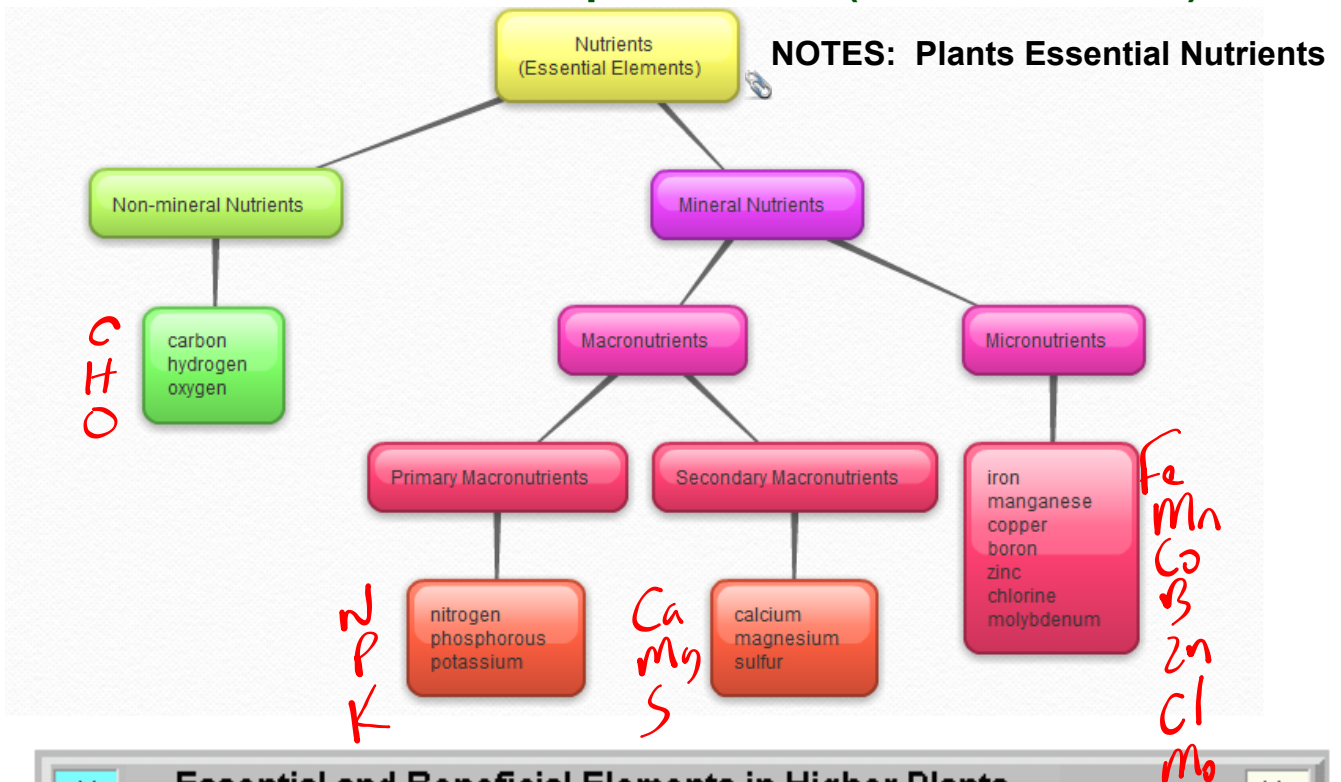


- 16 elements which most plants need (excludes nickel)...



Essential and Beneficial Elements in Higher Plants																	
H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Lr	Rf	Db	Sg	Bh	Hs	Mt									
		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb		
		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No		

**Remember: Energy flows through an ecosystem in one direction.**

## Nutrient Cycles

Nutrients are recycled through ecosystems...

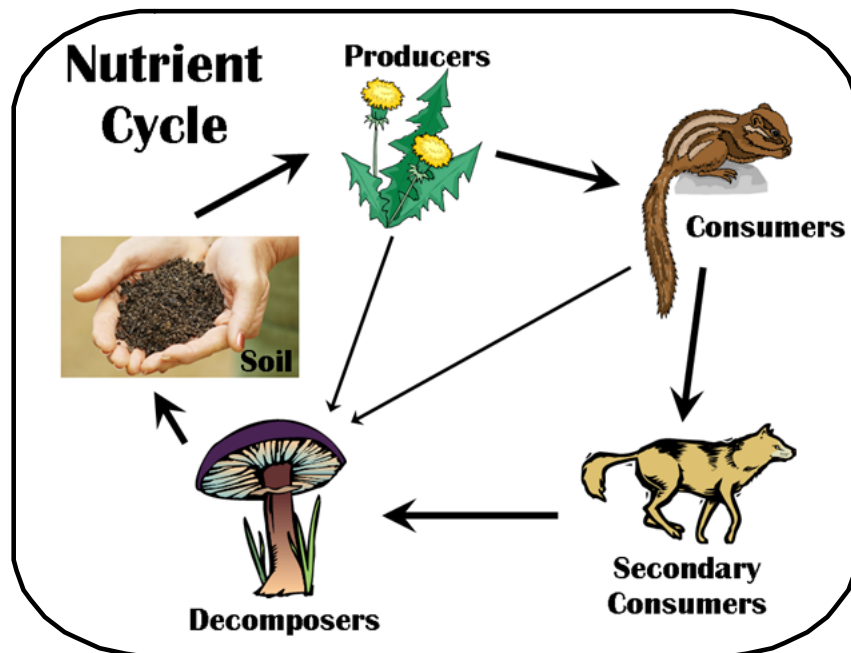
**Producers** get their nutrients from the soil, water and air.

**Herbivores** get nutrients when they eat producers.

**Carnivores** get nutrients when they eat herbivores.

**Decomposers** break down animal wastes and dead organisms.

The actions of decomposers release nutrients back into the soil, water and air so producers can use them again.



(Water and air not shown in this diagram.)

# Mineral Cycle

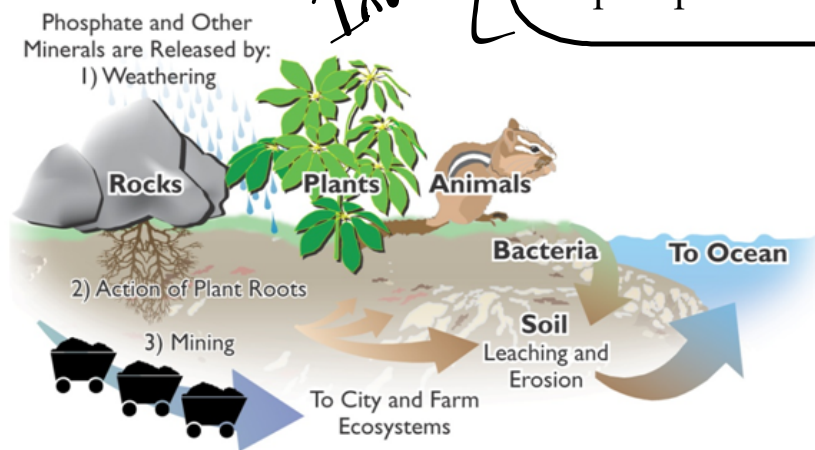
[Notes - Cycles.pdf](#)

*Terms  
Know*

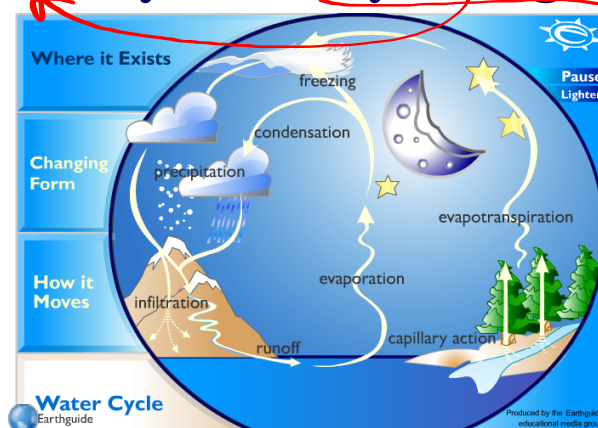
*Involve*

## Cycles to be studied:

1. water cycle
2. carbon cycle
3. nitrogen cycle
4. phosphorus cycle



## Water Cycle or Hydrologic Cycle



READ THE FOLLOWING ON THE WATER CYCLE.

**TEXT - Water and Nitrogen Cycles.pdf**

BE ABLE TO LABEL THE GIVEN DIAGRAM  
DEFINE EACH OF THE FOLLOWING...

1. **transpiration** - loss of water through the pores in the leaves of plants.
2. **evaporation** - water vaporizes into the air.
3. **condensation** - water forms into a liquid form.
4. **precipitation** - collects in clouds and falls to the ground as rain/snow.
5. **surface runoff** - water that travels on the ground to a stream, pond or other body of water.
6. **percolation/infiltration** - water soaks into the ground.
7. **ground water** - water found within bedrock.
8. **capillarity** - water movement from the soil up to the roots of a plant.

Taken from 'Investigating Terrestrial Ecosystems (Green Text)

pages 43-44

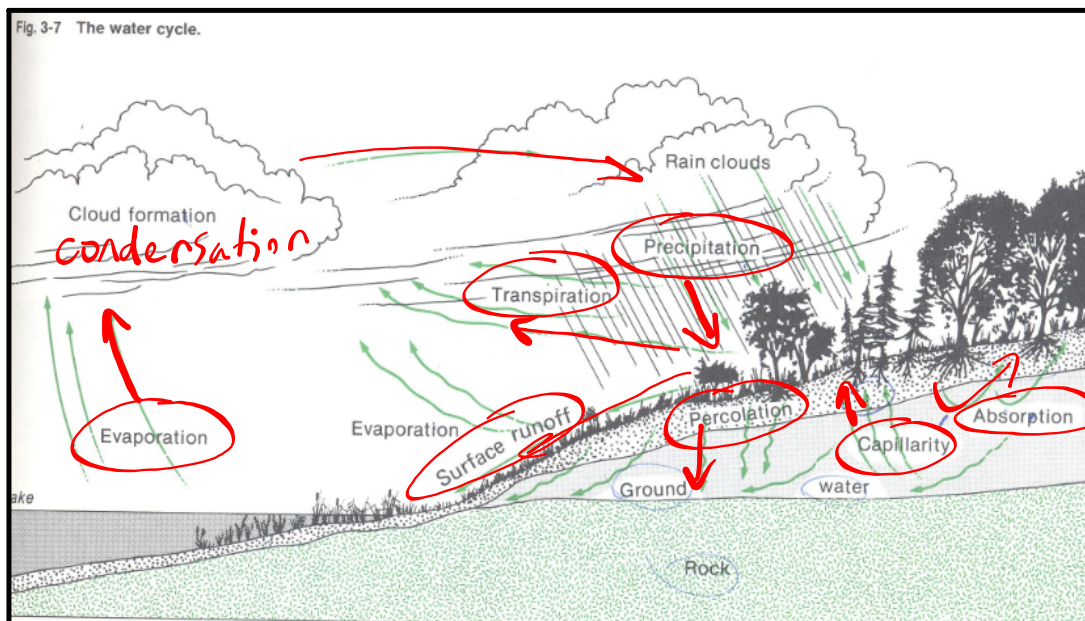
# The Water Cycle

The hydrogen and oxygen atoms in water are nutrients organisms need. These nutrients are recycled through ecosystems as follows.

Water vapour enters the atmosphere through **transpiration** from vegetation. (Transpiration is the loss of water through pores in the leaves of plants.) It also enters the atmosphere by evaporating from bodies of water and the soil (Fig. 3-7). In the cool upper atmosphere this vapour condenses, forming clouds. In time, enough water collects in the clouds to cause **precipitation**. When this happens, some of the water that falls on the ground runs along the surface of the ground to a stream, pond, or other body of water. This water is called **surface runoff**. But some of the water also soaks into the ground by a process called **percolation**. Some water percolates down to the bedrock. Then it becomes **ground water** and gradually runs back to lakes and other bodies of water.

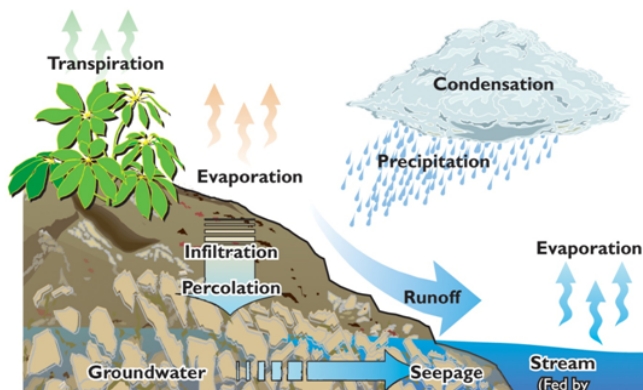
Some of the water in the soil moves up to the roots of plants by **capillarity**. The roots absorb the water. This is how most plants get the hydrogen and oxygen they need. Animals can obtain water by eating plants or by eating other animals. Of course, they can also obtain it by drinking water directly from a body of water.

Finally, when plants and animals die, they decompose. During this process, the water in their tissues is released back into the environment.





## Water Cycle



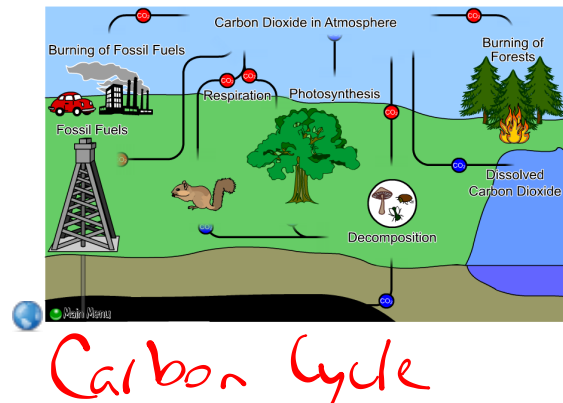
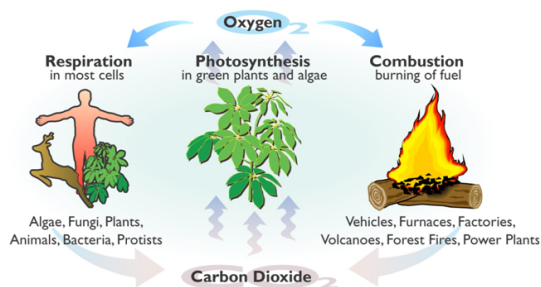
### Did you know?

- A fixed amount of water recirculates around the Earth.
- Water moves in certain directions from place-to-place (reservoir-to-reservoir) by only certain processes and pathways.
- Some processes of transfer are rapid while others are much slower.
- A conceptual "reservoir" of water is not quite the same thing as a reservoir in which water is stored.
- When land-based glacial ice melts and runs off into the sea, sea level rises.
- When land-based glacial ice forms, sea level drops.
- When floating icebergs melt into the sea, sea level doesn't change.
- Glacial ice is made up of freshwater that had previously fallen as snow.
- Evaporation of seawater requires an input of energy; condensation of clouds releases energy.

# Carbon Cycle

Carbon is needed by all living things and cycles through ecosystems.

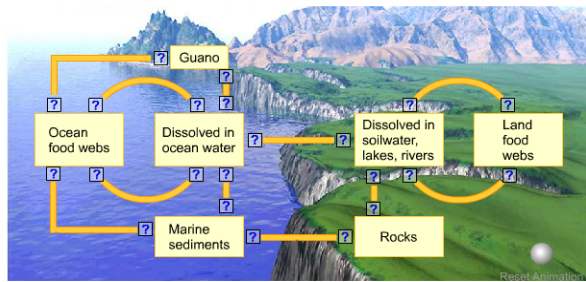
## Carbon-Oxygen Cycle



- Some organic matter does not decompose easily. Instead, it builds up in the earth's crust. Oil and coal were formed from the build-up of plant matter millions of years ago.
- At one time the carbon cycle was almost a perfect cycle. Carbon was returned to the atmosphere as quickly as it was removed. The increased burning of fossil fuels is adding carbon to the atmosphere faster than producers can remove it.

## Phosphorus Cycle

Many important molecules within cells contain phosphorous atoms. For example, ATP (adenosine triphosphate) is found in every living cell and plays a key role in energy storage and supply.



Complete this diagram by clicking on one end of each orange line to make it into an arrow that shows the direction of phosphorus flow. Mouse over the middle of a line to identify the process represented by that arrow.

\* Phosphorus is found in ATP  
 ↓  
 Kreb's Cycle

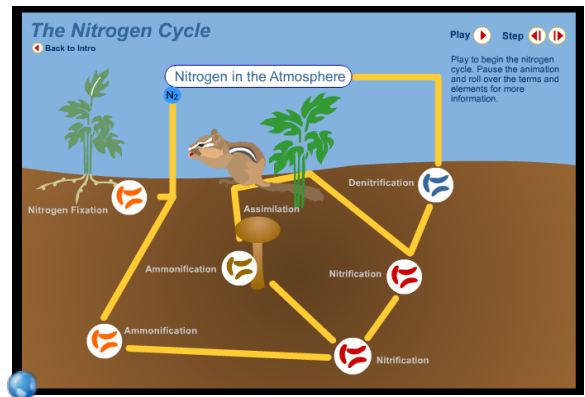
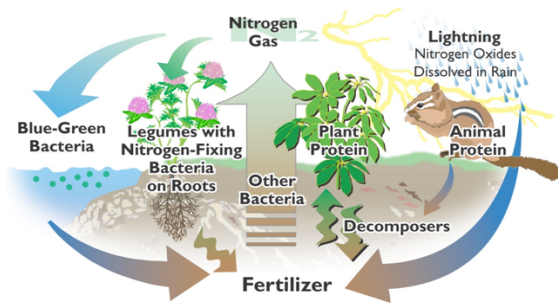
Phosphorus normally occurs in water and soil in inorganic compounds. Phosphates ( $PO_4$ ) are a common form. These compounds are absorbed by plants and used to make organic compounds such as ATP. When animals eat plants, phosphorus is passed on to them. When dead plants, dead animals, and fecal matter decay, organic forms of phosphorus are released into the water or soil. Bacteria decompose these organic forms into inorganic forms. Then, the cycle begins again.



# Nitrogen Cycle → found in DNA → chlorophyll (plants)

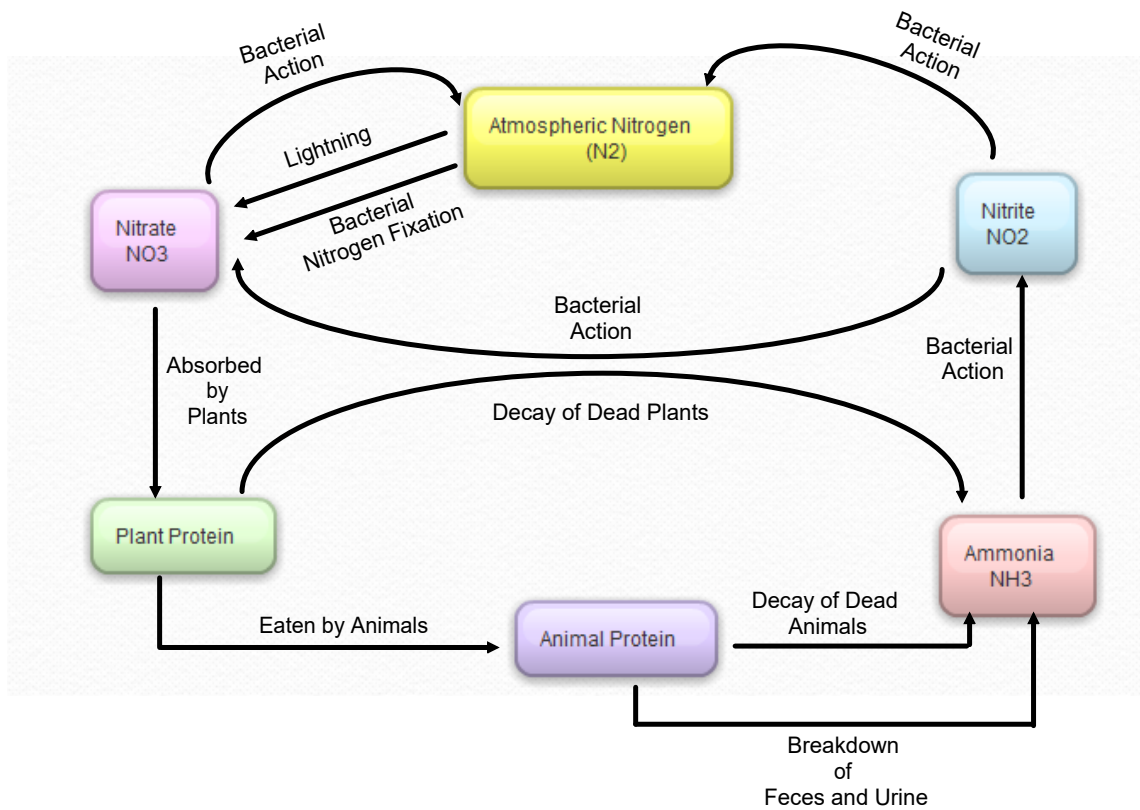
Nitrogen is an element essential to life. It is found in proteins, DNA (deoxyribonucleic acid), and in chlorophyll molecules.

## Nitrogen Cycle



# SOLUTION...

<https://bubbl.us/>



\*nitrogen fixation - the changing of nitrogen to nitrates

## Attachments

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Essential Nutrients for Plants.pdf

Notes - Cycles.pdf

TEXT - Water and Nitrogen Cycles.pdf