

Chapter 2 Lesson 3 Notes: How Soil Forms

1. **Soil:** loose, weathered material on Earth's surface in which plants can grow.
 - a. **Bedrock:** solid layer of rock beneath the soil.
 - Bedrock is one of the main ingredients of soil.
 - Once exposed at the surface, bedrock gradually weathers into smaller and smaller particles.
 - b. **Soil Composition:** soil is a mixture of rock particles, minerals, decayed organic material, water, and air.
 - **Rock Particles** – comes from sand, silt, and clay.
 - **Humus** – is a dark-colored substance that forms as plant and animal remains decay.
 - Humus helps create spaces for air and water.
 - Humus also contains nutrients such as nitrogen, sulfur, phosphorus, and potassium.
 - **Fertility** – is a measure of how well the soil supports plant growth. Soil rich in humus has high fertility.
 - c. **Soil Texture:** different components of soil have different textures.
 - Sand is coarse and grainy
 - Clay is smooth and silky.
 - Texture also depends on the size of the particles.
 - Gravel is largest, then sand, silt, and clay.
 - d. **Loam:** soil that is made of equal parts of clay, sand and silt.
 - It has a crumbly texture that holds both air and water. It is best for growing most types of plants.
2. The Process of Soil Formation
 - a. Soil forms as rock is broken down by weathering and mixes with other materials on the surface.
 - b. Soil is constantly being formed wherever bedrock is exposed and happens over a long period of time.
 - c. Soil horizon: a layer of soil that differs in color and texture from the layers above or below it.
 - **Horizon A:** is made up of **topsoil** which is a crumbly, dark brown soil that is a mixture of humus, clay, and **other minerals**.
 - **Horizon B:** is made up of **subsoil**, which usually consists of clay and other particles washed down from the A horizon, but has little humus.
 - **Horizon C:** contains only partly weathered rock.
 - d. The rate of soil formation depends on the climate and type of rock (just like the conditions for weathering rock).

3. **Soil Types** – scientists classify the different types of soil into major groups based on climate, plants, soil composition, and whether the soil is acidic or basic.
 - a. **Climates** – the best soil comes from climate regions with moderate temperatures and rainfall.
 - Too much wet climate can wash humus and minerals of the A Horizon.
 - Too cold climate produces soil that is often very thin and dry.
 - b. **Acidic:** reacts strongly with some metals, has a higher concentration of Hydrogen ions.
 - c. **Basic:** feels slippery and has a higher concentration of Hydroxide ions.
 - d. **pH Scale:** between 0 to 14 where 0-6 is acidic and 7 is neutral, and 8-14 is basic.
 - e. Plants grow best with a pH of 6-7.5.

4. Living Organisms in the Soil
 - a. Some soil organisms make humus while others mix the soil and make spaces for air and water.
 - b. **Litter:** plants shed leaves and form a loose layer.
 - The litter decomposes and then becomes humus.
 - c. **Decomposers:** organisms that break down the remains of dead organisms into smaller pieces and digests them with chemicals.
 - **Examples:** Fungi, bacteria, worms and other organisms.
 - d. Mixing the soil – earthworms burrow through the soil, carrying down humus to the subsoil. They also eat the soil and pass it out as waste that is rich in nutrients like nitrogen.
 - Burrowing animals such as mice, moles, gophers, prairie dogs break up hard compact dirt. They also add nitrogen to the dirt when they poop and or die and decompose.