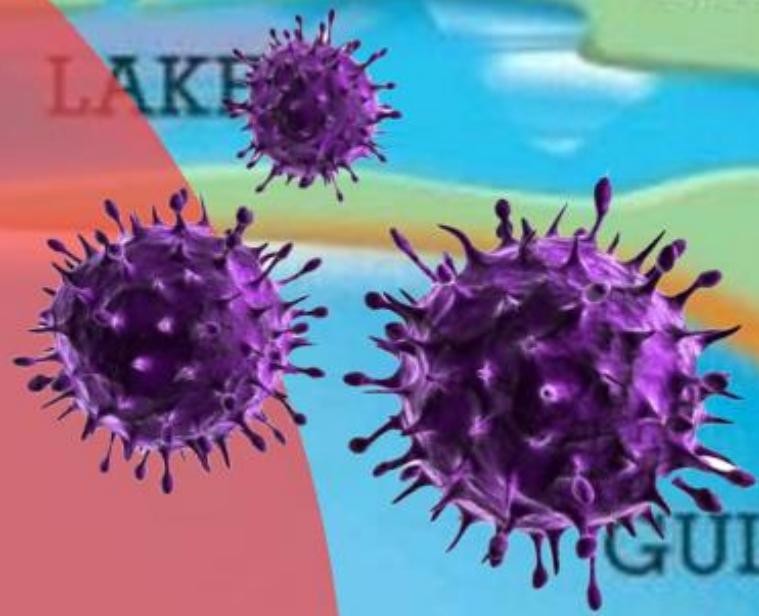
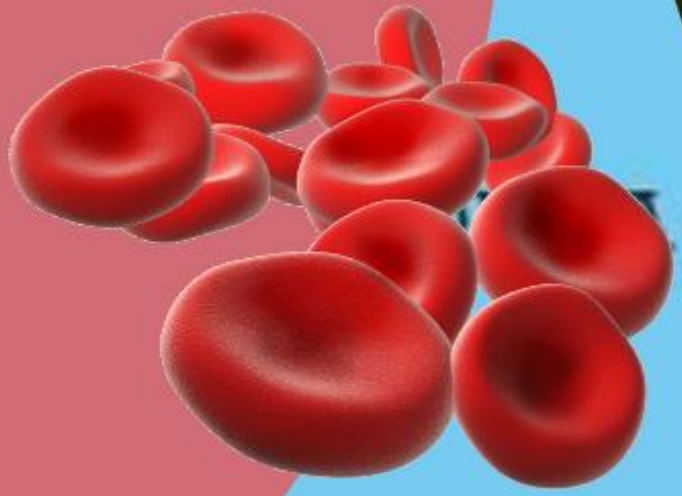
4. Cells

The basic building blocks of life.

Cells are composed of different organelles.

Examples are Eukaryotic and Prokaryotic cells.





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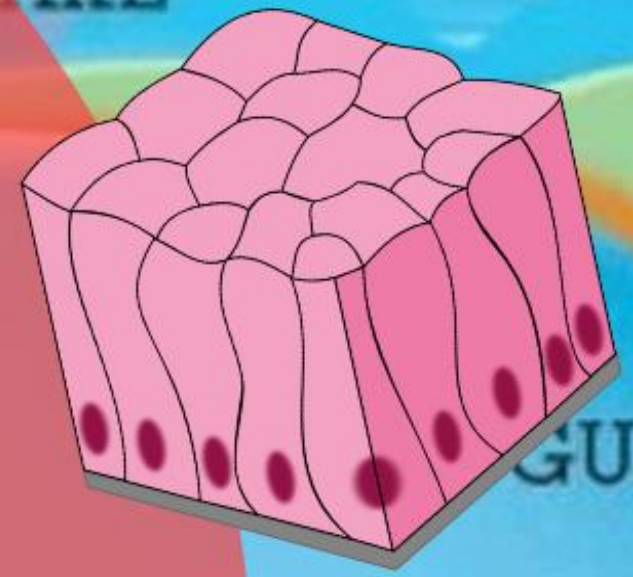
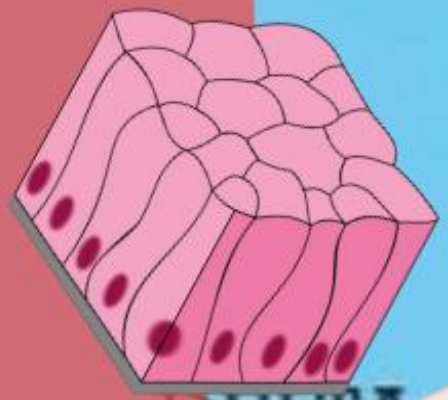
5. Tissue

A group of cells that have similar structure that performs together to initiate a specific function.

Examples are epithelial, connective, nervous and muscle tissues.





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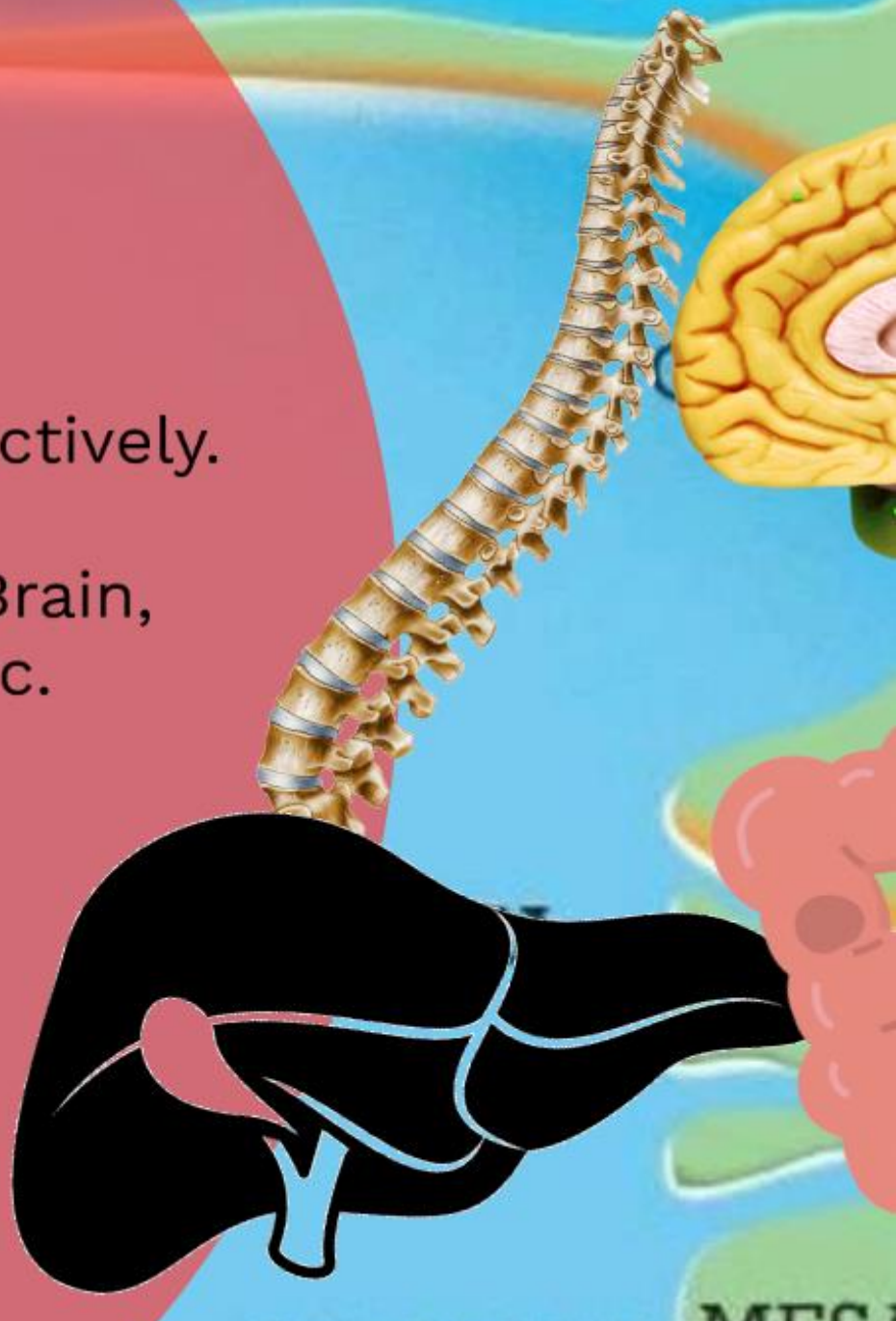
6. Organs

A group of specific tissues that performs a specific activity collectively.

Examples are the Heart, Lungs, Brain, stomach, Spleen, Skin, Bones, etc.



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7. Organ System

A group of organs that have similar function or do their tasks collectively to perform a bigger role in the next part of the hierarchy; the Organism.

Examples are the Respiratory, Digestive, Immune, Circulatory Systems.

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8. Organism

Any living thing that is capable of reproduction, growth, and homeostasis.

A group of different Organ systems that can stand on its own.

However, some organisms are unicelluar like bacteria and archaea.

Other examples includes plants, mammals, reptiles and fish

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9. Population

A group of organisms of the same species living together in a certain environment that is capable of interbreeding.

Examples are a pride of lions, a flock of birds, a school of fish.

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10. Ecosystems

A group of populations, a community, that coexists in an environment. This harmony also includes the geosphere attributes of the environment like the ground, ice, bodies of water and other non living things.

Examples are desert oasis, coral reefs, human ecosystems, etc.

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11. Biomes

A large group of ecosystems that have adapted to thrive in a specific climate or region.

The five main Biomes are Aquatic, Grasslands, Tundra, Deserts and Forest Biome.

Those five classifications also houses different kinds of smaller classifications like savanna, arctic tundra, cold deserts tropical forests, etc.

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12. Biosphere

The last and the largest among the classifications in the hierarchy.

The Biosphere is a very diverse subsystem the Earth.

From the ocean trenches, deep root systems, mountain tops, lush rain forests and deserts is where the Biosphere extends.

Basically, the Biosphere is a subsystem wherein life exists.

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II. Earth's Spheres an Biomes

Earth's Spheres

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Geosphere

Biosphere

Atmosphere

Hydrosphere

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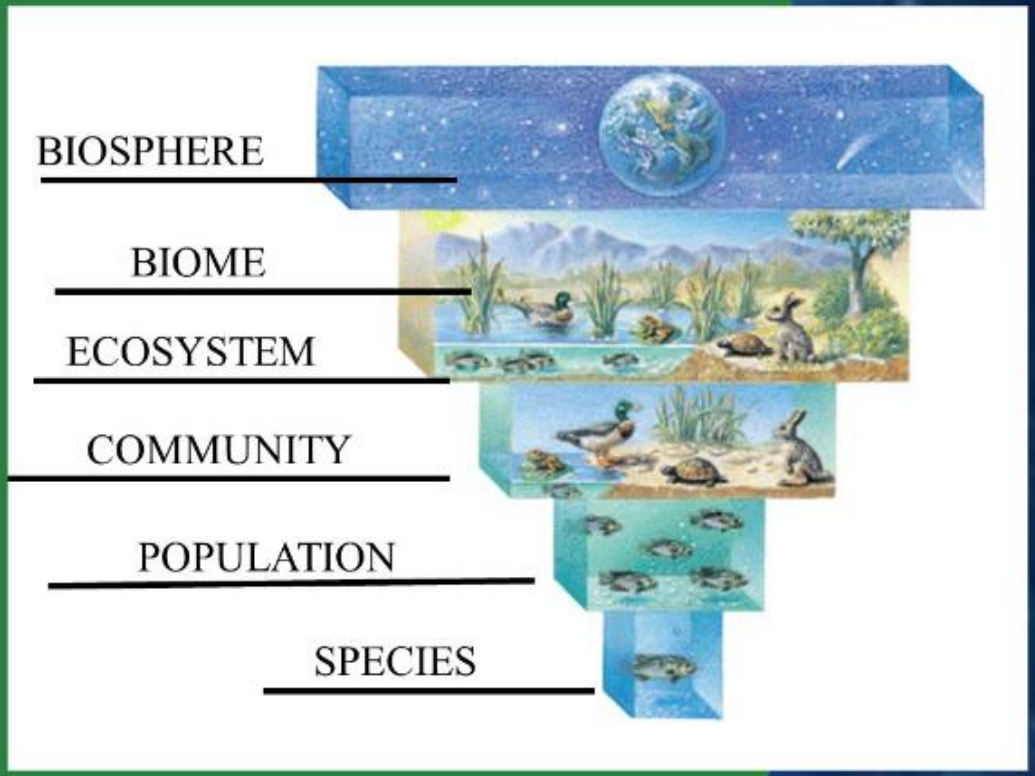
Biosphere, Biome, Ecosystem

Definition and differences



1. Biosphere

2. Biome

3. Ecosystem

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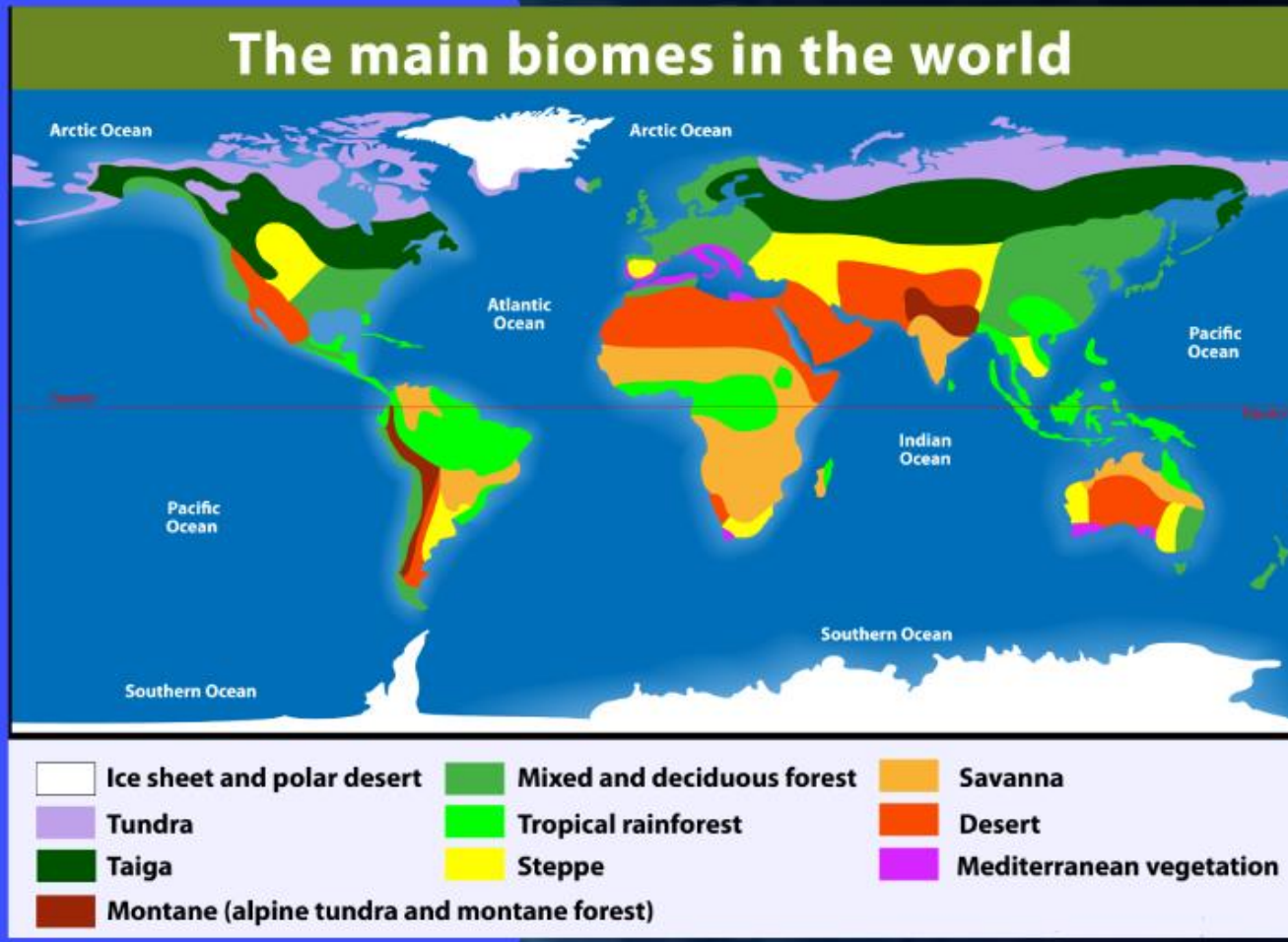
Biome

The wide geographic area that can be identified by their main vegetation and species in it.



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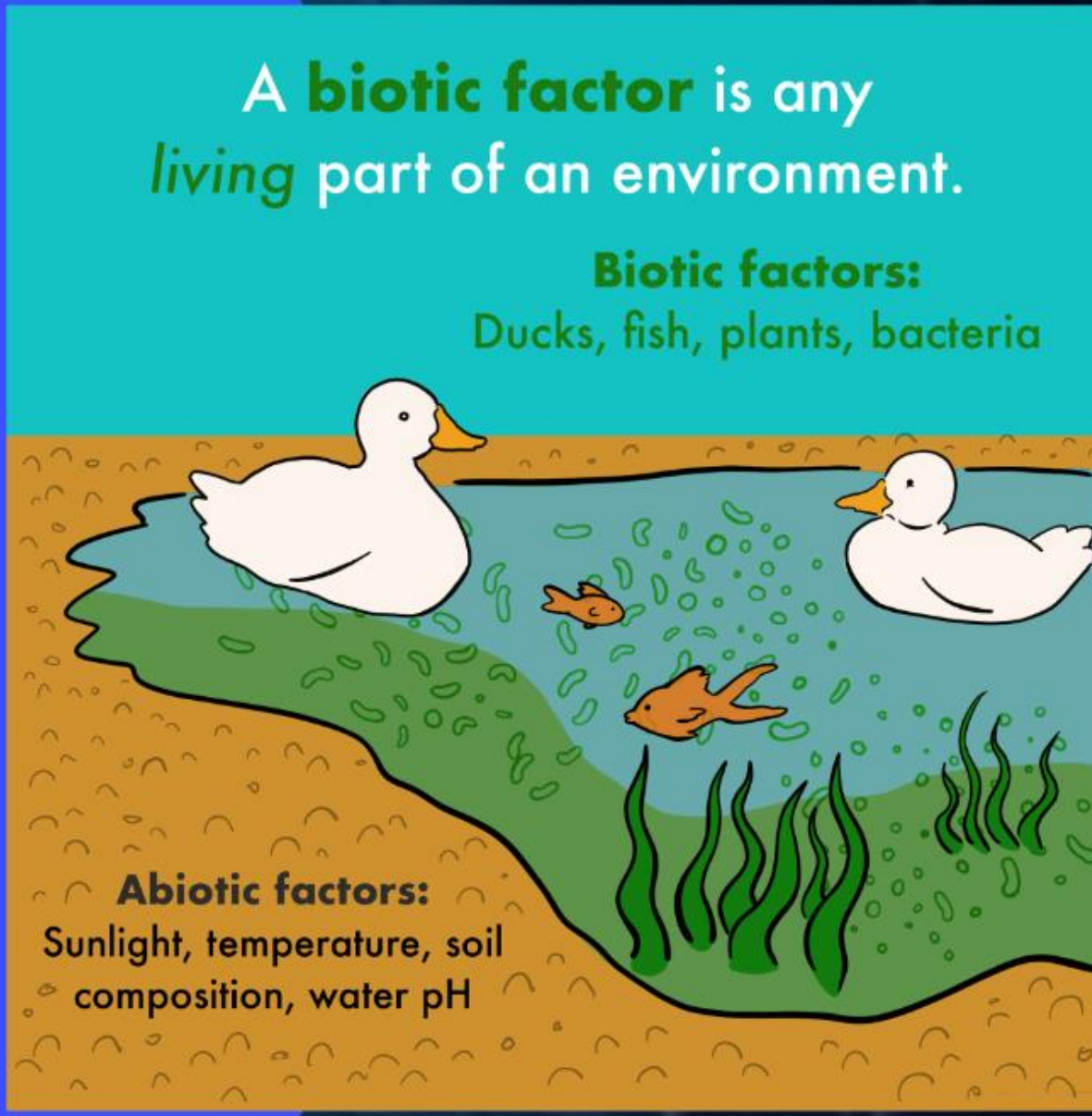
Ecosystem

It is the biosphere unit where living and Nonliving things interact.



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What were the Biome Classifications mentioned earlier?

As it is mentioned in the Biome part of the Biological Organization, Biomes can be recognized into five kinds:

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Aquatic: Marine Biomes

These biomes includes the oceans and the life thriving there.

This Biome roughly covers around 75% of the Earth's surface.

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Aquatic: Freshwater Biome

All bodies of water surrounded by land such as rivers, lakes and ponds belong to this biome.

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Grassland: Savanna (Tropical Grassland)

Savannas are found closer to the equator and can have a few scattered trees. They cover almost half of the continent of Africa, as well as areas of Australia, India, and South America.

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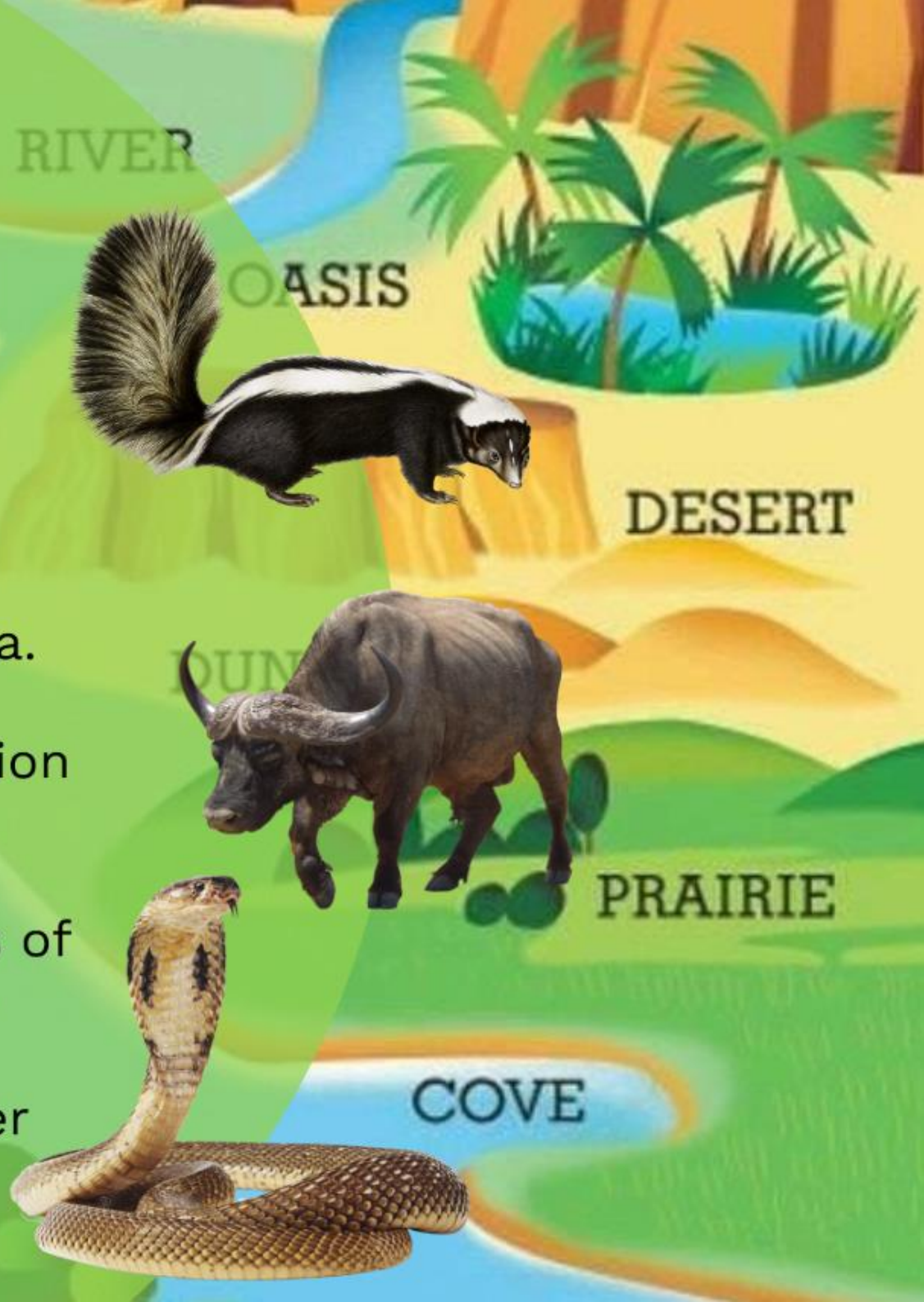
Grassland: Temperate Grassland Biome

Temperate grasslands are found further away from the equator, in South Africa, Hungary, Argentina, Uruguay, North America, and Russia. They do not have any trees or shrubs, and receive less precipitation than savannas.

Prairies and steppes are two types of temperate grasslands; prairies are characterized as having taller grasses, while steppes have shorter grasses.



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Forest: Temperate Forest Biomes

Temperate Forest Biomes are forest biomes that areon the temperate zone (latitude).

These forests experince the four seasons.

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Forest: Tropical Forest Biomes

These Biomes are forests that are found near the equator. It is usually humid and warm.

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Forest: Taiga (Boreal Forest Biome)

These are biomes found in high latitude areas. Most precipitation comes from snow.

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Desert: Coastal Desert Biome

These desert biomes are near the coast, where the land meets the sea.

This doesn't mean that it gets much rain, however. Instead, precipitation usually takes form through fogs.

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Desert: Semiarid Desert Biome

Semiarid deserts can be found in North America, Europe, and northern Asia.

These deserts are a lot like the hot and dry deserts. They have long, dry summers.

They also receive little rain during the winters. However, semiarid deserts do not get quite as hot during the day as hot and dry deserts.

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Desert: Hot and Dry

Desert Biome

Deserts with hot and dry climates are warm all year round, and are extremely hot in the summer.

Usually, they have very little rainfall, making the climate extremely dry, and hard for plants and animals to survive.

Very few vegetation is found in this biome.

Desert: Cold Desert

These desert biomes are usually found in temperate zones or in higher latitudes which is unlikely for a desert.

What makes these desert biomes desert, is the low precipitation and its remoteness to coasts.

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Tundra: Arctic Tundra Biome

Usually found north of the Boreal forests.

This biomes have little to no vegetation.

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Tundra: Alpine Tundra Biome

The alpine tundra is found on mountains where the altitude is too high for trees to survive.

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III. Interactions in Ecosystem

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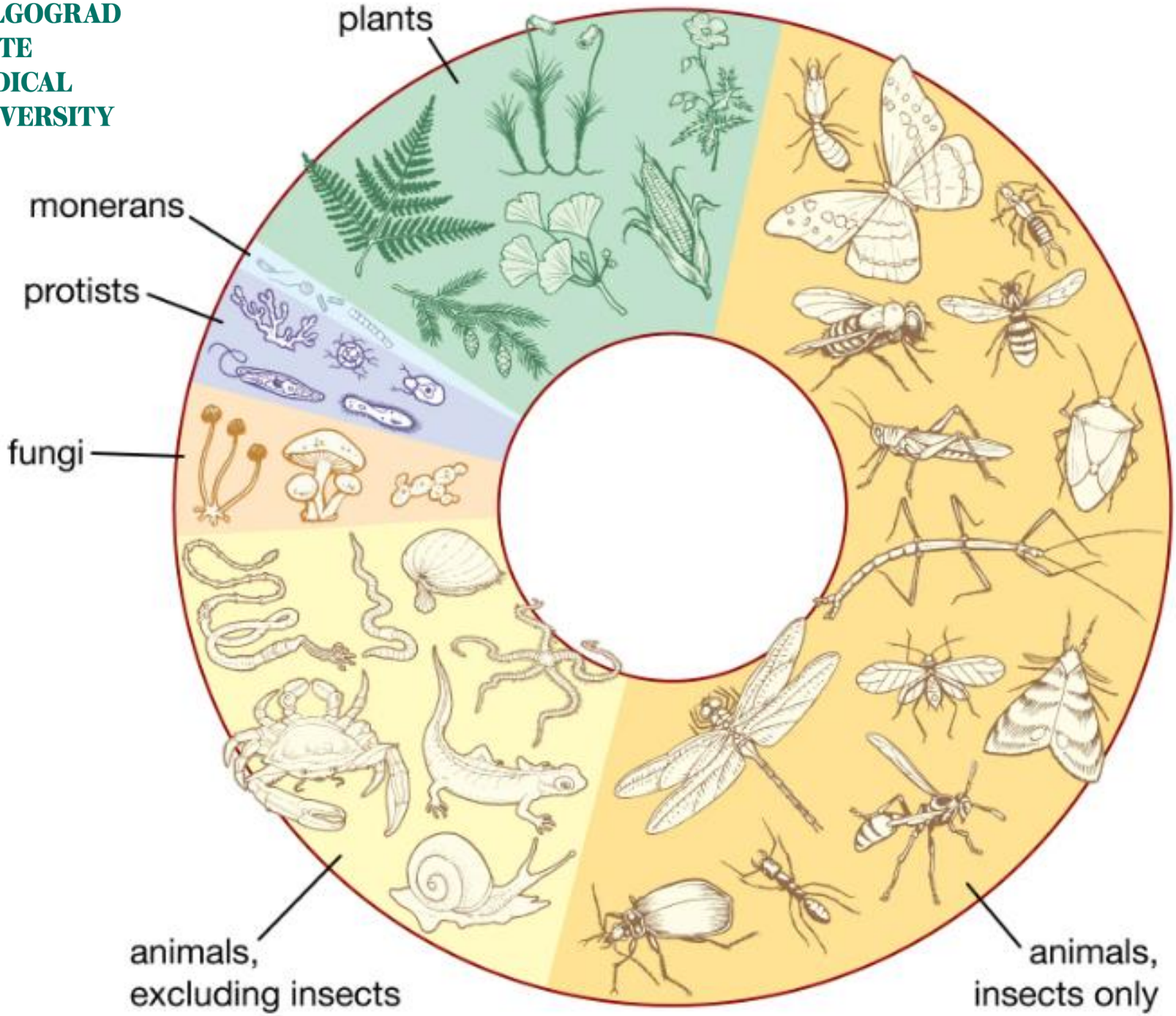

- Trophic levels
  - Trophic level is composed of all organisms that feed at a particular link in the food chain
    - Primary producers- first trophic level
    - Primary consumers- second trophic level
    - Secondary consumers- third trophic level
- Ecological pyramids- diagrams of the community
  - Represent amount of available energy in each trophic level
  - Producers are at the base- the most available energy
    - Energy is given off in less usable forms as producers are eaten by primary consumers, etc.
  - Numbers, biomass, or energy
  - Biomass- the number of organisms at each level multiplied by their weight

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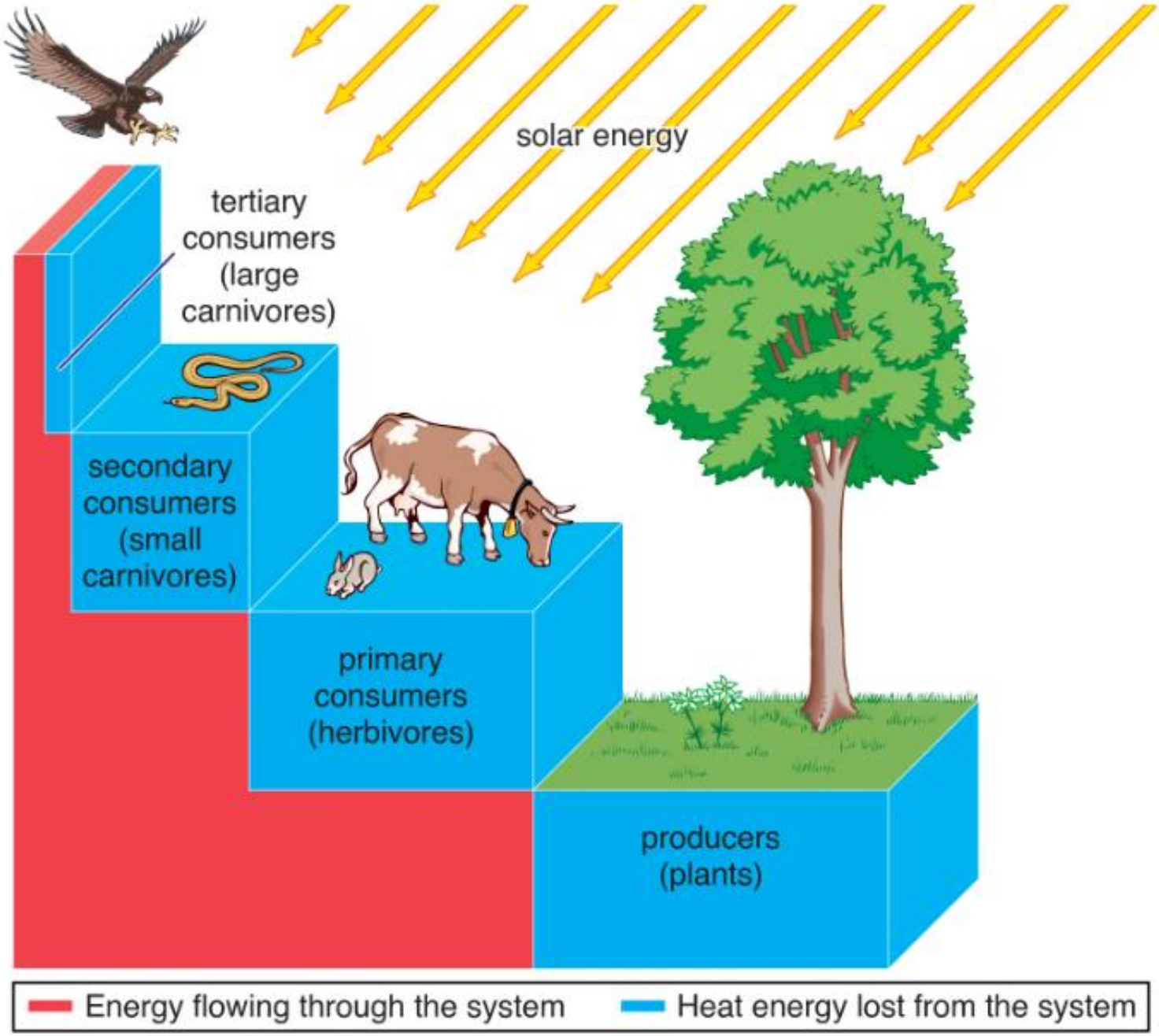
Energy flow



- Biogeochemical cycles
  - Pathways involve both biotic and abiotic components
    - Reservoir-source unavailable to producers
    - Exchange pool-source from which organisms take chemicals
    - Biotic community-chemicals move through community along food chains
  - 2 main types of cycles
    - Gaseous cycle-drawn from and returns to the atmosphere
    - Sedimentary cycle-element is drawn from soil by plant roots, eaten by consumers, returned to soil by decomposers

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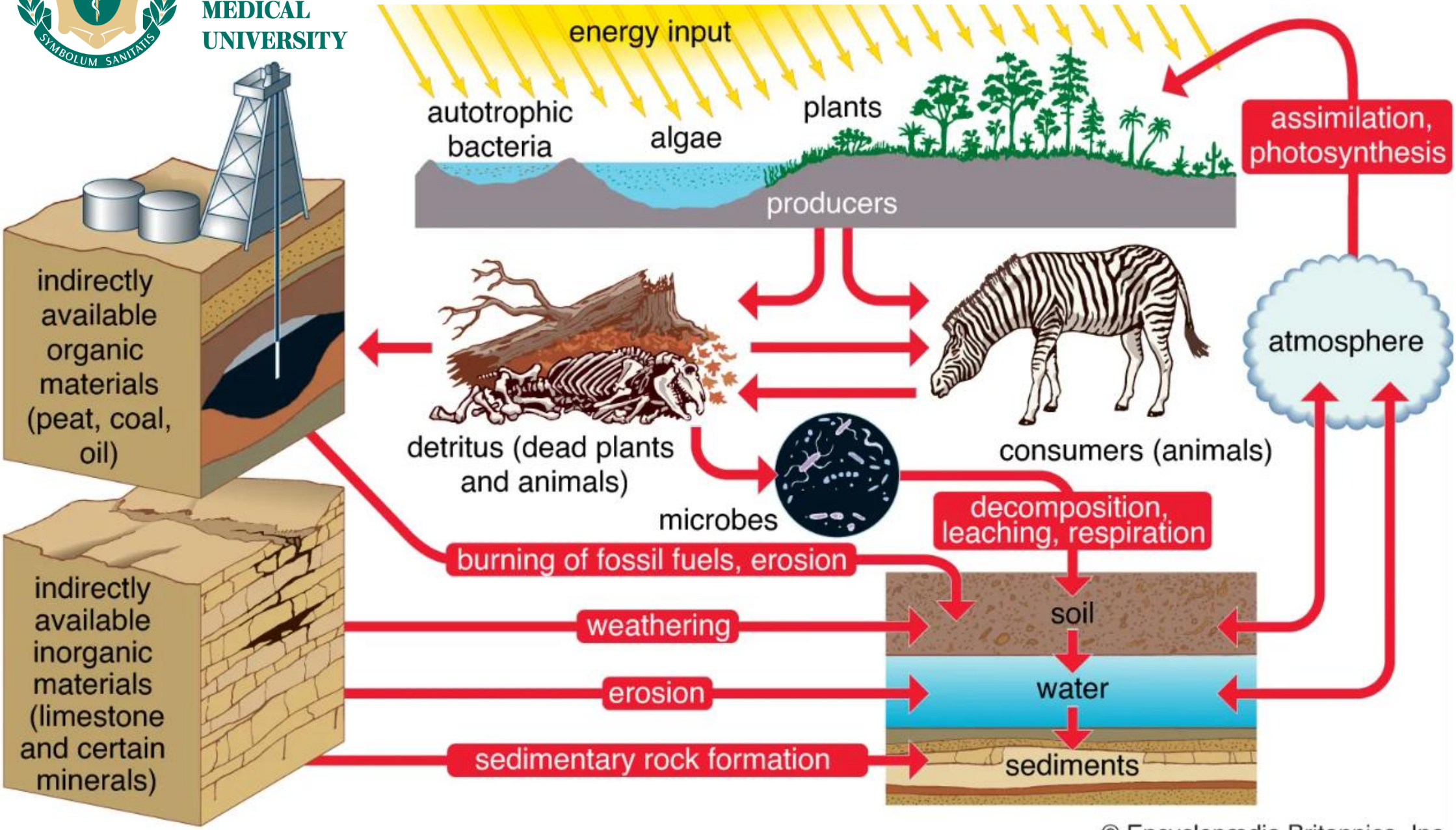

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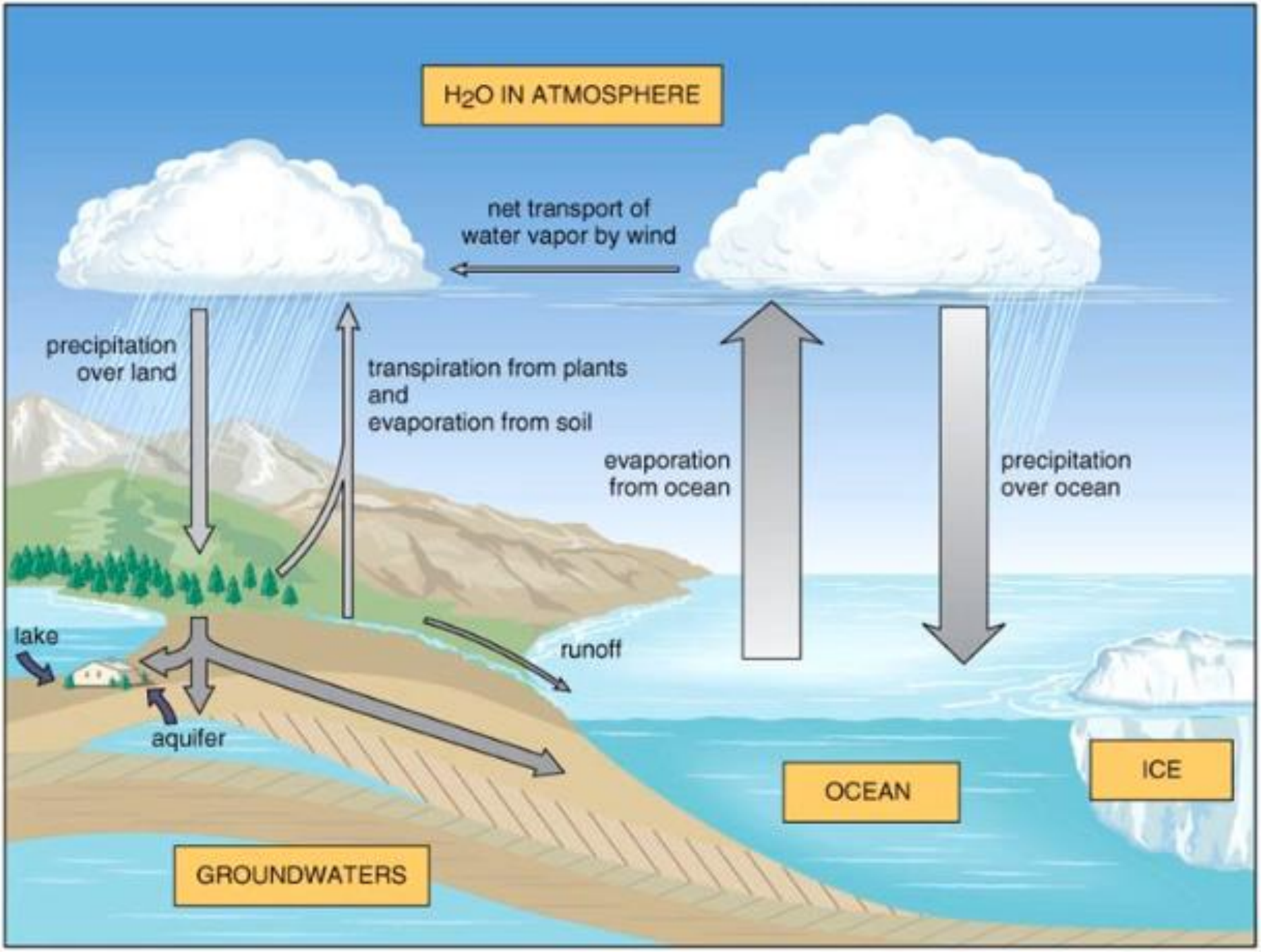
Water cycle



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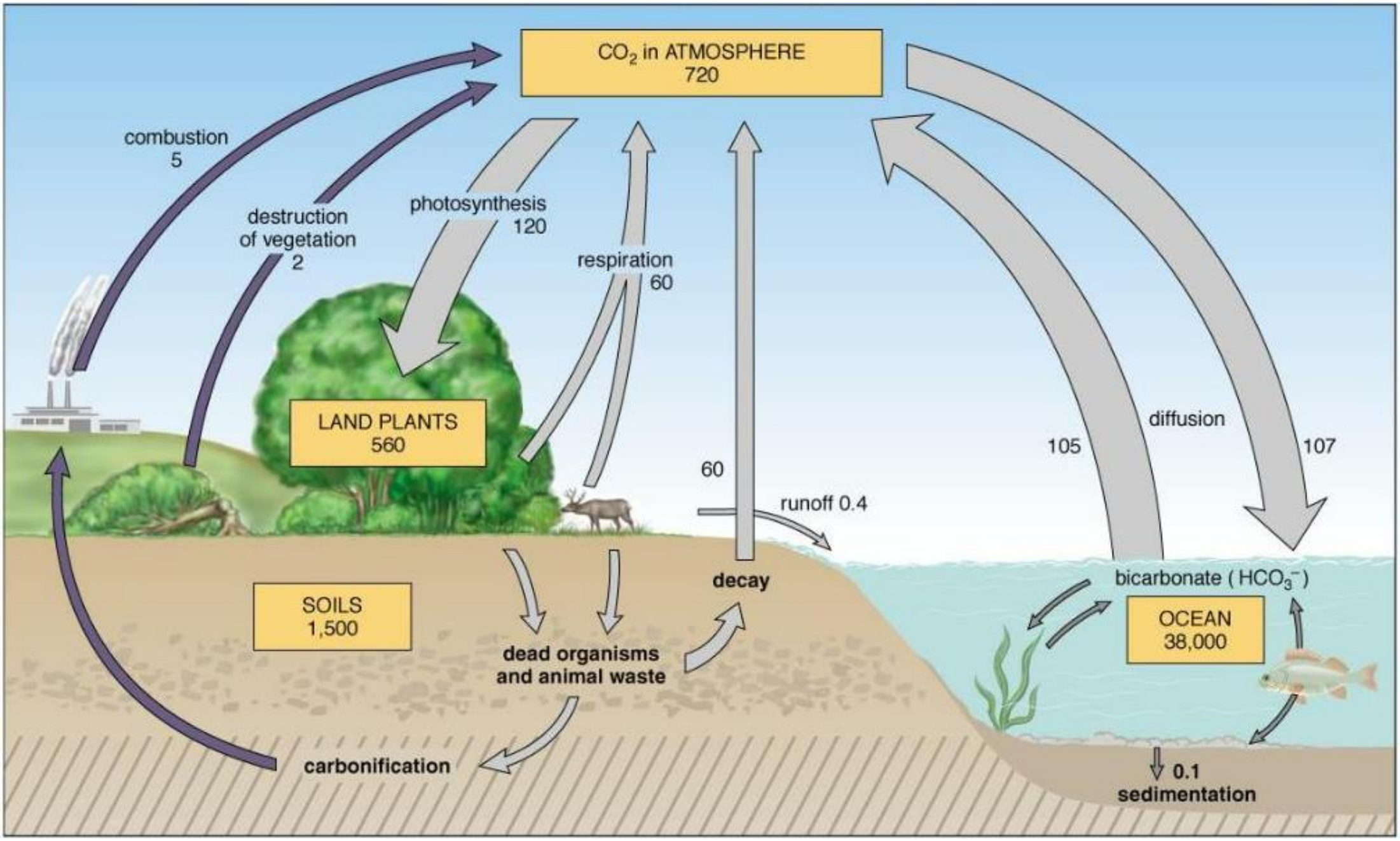
Carbon cycle



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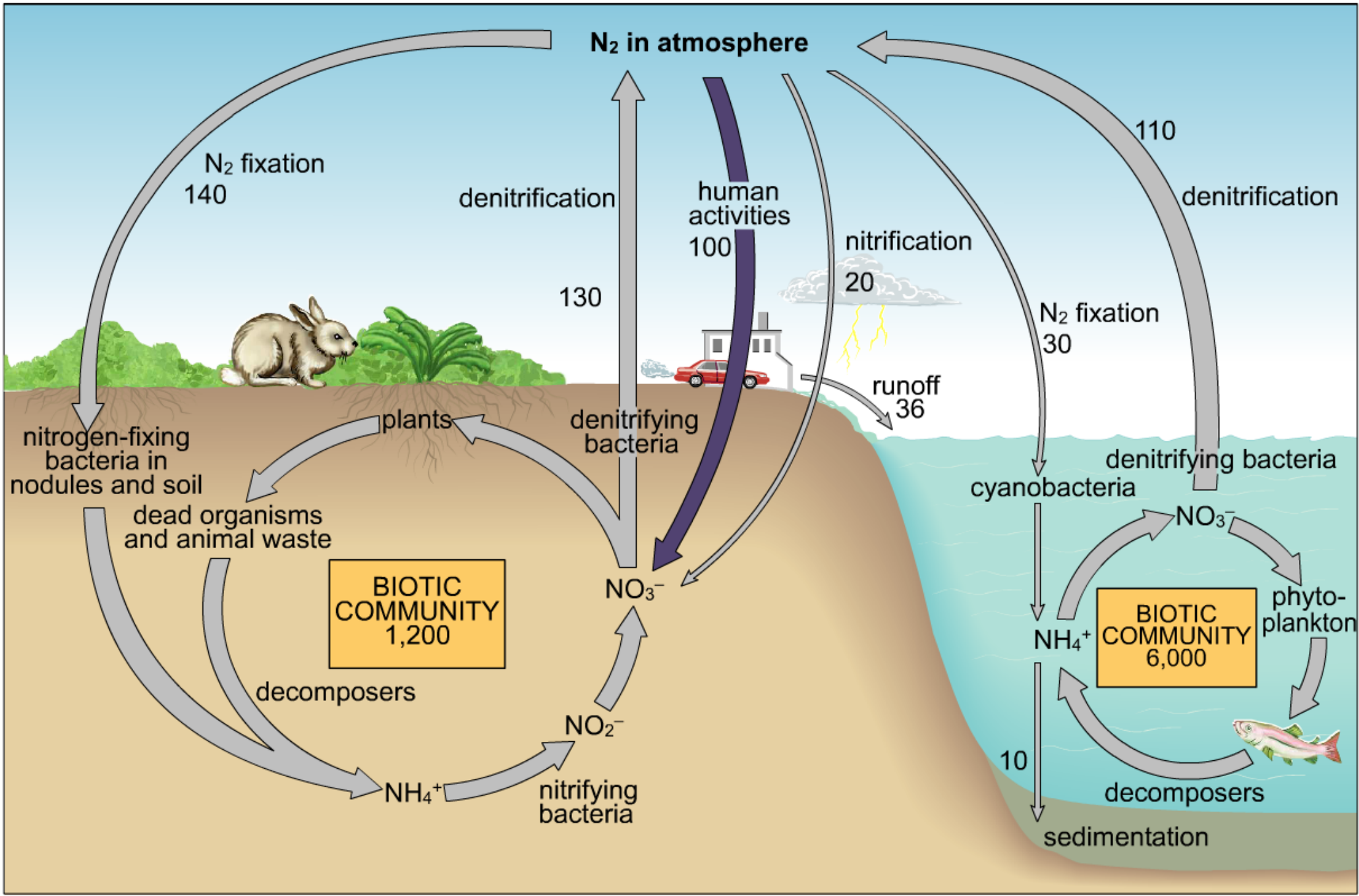
Nitrogen cycle



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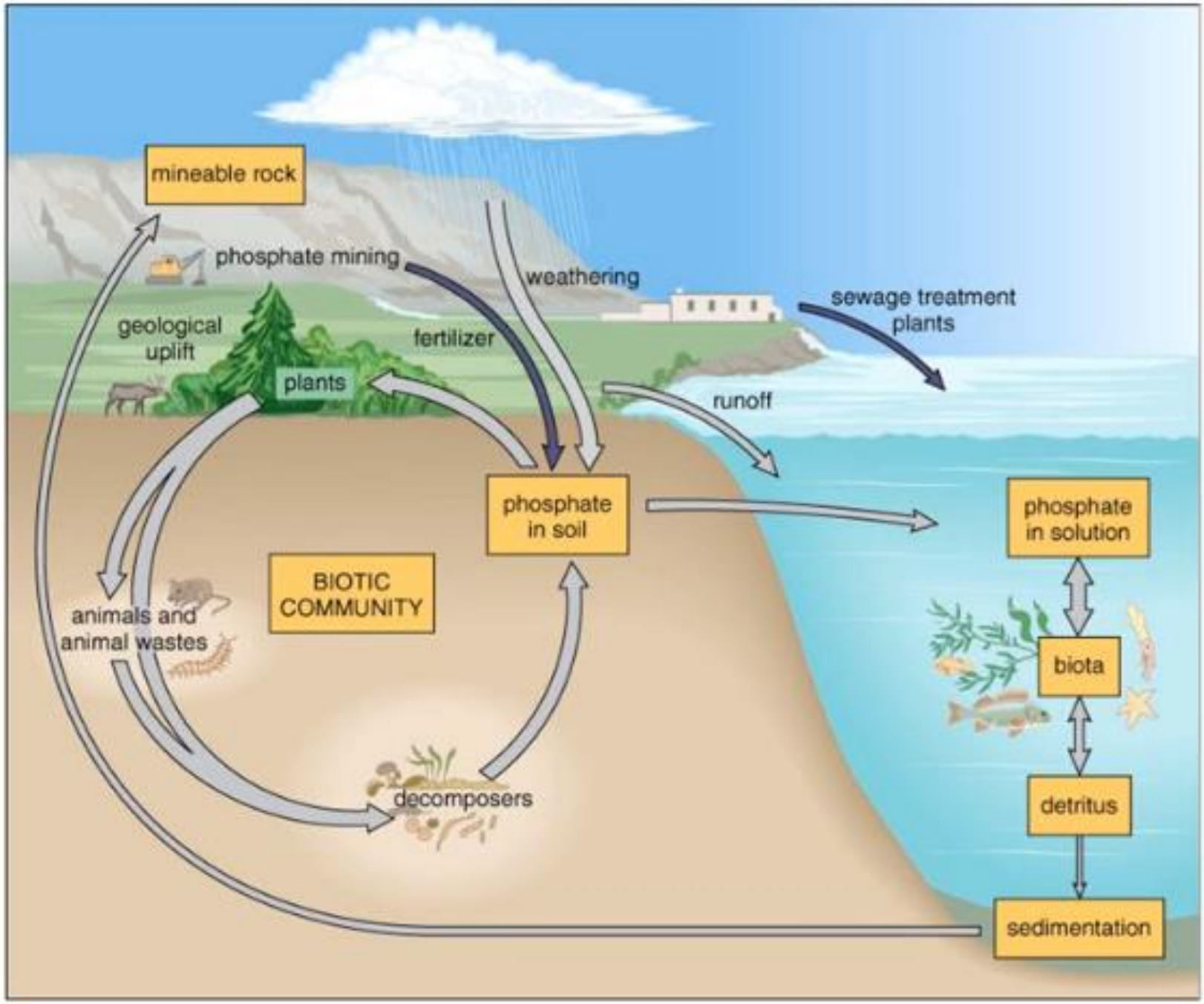
Phosphorous cycle



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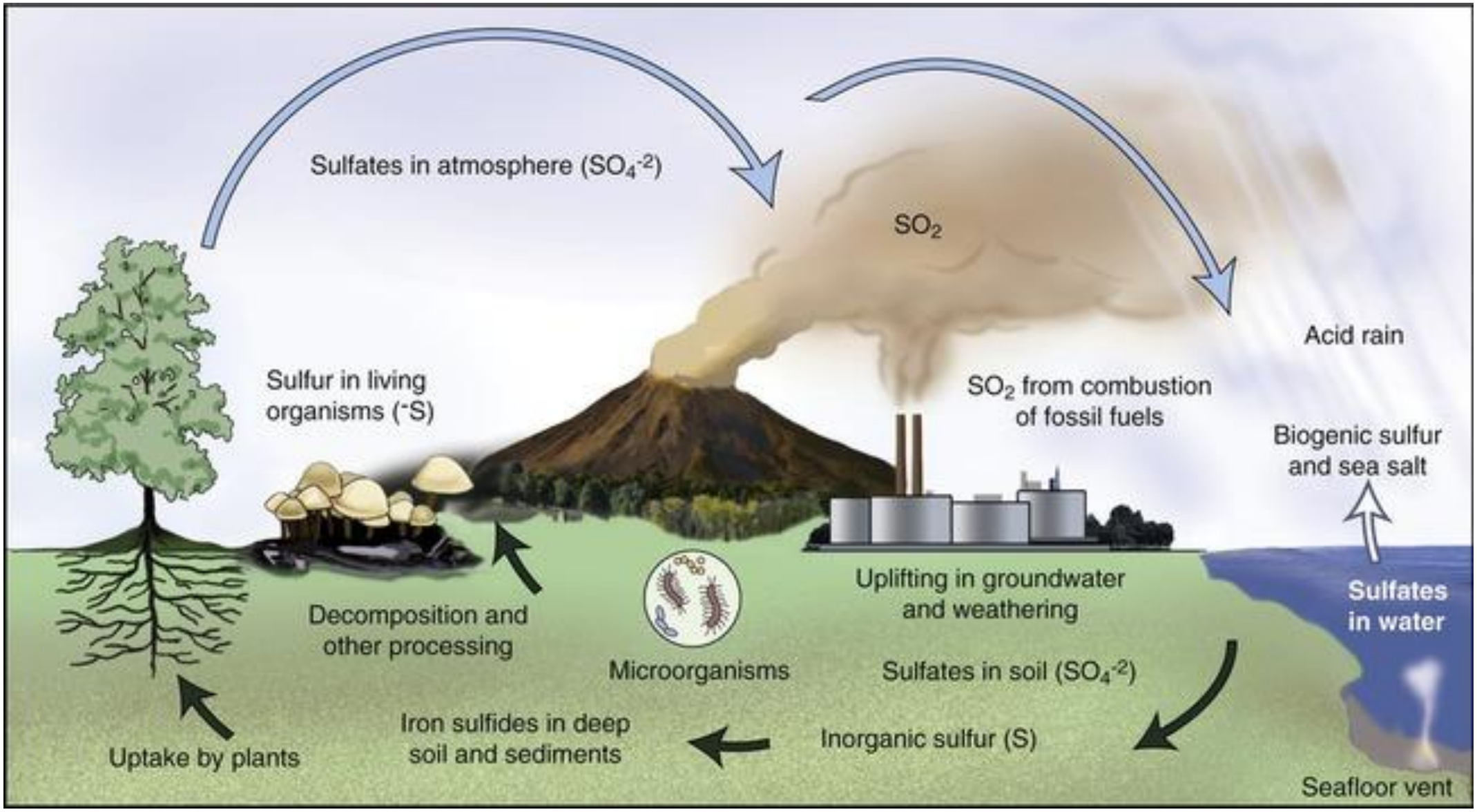
Sulphur cycle



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Noosphere of Vernadsky

Biosphere & Noosphere

Biosphere:

- Networks of living organisims

Noosphere:

- The realm of human thought, experience, memory, culture, language, etc.

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THANK YOU FOR ATTENTION!