



What is soil?

Soil is an amalgamation of sand, silt, and clay particles, combined with water, air, and many different microorganisms. The formation of different kinds of soils is influenced by temperature, climate, vegetation and other factors. Soil serves as a medium for plant growth. It also helps to clean water, regulate climate, and purify wastes. Soil is not dirt, but rather a body of plant, animal, mineral and other matter that, in combination, becomes the “ecstatic skin of the earth.”

Soil produces our food and fiber

Soil produces nearly all our food and fiber. Even foods grown in aquatic environments, such as rice, rely on nutrients that come from the soil.

Soil provides all but three of the 16 nutrients essential for plant growth: nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, copper, manganese, boron, chlorine, zinc, and molybdenum. These nutrients originate in the soil from minerals and decaying plant and animal material. Calcium, hydrogen, and oxygen — found predominately in the atmosphere — are also found in spaces between soil particles.

Fish and other aquatic organisms also depend on these nutrients, which are released from soil into streams and oceans.

Soil cleans our water

Virtually all freshwater travels over soil or through soil before entering our rivers, lakes and aquifers.



Soil helps prevent flooding by allowing large amounts of rain to soak in for later use by plants, or for distribution to water bodies over days, months or even years. Contaminated water is purified and cleansed while soaking through the upper layers of soil, where soil processes remove many impurities and kill potential disease-causing organisms.

During dry periods, stored water is made available to plants, which typically remove 400 to 2,000 pounds of water from the soil for every 2.2 pounds of plant matter produced.

Soil regulates our climate

Soil helps reduce greenhouse gases by taking carbon dioxide out of the atmosphere and storing it as soil carbon. In addition, soil microorganisms change methane and nitrous oxides — two important greenhouse gases — into less harmful by-products. Some researchers estimate that our soils could reduce greenhouse gases from 16 to 42 percent annually through better soil conservation.

Plants growing in the soil use carbon dioxide gas in combination with water and solar energy to create, through photosynthesis, the carbohydrates we use for food and fiber and the oxygen we breathe.

Some 85 percent of carbon dioxide in our atmosphere comes from the action of soil microorganisms feeding on organic matter (dead plant and animal material) in the soil. The microorganisms change the carbon in the organic matter to carbon dioxide.

The greenhouse gases (carbon dioxide, methane, and nitrous oxides), which make up about 80 percent of the atmosphere, keep the Earth warm enough to sustain life. They trap a portion of the sunlight, preventing it from reflecting into space. Excessive amounts of these gases, however, may increase the global temperature and affect weather and climate.

Soils purify our waste



Many types of waste can be safely disposed of when they are properly mixed into surface soil. These wastes include sewage sludge, food- and fiber-processing sludge, yard waste, composted garbage, oil and oil-contaminated soils, and gypsum from wallboards. The soil then recycles nutrients contained in the waste.

Some soils can filter and purify wastewater, as in a soil filter or leaching field. Some are ideal for containing nonhazardous municipal wastes in a sanitary manner.

Soil is important

- Without soil, the ecosystems in which we live could not function.
- Soil recycles dead plants and animals into the nutrients needed by all living things.
- Soil acts as a filter to protect air, water, and other natural resources.

Did you know?

- A spoonful of soil contains more microorganisms than the number of people on earth.
- The total weight of living organisms in the top six inches of an acre of soil can range from 5,000 pounds to as much as 20,000 pounds.
- Earthworms move from 1–100 tons of soil per acre per year.