



Earth Science Lesson 2
Shaping Earth's Surface (Grade 6)

Instruction 2-1
*Water Movement
(Grade 6)*

The surface of the Earth is constantly changing. Sometimes material is added, like when lava is erupted from a volcano. But most changes occur as a result of either *weathering* or *erosion*.

What's the difference?

Weathering vs. Erosion

Weathering is the process by which exposed rocks are broken down *on the spot* by some element of the weather. This could be frost, wind or rain. There are two types of weathering -- physical weathering and chemical weathering.

One type of physical weathering is called freeze-thaw., which is the freezing and thawing of water trapped in cracks in the rocks. The other is exfoliation, the flaking off of the surface of rocks due to extreme changes in temperature.

Chemical weathering involves a chemical change in the rocks themselves. This happens when they are soaked by rainwater that has absorbed carbon dioxide from the atmosphere. This forms carbonic acid that reacts with certain minerals in the rocks and breaks them down into small particles.

Sometimes these processes occur together. When this happens, geologists sometimes don't know which kind of weathering caused what.

Ayers Rock (*Uluru* in the Aboriginal language) in Australia is a good example. Was its shape caused by exfoliation -- the flaking off of surface layers of rock in the heat of the Sun? Or was it the result of the chemical reaction of minerals to the area's infrequent rains? We don't know.

In either physical or chemical weathering, however, the decomposed rock particles stay put.

Once the particles begin to move, it's called *mass wasting* or *erosion*. Mass wasting is when material moves down a slope solely because of gravity (like water moves down a hillside). Rock-falls, slumps and debris-falls are examples of mass wasting.

Erosion occurs when the rock particles are moved by some "flowing agent" like air, ice or water. As we said, many things cause changes in the Earth's surface. But the most effective is *erosion caused by running water*.

The Water Cycle



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Before we tell you about erosion, though, we want to remind you about The Water Cycle.

As you know, the Earth has a limited amount of water -- which keeps going round and round in a continuous Cycle. The Water Cycle consists of:

- **Evaporation,**
- **Condensation,**
- **Precipitation, &**
- **Collection.**

Evaporation. *Evaporation* takes place when the Sun heats up the water in a stream, river, lake or ocean. Some of the water then turns into water vapor or steam and evaporates into the air. Plants lose moisture, too -- through their leaves -- like people lose water through perspiration. This process is called transpiration. Transpiration from plants also adds water vapor to the air.

Condensation. When the water vapor in the air gets cold, it turns back into a liquid and forms clouds. This process is called *condensation*.

Precipitation. When so much water has condensed that the air cannot hold it any longer, it falls back to Earth -- as rain, hail, sleet or snow. This is called *precipitation*.

Collection. The water that falls back to Earth may land on oceans, lakes or rivers. Or it may end up back on land. If it falls on land, it may soak into the Earth and become part of the "ground water" that plants and animals drink. Or it may run over the soil and *collect* in the oceans, lakes or rivers. This starts The Water Cycle all over again.

Running Water

Nothing causes more -- or more dramatic -- changes in the Earth's surface than running water. Just think of the Grand Canyon, which was carved out over centuries by the Colorado River.

We'll tell you more about streams and rivers in our next Instruction.

Reading List

From the California Dept. of Education <http://www.cde.ca.gov/ci/sc/ll>