

Activity 1.3: Carbon Pools Reading

Carbon is the most important element for living things. Every single living cell on Earth—plants, animals and humans—is made with carbon atoms that form organic molecules. Humans are about 18% carbon atoms by weight, and a human being who weighs 150 pounds contains about 7 hundred trillion trillion carbon atoms (that’s 7 followed by 26 zeros!). That’s a lot of atoms.

Tracing carbon through ecosystems. Carbon is such an important element that when scientists want to study large populations of living things (for example when they’re thinking about grasses in a meadow, or trees in a forest), scientists can study these living things just by focusing on molecules that contain carbon atoms—carbon dioxide and organic molecules.

Looking at the world by tracing carbon atoms allows scientists to think on an ecosystem-sized scale or even Earth-sized scale about where living things are located and how they change. Living things are made up of organic carbon molecules, and there is carbon dioxide in the atmosphere.

Carbon pools. Scientists use the word “pools” when counting atoms. Carbon pools are parts of an ecosystem that contain carbon atoms, like plants, soils, animals, or air. Pools are bigger than one individual animal or tree; for example, a pool could be all the grasses growing in a meadow ecosystem or all the rabbits living in a meadow ecosystem. Pools can be lots of different sizes, and scientists even talk about the “all the vegetation in the world” as one pool of carbon. In the next lesson we will study a meadow ecosystem with five major carbon pools:

1. *Atmospheric CO₂*: Carbon dioxide molecules in the air.
2. *Producers*: Organic carbon molecules in plants (which *produce* organic carbon through photosynthesis).
3. *Herbivores*: Animals that eat plants.
4. *Carnivores*: Animals that eat animals.
5. *Soil organic carbon*: Organic carbon in dead leaves, plants, animals, and decomposers.

Measuring carbon pools. For example, trees are the biggest part of the producer pool in forest ecosystems. Dr. Andres Schmidt at Oregon State University traces carbon atoms entering and leaving trees. He uses high-tech tools to measure carbon atoms, like 150 feet high towers that let him look out over the forest canopy. These towers count carbon atoms in the form of carbon dioxide (CO₂) molecules in the air, as well as keep track of meteorological conditions like moisture and temperature. There are more than fifty of these towers all across the United States in a network called AmeriFlux. These scientists want to know if forests can absorb extra carbon in the air due to fossil fuel combustion.

Pools are usually measured by the amount of carbon in an area (for example, tons of carbon per hectare—10,000 square meters). Scientists like Dr. Schmidt also measure pools in lots of “low-tech” ways—they actually walk through the forest measuring trees and collecting leaf litter! Since plants are about 40% carbon by dry weight, the scientists, like Dr. Schmidt, are able to estimate how many carbon atoms are in a pool just by measuring the mass of trees, logs, and leaves.

Can you describe a carbon pool in your own words? What is an example of a carbon pool and some things in it?