

Background Information for Parents- Weathering, Erosion, and Deposition and Soil

Weathering

Weathering is the process by which rock materials are broken down into smaller pieces by chemical or physical processes. *Chemical weathering* is caused by water (weakening bonds in minerals), weak acids (acid precipitation, acids in groundwater causing caves), and air (through oxidation). *Physical weathering*, also called mechanical weathering, occurs several ways. Water expands when it freezes; when water gets into cracks in rocks and then freezes and expands, pieces of the rock can crack off. Another way that rock cracks can be expanded and broken apart is when plant roots grow into them. Rock can also be weathered through abrasion—other rocks or sand particles hitting against the rock. This can occur in a river, as pebbles and rocks flow with the water, hitting other rocks in their path, or in the open, such as when rock faces get blasted by sand carried by the wind. Even gravity can cause abrasion, such as when a rockslide occurs down a slope. Even animals can cause weathering—such as when earthworms burrow in soil, further breaking apart particles.

Weathering usually takes a long time, but several factors can cause the speed to vary. For example, softer rocks like sandstone weather more quickly than harder rocks like granite. Rocks that have more surface area exposed to weathering agents will also weather more quickly. Even climate can affect rates of weathering; rocks will weather more quickly in hot, humid climates than in cold, dry ones.

Erosion

Erosion is the process of moving particles of rock from one place to another. Erosion can happen quickly or slowly, especially when caused by gravity. Rapid mass movements such as landslides, rockfalls, and lahars (volcanic mudslides) all happen very quickly. A type of slow mass movement is called creep—when a hillside gradually moves downslope due to water or plant roots. Water, wind, and ice are major factors that cause erosion. Waves and rivers carry weathered sediments from coastlines and river banks, changing their shape in the process. Wind picks up loose rocks and sand and carries them away. Sand dunes change shape as a result. Ice, usually in the form of glaciers moving over land, scrape and move rocks underneath them.

Deposition

Deposition occurs when rock fragments and sediments are laid down, or deposited. Deposits can occur in water or on land. Deposits in water include deltas, which occur when rivers slow down when entering a larger body of water like a sea or ocean, and barrier islands and beaches. In rivers, deposits form in river bends, where the water slows down. Land-based deposits include floodplains (caused by rivers), loess (a fine layer of sediment deposited by wind) and dunes. Glacial deposits include moraines (rock deposits at the front and side of glaciers) and outwash plains (broader deposits in front of the glacier).

Soil Formation

Soil is more than mud pies and sand castles. It is the very source of life on which we build our existence. The type of soil in your area can determine if you live in poverty or prosperity. Soil is composed of four

main things: weathered rocks, air, water, and organic material. Different soil types are based on the rock from which they weather. Soils form in layers, with bedrock being the rock layer beneath soil. Sometimes the bedrock is the parent rock that weather to form the soil, other times, the weathered rock and eroded and deposited over a layer of bedrock. Because of the way soil forms, soil often ends up in a series of layers, with humus-rich soil on top, sediment below that, and bedrock on the bottom. Geologists call these layers *horizons*. The uppermost layer is called topsoil and is important for planet growth. Topsoil contains humus, organic material in the soil made from the remains of plants and animals. Humus is important for adding nutrients to the soil. Soils without a rich layer of topsoil are not productive for plant growth.

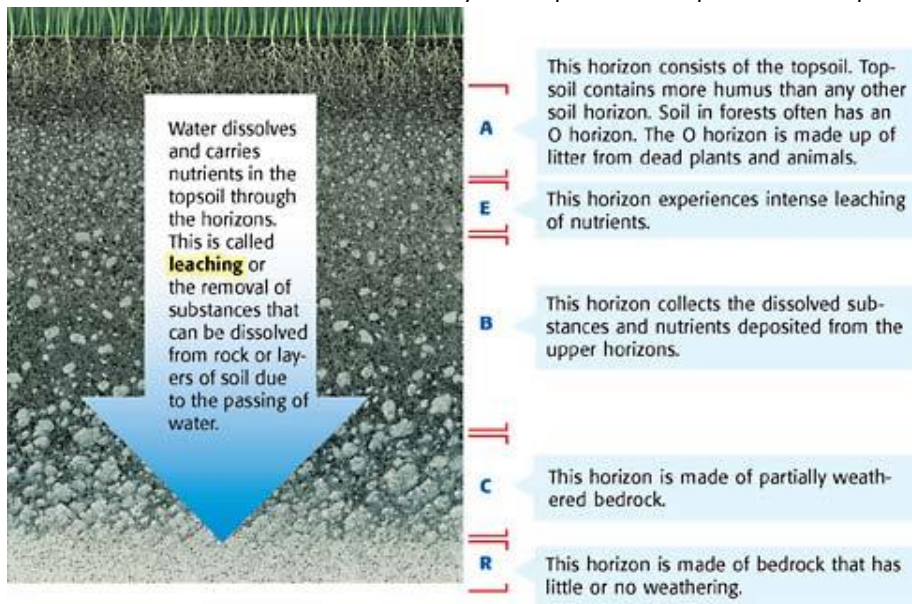


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Because soils are made of different types and sizes of particles, they vary in their consistency, which affects how much water they allow to pass through and how easy they are to break apart. For example, loams have a high percentage of sand in them, which allows water to infiltrate easily, whereas soils high in clay content do not allow water to infiltrate easily.