

Name _____ Teacher _____ Date _____

Activity 3.1: 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.

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 counting carbon atoms. Looking at the world by counting 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, but there is inorganic carbon in the abiotic components of ecosystems, especially the atmosphere. Carbon dioxide in the air acts as a greenhouse gas that traps heat in the atmosphere. Excess atmospheric carbon dioxide contributes to global climate change. Changes in global climate have many effects on living organisms, and counting carbon on the landscape gives us important information about those changes.

In many ecosystems, one important place where lots of carbon atoms are located is in trees. Dr. Andres Schmidt at Oregon State University is an atom counter. 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.

Scientists use the word “pools” when counting atoms. Carbon pools are reservoirs of carbon atoms in a particular part of the ecosystem, 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. In ecosystems, we think of major pools of carbon as soil, plants, animals and air. Pools can be lots of different sizes, and scientists even talk about the “all the vegetation in the world” as one pool of carbon. Pools are usually measured by the amount of carbon in an area (for example, pounds of carbon per acre). 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 50% 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?