



# Lesson 9

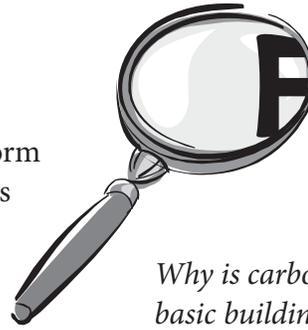
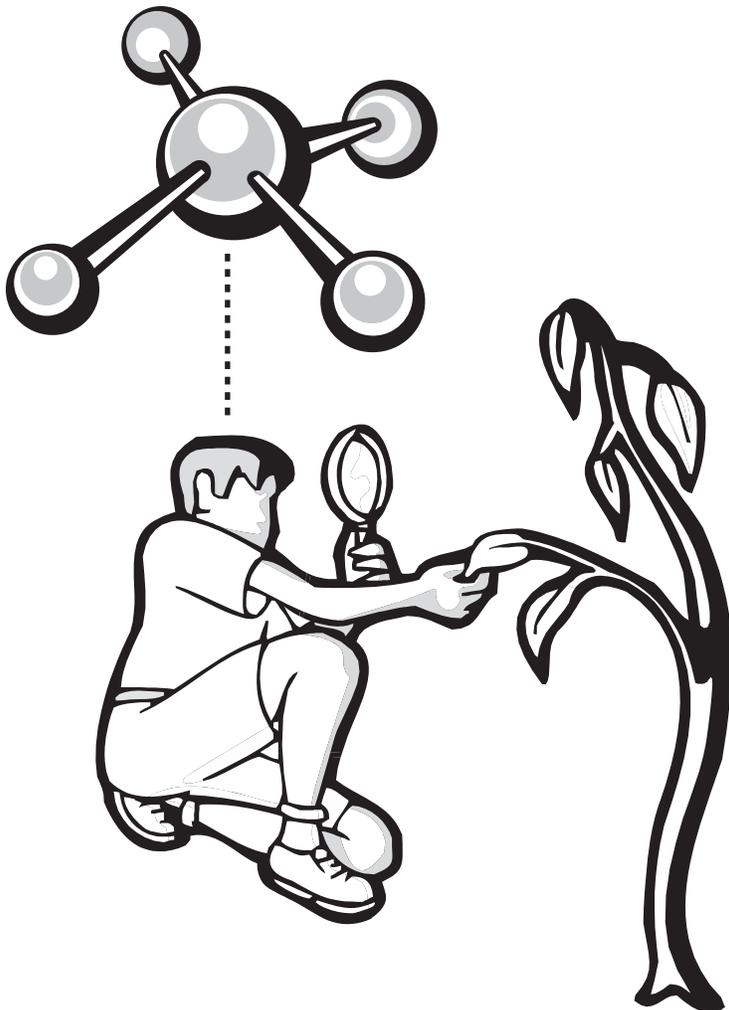
## Forests, Carbon & Our Climate

### Objectives:

1. To understand that carbon cycles from one form to another and the role that forests play in this process.
2. To understand where and how carbon is stored.
3. To understand how forests can play a role in offsetting climate change.

### Subjects:

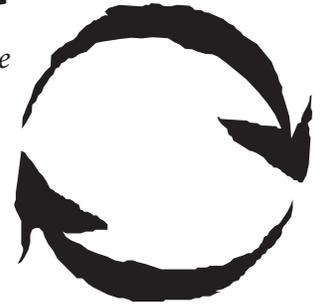
1. Science: Ecology & Chemistry
2. Reading / Language Arts



### Focus:

#### Establish the basic carbon cycle

*Why is carbon important? It is the basic building block of nearly all molecules that make up living organisms. It is in sugars, DNA, proteins, fats... etc.*



Carbon is in most things around us; people, plants, trees, soil, oceans, and even the air we breathe. There is only a certain amount of carbon in, on, and around the Earth. The total amount of carbon stays the same, it just changes from one form to another. This is called a cycle.

The Carbon Cycle is the movement of carbon, in its many forms, between the biosphere (all of the Earth's living organisms), atmosphere (the gaseous envelope surrounding the Earth), hydrosphere (the Earth's supply of water), and geosphere (the solid part of the Earth).

#### Translated this means:

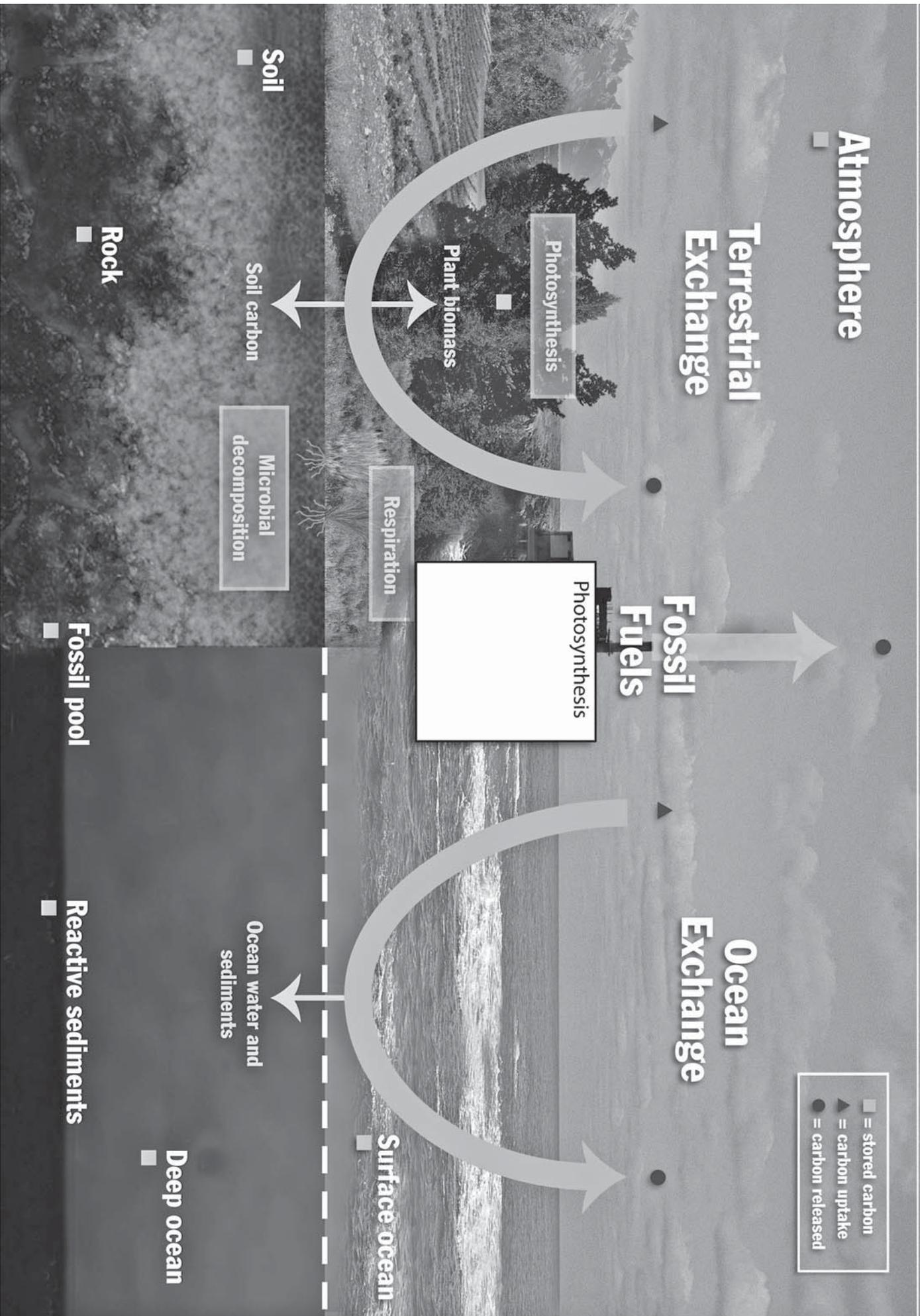
The Carbon Cycle is the movement of carbon, in its many forms, between:

1. All living plants and animals
2. The gas surrounding the Earth
3. Water
4. Soil and rocks

Show students the graphic of the Carbon Cycle. Point out that there are really only a few main pieces to the carbon cycle:

1. The Atmosphere
2. Ocean exchange
3. Fossil fuels emissions
4. Terrestrial exchange

# Simplified Global Carbon Cycle



# Vocabulary

- 1. Atmosphere:** the gaseous envelope surrounding the Earth.
- 2. Biomass:** the term biomass has two definitions: 1) the total mass of living matter within a given unit of environmental area; or 2) plant material, vegetation, or agricultural waste used as a fuel or energy source.
- 3. Carbon Cycle:** movement of carbon, in its many forms (solid, liquid, and gas), between the biosphere, atmosphere, hydrosphere, and geosphere.
- 4. Carbon Sequestration:** the removal and capture of available atmospheric carbon in plants, soils, oceans, or atmosphere. Trees in the forests, as well as forest products, are primary carbon sequestration mechanisms. Approximately 50% of wood consists of carbon. The place where the carbon is sequestered is often referred to as a carbon sink.
- 5. Decomposition:** the breakdown of organic material into smaller molecules which are then recirculated or used again by another organism. This is nature's way of recycling. During the process, carbon dioxide is released into the atmosphere.
- 6. Emission:** the act of releasing or putting a substance into circulation making it available for chemical reaction. Often the word emission is a term used to describe pollution such as the gases given off by an automobile or a large forest fire; however it can also be used to describe gases that are given off by a tree or a human and released into the air. Contrast with Sequestration.
- 7. Fossil Fuels:** fuels such as oil, natural gas, and coal. These combustible materials are found in the Earth's crust and are the remains of prehistoric organisms. Burning fossil fuels typically results in a release of high levels of carbon into the atmosphere. Fossil fuels are a non-renewable resource.
- 8. Global Warming:** the theory that Earth's surface temperature is rising as a result of the increased concentrations of various gases in the atmosphere called greenhouse gases.
- 9. Greenhouse Effect:** the effect of various gases within the Earth's atmosphere reflecting radiant energy back to the Earth's surface similar to the effect which occurs in a greenhouse. Greenhouse gases, such as CO<sub>2</sub> (carbon dioxide), methane, and ozone, insulate and warm the Earth's surface. Without the Greenhouse Effect, life on Earth, as we know it, would not be possible and there would be no liquid water on the Earth. The greenhouse effect may be enhanced by increased levels of greenhouse gases in the atmosphere thus causing a greater warming of the Earth's surface temperatures (Global Warming).
- 10. Photosynthesis:** the process whereby plants make the carbohydrates glucose, sucrose, and starch from sunlight, carbon dioxide, and water. During this process oxygen and water are released as byproducts. The carbon from the carbon dioxide is made into carbohydrates which are either used or stored. The carbohydrates that are used are converted to energy through the process of respiration; carbon dioxide and water are formed as byproducts. See Respiration. The carbon that is stored in the plant is said to be sequestered. See Carbon Sequestration.
- 11. Respiration:** the process whereby plants and animals convert carbohydrates, water, and oxygen into energy, carbon dioxide and water are released as byproducts of this process. Both photosynthesis and respiration occur in plants. The difference between the carbon uptake through photosynthesis and carbon release through respiration is called net carbon uptake and is the amount of carbon that is sequestered. See Photosynthesis.
- 12. Sequestration:** the act of forming a stable compound so it is not available for chemical reaction. Contrast with Emission. See also Carbon Sequestration definition above.
- 13. Sink and Source:** within the carbon cycle, a sink is any location where carbon is stored. A source is any location in the carbon cycle where carbon is released or made available for chemical reaction. Some examples of carbon sinks are forests, soil, and the ocean. A sink may be temporary. Carbon sinks can turn into carbon sources; for example, fossil fuels are sinks while they are buried in the Earth and wood is a sink. When the fossil fuels or wood are burned, carbon is released into the atmosphere and it is now called a carbon source.