Topsoil in Our Food System

Soil

A Nonrenewable Resource

Topsoil is the upper layer of soil. It is the most nutrient-rich layer of the soil profile because it is the first to receive nutrients from decaying organic matter. Agriculture depends on good soil. Land and soil that is producing a food crop, grazing livestock, or producing crops for livestock feed, must have fertile topsoil. Fertile topsoil produces the highest yields of food per acre.

Soil is composed of both living (**biotic**) and nonliving (**abiotic**) elements. Soil contains air, water, and minerals as well as plant and animal matter. Soil is formed by the disintegrating of rock under the influence of **climate**. Events such as temperature fluctuations (freezing and thawing) contribute to the weathering of rock into the substance we recognize as soil. Organic matter such as leaves, dead plant material, and decaying organisms contribute to the biotic components of soil.

It can take 100 to 500 years to make one inch of topsoil. From the perspective of a human lifetime, soil is a **nonrenewable resource** because it can be lost from wind and water **erosion** faster than it can be replaced. Erosion reduces agricultural productivity and washes sediment into rivers, lakes, ocean gulfs and bays, affecting fisheries and recreation opportunities in these water bodies. Soil loss affects our country's economy and our lives because soils produce our food, keeping us alive.

Topsoil

How deep is topsoil?

Topsoil is also called **humus**. It is the dark organic matter in soil that is formed by the **decomposition** of plant and animal matter. Topsoil is full of nutrients, minerals, and organic matter. Soil nutrients are consumed by plants that are grown in the soil. Nutrients can be replaced as organic matter is added to the surface of the soil. This is accomplished naturally as plants and animals grow and die. Humans can assist in this process by adding organic matter to the soil such as compost, leaves, animal manure, etc.

The depth of topsoil varies by region, **ecosystem**, and environmental conditions. For example, forested areas have many trees that shed their leaves annually and eventually die giving way to a thicker region of topsoil than a barren area where there is little vegetation. Regions with little vegetation have fewer trees, grasses and animals that will eventually contribute to the top layer of the soil when they die.

Topsoil distribution is impacted by climate and geoscience processes.

Ecosystems in hot, dry regions have limited plant growth and animal life. These regions also have limited topsoil depths.

Ecosystems in temperate or subtropical regions with adequate or abundant rainfall have more topsoil due to additional plant and animal life.

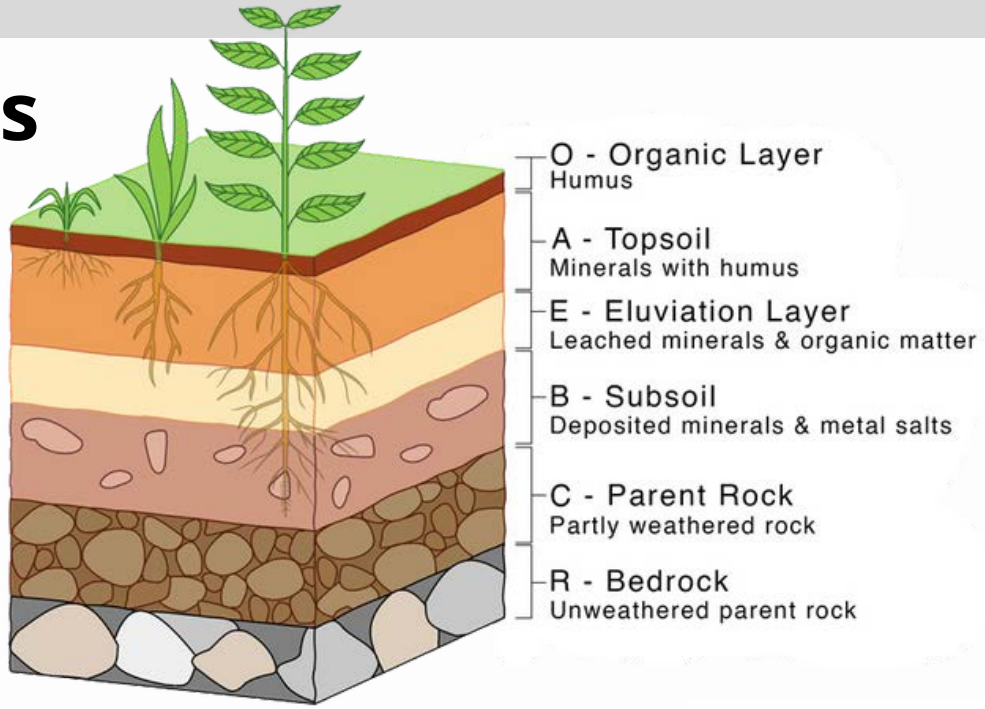
Geoscience processes like surface weathering, deposition from water, ice, and wind, and geochemical reactions impact soil formation.

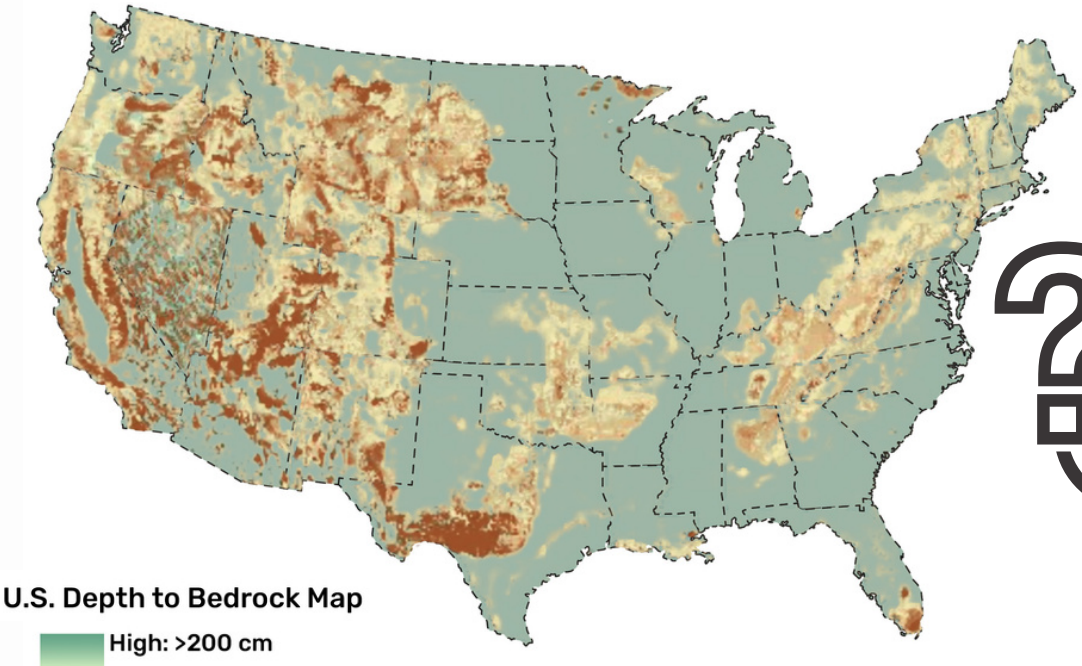
Soil Horizons

How deep is soil?

If you dig deep into soil, you'll see that it is made of layers, or **horizons**. All of the horizons put together make up a **soil profile**.

The total depth of soil varies by area. Some geographic areas have deep soil horizons before hitting bedrock and others are more shallow.





U.S. Depth to Bedrock Map

High: >200 cm

Low: 0 cm

Can you find any correlations between soil depth and where our food is grown?

Sustainability

How are soils protected and conserved?

Soil is invaluable. Historical events such as the Dust Bowl of the 1930s led to research to find better farming practices that would protect and conserve soil. Farming practices are still being improved today through study and research. Farming practices like strip cropping, contour planting, low- or no-till farming, and cover crops are all examples of practices designed to conserve and improve our soil.

Review

1. How is topsoil different than other layers of soil in the Earth's crust?

2. Why is topsoil important to our food supply?

3. What is soil composed of?

4. Why is soil considered a nonrenewable resource?

5. Is topsoil a resource that is distributed equally throughout the world? Why or why not?

Vocabulary

- Abiotic=
- Biotic=
- Climate=
- Decomposition=
- Ecosystem=
- Erosion=
- Geoscience=
- Humus=
- Nonrenewable Resource=
- Topsoil=