

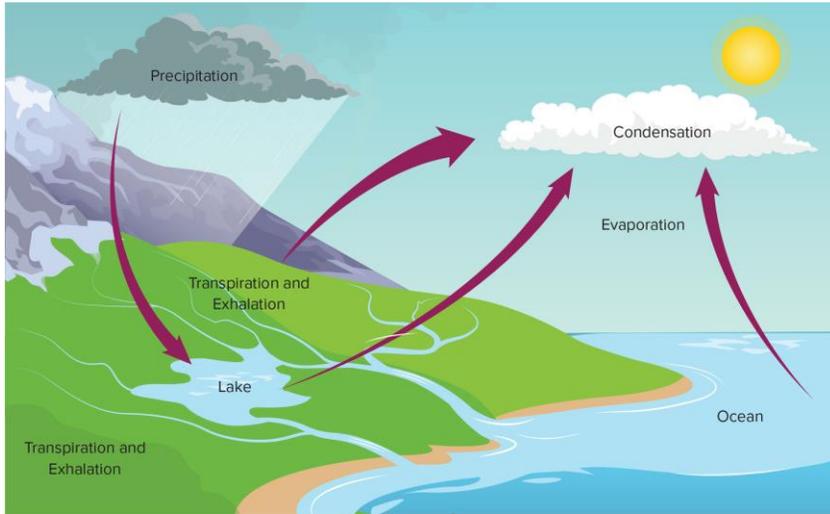
12.2- Cycles of Matter

How does matter move in ecosystems?

Water moves continuously through ecosystems. It is used over and over again. The same is true of carbon, oxygen, nitrogen, and other types of matter. This idea is called the **law of conservation of mass**. Elements that move through one matter cycle may also play a role in another, such as oxygen's role in the water cycle.

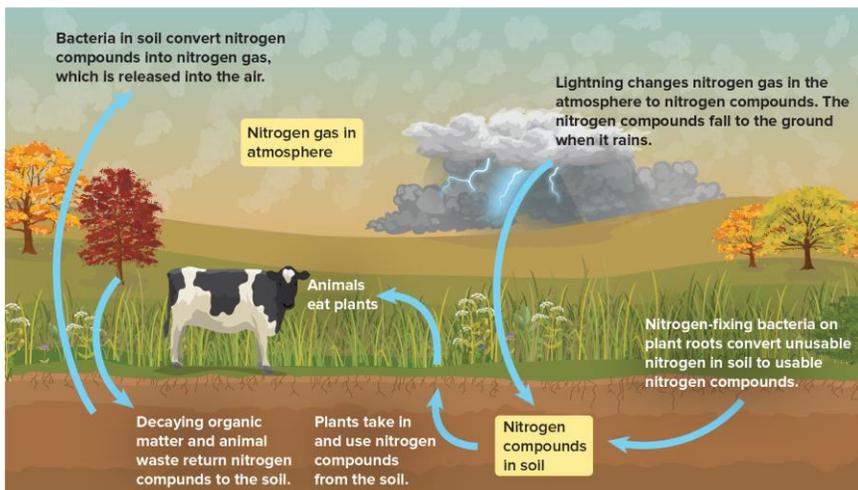
The Water Cycle:

-Water continually cycles from Earth to its atmosphere and back again. This movement of water is called **the water cycle**. The three major processes include: **evaporation, condensation, and precipitation**.



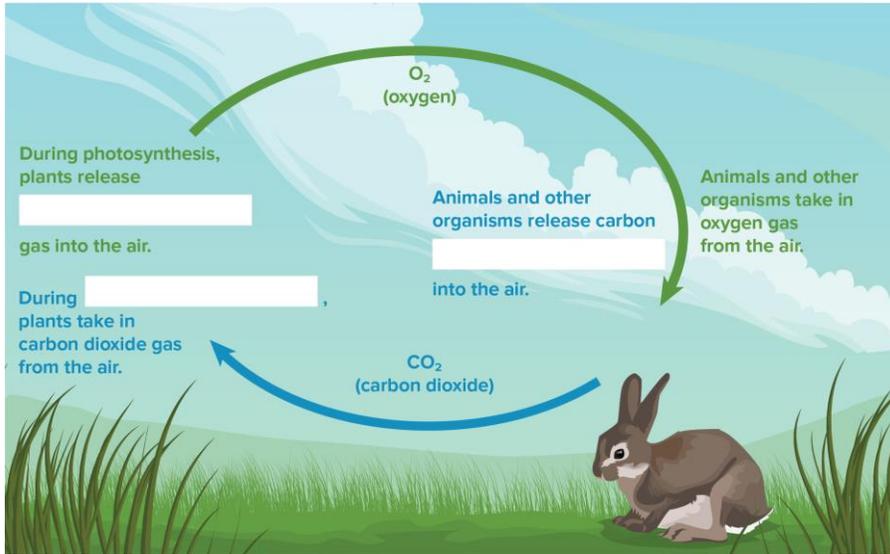
The Nitrogen Cycle:

Just as water is necessary for life on Earth, so is the element nitrogen. It is an essential part of proteins, which all organisms need to stay alive. Nitrogen is also an important part of DNA, the molecule that contains genetic information. Nitrogen, like water, cycles between Earth and its atmosphere and back again.



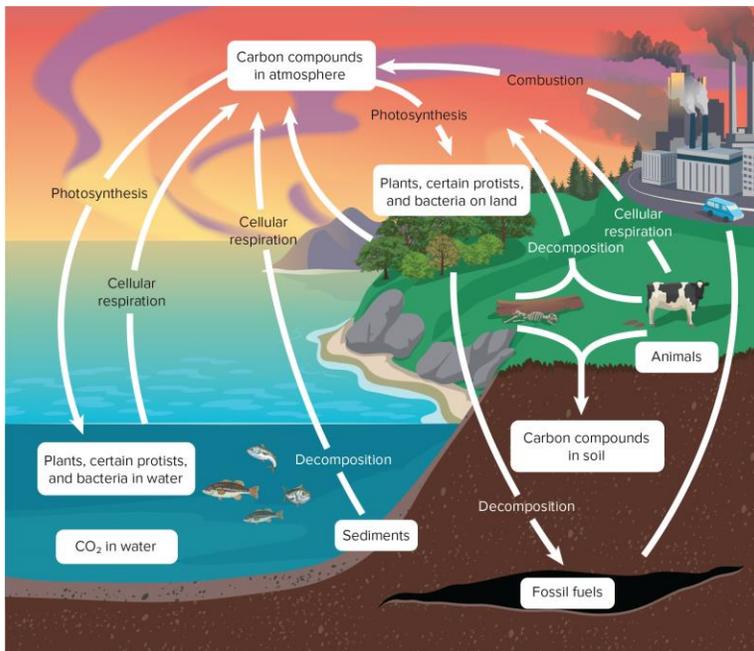
The Oxygen Cycle:

Almost all living things need oxygen for cellular processes that release energy. Oxygen is also part of many substances that are important to life, such as carbon dioxide and water. Oxygen cycles through ecosystems, as shown below.



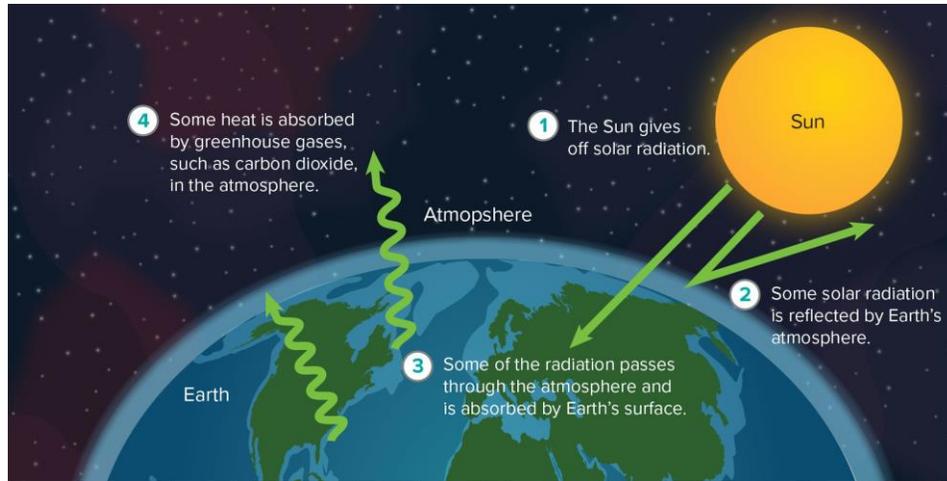
The Carbon Cycle:

All organisms contain carbon. It is part of proteins, sugars, fats, and DNA. Some organisms, including humans, get carbon from food. Other organisms, such as plants, get carbon from the atmosphere or bodies of water.



The Greenhouse Effect:

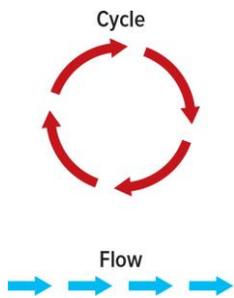
Carbon dioxide is one of the gases in the atmosphere that absorbs thermal energy from the Sun and keeps Earth warm. This process is called the greenhouse effect.



12.3- Energy in Ecosystems

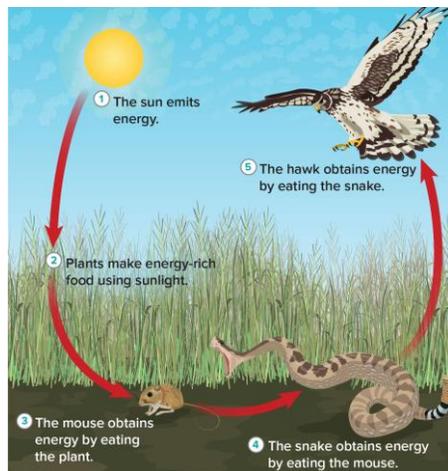
How does energy move in ecosystems?

Each movement made by a living thing requires energy. All of life's functions, including growth and reproduction, require energy. The main source of energy for most life on Earth is the Sun. Unlike other resources, such as water and carbon, energy does not cycle through ecosystems. Instead, energy flows in one direction, as shown to the left.



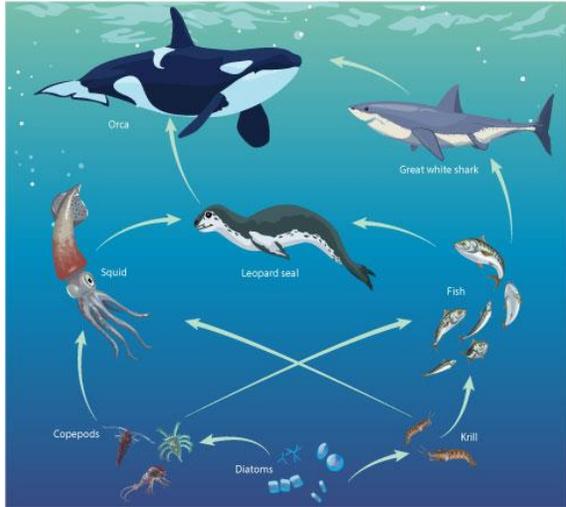
Modeling Energy in Ecosystems

Scientists use models to study this flow of energy through an ecosystem. They use different models depending on how many organisms they are studying.



Food Webs

Scientists use a model of energy transfer called a **food web** to show how food chains in a community are interconnected, as shown below.



Energy Pyramids

Scientists use a model called an **energy pyramid** to show the amount of energy available in each step of a food chain, as shown below.

