THE IMPORTANCE OF SOIL

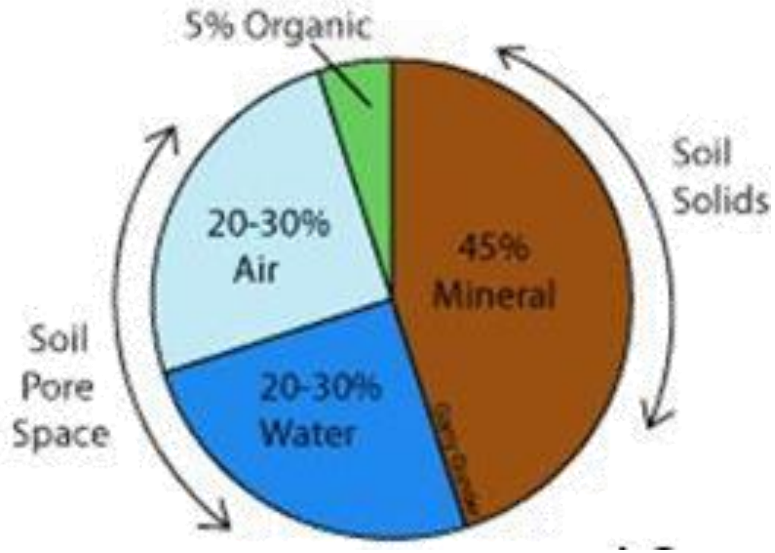
Soil is a Life-Supporting Layer of Material

- Atmosphere, crust, and soil
  - Interact to provide plants and animals with the resources they need
- Living things
  - Need proper temperature, oxygen, water, carbon (the basic element of all living bodies), and other nutrients

Soil is a Medium for Plant Growth

- Broad view
  - Soil has important ecological functions in recycling resources needed for all life
- Narrow view
  - Individual plant depends on soil for four needs
    - Anchorage, water, oxygen, and nutrients

Soil: A Three-phase System



- Components
  - Solid particles
  - Pore spaces
  - Liquids (water)
- Root growth
  - Plants need a sufficient volume of quality soil to host roots and supply needed resources
  - Important component: pores
  - Water flows toward the root or the root grows into moist soil

Agricultural Uses of Soil

- Different agricultural uses require different soil management practices
  - Cropland
  - Grazing land
  - Forest
  - Landscape horticulture
    - LEED and landscaping
    - Urban agriculture

Non-agricultural Uses

- Specific non-farming soil uses
  - Recreation
  - Engineering
  - Waste disposal
  - Building materials

Land Use in the United States

- In any given year, some forest is cleared for cropland, while somewhere else cropland returns to forest
  - Market forces spur changes
- About 80% of non-federal land is evenly divided between crop, forest, and rangelands
  - Urbanization: one land use that continues to grow

Soil Quality

- Also called soil health
  - Capacity of a specific soil to provide needed functions for human or natural ecosystems over the long term
- Soil degradation
  - Loss of soil quality
    - Erosion and pollution
    - Desertification
    - Changes in soil chemistry
    - Salinization
    - Loss of organic matter

Soil Quality (Continued)

- Best Management Practices (BMP)
  - Preserving soil and water quality by understanding basic soil process and management
  - Includes specific practical and profitable practices that preserve soil and water resources

Soil in Nature

- Plays a critical role in natural ecosystems
  - Determines which livings things reside where by availability of such resources as moisture and nutrients, as well as temperature

Soil and Climate

- Soils interact with the atmosphere by gas exchange
  - When we manage soil, we can increase or decrease the concentration of greenhouse gases in the atmosphere, thus affecting the degree of climate change

Soil and Climate (Continued)

- Soil and carbon
  - Organic matter in soil is one of the planet's largest reservoirs of carbon
  - When organic matter is lost from fields, more CO_2 goes into the atmosphere
  - Carbon sequestration: process of storing carbon in soils, plants, or elsewhere
  - Carbon sinks: locations where carbon is sequestered

SUMMARY

- Soil functions
  - Serves ecological functions that support life
  - Supplies anchorage, water, and nutrients to the plant and oxygen to the roots
  - People inhabit the soil surface and have both agricultural and nonagricultural uses for soil