

Lesson 1: “Gully! It’s Soil Erosion”

Soil is the loose rock material that covers much of Earth’s surface. If you’ve ever seen construction workers digging a deep hole it may seem that the soil goes on forever, but the layer of soil is actually very thin compared to the thick layer of rock beneath it.

Soil is a **natural resource**. A natural resource is anything that we can use that comes from nature. Other natural resources include trees and plants, water, and animals. The most important thing about soil is that plants grow in it. If we didn’t have plants, people and animals would not be around. Plants are the source of food for all living things on Earth.

It takes time to make soil. Soil is made of weathered rock and other materials. The three main layers of soil are the **topsoil**, **subsoil**, and **weathered rock**. These layers all sit on top of a solid rock layer called the bedrock. The topsoil is a mixture of weathered rock and humus. It is the top layer of the soil. **Humus** is a mixture of decayed plant and animal matter. Humus provides plants with the nutrients they need to grow. The subsoil is below the topsoil. It is a yellowish or reddish layer that is made mostly of clay and weathered rock. The bottom layer is mostly weathered rock that sits on the bedrock below.

It is important to **conserve** soil. **Conservation** is using natural resources wisely. The biggest cause of soil erosion is moving water. In some places moving water can create **gullies**. A gully is a miniature river valley. Soil that does not have a lot of plants in it erodes more quickly than soil that does. Plant roots help hold the soil in place, so the easiest way to conserve soil is to leave plants growing.

There are many ways that people can stop soil erosion. Farmers might try any of these things to prevent soil from eroding away:

- **Contour Plowing:** Plowing hilly land in a way that follows the shape of the land. This slows down water so plants can use it and also slows down erosion.
- **Strip Cropping:** Planting a plant that grows quickly between rows of other plants to slow down water and erosion.
- **Dam Building:** Building dams slows down the formation of gullies.
- **Terracing:** In some areas, there is not a lot of flat farmland, so farmers cut step-like ridges into the sides of mountains. This prevents water from running quickly downhill.

- “Natural” = anything that comes from nature.
- “Resource” = something we can use
- “Sub-” = below (*subway*, *submarine*, *suburban*)
- “Humus” is pronounced with the long u sound as in “human,” not a short u as in “hummus.”

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- The most important thing about soil is that plants grow in it.
 - The easiest way to prevent soil erosion is to leave plants growing whenever possible.

The planet Earth is made up of layers. The outermost layer is the **crust**. The crust is made of mostly rock. The thickest parts of the crust are the continents, and the thinnest parts are found on the ocean floor. Although the crust of the Earth is covered in soil, rocks, water, and plants, deep down it is solid rock.

A **rock** is a solid material made up of one or more minerals. A **mineral** is a natural solid that has an exact chemical makeup, which means it is made of specific things. Most rocks are made of at least two kinds of minerals.

Rocks have different **properties** or features that make them special. **Granite** is a very hard rock that takes a long time to weather, so it is used as a building material. **Marble** is a rock that is very beautiful and is used in many art sculptures.

Minerals have different properties that make them valuable, which makes the rocks that contain these minerals valuable too. Minerals can be used for all sorts of things. **Graphite** is used in pencils. **Calcite** is used to make chalk. **Halite** is the salt you might find in your kitchen.

Rocks that contain valuable minerals are called **ores**. Most of the minerals and metals we use come from ore. Iron, copper, aluminum, gold and tin are very useful metals and we get them from ores. Getting the minerals from ore is very difficult and expensive.

Properties are ways to describe the features of a rock or mineral. For example, some minerals are **magnetic**, which means they are attracted to metal. Others are named for the shape of their **crystals**. Quartz forms six-sided crystals, and halite can form cubes. **Color, shine** (or **luster**), and **hardness** are other properties of minerals. The hardness of a mineral is tested using the Mohs Scale.

There are three different kinds of rocks: **Igneous, Sedimentary, and Metamorphic**. **Igneous** rocks are formed when melted rock from under Earth's crust cools and hardens. Melted rock is called **magma**. When magma cools slowly, large crystals can grow. If it cools quickly the crystals are small or may not grow at all.

Sedimentary rocks are formed as sediment builds up over time. The sediment builds up in layers, and the top layers press down on the bottom layers. Over time the bottom layers harden and form sedimentary rocks. Fossils are very often found in sedimentary rock, and when you look at these kinds of rocks you can often see layers of sediment. **Metamorphic** rocks are rocks that change. When igneous or sedimentary rocks are given high temperatures and/or pressure, they can change into other rocks.

Rocks and minerals are **nonrenewable resources**, which means that once they are used up they cannot be replaced. Other nonrenewable resources are **fossil fuels** like coal, oil, and natural gas. **Renewable resources** are resources that can be replaced when we use them, like trees, plants, and animals.

○ “Crust”: Think about the crust on a slice of bread. It goes all around the outside, like the crust of the Earth.

○ Minerals are like the ingredients in a recipe. When you mix together certain ingredients, you get a specific thing. Mixing certain minerals together gives you a specific kind of rock.

○ “Metamorphic” = able to change. When a caterpillar turns into a butterfly, that’s called **metamorphosis**.

○ Minerals are important because we use them in all areas of our lives.

○ Minerals should be conserved because they are nonrenewable resources. They can be conserved by using them wisely.