

## Conservation of Matter and Energy

Matter is not created or destroyed is a simple definition of conservation of matter; meaning that if we consider matter at the atomic level, the small particles are not created or destroyed. We can trace these atoms and molecules through a system.

A common misconception is that plants “create” energy through photosynthesis. Another common misconception is that when something decomposes, the stuff just goes away. How the ideas of conservation of matter and energy specifically apply to the forest ecosystem is covered here.

### Conservation of Matter

A good working definition of matter is anything that has mass and takes up space. When somebody says that matter is not created or destroyed, he or she is usually talking about matter the size of atoms. This contradicts our everyday experiences, because when a tree burns down or we light a match, the wood is destroyed. However, the atoms that make up the wood have been converted from one form to another; they have been converted from the solid wood to carbon dioxide, water vapor, and ash.

Thinking in terms of conservation of matter is necessary when considering either the carbon cycle or the nutrient cycle in the forest ecosystem.

Tracing an atom, or group of atoms, through either the nutrient cycle or carbon cycle is a useful thought experiment to conduct.

Cross reference to nutrient cycle and photosynthesis

Cross reference to GLAD strategy on “destroy” compare and contrast

### Conservation of Energy

A good working definition of energy is the ability of a physical system to do work on another physical system. When considering the types of energy in the forest ecosystem it is useful to consider the following four

*Chemical Potential Energy*

*Kinetic Energy*

*Heat Energy*

*Light Energy*

Of these four, chemical potential energy is probably the least understood. Atoms form bonds with other atoms to form molecules by transferring some of their energy. It takes energy to break the bonds between atoms. When the bonds of a glucose molecule (a basic sugar that is

produced through photosynthesis) are broken the atoms will rearrange themselves into different molecules, usually carbon dioxide and water. The carbon, hydrogen, and oxygen atoms in the form of carbon dioxide and water have a lower potential chemical energy, so the rest of the energy is made available to do work.

Energy is conserved, but it can also be converted from one form to another. Following how energy flows through a system is a useful thought experiment to conduct.

For more information refer to:

- Energy Flow
- Photosynthesis and Respiration