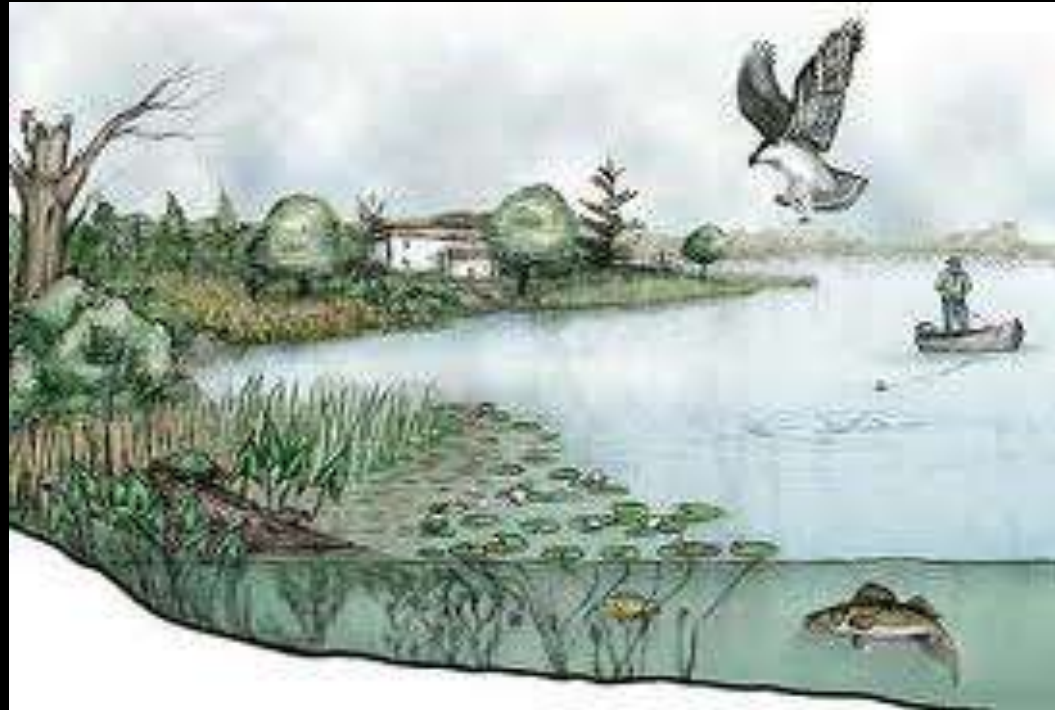


Chapter 4



Ecosystems

Chapter 4 Section 1: What Is an Ecosystem

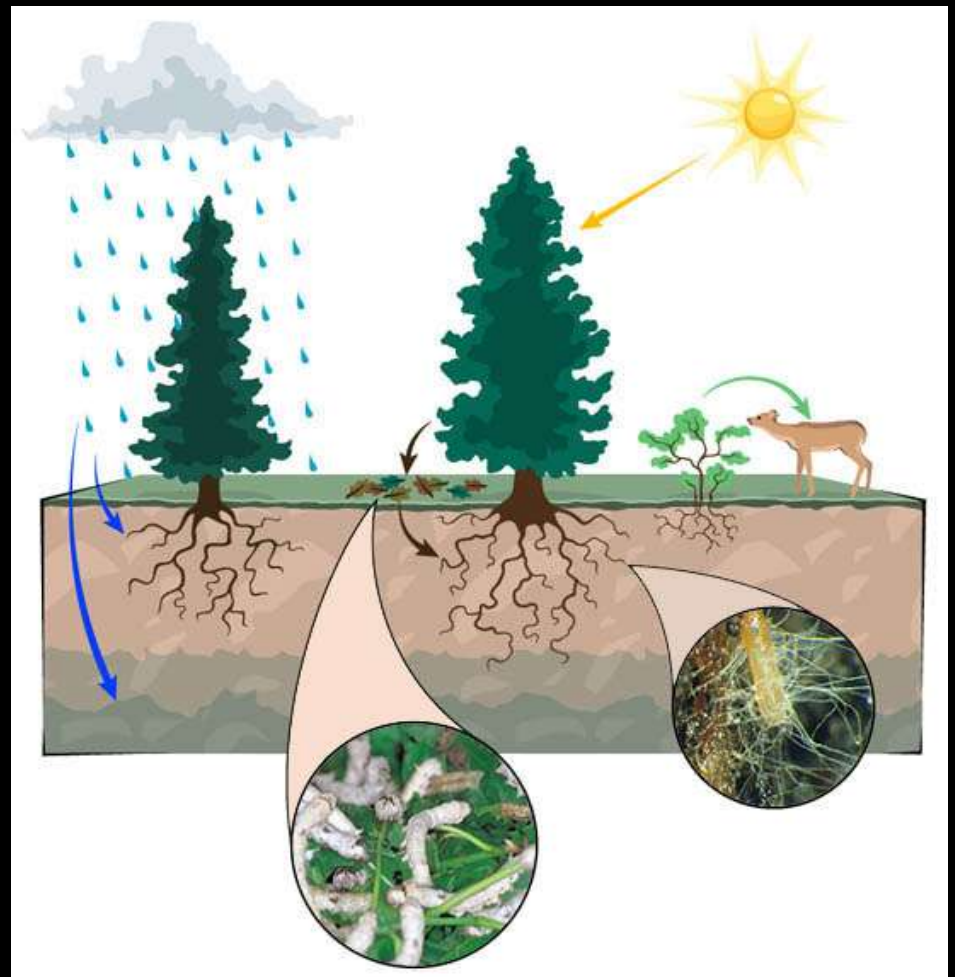
Key Vocabulary Terms

7



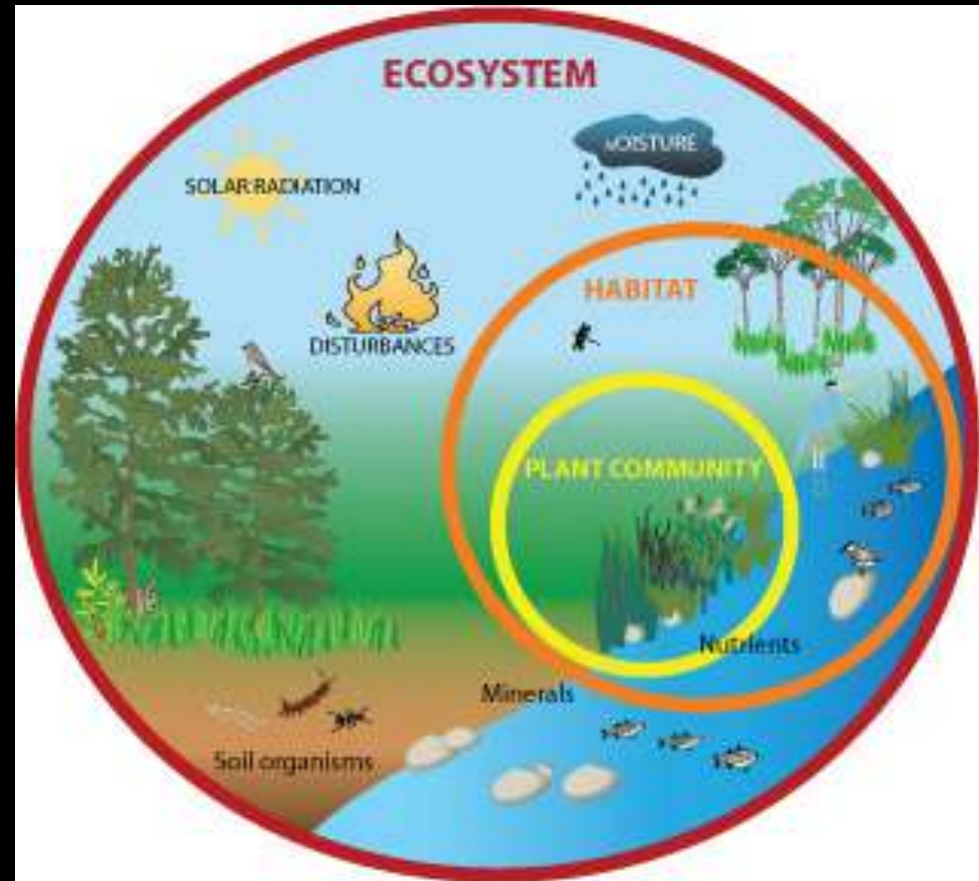
Community

A group of various species that live in the same habitat and interact with each other



Ecosystem

A community
of organisms
and their
abiotic
environment.



Habitat

A place where
an organism
usually lives



Biodiversity

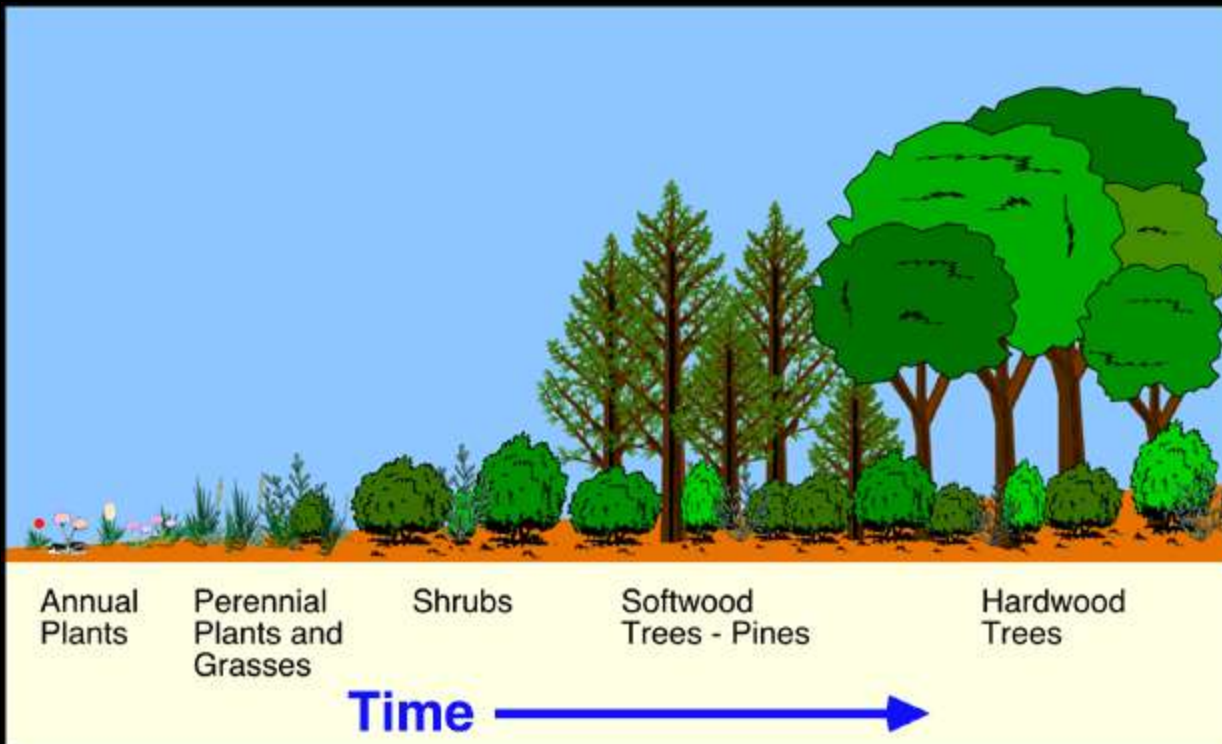


The variety of:

- organisms in an area
- genetic variation in a population
- species in a community
- communities in an ecosystem

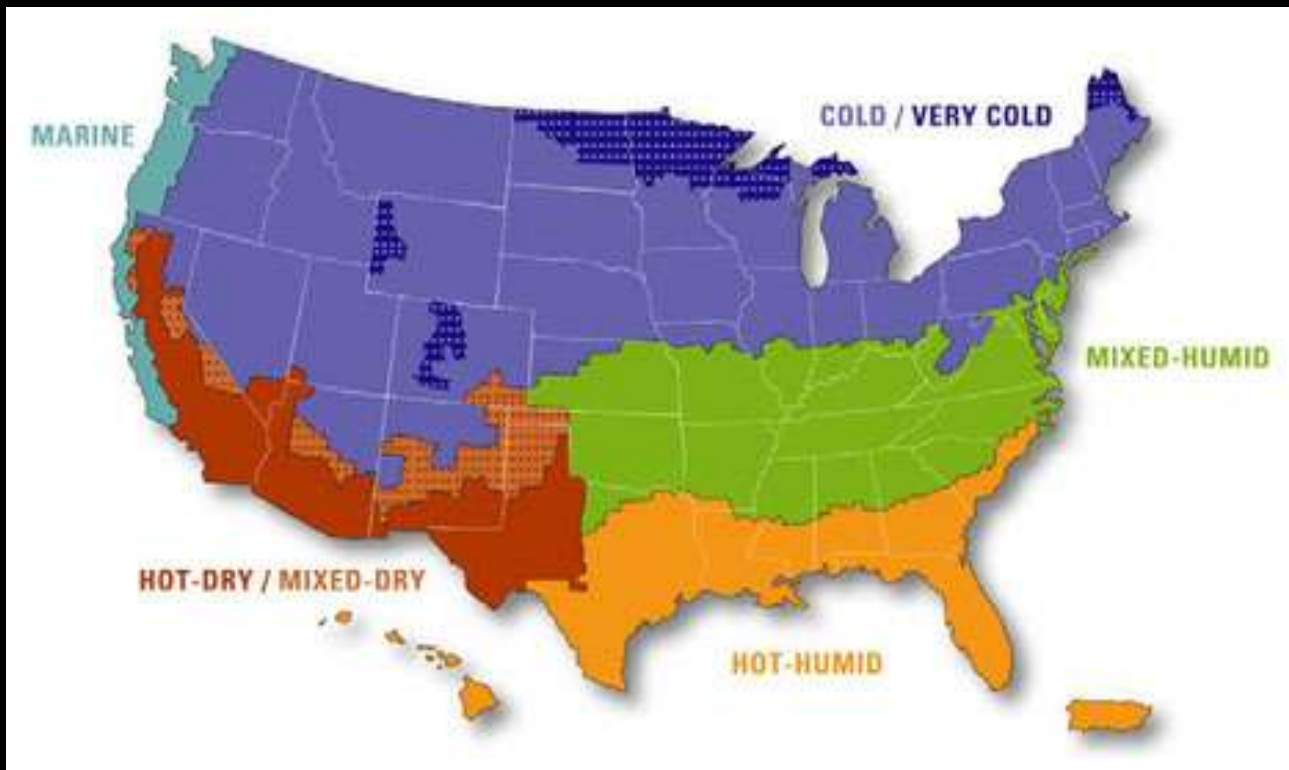
Succession

The replacement of one type of community by another at a single location over a period of time



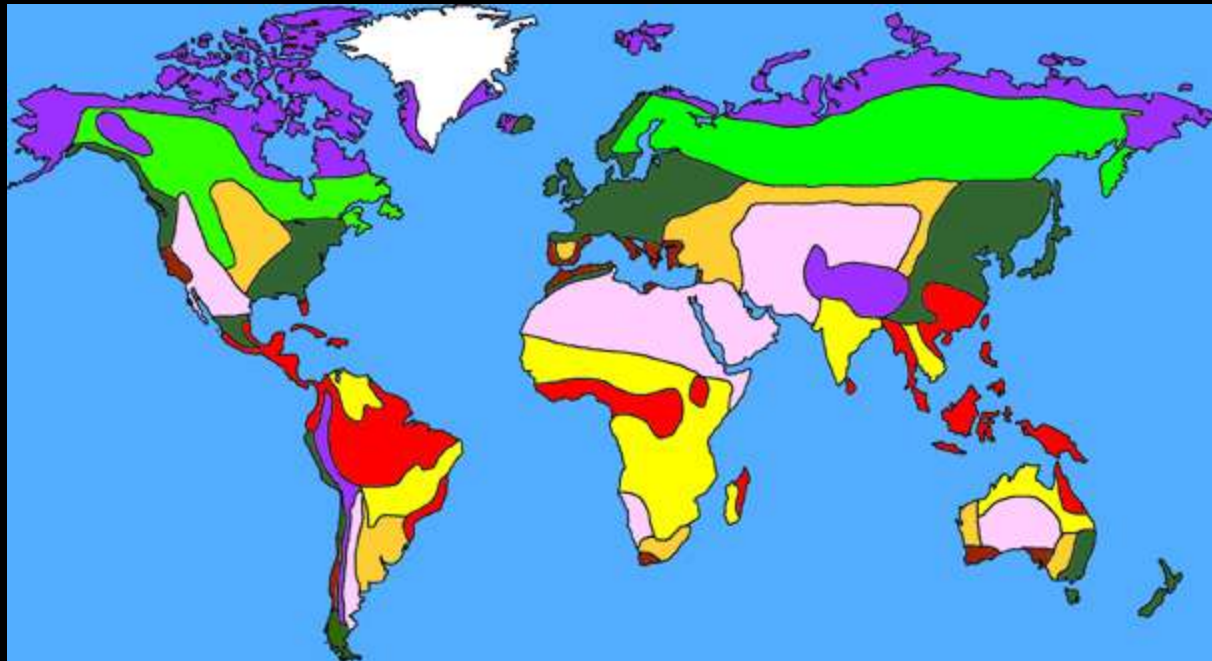
Climate

The average weather conditions in an area over a long period of time.



Biome

A large region characterized by a specific type of climate and certain types of plant and animal communities



Predator and prey relationships



A predator eats its prey.

Content Objectives

I will be able to identify:

- The parts of an ecosystem.
- How an ecosystem responds to change.
- Two key factors of climate that determine a biome.
- The three major groups of terrestrial biomes
- The four kinds of aquatic ecosystems.

Chapter 4

Section 1:

What Is an Ecosystem



Notes

Chapter 4 Section 1: What Is an Ecosystem

Ecosystems



YOUR
TURN

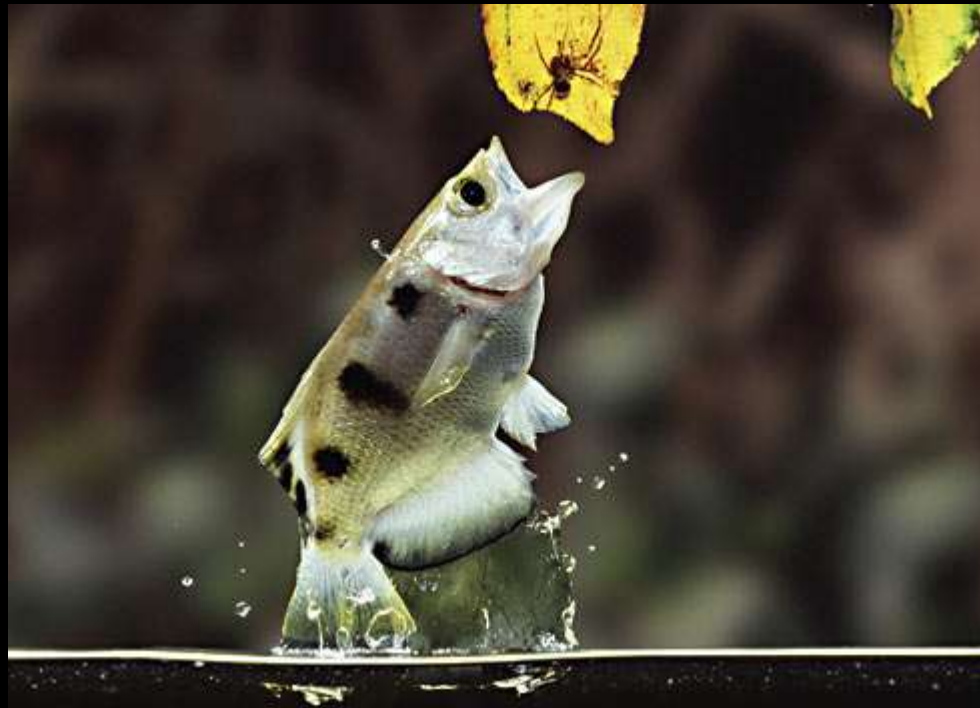
YOUR TURN

Active Reading

Section 1 – What is an Ecosystem?

Community of Organisms

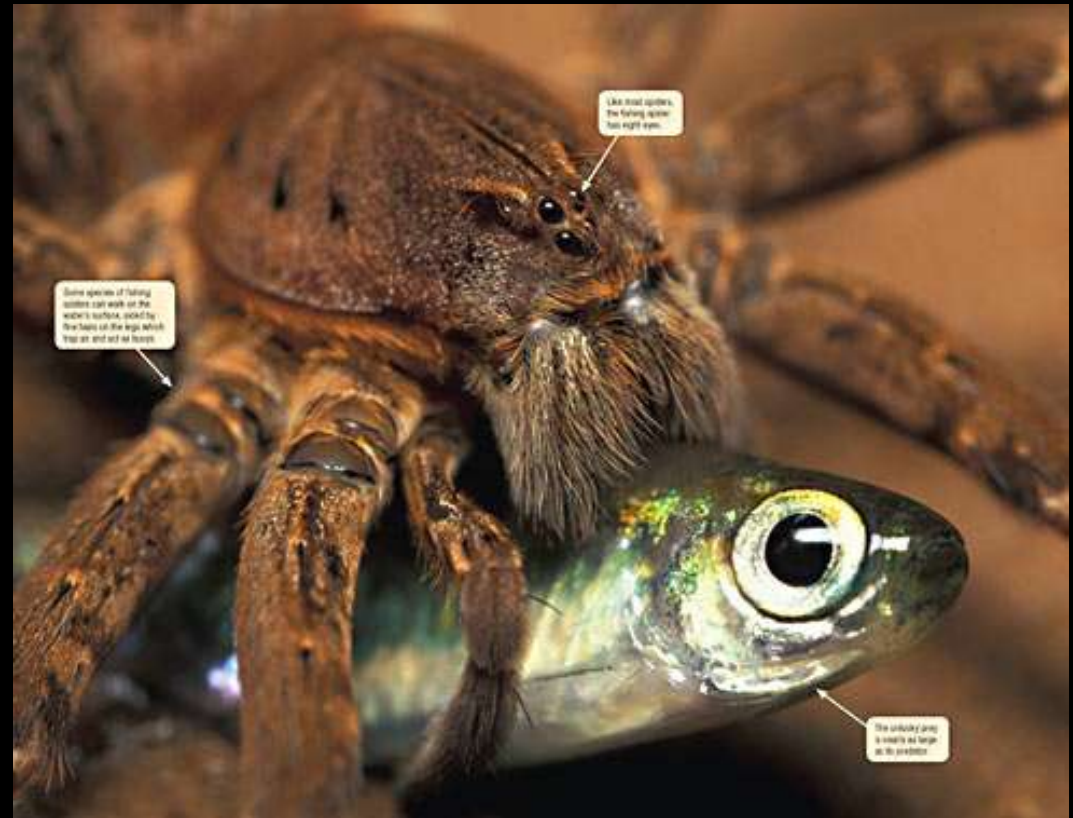
Predator and prey relationships



A predator eats its prey.

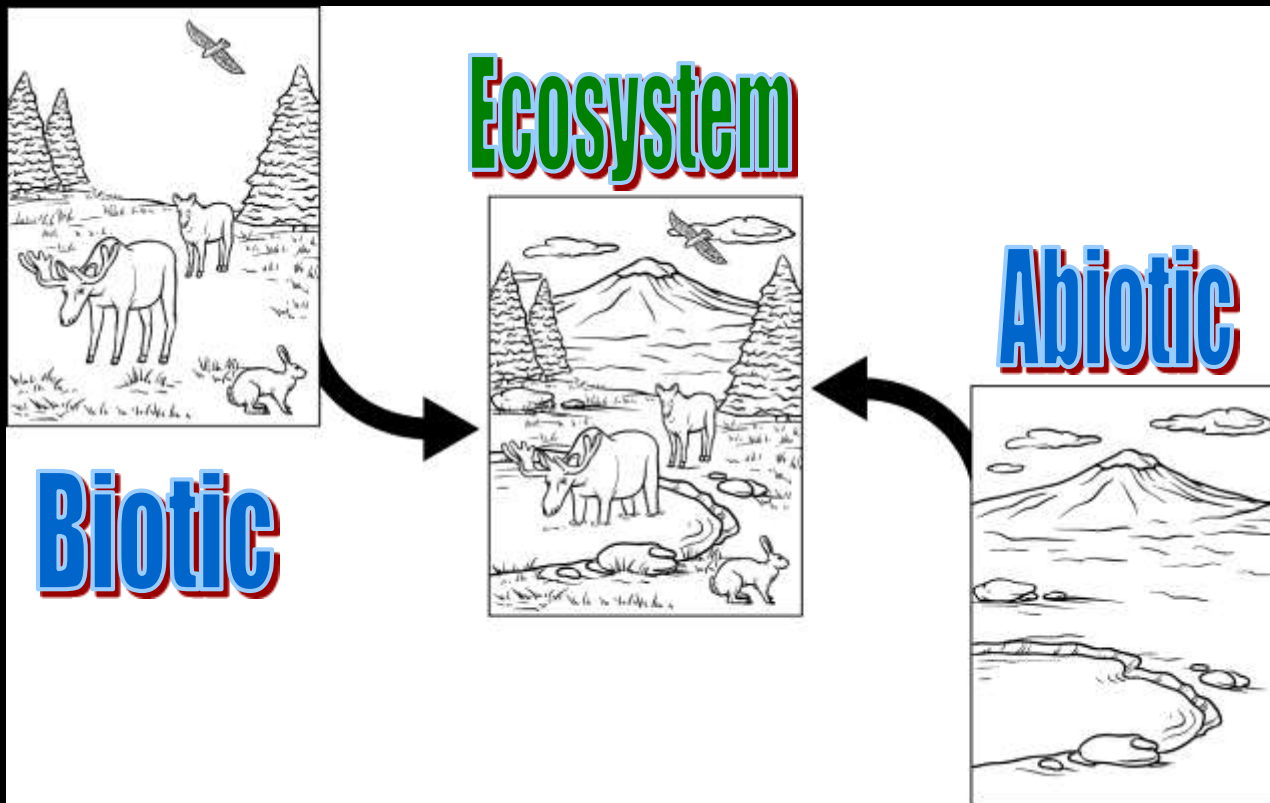
Community of Organisms

Biotic Factors describes **living** factors in an ecosystem



Physical Factors

Abiotic factors – **nonliving** part of the ecosystem



Biodiversity - Affected by abiotic factors & biotic factors

Ecosystems with **high** biodiversity are better able to resist damage than those with **low** biodiversity.



THINK, SHARE, WRITE, (TSW) #1

List 3 examples of “physical parts” of an ecosystem.

THINK, SHARE, WRITE, (TSW) #1

List 3 examples of “physical parts” of an ecosystem.

Water, Sunlight, Oxygen

5 & 6 & 7

Chapter 4 Section 1: What Is an Ecosystem

Succession



Change in an Ecosystem

When a **volcano** forms or when a **fire** burns an area, **new organisms appear**.



Pioneer species

Lichen – important pioneer species for **soil** formation



Pioneer species

Small, fast-growing plants that appear first in the succession process.



Succession



Pioneer species quickly modify the land recently exposed after a glacier has receded.



Alders, grasses, and shrubs take over from the pioneer plants and help form more soil.



As the amount of soil increases, spruce and hemlock trees become plentiful.

Equilibrium

An ecosystem responds to change in such a way that the ecosystem is **restored to equilibrium**



THINK, SHARE, WRITE, (TSW) #2

Why are pioneer species helpful
to other species?

THINK, SHARE, WRITE, (TSW) #2

Why are pioneer species helpful
to other species?

Pioneer species change the
habitat so that other species can
then live in that habitat.

Chapter 4 Section 1: What Is an Ecosystem

Major Biological Communities



Major Biological Communities

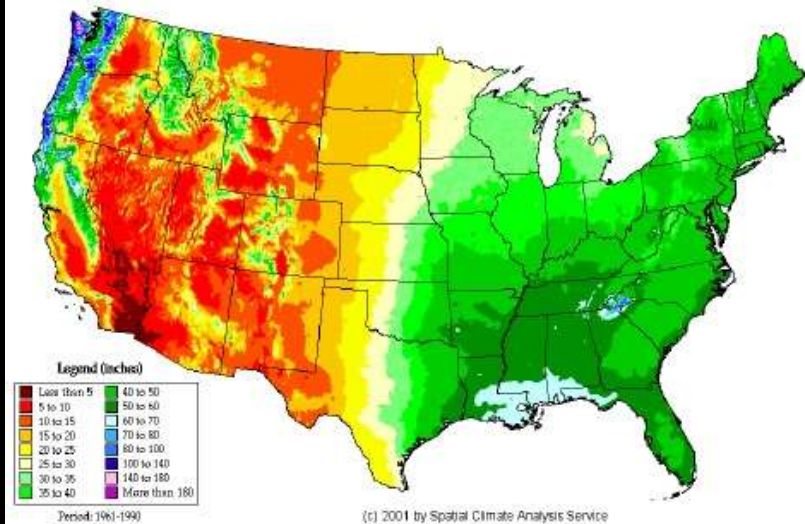
Two key **factors of climate** that determine biomes are:

Temperature

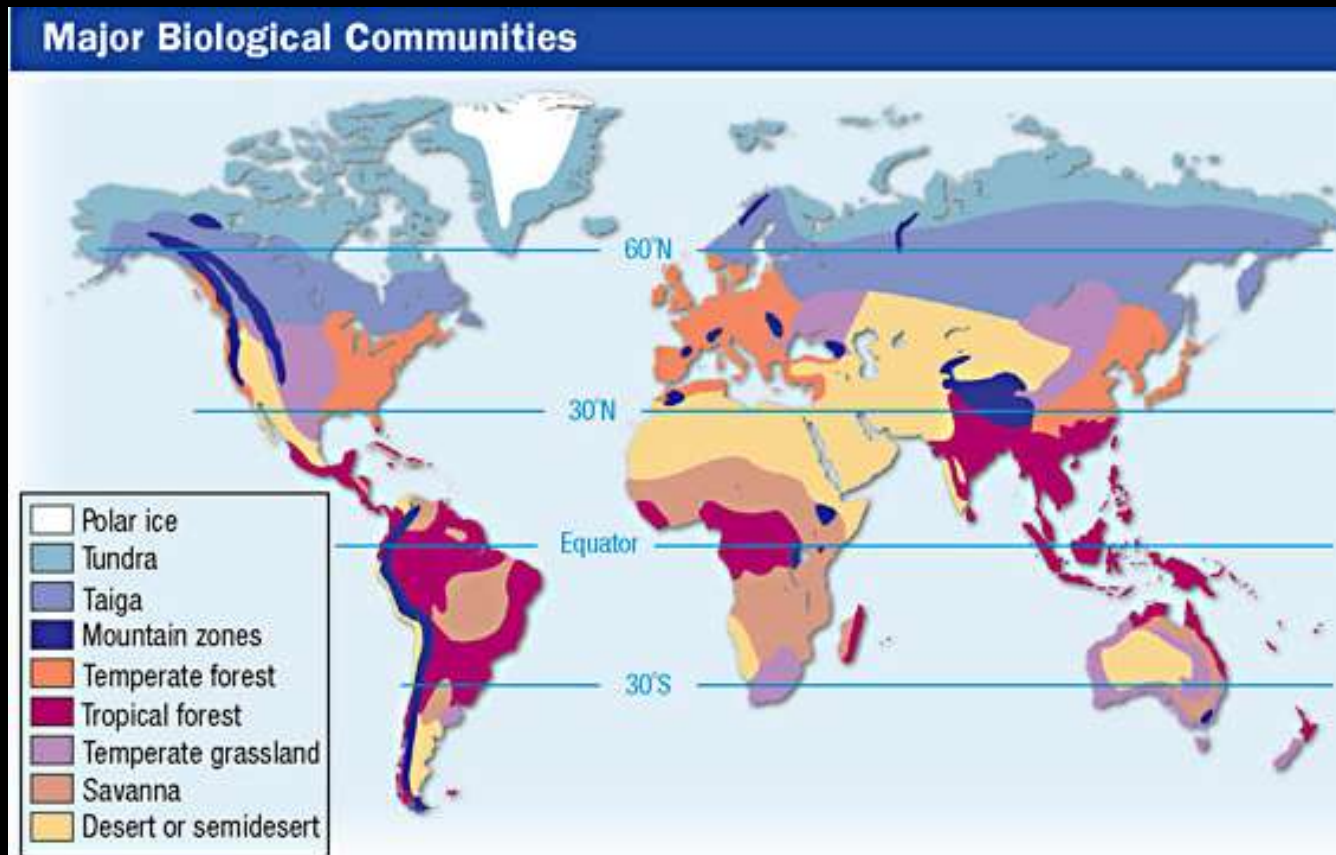
Precipitation



Average Annual Precipitation
Continental United States



Terrestrial Biomes (Land Biomes) Grouped by **latitude**



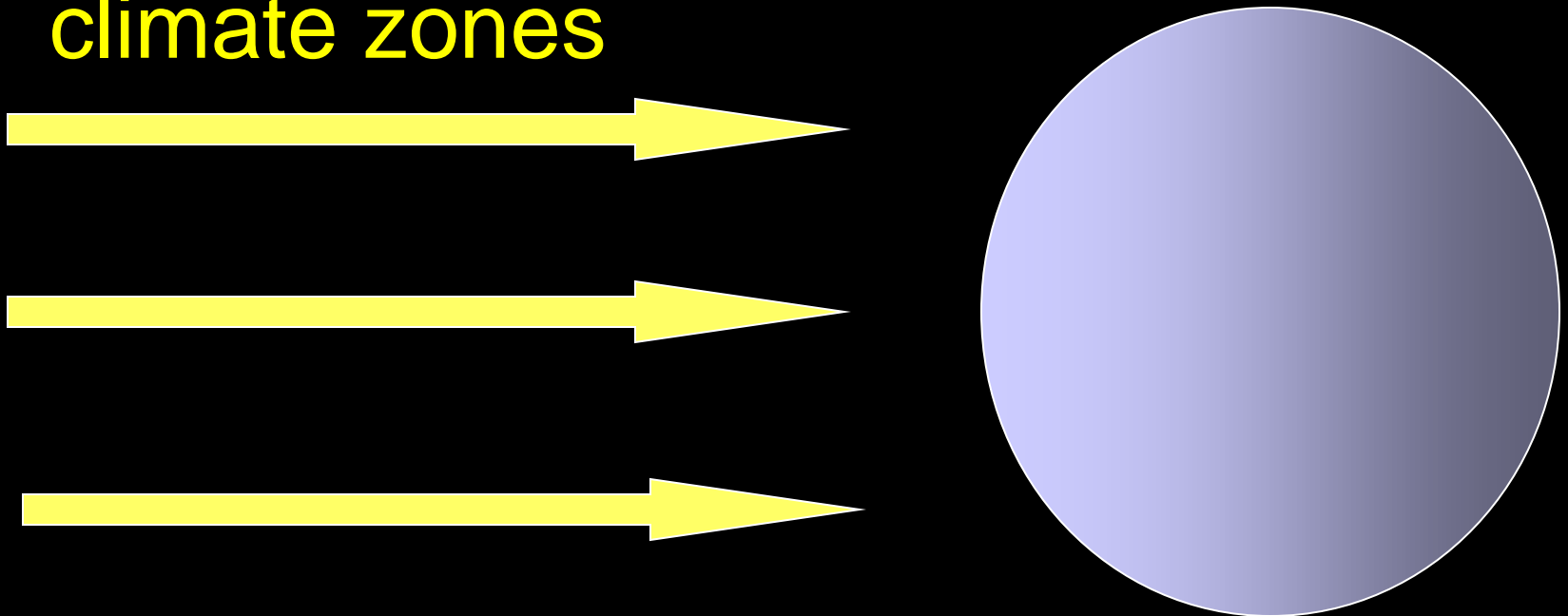
Terrestrial Biomes



Latitude

The equator receives more solar energy than the more northern or southern latitudes.

**the angle of heating causes different climate zones*



Tropical Biomes

Tropical rain forests

A lot of rain,
highest
biodiversity.



Tropical Biomes

Savannas – grasslands



Tropical Biomes

Tropical deserts



Temperate Biomes

Temperate Grasslands



Temperate biome: temperate grasslands

Temperate Biomes

Temperate Forests



Temperate Biomes

Temperate Deserts



High-Latitude (Polar) Biomes

Taiga



Polar biome: taiga

High-Latitude (Polar) Biomes

Tundra



**THINK, SHARE, WRITE,
(TSW) #3**

In what latitudes are savannas
found?

THINK, SHARE, WRITE, (TSW) #3

In what latitudes are savannas found?

Savannas are found in “Low Latitudes”.

Aquatic Ecosystems

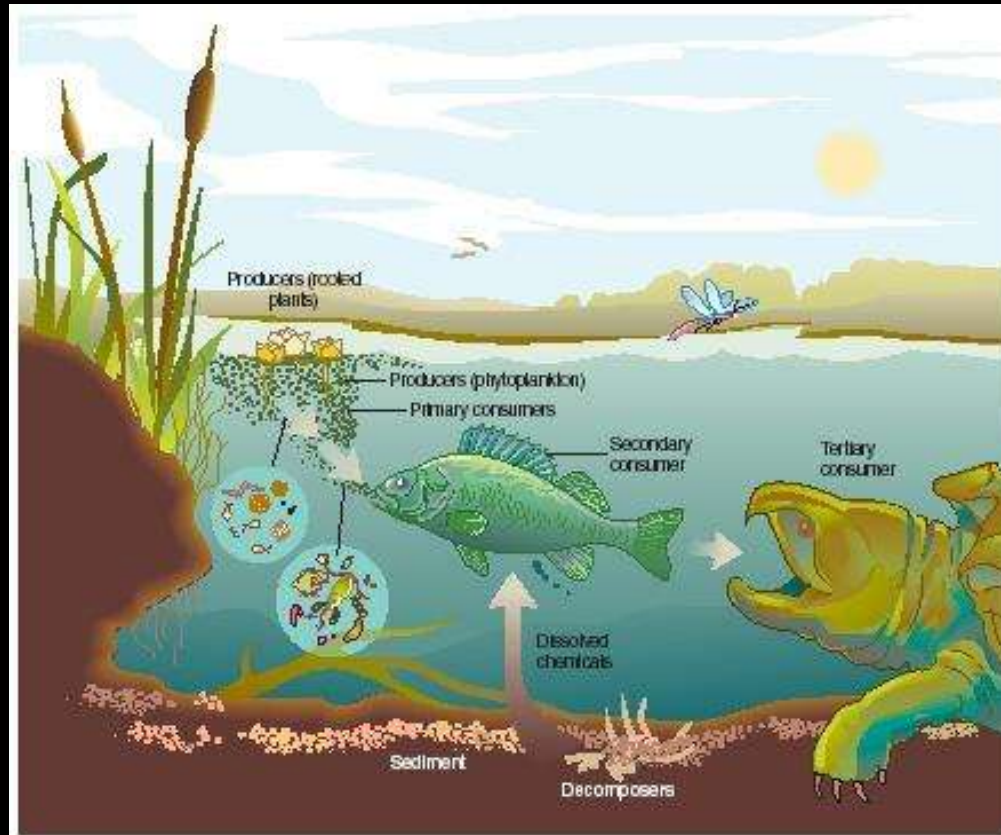
Classified based on salt levels



Aquatic Ecosystems

Classified based on salt levels

Freshwater – no salt



Aquatic Ecosystems

Classified based on salt levels

Wetlands – marshes – moderate flooding



Aquatic Ecosystems

Classified based on salt levels

Estuaries – fresh water meets the ocean



Aquatic Ecosystems

Classified based on salt levels

Marine – salty - oceans...



THINK, SHARE, WRITE, (TSW) #4

Which aquatic ecosystems have salt water?

THINK, SHARE, WRITE, (TSW) #4

Which aquatic ecosystems have salt water?

Marine communities and estuaries are ecosystems that have salt water.

Chapter 4 Section 2: Energy Flow in Ecosystems

Key Vocabulary Terms

5



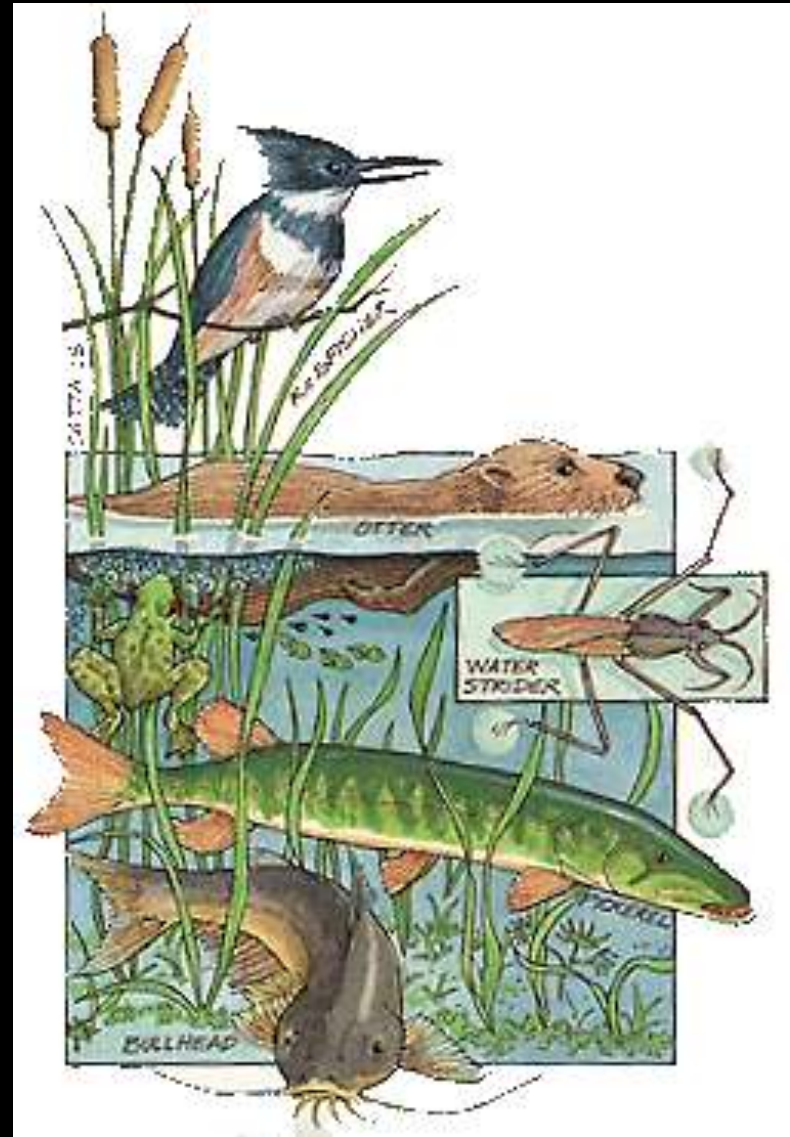
Producer

A photosynthetic or chemosynthetic autotroph that serves as the basic food source in an ecosystem



Consumer

An organism that eats other organisms or organic matter; heterotroph



What organisms are consumers?

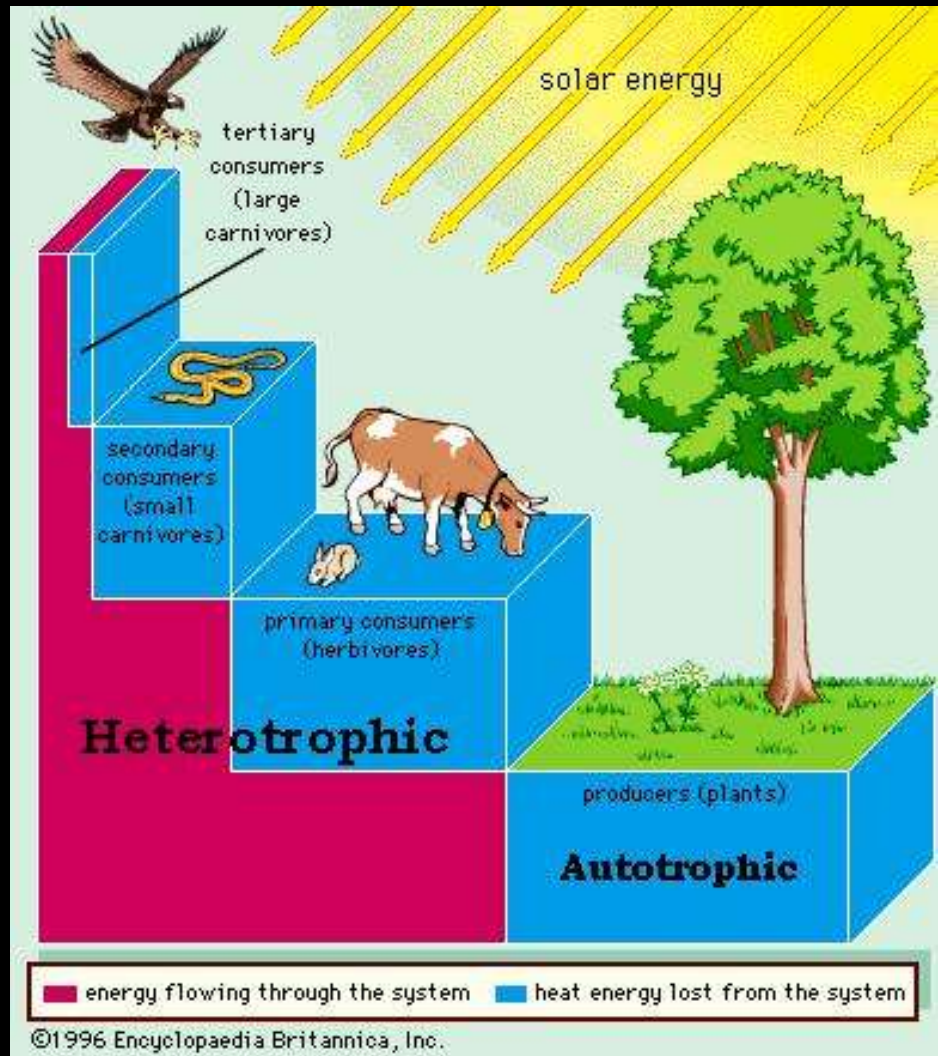
Decomposer

An organism that feeds by breaking down organic matter from dead organisms; heterotroph



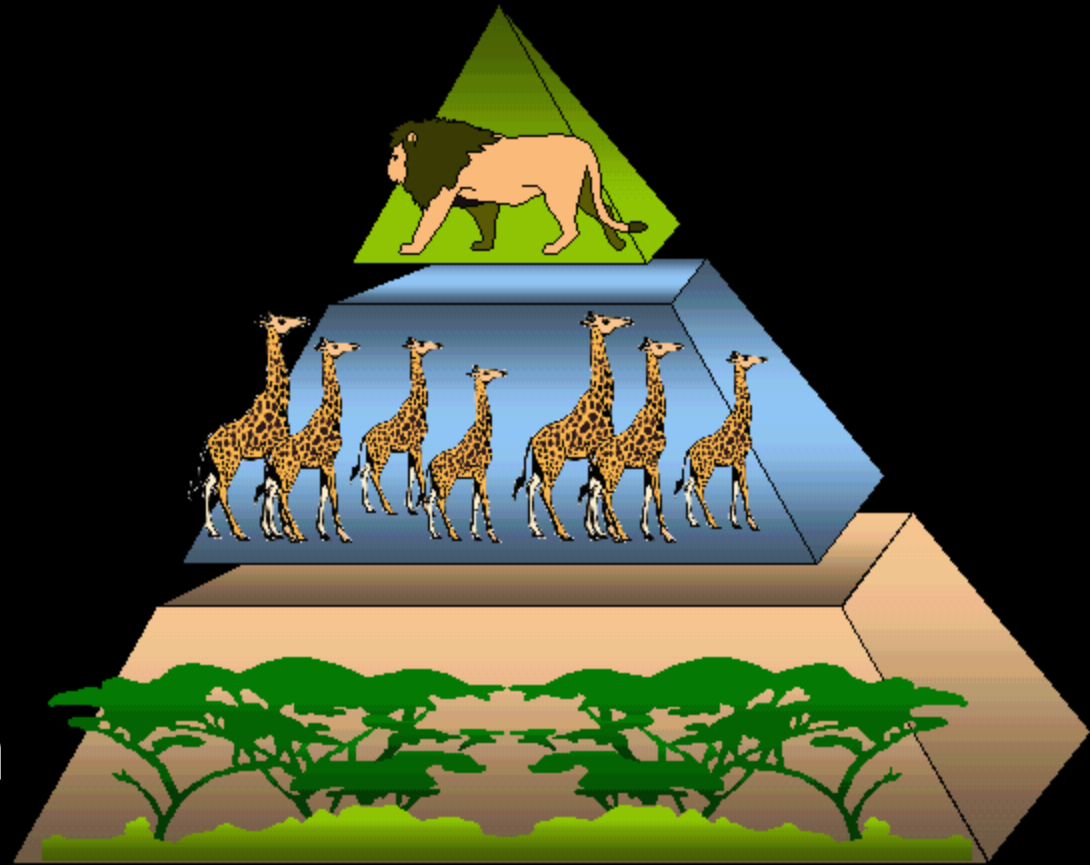
Trophic Level

A step in the food chain or food (energy) pyramid



Energy Pyramid

A triangular diagram that shows ecosystem's loss of energy through the food chain in an ecosystem



Content Objectives

I will be able to identify:

- How energy flow through an ecosystem.
- What happens to energy as it is transferred between trophic levels in a community

Chapter 4

Section 2:

Energy Flow in Ecosystems



Notes

Chapter 4 Section 2: Energy Flow in Ecosystems

Trophic Levels

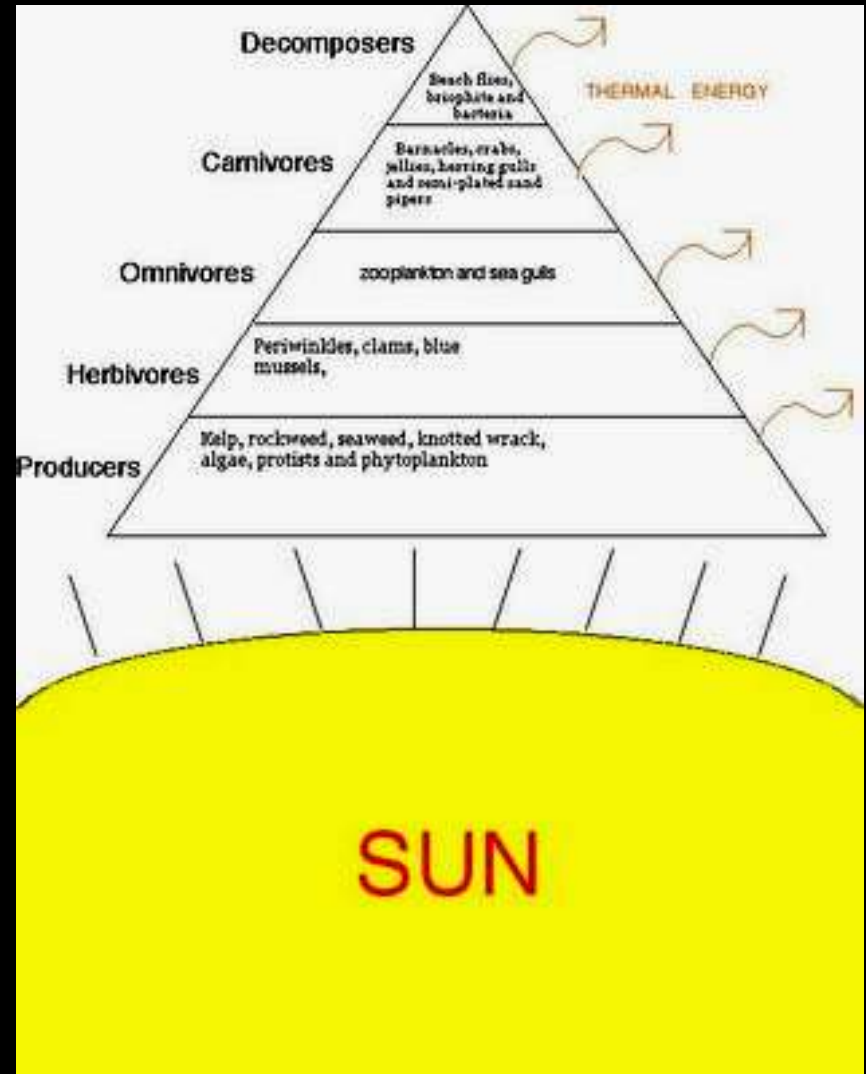


YOUR
TURN

YOUR TURN
Active Reading
Section 2 – Energy Flow in
Ecosystems

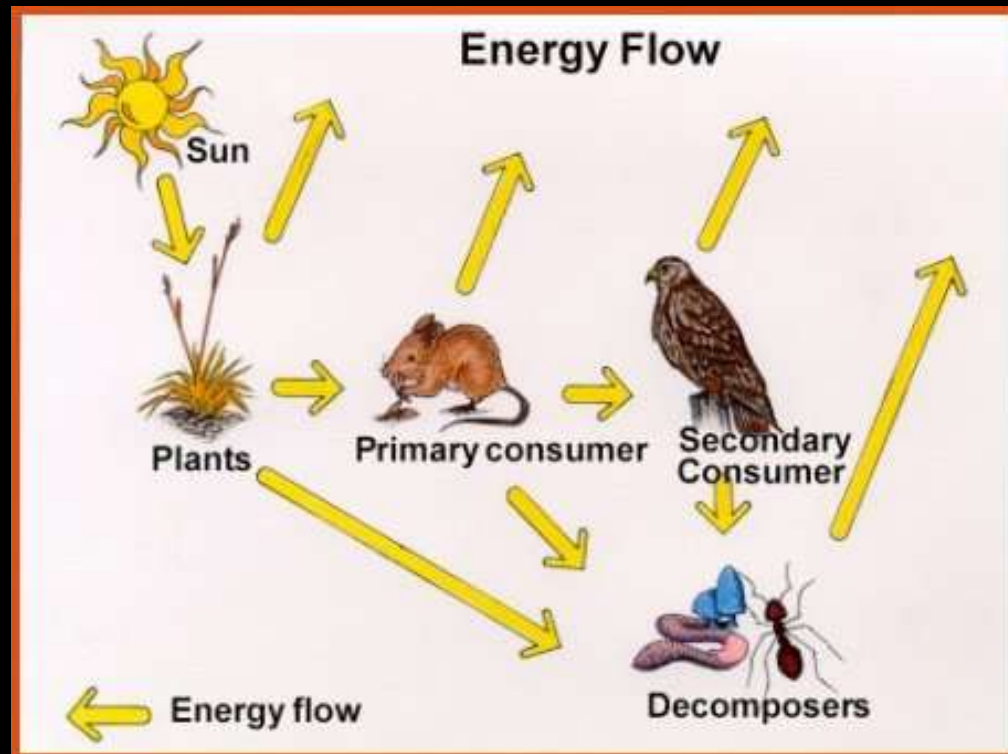
Trophic Levels

Energy flows through an ecosystem from the **Sun** to **Producers** to **Consumers** to **Decomposers**.



Trophic Levels

Energy **cannot** be recycled! Energy flow is **ONE WAY** 



THINK, SHARE, WRITE, (TSW) #5

Where do consumers get their
energy?

THINK, SHARE, WRITE, (TSW) #5

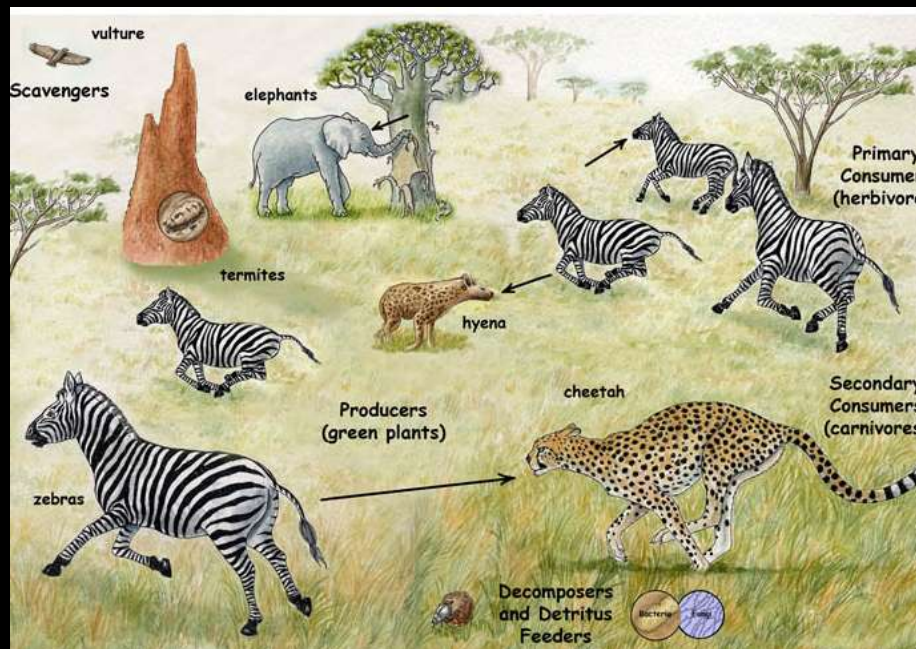
Where do consumers get their energy?

Consumers get their energy from eating producers or other consumers.

Ultimately, all living organisms get their energy from the sun.

Food Chains

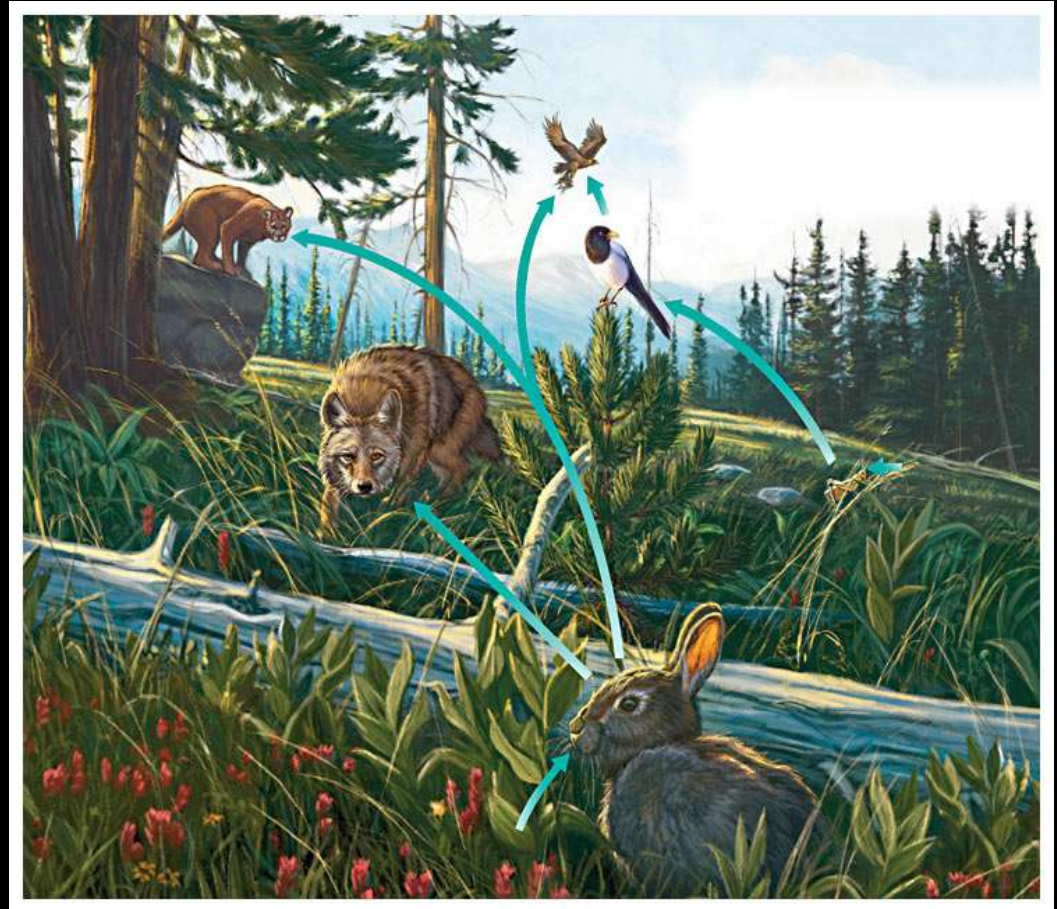
Shows the flow of energy through organisms



Grass → Zebra → Lion → Vulture → Decomposers

Food Webs

A complicated,
interconnected
group of food
chains



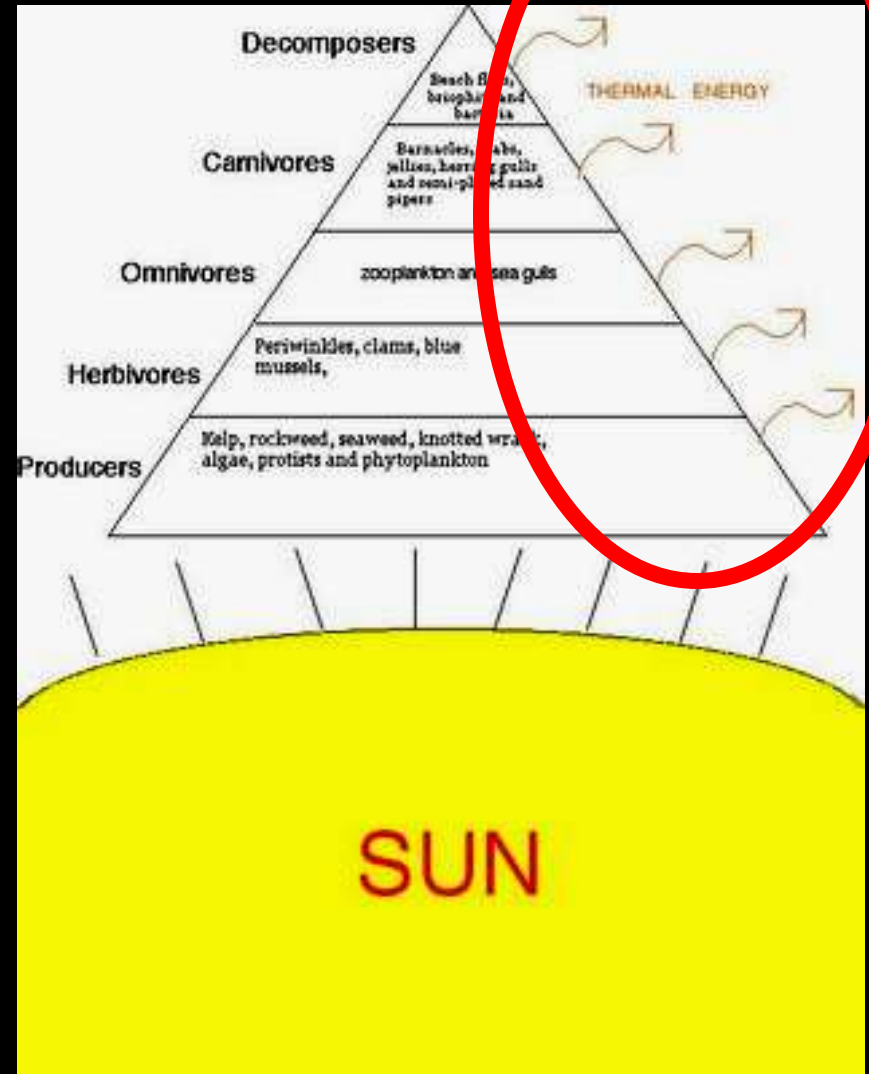
Chapter 4 Section 2: Energy Flow in Ecosystems

Loss of Energy



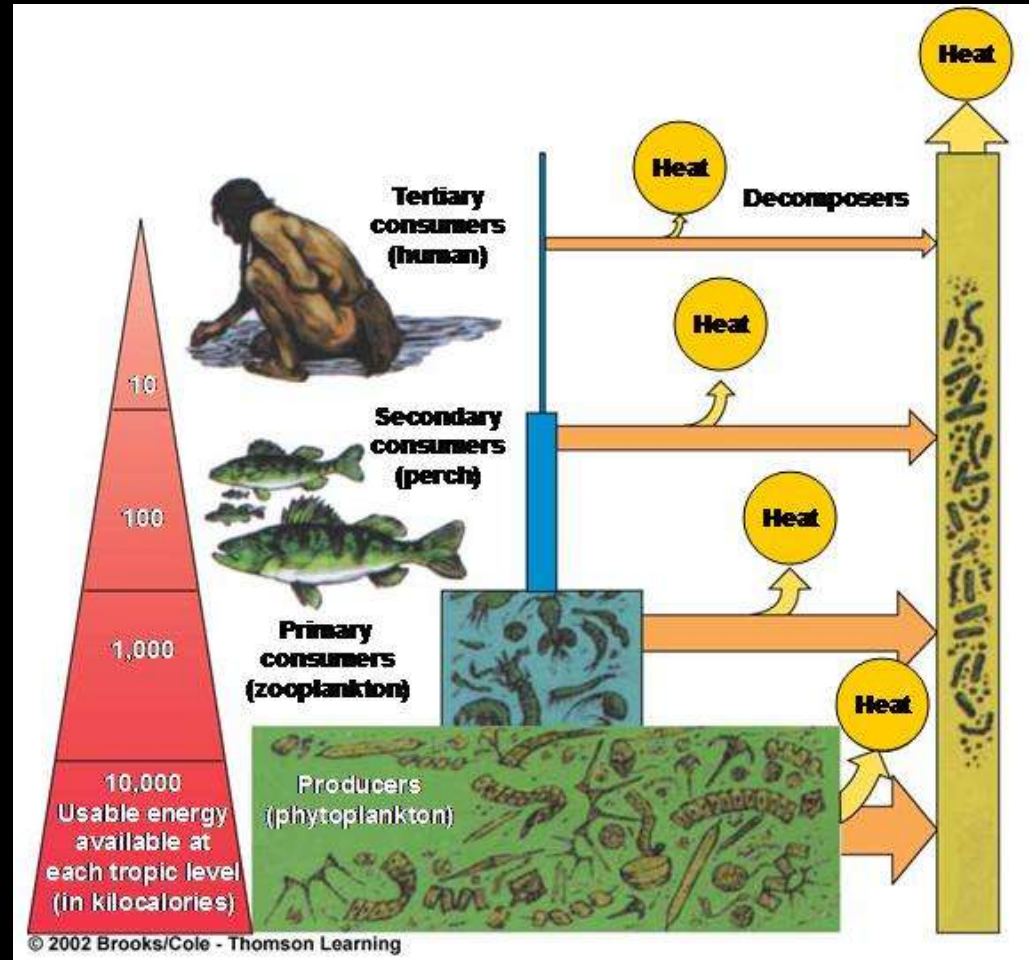
Loss of Energy

Energy is stored at each link in a food web. Some energy that is used is **LOST** as **HEAT** into the environment. That energy **CANNOT** be recycled.



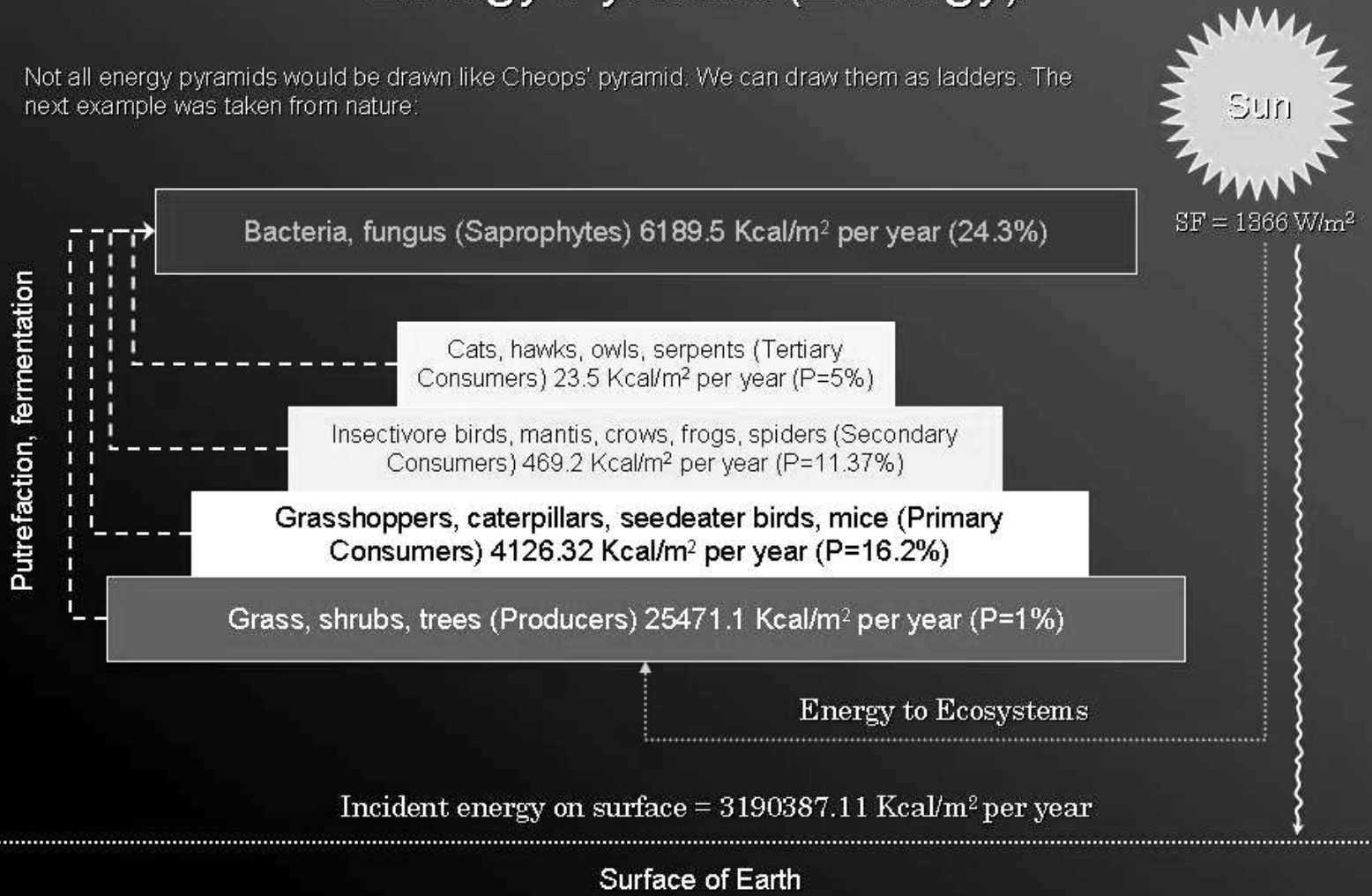
Ten Percent Rule

Only **10 percent** of the energy consumed is **stored** at each trophic level.



Energy Pyramid (Ecology)

Not all energy pyramids would be drawn like Cheops' pyramid. We can draw them as ladders. The next example was taken from nature:



THINK, SHARE, WRITE, (TSW) #6

When energy is transferred from one trophic level to another, where does 90% of the energy go?

THINK, SHARE, WRITE, (TSW) #6

When energy is transferred from one trophic level to another, where does 90% of the energy go?

90% of the energy in a predator's prey is lost to the environment as heat as the predator burns the energy to do work, such as running and breathing, etc.

Chapter 4 Section 3: Cycling of Matter

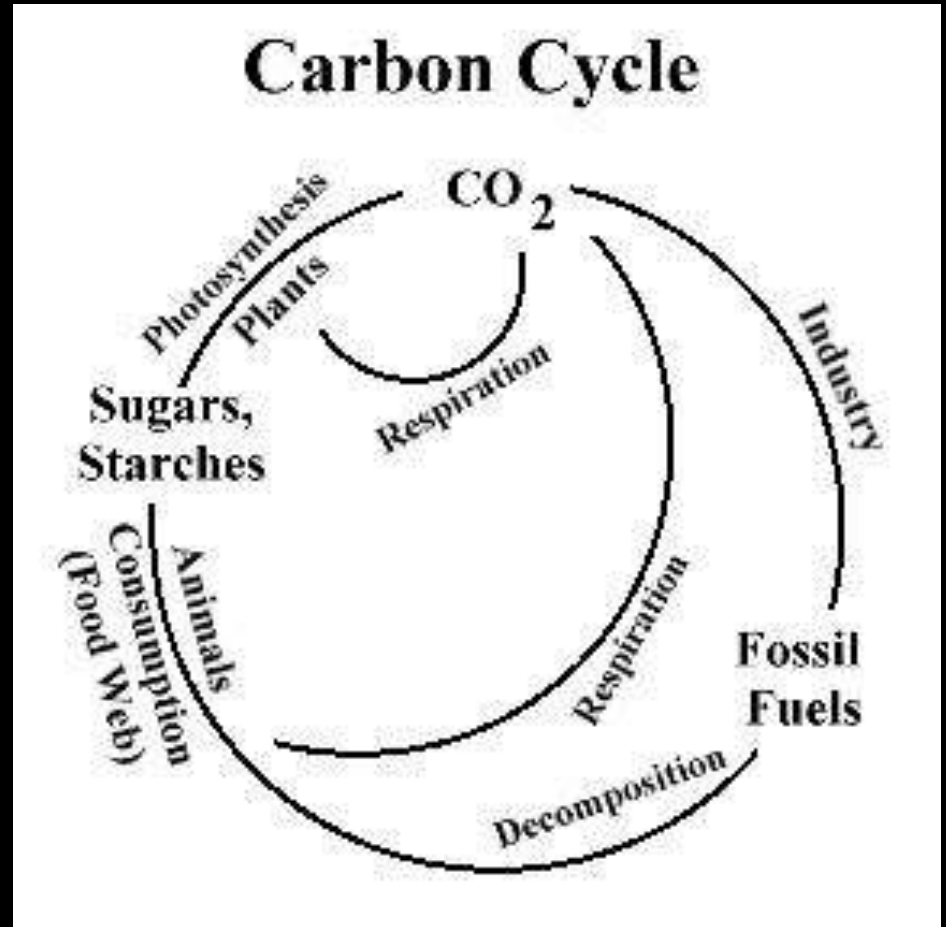
Key Vocabulary Terms

4



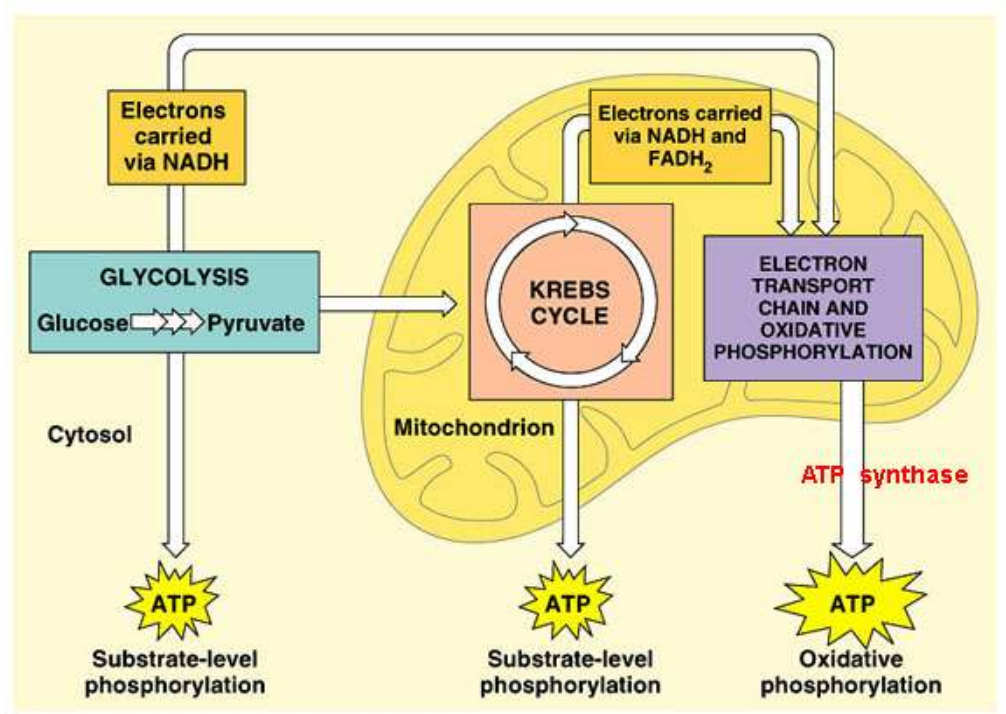
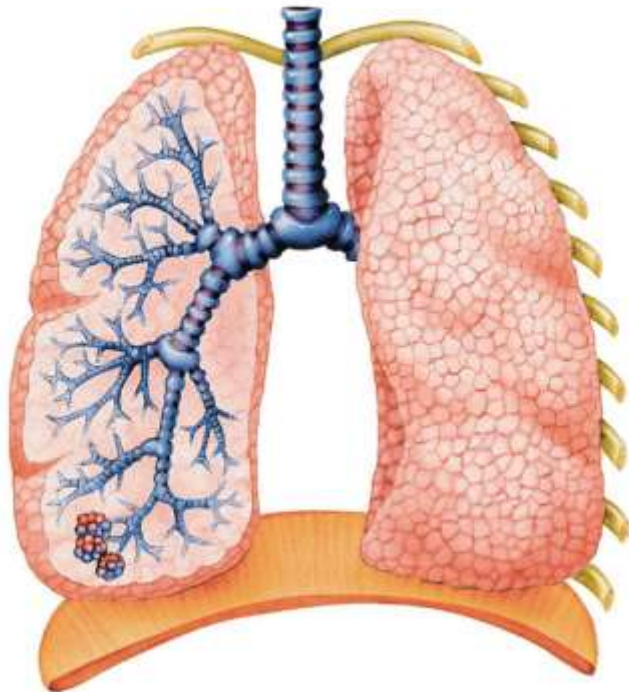
Carbon Cycle

The movement of carbon through the environment



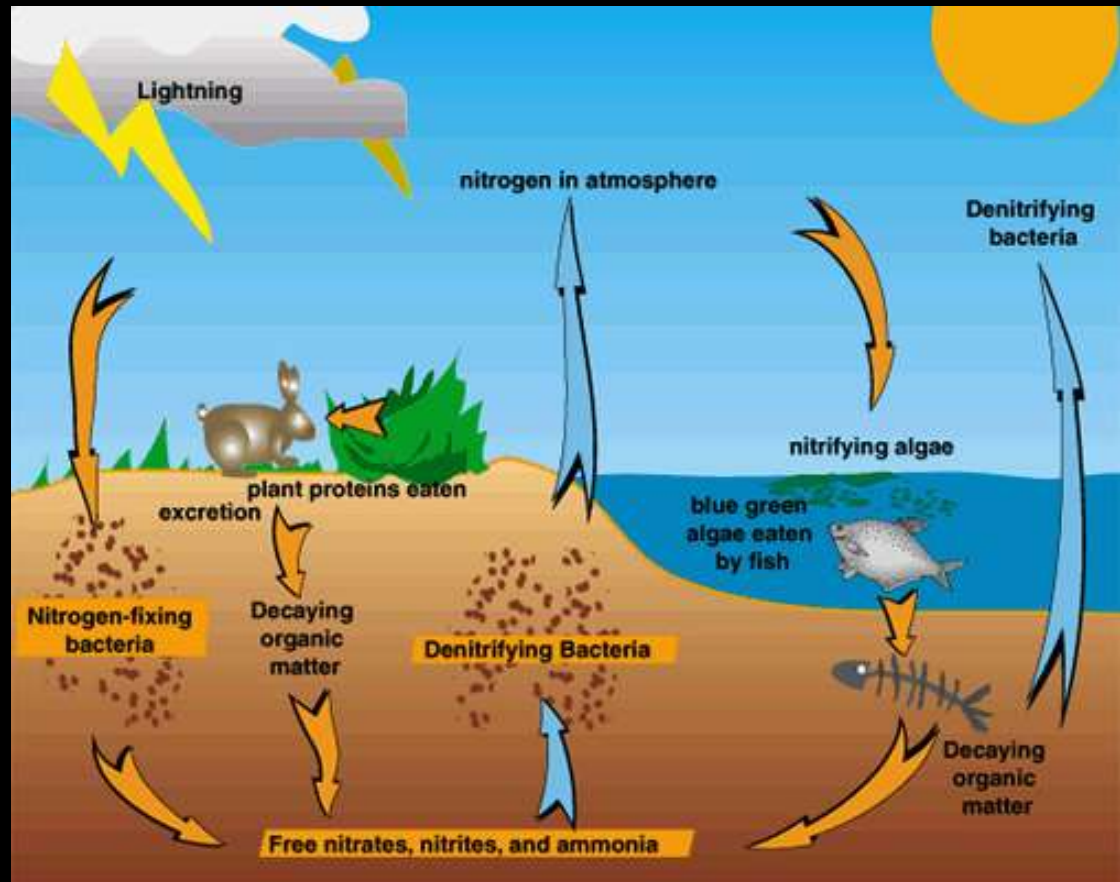
Respiration

The exchange of oxygen and carbon dioxide between living cells and their environment



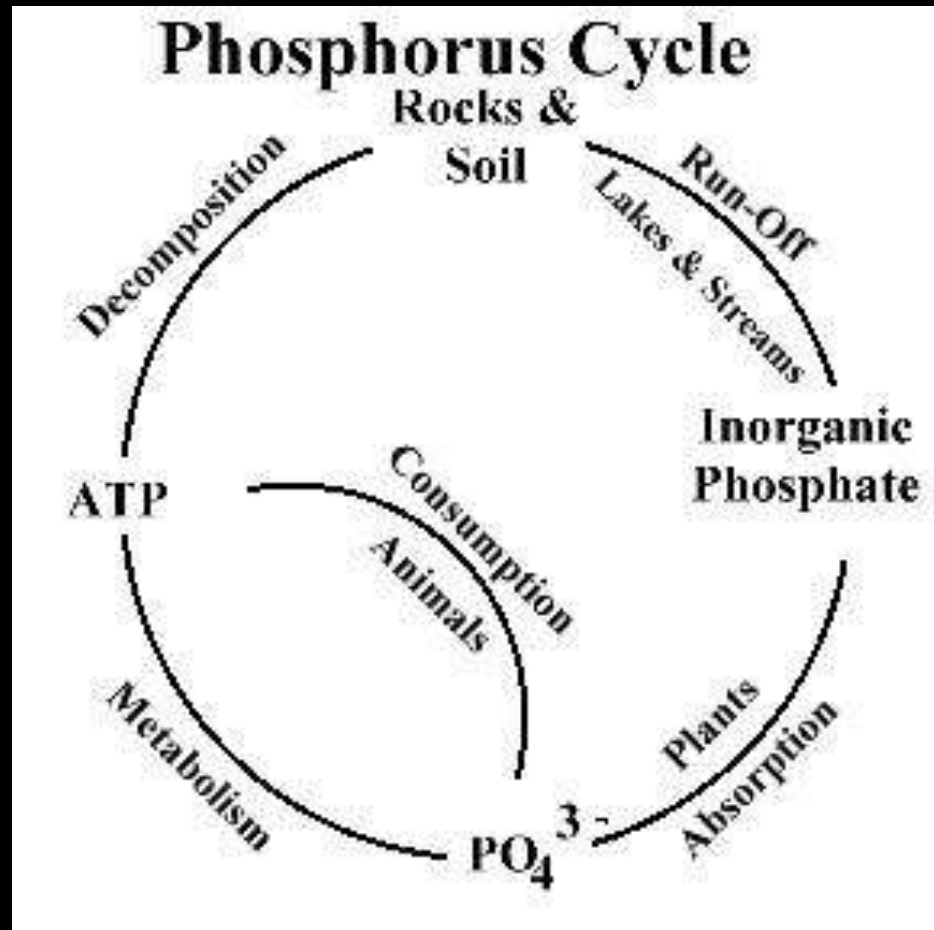
Nitrogen Cycle

The cycling of nitrogen through organisms, soil, water, and the atmosphere



Phosphorus Cycle

The cycling of phosphorus through organisms and the environment



Content Objectives

I will be able to identify:

- The parts of the water cycle.
- The importance of plants and animals for carbon and oxygen in an ecosystem.
- Why nitrogen must cycle through an ecosystem.
- Why phosphorus must cycle through an ecosystem.

Chapter 4

Section 3:

Cycling of Matter



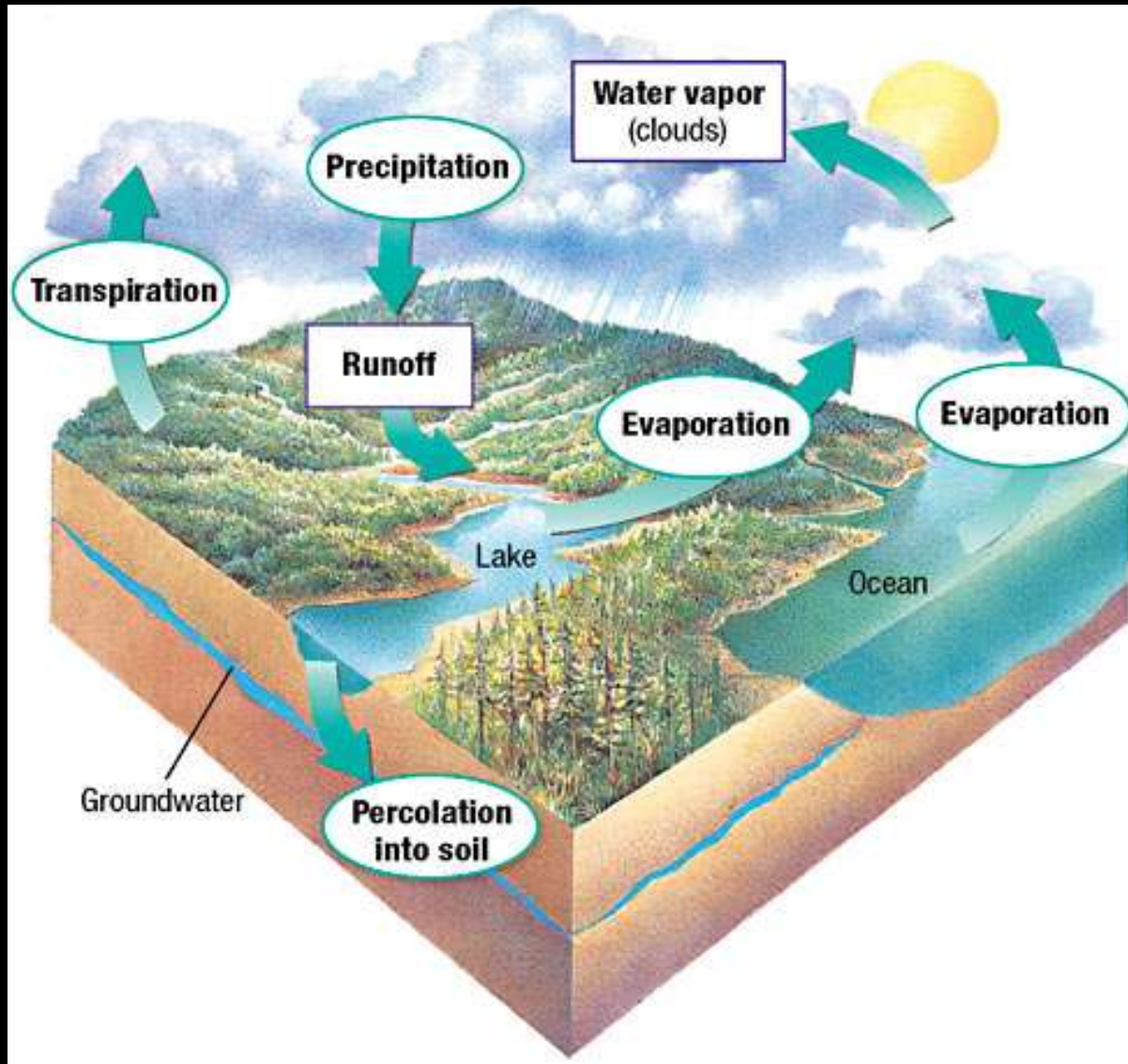
Notes

Chapter 4 Section 3: Cycling of Matter

Water Cycle

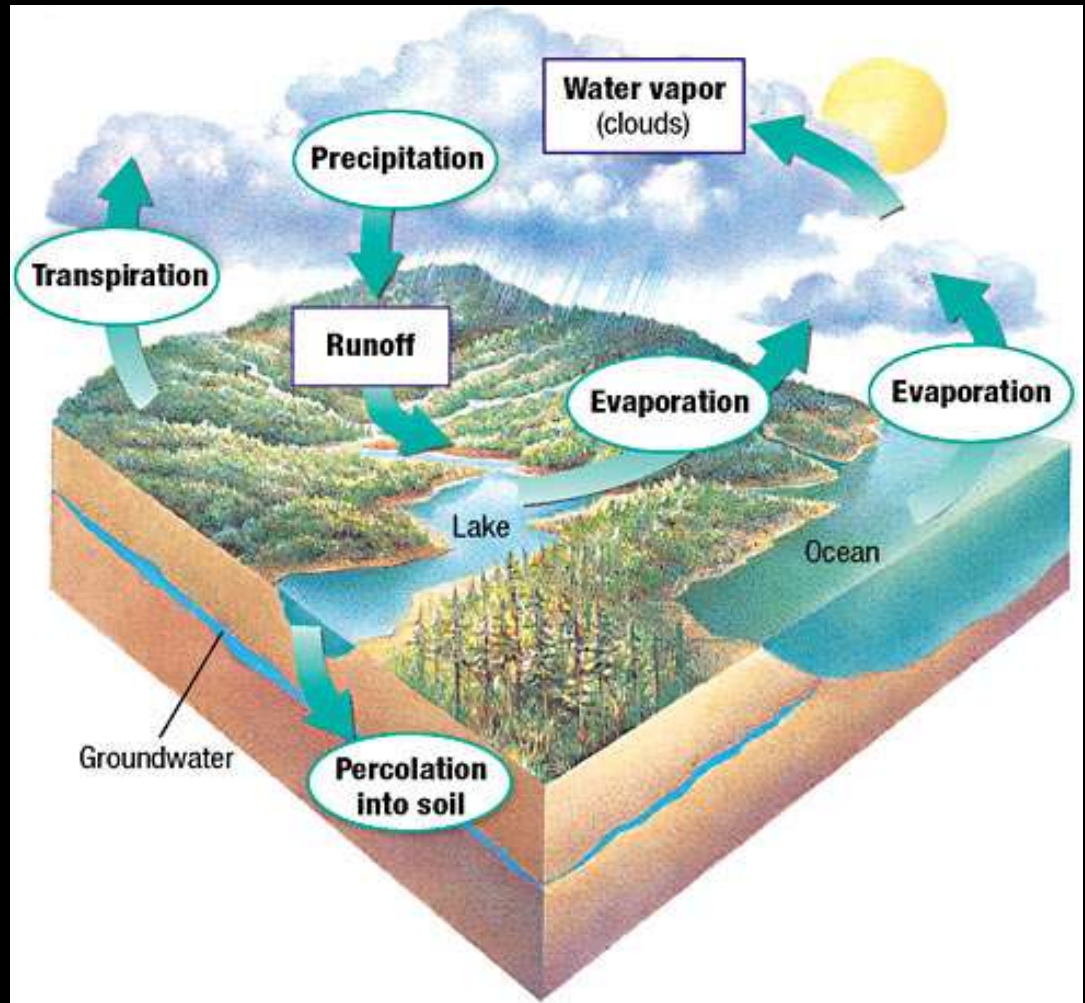


Water Cycle



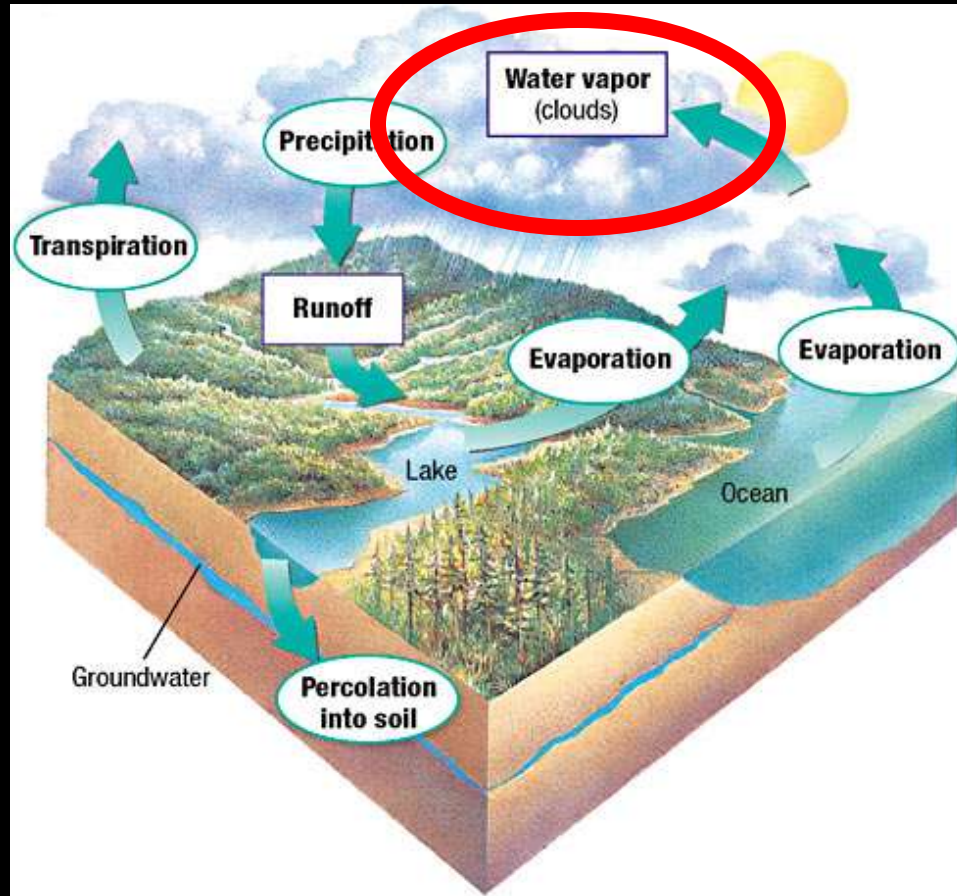
Water Cycle

The continuous movement of water through the atmosphere, land, and oceans.



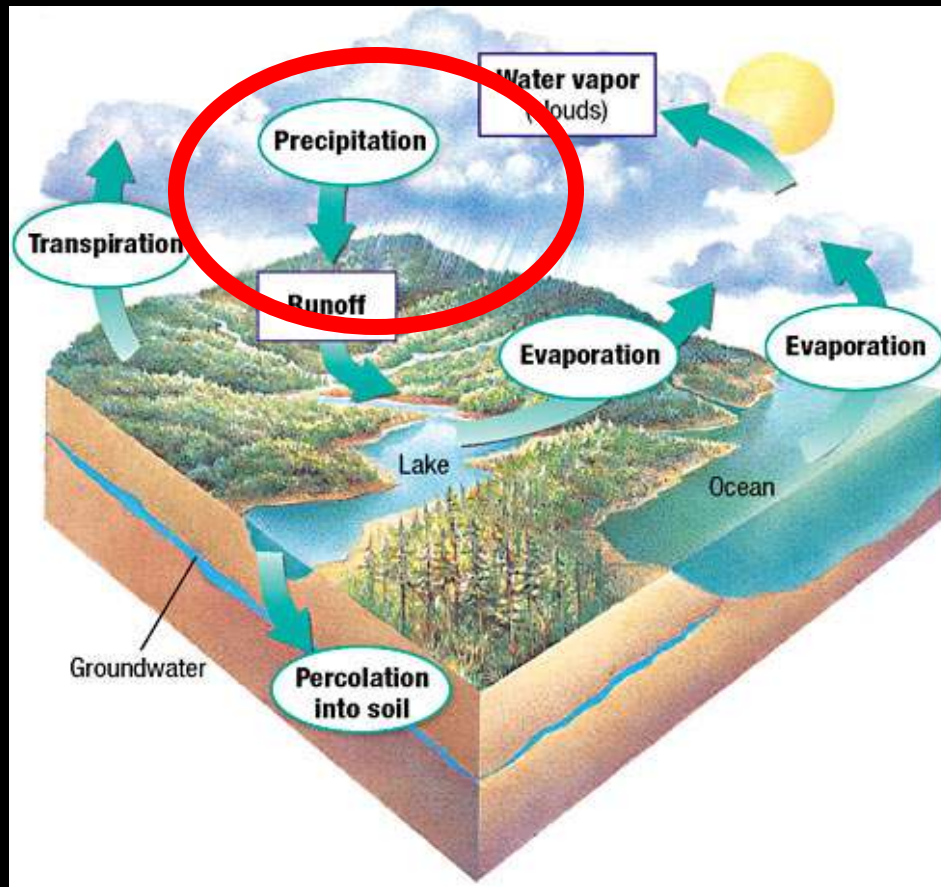
Water Cycle

Condensation – gas to liquid



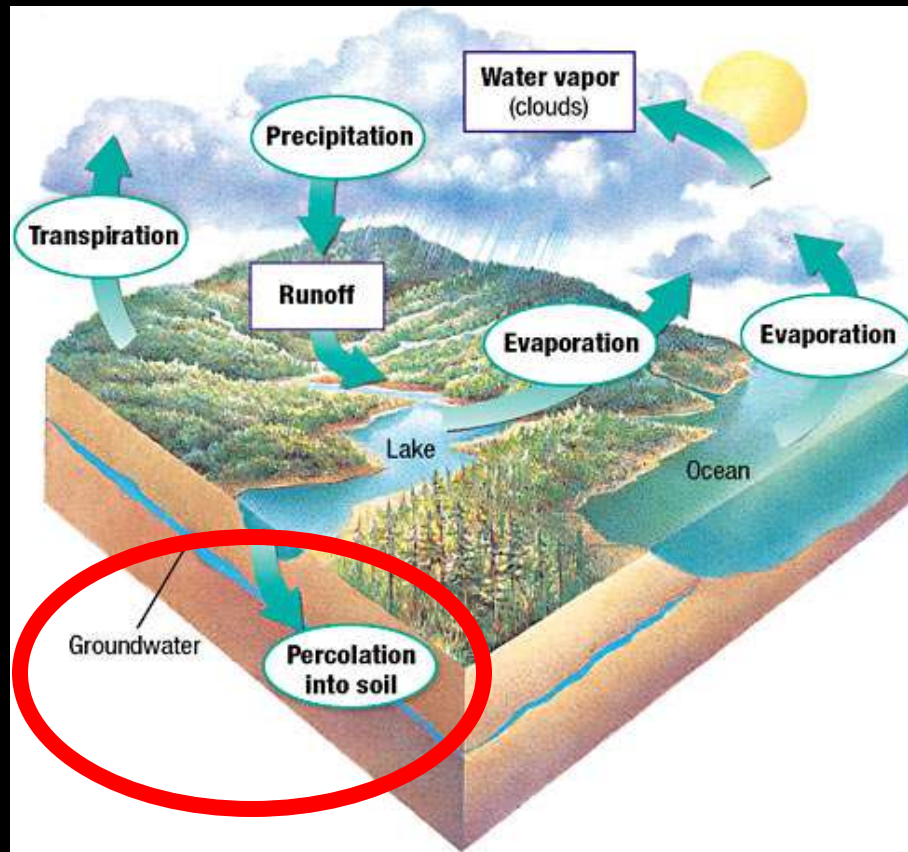
Water Cycle

Precipitation – water falls to Earth



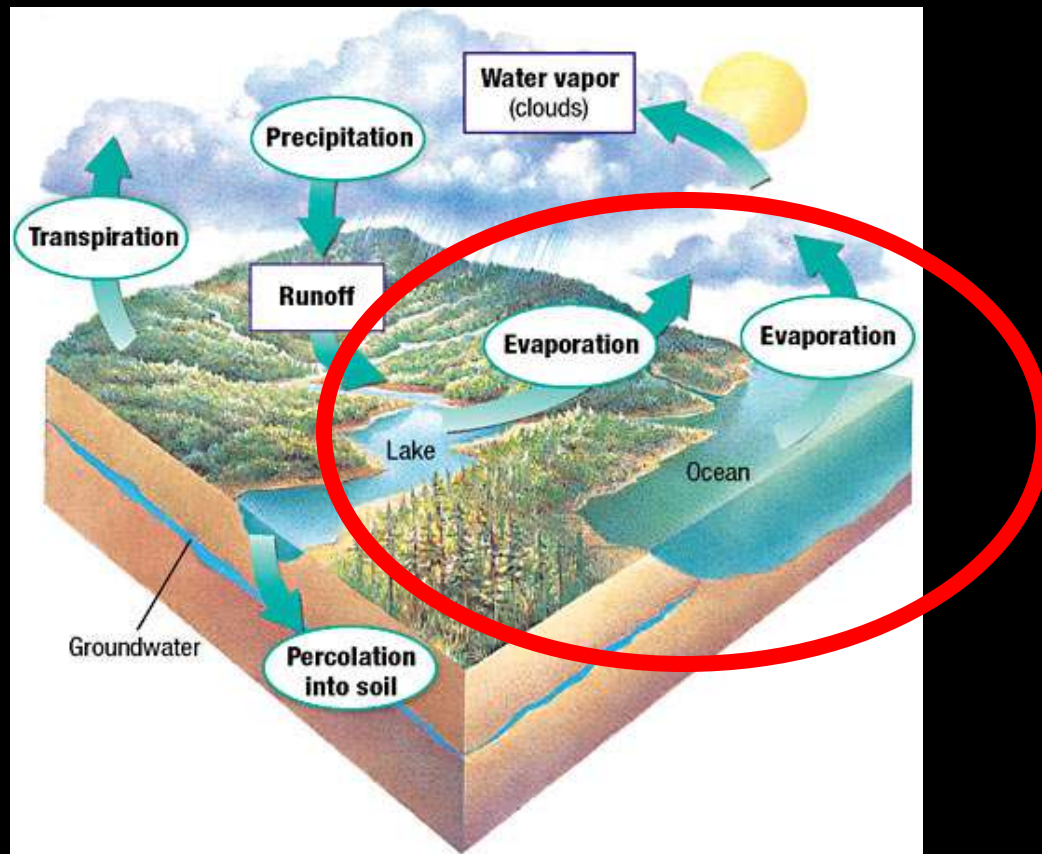
Water Cycle

Percolation – soaks into groundwater



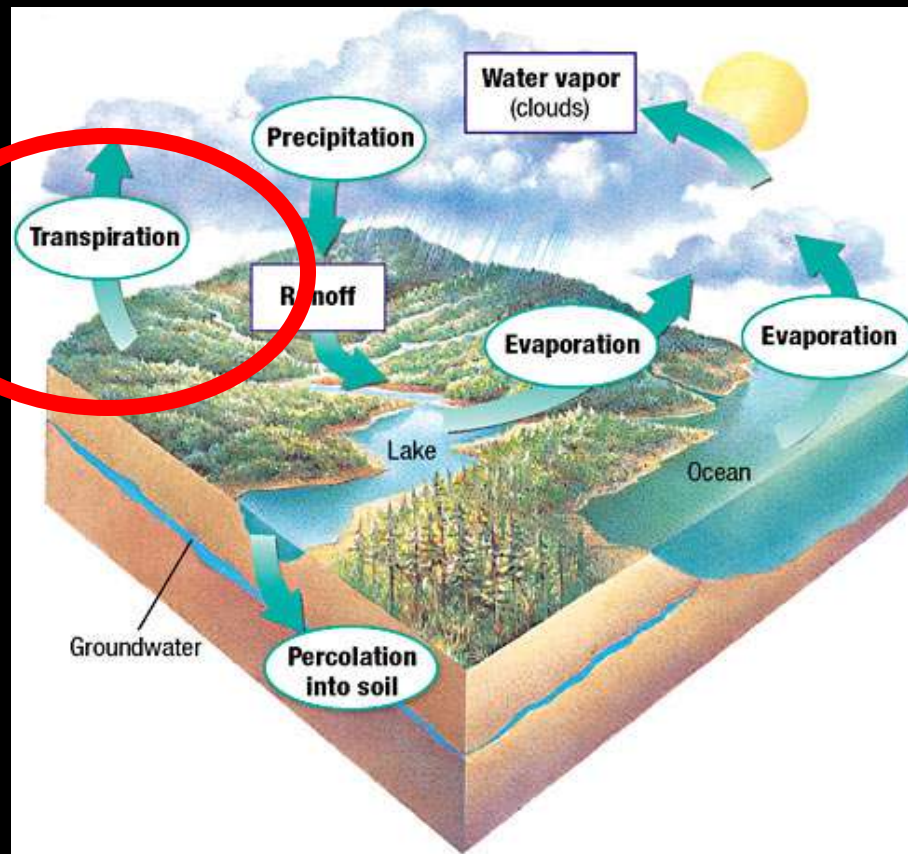
Water Cycle

Evaporation – liquid to gas



Water Cycle

Transpiration – evap. from plants

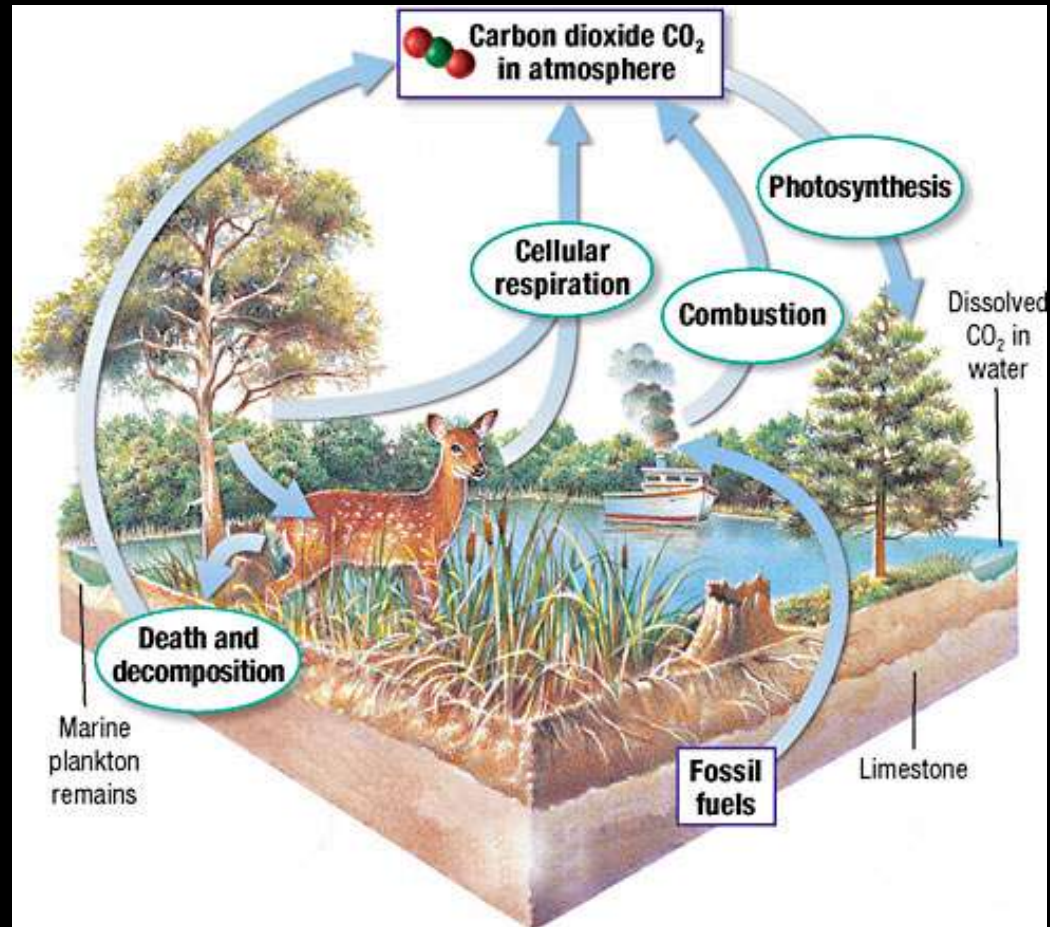


YOUR
TURN

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Active Reading
Section 3 – Cycling of Matter

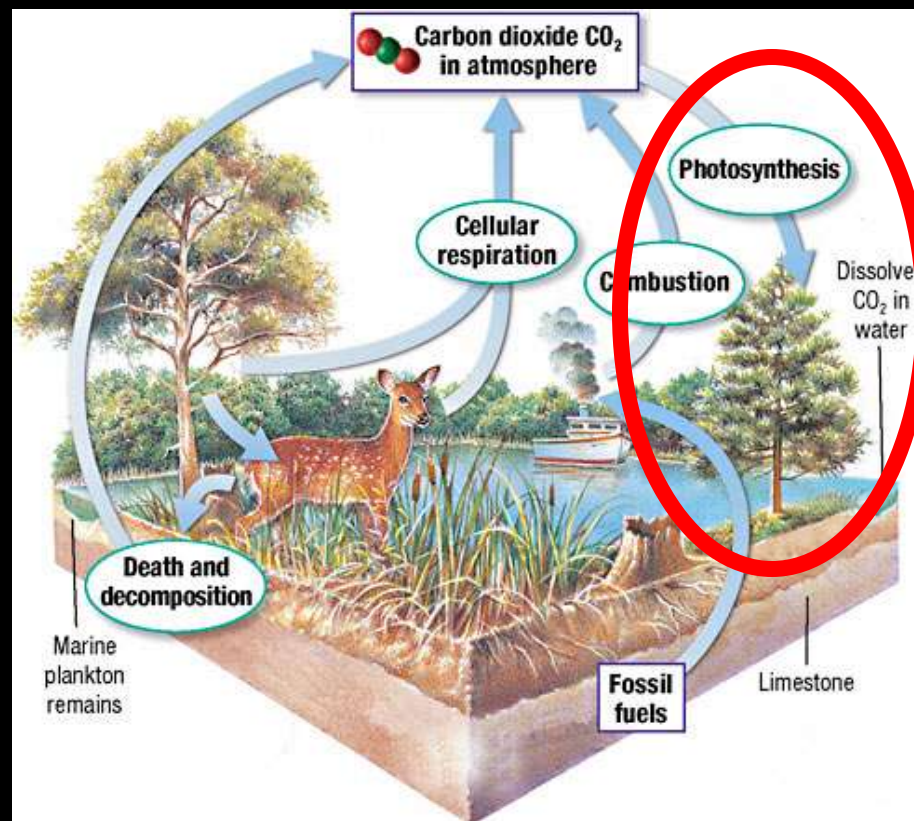
Carbon (oxygen) Cycle

The continuous movement of **carbon** through **living** things, **nonliving** things and **back**.



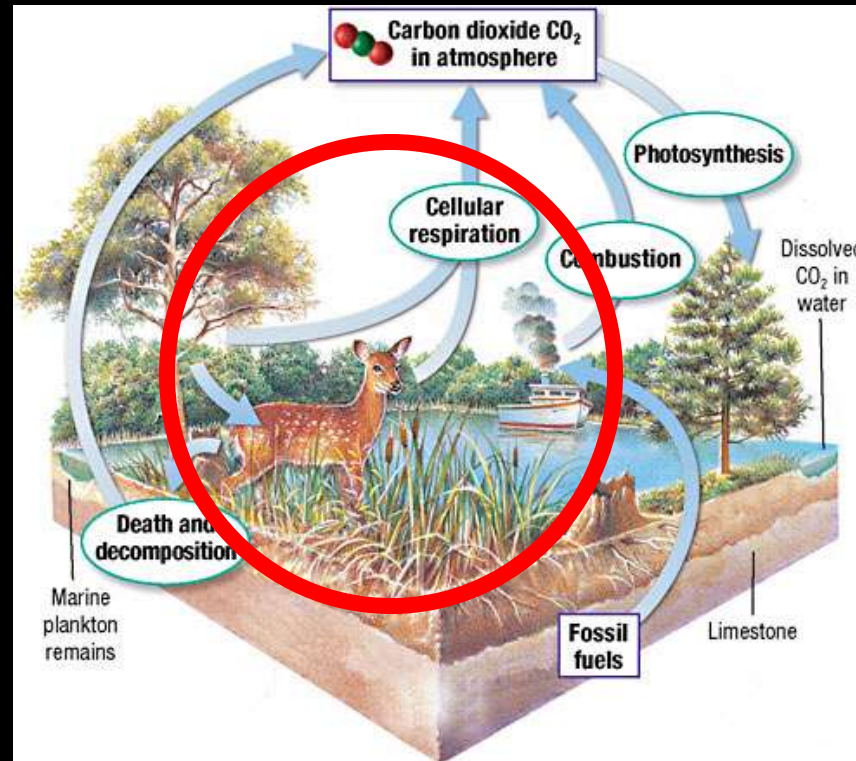
Carbon (oxygen) Cycle

Photosynthesis – CO₂ to Carbohydrate



Carbon (oxygen) Cycle

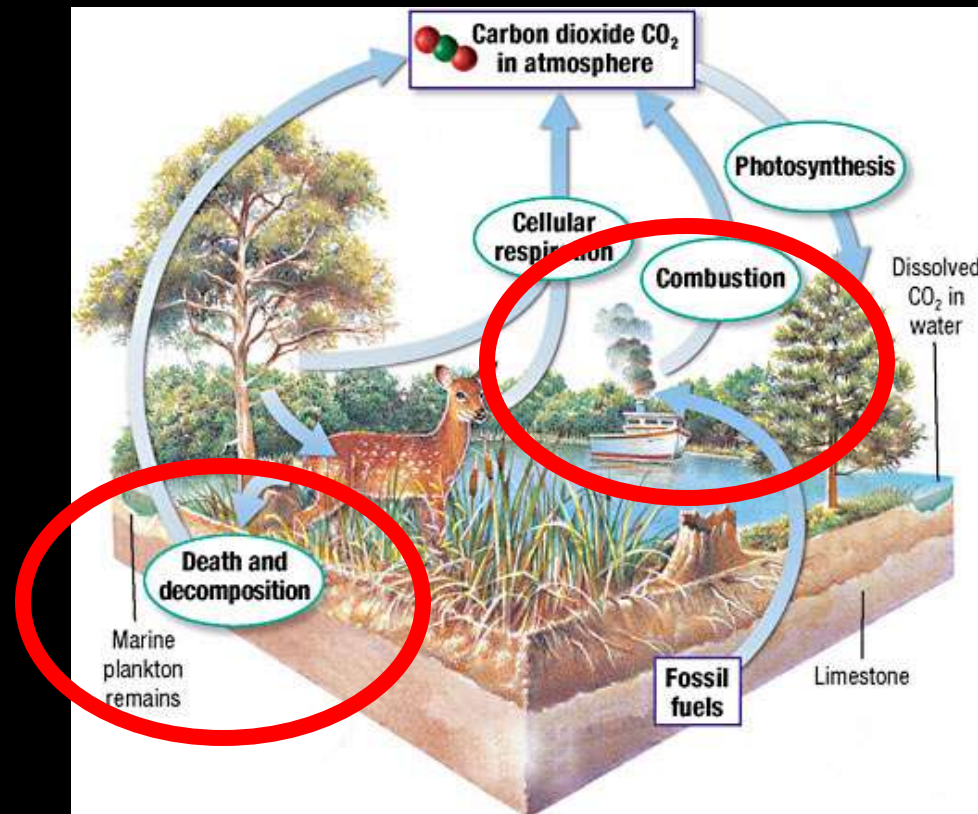
Respiration – Biomolecules to



Carbon (oxygen) Cycle

Combustion – burning –C released to air

Death - Decomposition



THINK, SHARE, WRITE, (TSW) #7

How does respiration play a role in cycling carbon and oxygen through an ecosystem?

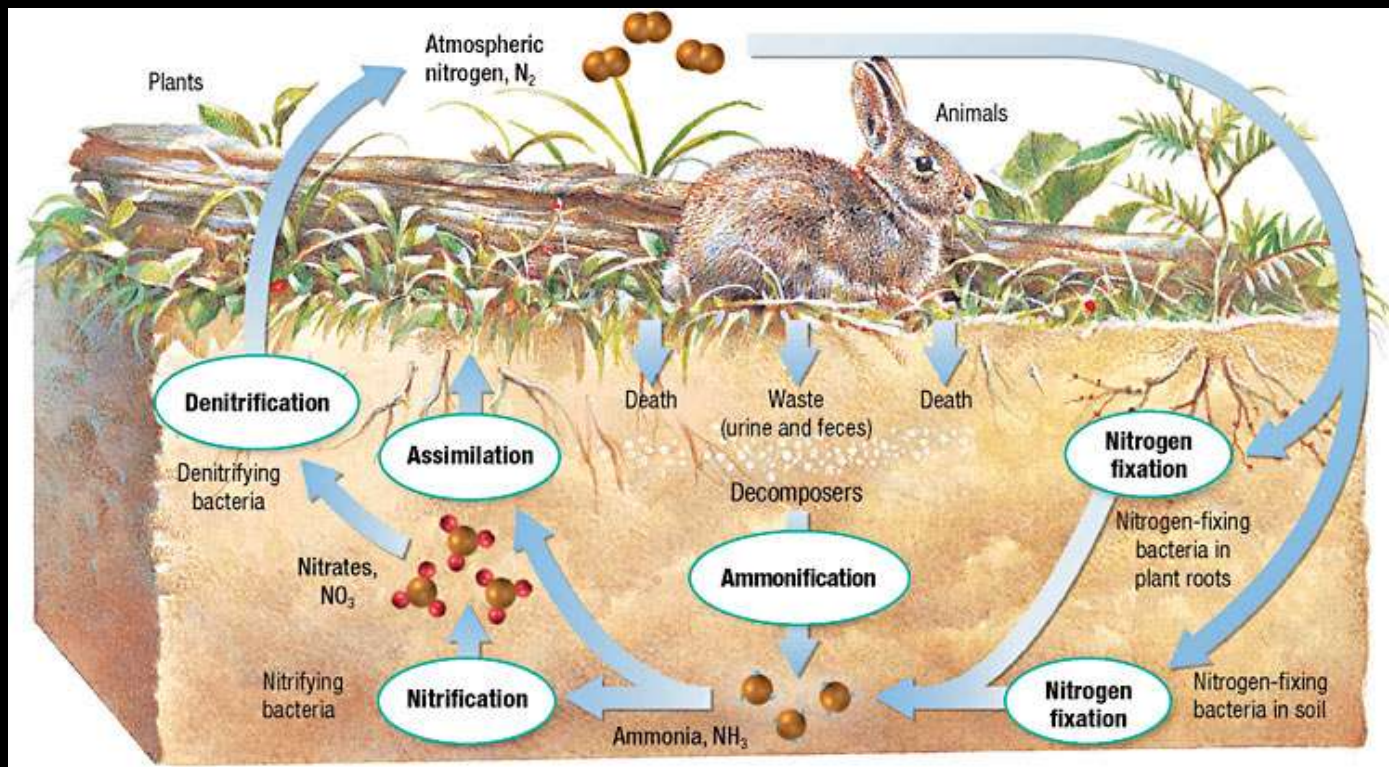
THINK, SHARE, WRITE, (TSW) #7

How does respiration play a role in cycling carbon and oxygen through an ecosystem?

Respiration is a part of the carbon cycle because it is a process in which oxygen and carbon are exchanged between living organisms and their environment.

Nitrogen Cycle

The continuous movement of **nitrogen** through **living** things to make **protein**.

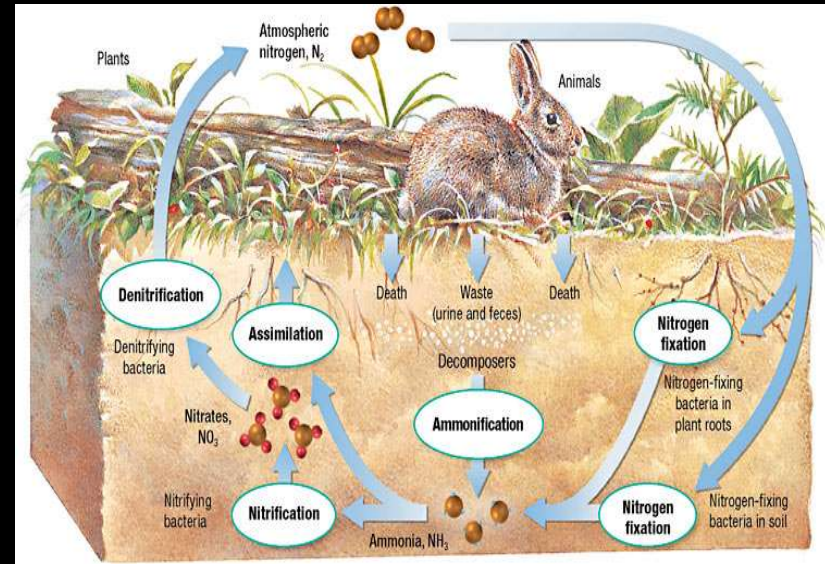


Nitrogen fixation – a process by which **nitrogen** (N_2) in the **atmosphere** is converted into **ammonia** (NH_3).

Atmospheric nitrogen or molecular nitrogen (N_2) does not easily react with other chemicals to form new compounds.

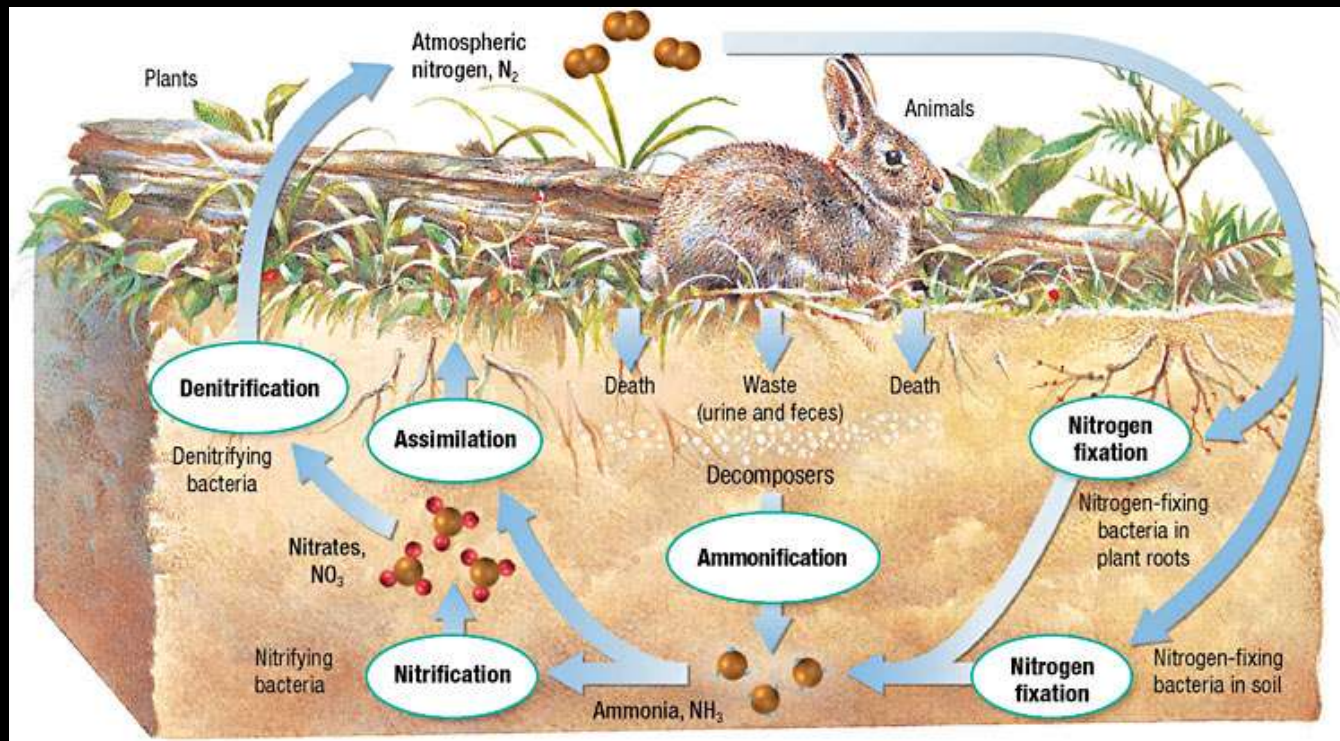
Fixation processes free up the nitrogen atoms from their diatomic form (N_2) to be used in other ways.

Nitrogen Cycle



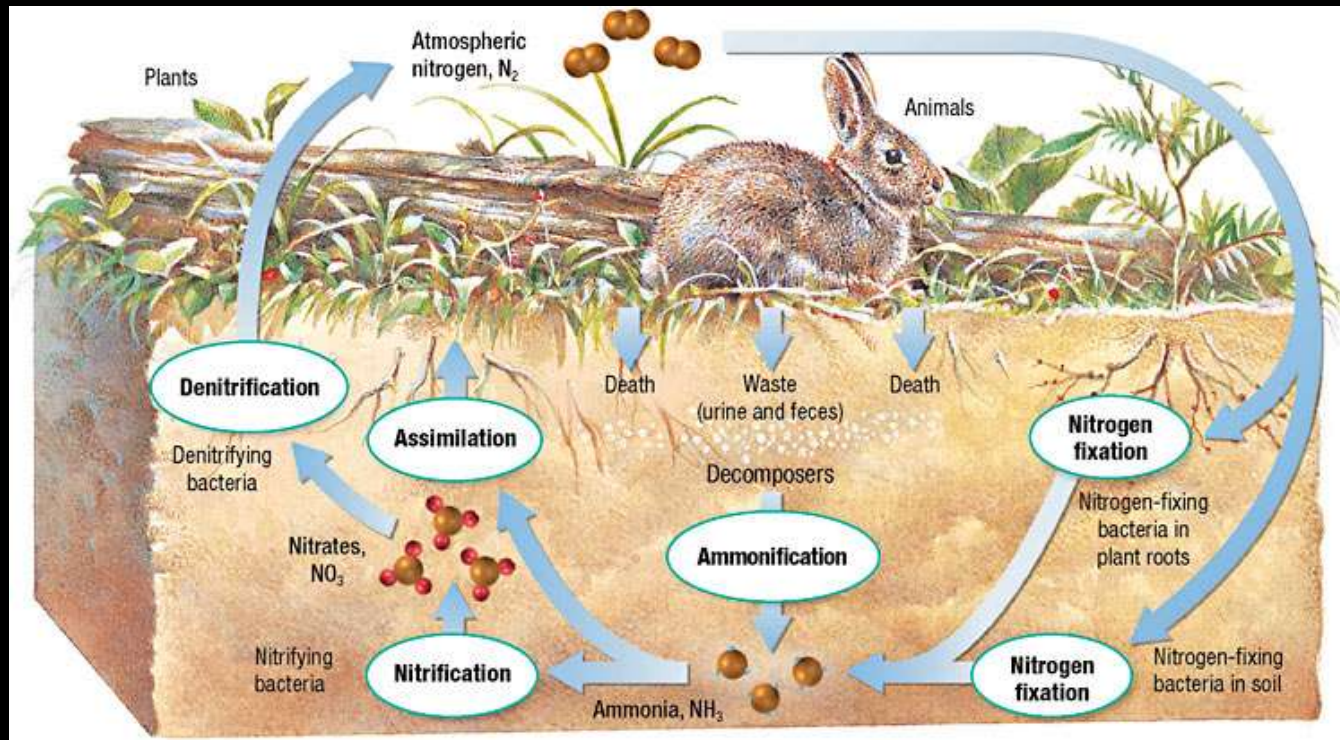
Nitrogen Cycle

Nitrogen fixation – soil bacteria and lightening combine N_2 with H to make ammonia



Nitrogen Cycle

Assimilation – Plant roots absorb
Nitrogen (N)

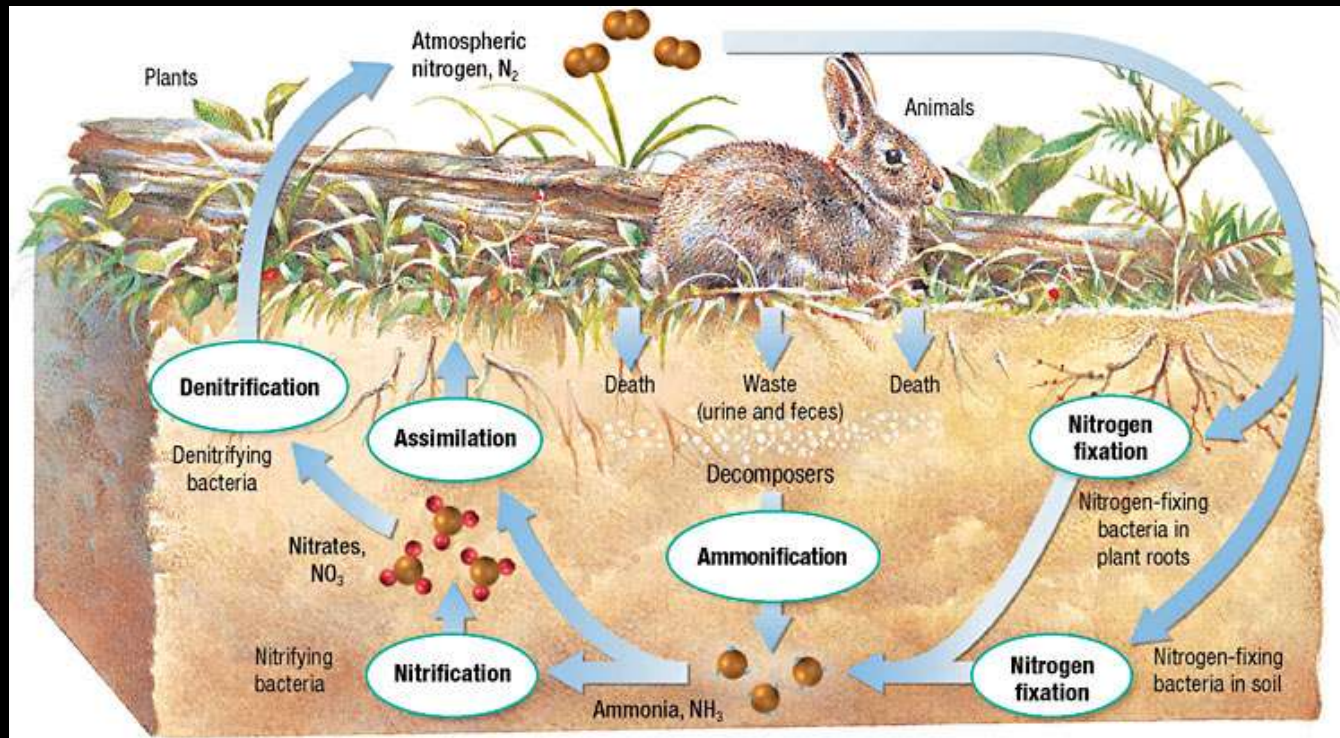


Nitrogen Assimilation

The formation of organic nitrogen compounds like **amino acids** from inorganic nitrogen compounds present in the environment. Organisms like plants, fungi and certain bacteria that cannot fix nitrogen gas (N_2) depend on the ability to assimilate nitrate or ammonia for their needs. Other organisms, like animals, depend solely on organic nitrogen from their food.

Nitrogen Cycle

Ammonification – waste and decomposing organisms return NH_3 to the soil



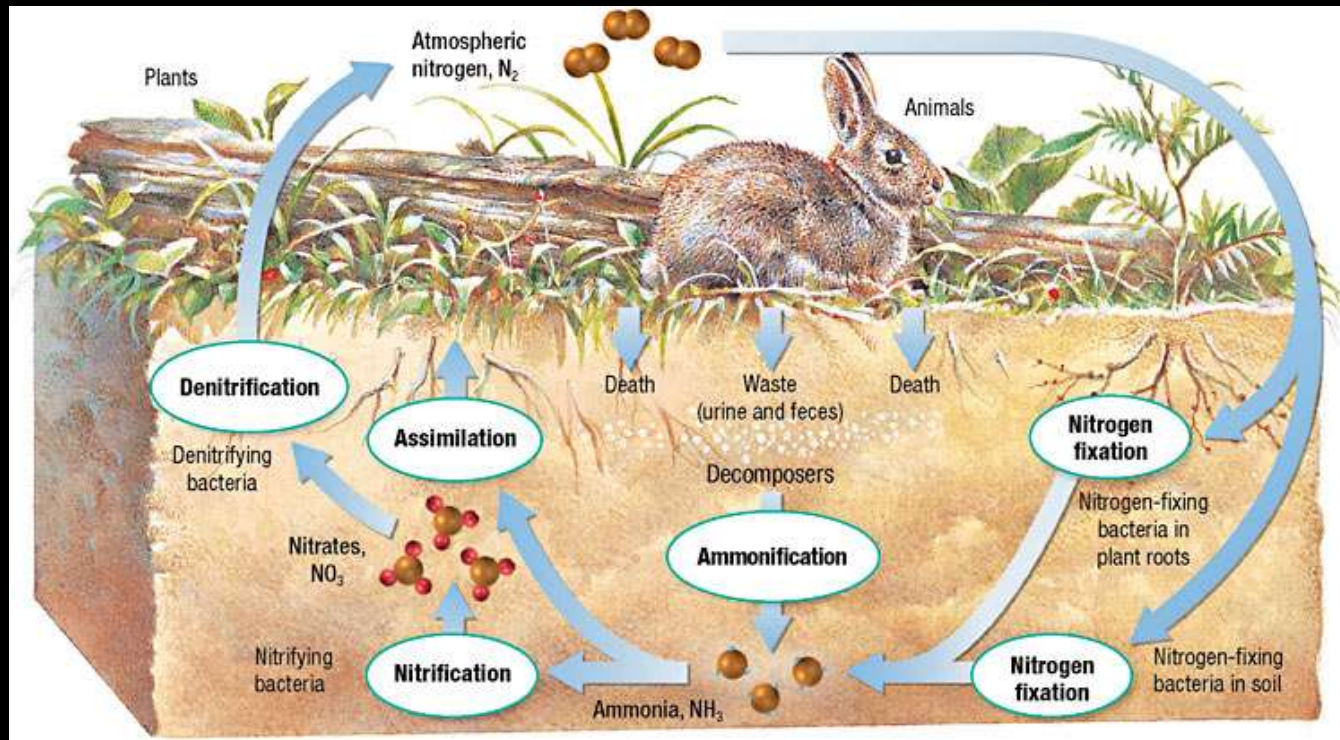
Ammonification

When a plant or animal dies, or an animal expels waste, the initial form of nitrogen is organic.

Bacteria, or fungi in some cases, convert the organic nitrogen within the remains back into ammonium (NH_4^+),

Nitrogen Cycle

Nitrification – Nitrite (NO_2) to Nitrate (NO_3)



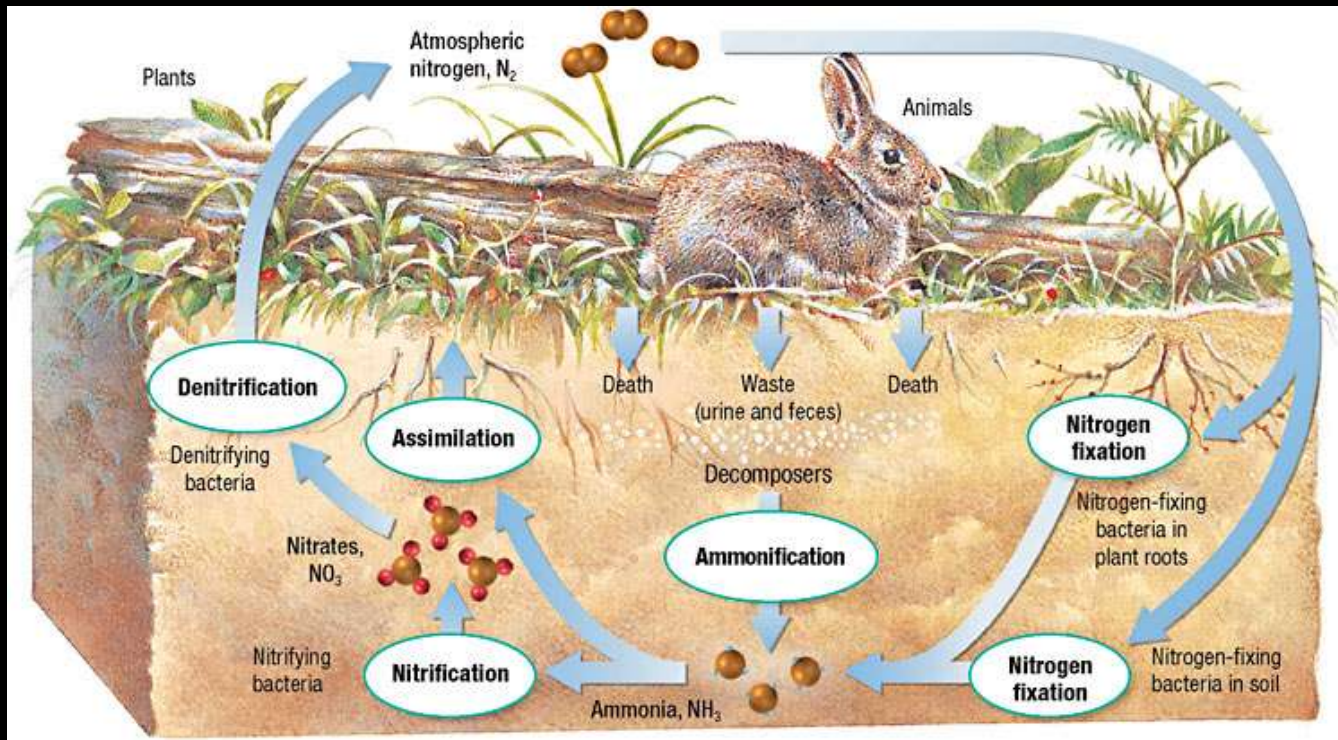
Nitrification

The biological oxidation of ammonia with oxygen into nitrite followed by the oxidation of these nitrites (NO_2) into nitrates (NO_3).

Nitrification is an important step in the nitrogen cycle in soil

Nitrogen Cycle

Denitrification – Nitrate to N gas



THINK, SHARE, WRITE, (TSW) #8

Explain the role of bacteria in the nitrogen cycle.

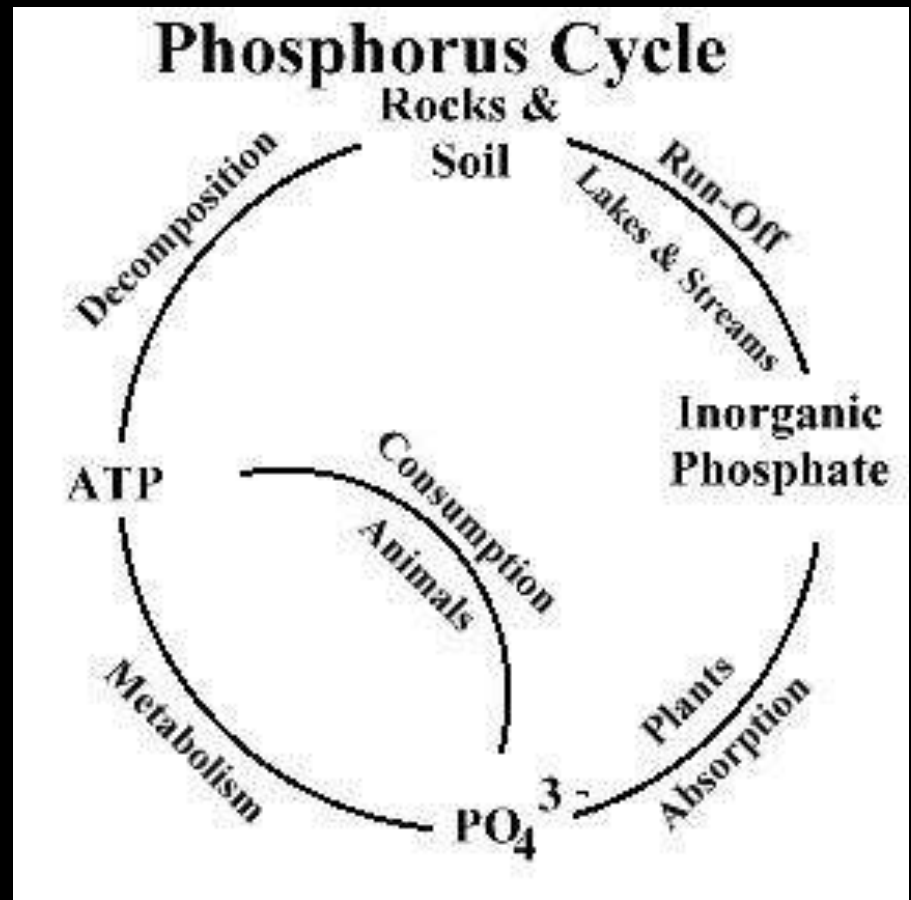
THINK, SHARE, WRITE, (TSW) #8

Explain the role of bacteria in the nitrogen cycle.

Bacteria breaks down N_2 into a form that other organisms can use.

Phosphorus Cycle

The continuous movement of **phosphorus** through **living** things to make **ATP** and **Nucleic Acids (DNA and RNA)**.



THINK, SHARE, WRITE, (TSW) #9

How does phosphorus play a role in living organisms?

Phosphorus is absorbed by the roots of plants.

Use the climate graph for Turlock below to determine the average precipitation, the average high temperatures, and the average low temperatures

