

Science Standard 6d:

Biogeochemical Cycles/ Nutrient Cycles

Ch. 3 Sec. 3

La Serna High School



Vocabulary

Biogeochemical Cycles

Water Cycle

Evaporation

Transpiration

Condensation

Precipitation

Runoff

Seepage

Root Uptake

Carbon Cycle

Phosphorus Cycle

Nitrogen Fixation

Denitrification



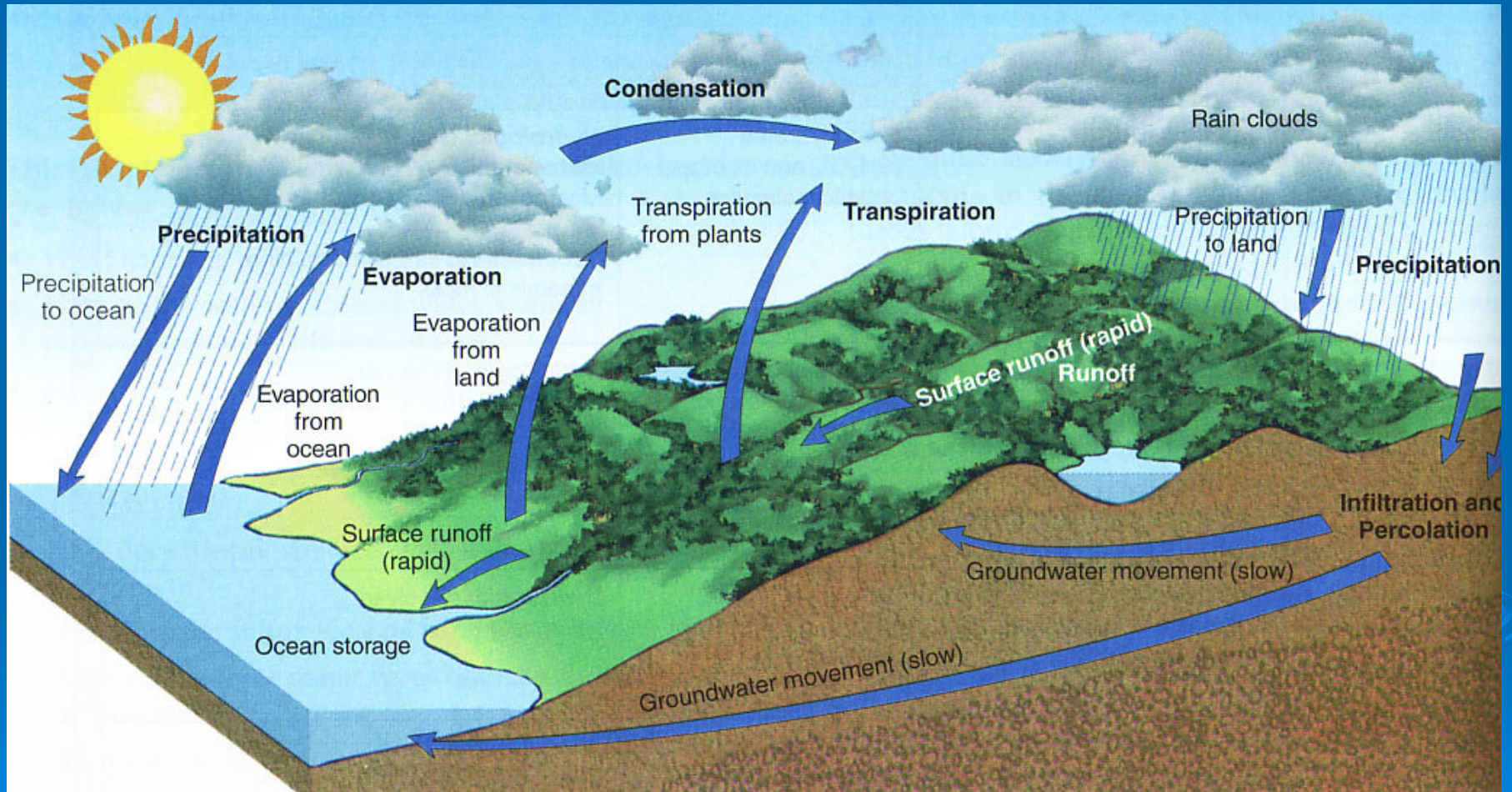


Matter is recycled within and between ecosystems.

Biogeochemical cycles

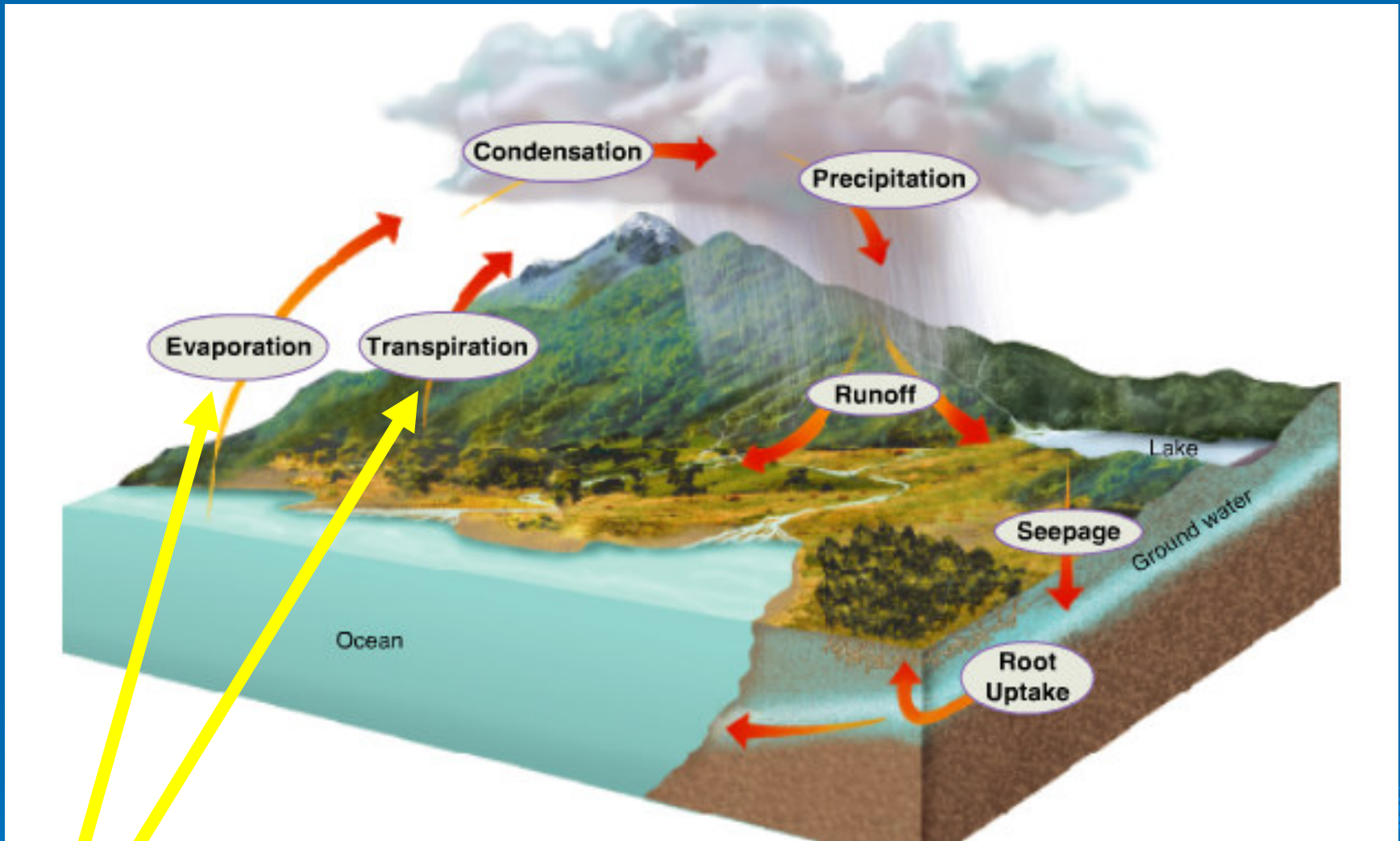
- **Biogeochemical Cycles**, or Nutrient cycles, is how elements, chemical compounds, and other forms of matter are passed from one organism to another and from one part of the biosphere to another.
- Types of Biogeochemical Cycles:
 - **Hydrologic**- ex water cycle
 - **Atmospheric**- ex carbon cycle and nitrogen cycle
 - **Sedimentary** – ex phosphorus cycle

The Water Cycle

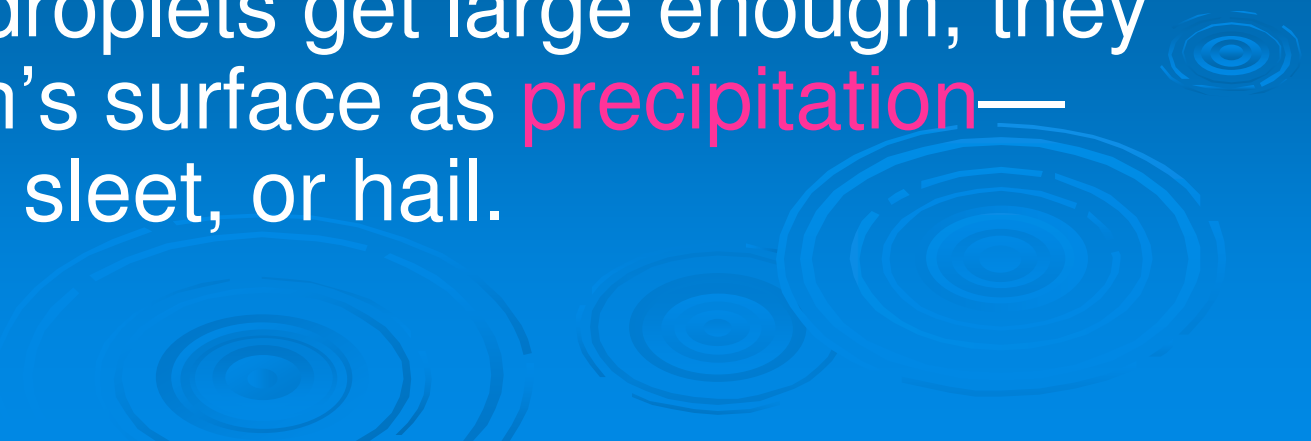


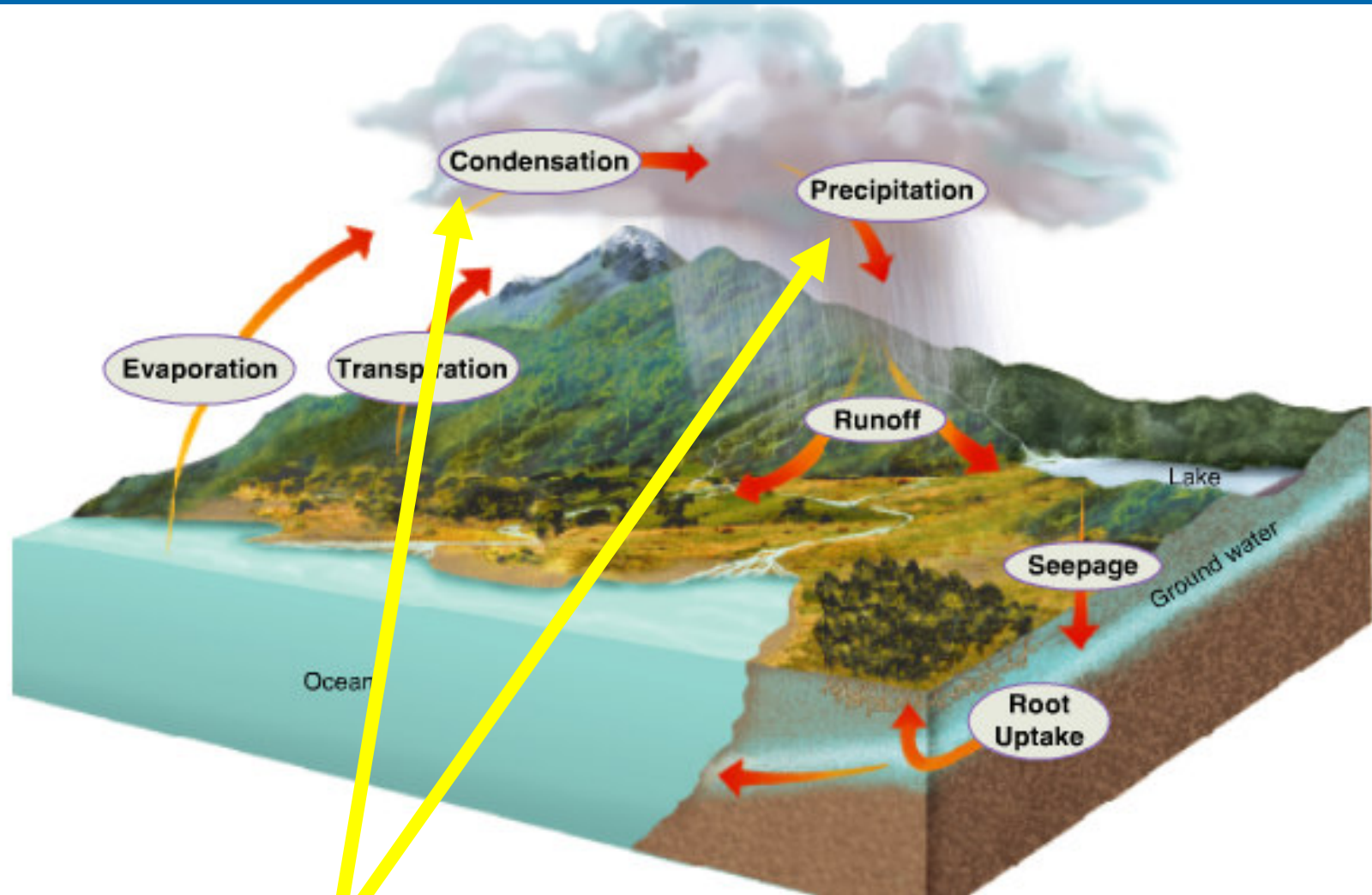
- All living things require water to survive.
- Water cycles between the ocean, atmosphere, land, and living things.
- Several different processes are involved in the water cycle, including evaporation and transpiration.
- During **evaporation**, liquid water changes to a gas.
- **Transpiration** is the evaporation of water from the leaves of plants.





Evaporation and Transpiration

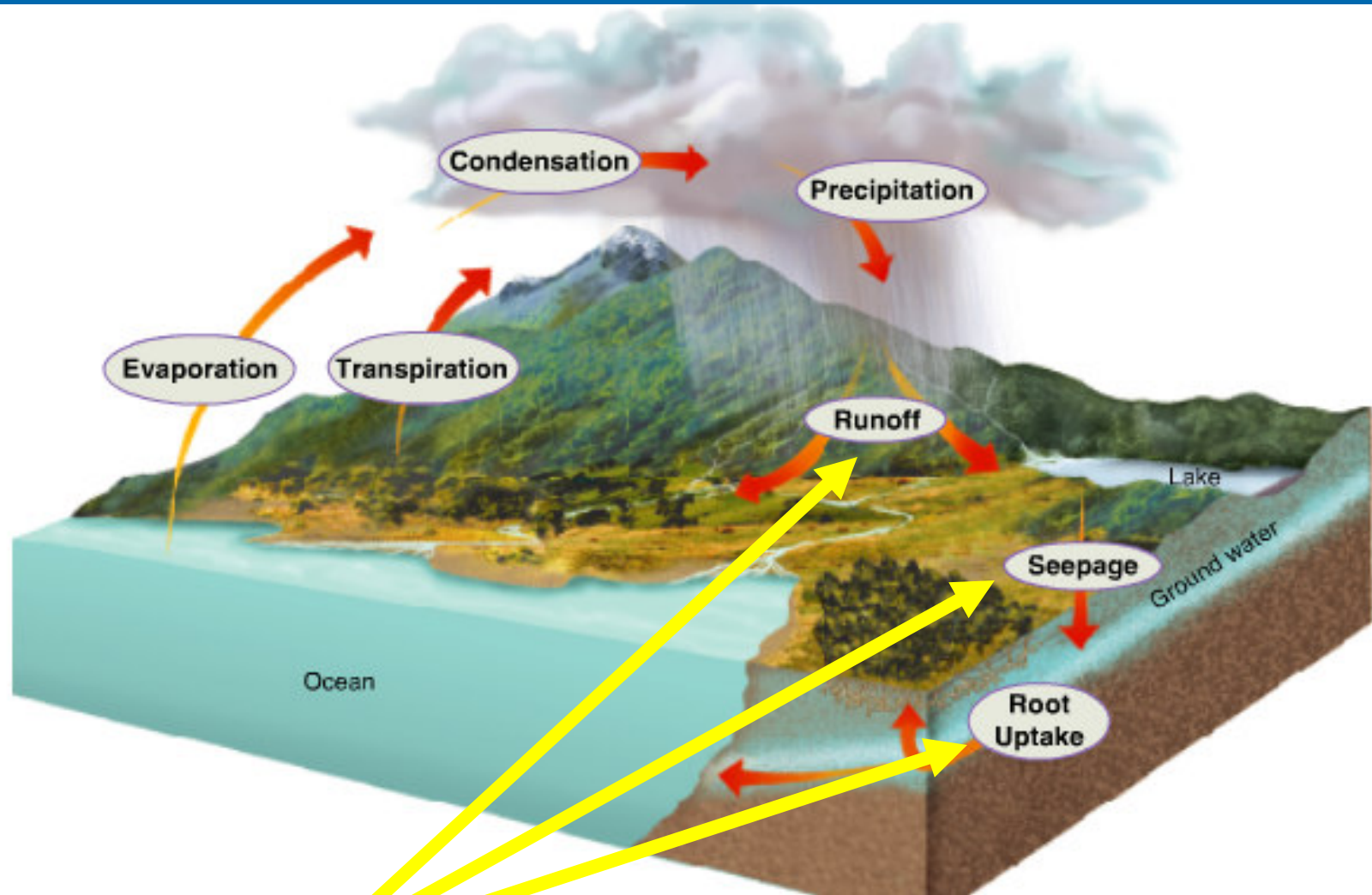
- During the day, the sun heats the atmosphere.
 - Water changes from a gas to a liquid through the process of **condensation**.
 - Water vapor in the atmosphere condenses into tiny droplets that form clouds.
 - When the droplets get large enough, they fall to Earth's surface as **precipitation**—rain, snow, sleet, or hail.
- 



Condensation and Precipitation

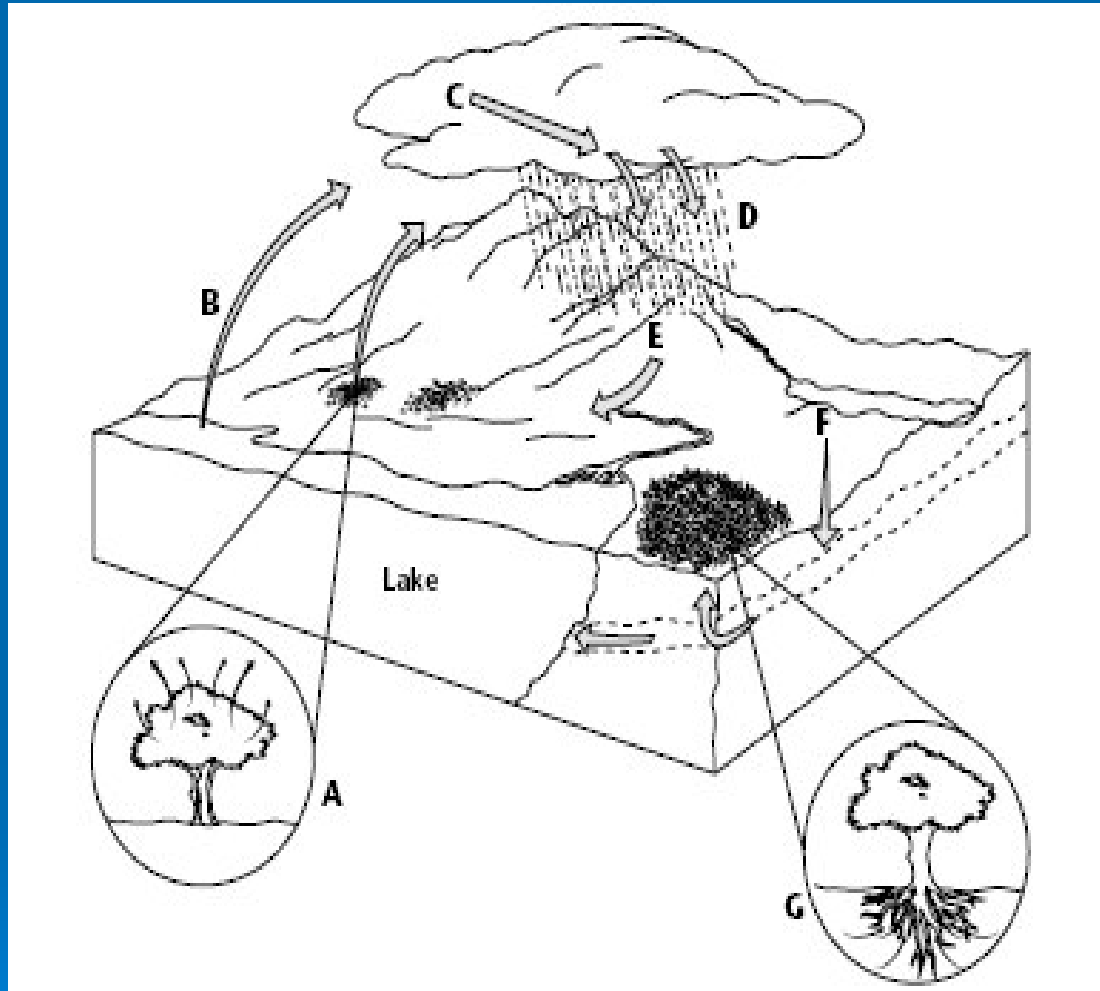
- On land, much of the precipitation runs along the surface of the ground until it enters a river or stream that carries the **runoff** back to an ocean or lake.
- Rain also **seeps** into the soil, some of it deeply enough to become ground water.
- Water in the soil enters plants through the **roots**, and the water cycle begins again.





Runoff, Seepage, and Root Uptake

Identify each step in the Water Cycle



A. Transpiration

B. Evaporation

C. Condensation

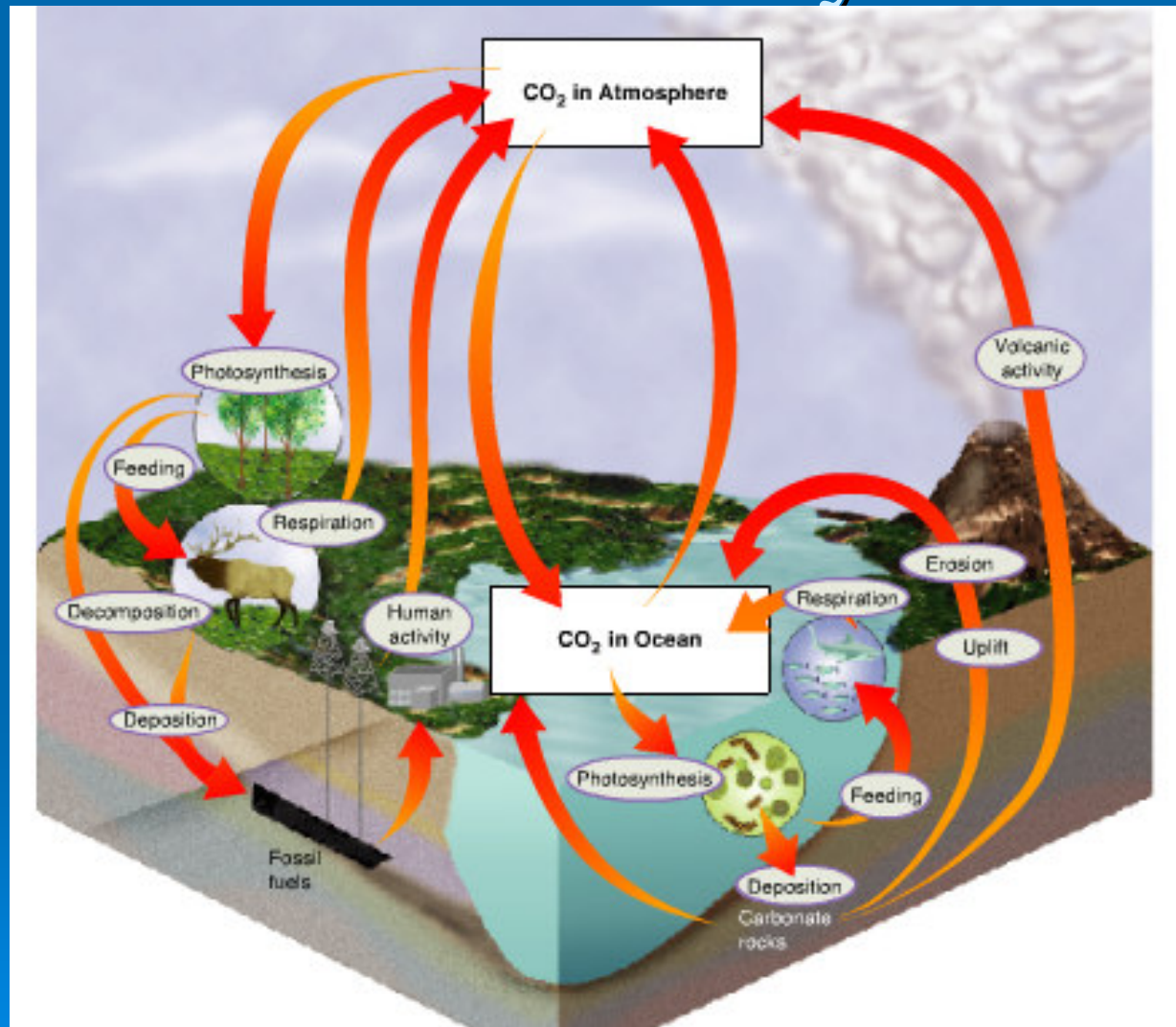
D. Precipitation

E. Runoff

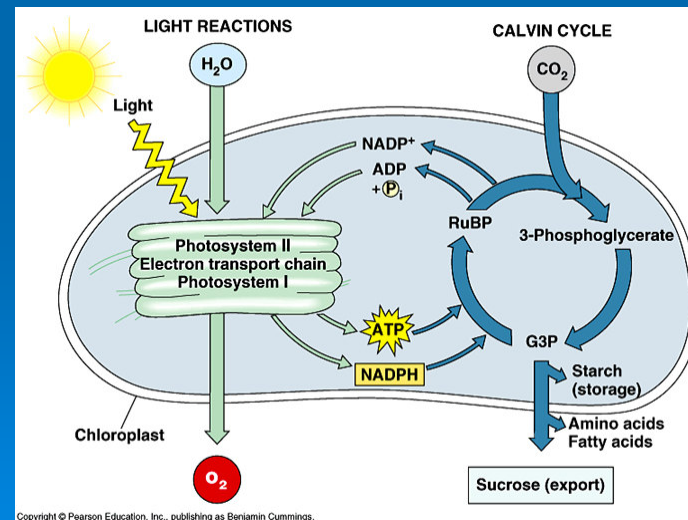
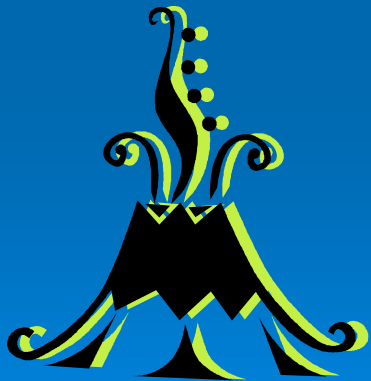
F. Seepage

G. Root uptake

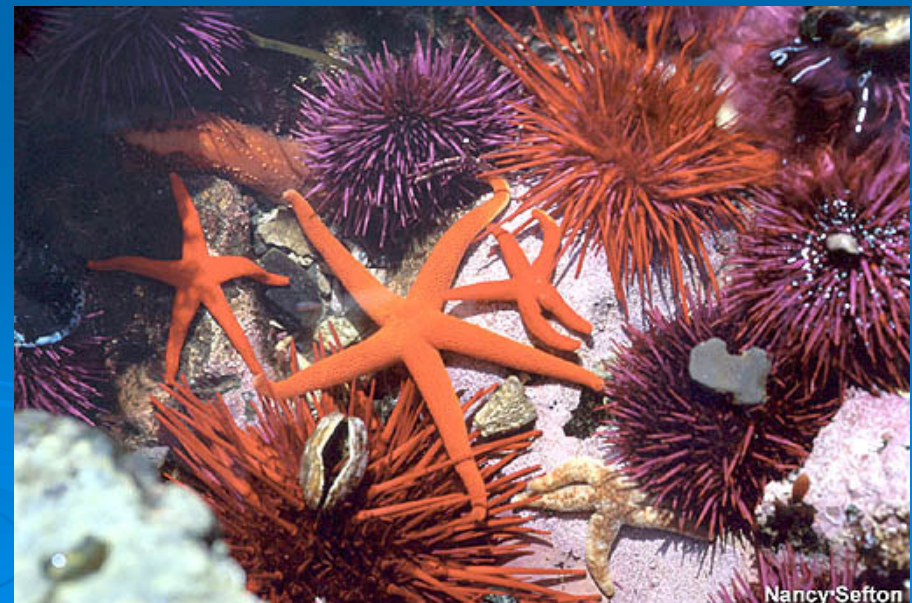
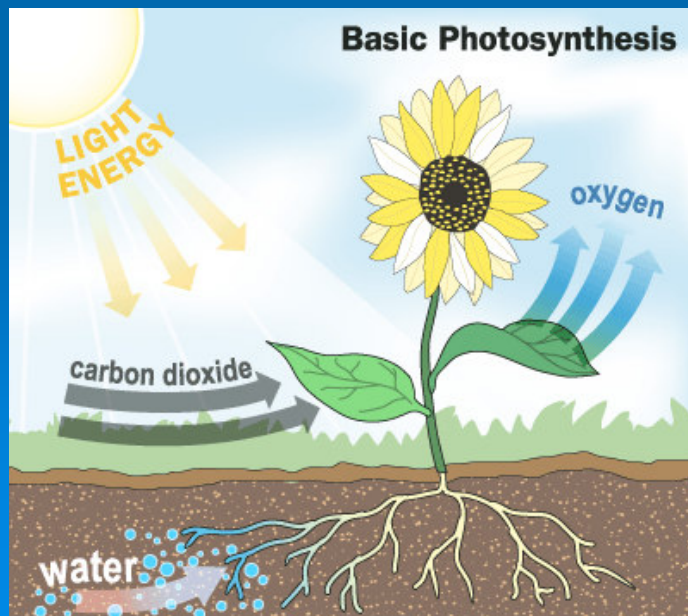
The Carbon Cycle

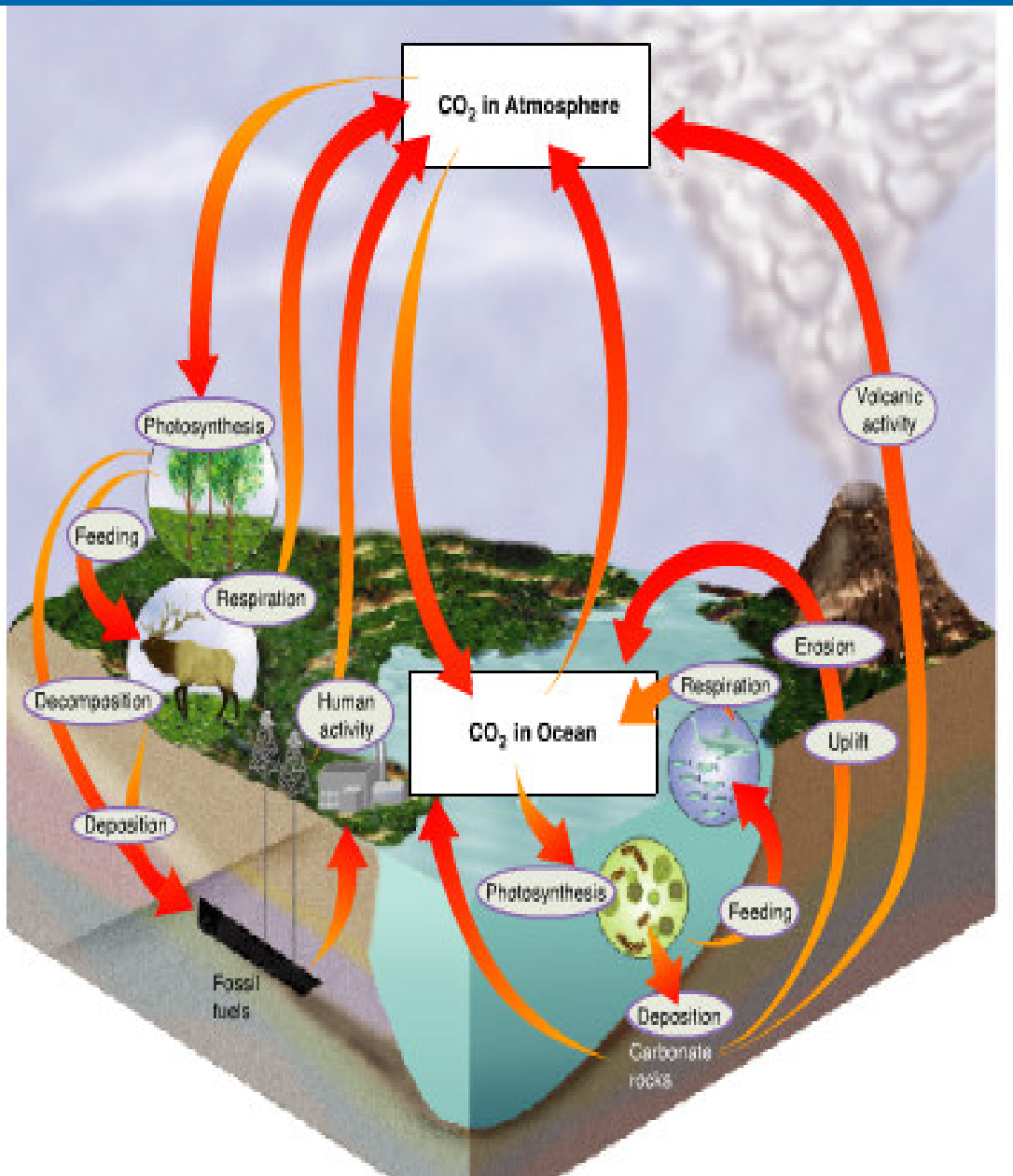


- Carbon is a key ingredient of living tissue.
- In the atmosphere, carbon is present as carbon dioxide gas, CO₂.
- Carbon dioxide is released into the atmosphere by
 - volcanic activity
 - respiration
 - human activities
 - the decomposition of organic matter



- Plants take in carbon dioxide and use the carbon to build carbohydrates during photosynthesis.
- The carbohydrates are passed along food webs to animals and other consumers.
- In the ocean, carbon is also found, along with calcium and oxygen, in calcium carbonate, which is formed by many marine organisms.





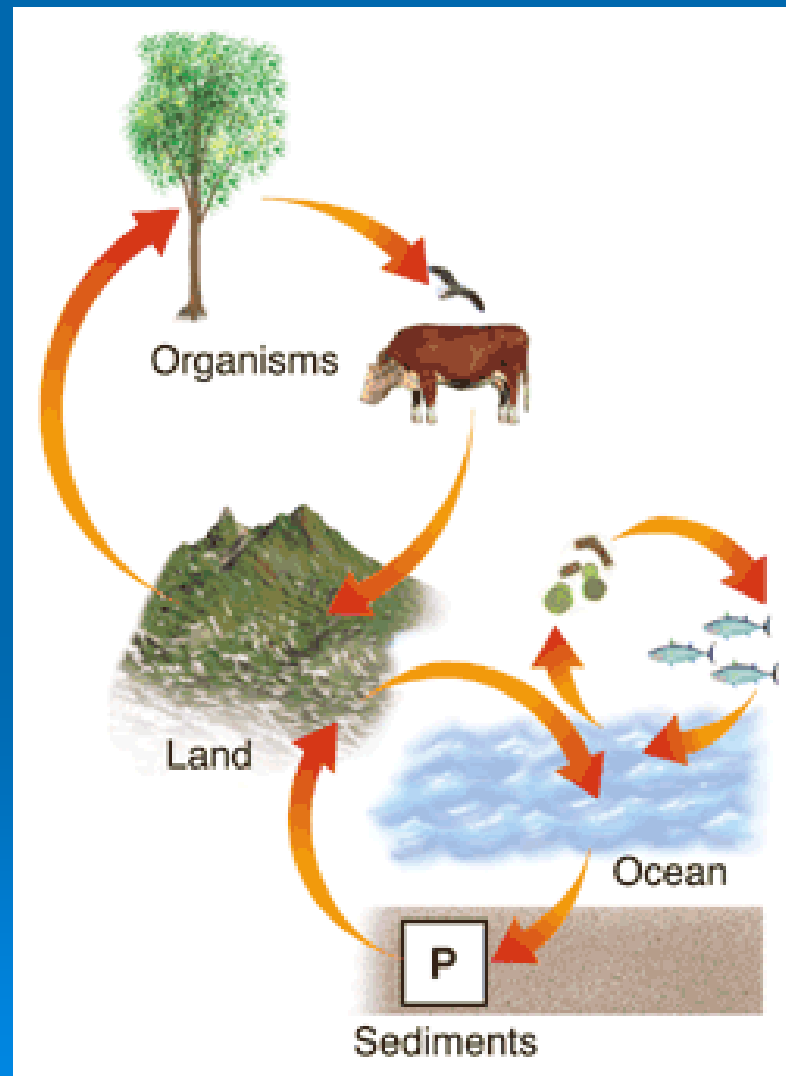
1. Which process releases carbon into the atmosphere?

Respiration, Volcanic Activity, Evaporation of water, Human Activity

2. Which process removes carbon from the land?

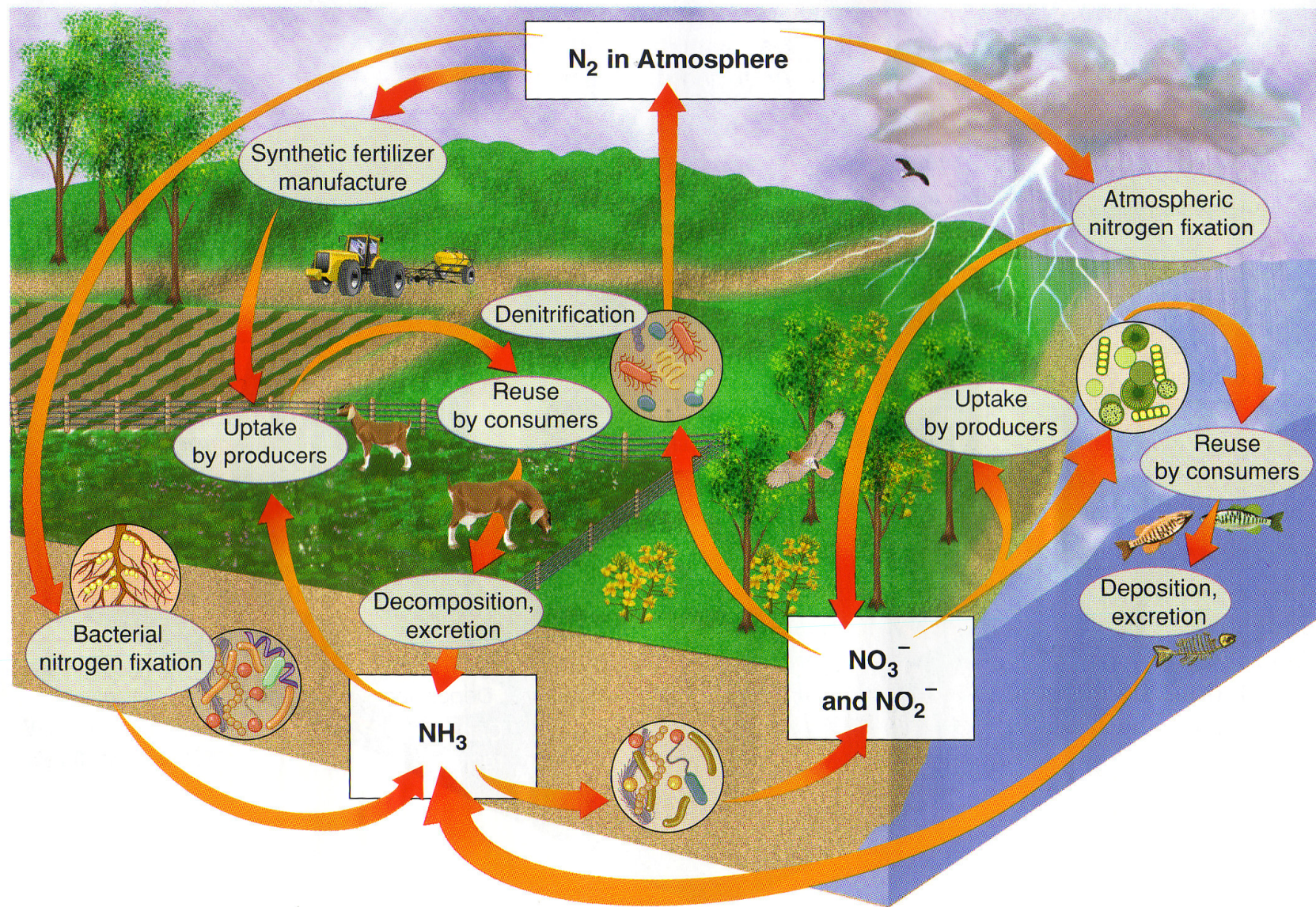
Human activity, Uplift, Volcanic activity

The Phosphorous Cycle



- Phosphorus is necessary for nucleic acids, fats, cell membranes, bones, teeth and shells
- There is very little phosphorus in the atmosphere, and most phosphorus is stored in rocks and ocean sediments.
- This phosphorus is slowly released into water and soil and then used by organisms
- Phosphorus is a key part of DNA and RNA.

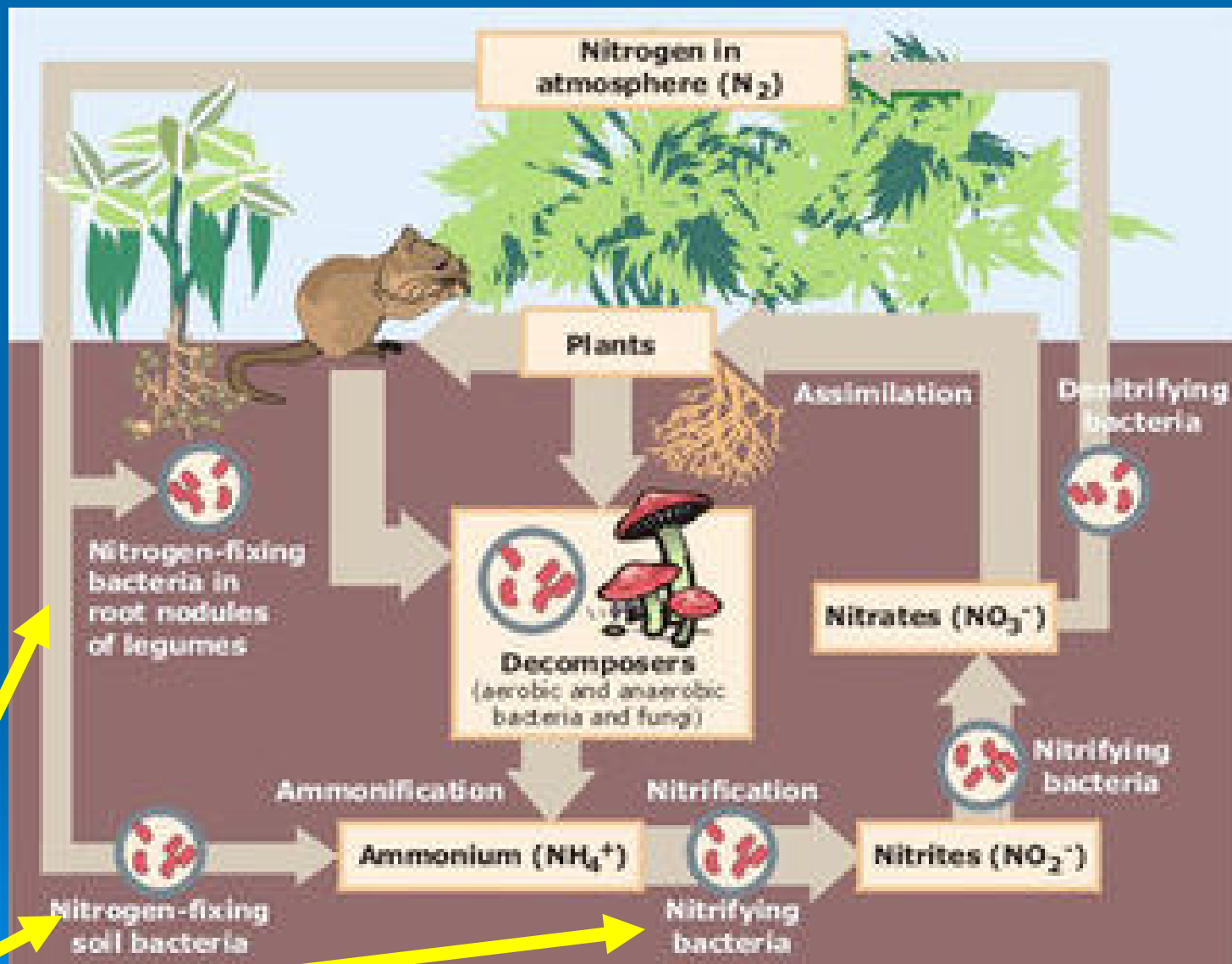
The Nitrogen Cycle



- Organisms need nitrogen to build proteins.
- Different forms of nitrogen cycle through the biosphere.
- Nitrogen gas is the most abundant form of nitrogen on Earth.
- It cannot be directly used by organisms.
- Nitrogen must be converted into compounds that can enter food webs by the process of “Nitrogen Fixation”

Nitrogen Fixation

- How do we get the Nitrogen we need?
Nitrogen Fixation.
- Specialized **bacteria** convert N_2 from the atmosphere to ammonia (NH_3) for the plants to use.
- Plants will use the ammonia to make nitrogen-containing organic molecules
- Animals get nitrogen by eating plants or plant-eating animals



Denitrification

- How is Nitrogen returned to the soil?
Denitrification.
- When organisms die, decomposers return nitrogen to the soil. Other bacteria change nitrogen compounds called nitrates back into nitrogen gas.
- This process is called **denitrification.**

