

CYCLES OF THE EARTH

From <http://www.realtrees4kids.org/sixeight/cycles.htm>

In nature, the materials needed by all organisms in an ecosystem are reused or recycled. **Nitrogen**, **carbon**, **oxygen**, and other **nutrients** move through ecosystems in a predictable pattern or cycle. These nutrient cycles in nature are called biogeochemical cycles.

Look at the word biogeochemical and see if you can figure out what these cycles are all about.

- **Bio** means "life".
- **Geo** means "earth".
- **Chemical** means "of or relating to chemistry".

From those meanings, you could say that biogeochemical is a word that we would describe the connections between plants and animals, the earth, and the chemistry of how they live.

Let's look further. Plants and animals are pretty easy to understand. They are the living parts of an **ecosystem** or habitat. The earth is also pretty easy to understand. It's the habitat or location where an organism lives.

It's the chemistry that you might find a bit tricky. The nutrients needed and used by all living things are made up of chemical **elements** and molecules. This is the chemistry of life.

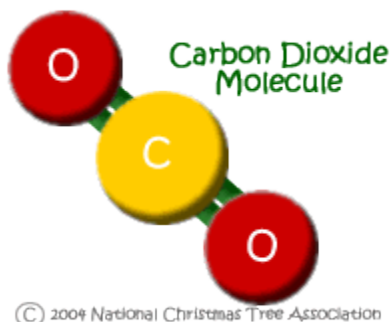
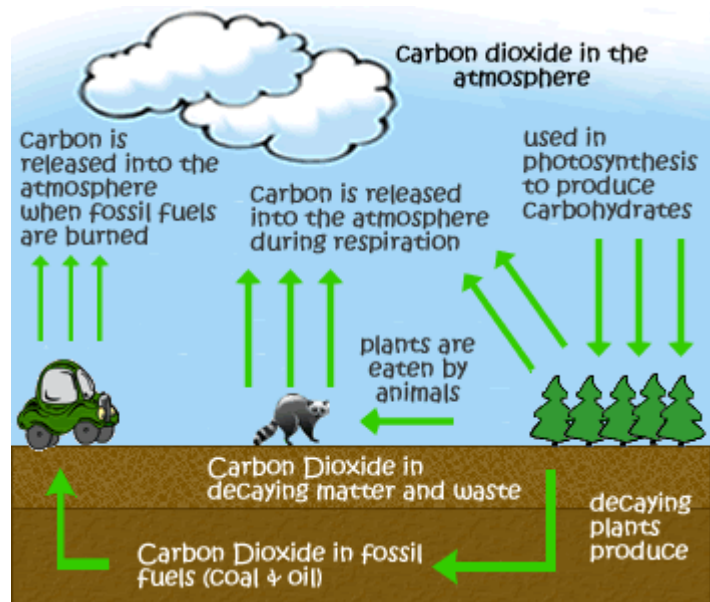
This section is going to take a look some of the ways these chemicals or nutrients are cycled through

nature. Without these cycles, living things could not survive.

The Carbon Cycle

Carbon is an element found in nature. It's in the graphite that make up the "lead" of your pencil. It's found in the shiniest diamonds and in the gasoline we use to run our cars. It's one of the most important elements found on earth. Carbon is also found in all living organisms. In fact, living things are full of carbon!

Carbon is one of the elements that cycles through nature. The Carbon Cycle is one of the biogeochemical cycles.



During **photosynthesis**, plants combine **carbon dioxide** from the air and hydrogen from water to make carbohydrates. Some of these carbohydrates are stored in the tissues of the plant. Others are used by the plant for energy.

When that plant is eaten, the cells of the animal break down the plant's tissues during digestion. This releases the stored carbon and other nutrients into the animal's system.

As the animal breathes out (exhales), carbon dioxide is released into the air (atmosphere) and the cycle can begin again. This is known as respiration.

Respiration is not the only way carbon makes it into the air (atmosphere). Carbon and/or carbon dioxide is also released when dead plants and animals are decomposed and when fossil fuels are burned.

The Nitrogen Cycle

Nitrogen is the most common gas found in the earth's atmosphere. It is necessary for plant growth. In fact, it's necessary for the survival of all ecosystems!

Free nitrogen - the nitrogen found in the atmosphere, animal wastes, and dead and decaying organisms - is all around. However, only a few organisms can use it just as it is. These organisms "fix" the nitrogen for all other organisms to use. They are called nitrogen fixing bacteria.

Nitrogen Gas



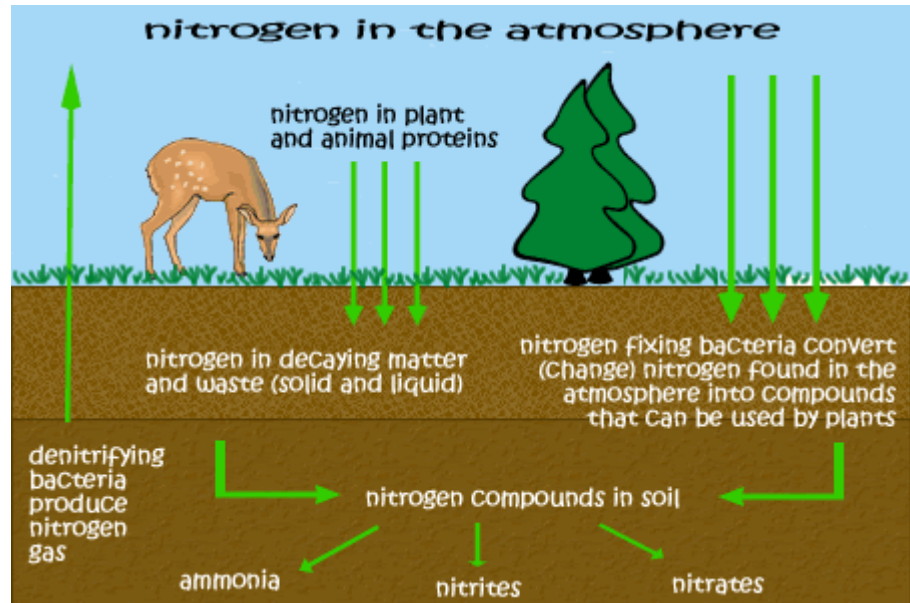
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You might find it helpful to study the nitrogen cycle in two parts!

Let's get started.

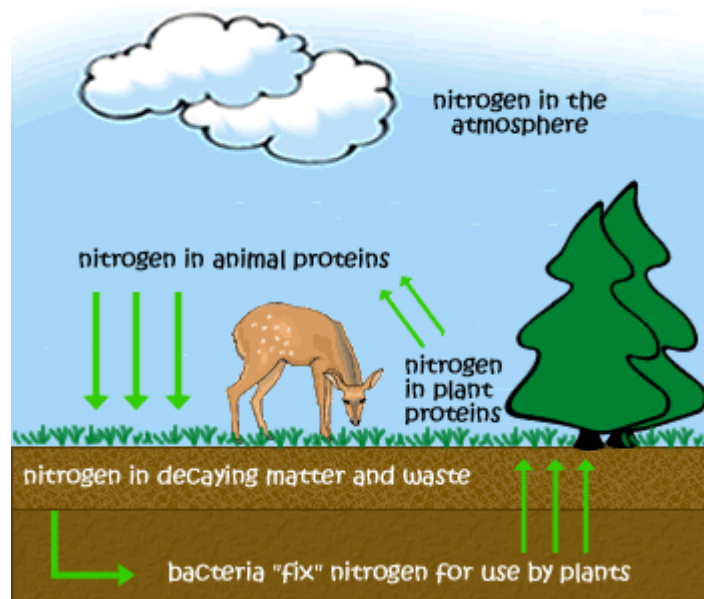
In the nitrogen fixation part of the cycle, nitrogen-fixing bacteria found in the soils and in the roots of certain plants, change (or convert) free nitrogen into substances that other organisms can use. When the fixing process is finished, free nitrogen is converted into nitrates, nitrites, and ammonia. These substances can be used by plants. As the plants become food, the nitrogen can be used by animals.

Just as there are nitrogen-fixing bacteria, some bacteria have the job of denitrifying the soil to keep the nitrogen in balance. These bacteria take the nitrogen compounds and return them to nitrogen gas that is released back into the atmosphere.

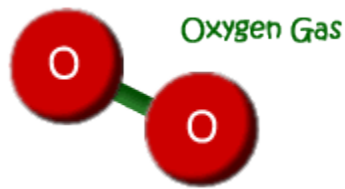


In another part of the cycle, animals eat plants containing usable nitrogen. That nitrogen returns to the soil as organic material -- animal waste, decaying plants and animals -- which are decomposed by bacteria and other decomposers.

As in the first part of the cycle, denitrifying bacteria keep the nitrogen level in the soil balanced.



The Oxygen Cycle



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You know that oxygen is a must for life. Oxygen gas makes up about 21% of the air in the earth's atmosphere. Green plants are key to keeping the oxygen cycle going.

During [photosynthesis](#), plants use water from the soil, energy from the sun, and carbon dioxide to make simple sugars. During this process, molecules are split into their basic elements.

The basic elements of a water molecule are atoms of hydrogen and oxygen. In photosynthesis, the hydrogen is combined with carbon atoms. This allows oxygen to be released into the atmosphere. It's one of the products of photosynthesis.

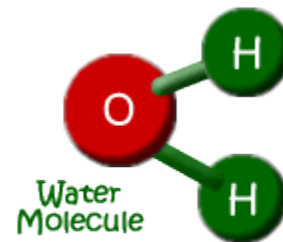
Oxygen is used in the process of respiration. This process releases water into the atmosphere. The water is absorbed by plants and the cycle can begin again!

The Water Cycle

Water, like other nutrients, cycles through nature. The cycle begins when the energy from the sun causes water to evaporate.

Look closely at the word **evaporate**. You can see the word "vapor" sitting right in the middle! During evaporation, water becomes water vapor and is returned to the atmosphere.

Water in this part of the cycle comes from many places. Some of these places include: oceans, ponds, lakes, streams, leaves (needles) of plants, soil, glasses of water, and from your body as you sweat (perspire).



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Water vapor in the atmosphere begins to cool. As it does, it condenses and forms droplets of water. When these droplets become too heavy and dense to remain in the atmosphere, they fall to the earth. You know this as precipitation (like rain or snow).

As precipitation falls, some of it evaporates immediately. Some of it soaks into the ground. Water that does this is called groundwater. Not all of the precipitation can soak into the soil. This excess water becomes what is called runoff. This is the water that moves from land back into lakes, streams, ponds, and the ocean.

Groundwater is used by plants immediately. Roots gather the water needed for photosynthesis. As the sun shines down and provides more energy, water begins its return to the atmosphere.