The carbon cycle is the movement of carbon through Earth's systems. Carbon is an element. An element is a basic substance made of one type of atom. Carbon atoms are the backbone of life. Every living thing on Earth contains carbon. Your muscles, your skin, your brain — all built from carbon-based molecules.

The carbon cycle describes how carbon moves between the atmosphere (air), the biosphere (living things), the hydrosphere (water), and the geosphere (rocks and soil). A cycle means it repeats. Carbon does not disappear. It changes form and location.

Start in the air.

In the atmosphere, carbon is mostly found as carbon dioxide. Carbon dioxide is a gas made of one carbon atom bonded to two oxygen atoms. Plants take in carbon dioxide during photosynthesis. Photosynthesis is how plants use sunlight to make food. When plants take in carbon dioxide, they use the carbon atoms to build glucose. Glucose is a sugar molecule that stores energy.

So carbon moves from the air into plants.

Now animals eat plants. When you eat fruit, vegetables, or grains, you are taking in carbon that was once in the air. That carbon becomes part of your body. It helps build proteins, fats, and carbohydrates. Carbon moves from plants into animals through consumption. Consumption means eating.

Now consider respiration. Respiration is the process by which cells break down glucose to release energy. When animals and plants perform cellular respiration, they release carbon dioxide back into the atmosphere. So carbon moves from living organisms back into the air.

Now think about what happens when organisms die.

When plants and animals die, decomposers break them down. Decomposers are organisms like bacteria and fungi that break down dead material. During decomposition, carbon stored in bodies is released back into the soil and the atmosphere. Some becomes carbon dioxide again.

Some carbon, however, does not return to the atmosphere quickly. Over millions of years, buried plant and animal material can transform under pressure and heat into fossil fuels. Fossil fuels include coal, oil, and natural gas. These are long-term carbon storage forms.

When humans burn fossil fuels for energy, carbon that was stored underground for millions of years is released back into the atmosphere as carbon dioxide. Burning is called combustion. Combustion is a chemical reaction between a fuel and oxygen that produces heat and carbon dioxide.

Now let's talk about the ocean.

The ocean absorbs carbon dioxide from the atmosphere. When carbon dioxide dissolves in water, it can form carbonic acid. Carbonic acid can break apart into bicarbonate and carbonate ions. These forms allow carbon to be stored in ocean water.

Marine organisms like shellfish use carbonate to build shells. Their shells are made of calcium carbonate. When these organisms die, their shells can sink and become part of ocean sediments. Over long periods, this sediment can form limestone rock. Limestone is a sedimentary rock made largely of calcium carbonate.

So carbon can move from the air into the ocean, into shells, into rock.

That is long-term storage.

Volcanoes can release carbon back into the atmosphere from deep within Earth. Volcanic eruptions release carbon dioxide that was stored in rocks and magma.

Now step back and look at the big picture.

Carbon moves from air to plants through photosynthesis. It moves from plants to animals through eating. It moves from living things back to the air through respiration. It moves into soil through decomposition. It moves underground over long time periods to become fossil fuels. It moves into oceans by dissolving and forming shells and sediment. It returns to the air through combustion and volcanic activity.

That continuous movement is the carbon cycle.

Now let's talk about balance.

For most of Earth's history, the carbon cycle stayed roughly balanced. Carbon released into the atmosphere was roughly equal to carbon removed by photosynthesis and ocean absorption. But human activity has changed that balance.

When we burn fossil fuels, we release carbon that was locked away for millions of years. This adds extra carbon dioxide to the atmosphere faster than natural systems can remove it.

Carbon dioxide is a greenhouse gas. A greenhouse gas traps heat in the atmosphere. It allows sunlight to enter but slows the escape of heat. When carbon dioxide levels rise, more heat is trapped. This contributes to global warming.

Global warming refers to the long-term increase in Earth's average temperature.

Deforestation also affects the carbon cycle. Trees store carbon in their wood. When forests are cut down or burned, that stored carbon returns to the atmosphere. At the same time, there are fewer trees available to remove carbon dioxide through photosynthesis.

The carbon cycle operates on different time scales. Some processes are fast, like respiration and photosynthesis. These happen daily. Other processes are slow, like fossil fuel formation and limestone formation. These take millions of years.

Understanding the carbon cycle helps explain climate change, ocean chemistry changes, and ecosystem health.

At its core, the carbon cycle is the path carbon atoms take as they move through air, water, soil, rocks, plants, animals, and back again.

If you remember one simple foundation, remember this: carbon is constantly moving and changing form, but it never disappears. Life depends on that movement. The climate depends on that balance.