

Effects of Weather On Soil and Rocks

WHAT IS SOIL?

Geologists define soil as a combination of minerals, moisture, organic matter and air. An average soil sample is 45% minerals, 25% water, 25% air and 5% organic matter. It makes up the outermost layer of our planet.

Soil is formed from rocks and decaying plants and animals. In the Kansas City area, the rocks were ground down by the glaciers that moved over our area about 1.5 million years ago. Different sized mineral particles, such as sand, silt and clay, give soil its texture. The best soil is found nearest the surface and is called topsoil.

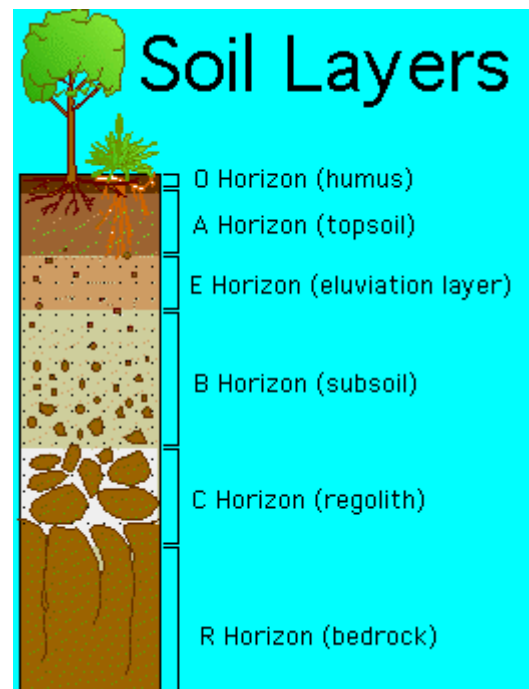
WHERE DID KC'S SOIL COME FROM?

For millions of years, what became the Midwestern portion of the United States was covered with a shallow, brackish sea. Mud reefs and sand bars dotted the surface.

Sedimentary rock is formed from sediment, like sand, mud, or small pieces of other rocks. Over long periods of time, these small pieces of debris are compressed (squeezed) as they are buried under more and more layers of sediment that piles up on top of it. Eventually, they are compressed into rocks, made of strata, or layers. Most fossils are found in sedimentary rock like sandstone, limestone or shale.

About 1.5 million years ago, our area was covered with glaciers from the Iowa border to the Missouri river. As the ice sheets expanded and contracted, they compressed the rocks they passed over creating shale and limestone.

Before the glaciers, the Missouri river bed was considerably north of its current location. The river bends at Kansas City because it had to flow around the edge of the glacier. The river bed was carved so deeply that it never returned to its former space. There was little surface water; most of it was locked in the ice of the glaciers. The mud flats left by the inland seas



turned to dust and were blown into dunes; these soils are called loess and are extremely fertile. Some of the loess hills north of present day Kansas City are fifty feet tall.

Soils in Kansas City range from loess hills to glades (which are thin layers of soil covering limestone outcroppings). Sedimentary rocks, like limestone and shale, are the only rocks found in the area. Think of shale as solid mud; a large piece will dissolve in water in about an hour.

ANIMALS, PLANTS AND SOIL CREATION

Natural processes can take more than 500 years to form one inch of topsoil, the most productive soil layer. Five tons of topsoil, spread over a single acre, is only as thick as a single dime. Five to ten tons of animal life can be supported by a single acre of topsoil; this includes species ranging from microbes in the soil to large herbivores and their predators.

Animals help to make topsoil. Earthworms digest organic matter, recycle nutrients and make the surface soil richer. Fungi and bacteria also help to break down organic matter in soil. Mice, moles and shrews dig burrows which help to aerate the soil. Grazing animals - from the smallest rabbit to the largest bison, deposit dung, which rots and adds to the organic portion of soil. Mice, squirrels and chipmunks bury seeds and nuts which decay and become part of the soil.



Plant roots and lichens break up rocks which become will eventually become parts of new soil. Roots also loosen the soil allowing oxygen to penetrate.

WEATHERING & EROSION

Weathering is the breakdown of soil, rocks and minerals at or near the earth's surface by processes such as freezing and thawing, water flowing, wind and rain. Freezing and thawing cause rocks to break up into smaller rocks. Water flowing over the rocks creates channels that develop into cracks and eventually break the rock surface. Wind carries dust and abrades the surface of the rocks. The jutting stones in limestone glades are the results of weathering.



Erosion involves the same processes, but the soil is carried away. Wind, water and gravity combine to remove the top layers. Soil is transported by streams, and most will eventually be deposited on a floodplain or at the mouth of the river in a delta. Wind erosion created the loess hills; the dust storms of the 1930's are another example of wind erosion.