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Erosion

National Geographic Education

Erosion is the act in which earth is worn away, often by water, wind, or ice. A similar process, weathering, breaks down or dissolves rock, weakening it or turning it into tiny fragments. No rock is hard enough to resist the forces of weathering and erosion. Together, they shaped the sharp peaks of the Himalaya Mountains in Asia and sculpted the spectacular forest of rock towers of Bryce Canyon, in the U.S. state of Utah.

The process of erosion moves bits of rock or soil from one place to another. Most erosion is performed by water, wind, or ice (usually in the form of a glacier). These forces carry the rocks and soil from the places where they were weathered. If water is muddy, it is a sign that erosion is taking place. The brown color indicates that bits of rock and soil are suspended in the water and being transported from one place to another. This transported material is called sediment.

When wind or water slows down, or ice melts, sediment is deposited in a new location. As the sediment builds up, it creates fertile land. River deltas are made almost entirely of sediment. Delta sediment is eroded from the banks and bed of the river.

Erosion by Water

Moving water is the major agent of erosion. Rain carries away bits of soil and slowly washes away rock fragments. Rushing streams and rivers wear away their banks, creating larger and larger valleys. In a span of about 5 million years, the Colorado River cut deeper and deeper into the land in what is now the U.S. state of Arizona. It eventually formed the Grand Canyon, which is more than 1,600 meters (1 mile) deep and as much as 29 kilometers (18 miles) wide in some places.

Erosion by water changes the shape of coastlines. Waves constantly crash against shores. They pound rocks into pebbles and reduce pebbles to sand. Water sometimes takes sand away from beaches. This moves the coastline farther inland.

The Cape Hatteras Lighthouse was built in 1870, on the Outer Banks, a series of islands off the coast of the U.S. state of North Carolina. At the time, the lighthouse was nearly 1,000 meters (3,300 feet) from the ocean. Over time, however, the ocean eroded most of the beach near the lighthouse. By 1999, the surf endangered the structure. Many people thought it would collapse during a strong storm. The lighthouse was moved 880 meters (2,900 feet) inland.

The battering of ocean waves also erodes seaside cliffs. It sometimes bores holes that form caves. When water breaks through the back of the cave, it creates an arch. The continual pounding of the waves can cause the top of the arch to fall, leaving nothing but rock columns. These are called sea stacks. All of these features make rocky beaches beautiful, but also dangerous.

"Erosion" is an encyclopedic entry at the National Geographic Education website. It was accessed on July 25, 2012, at this website address:

<http://education.nationalgeographic.com/education/encyclopedia/erosion/kd/?ar a=5&ar r=3#page=1>

Erosion by Wind

Wind is also an agent of erosion. It carries dust, sand, and volcanic ash from one place to another. Wind can sometimes blow sand into towering dunes. Some sand dunes in the Badain Jaran area of the Gobi Desert in China reach more than 400 meters (1,300 feet) high.

In dry areas, windblown sand blasts against rock with tremendous force, slowly wearing away the soft rock. It also polishes rocks and cliffs until they are smooth.

Wind is responsible for the dramatic arches that give Arches National Park, in the U.S. state of Utah, its name. Wind can also erode material until nothing remains at all. Over millions of years, wind and water eroded an entire mountain range in central Australia. Uluru, also known as Ayers Rock, is the only remnant of those mountains.

Erosion by Ice

Ice can erode the land. In frigid areas and on some mountaintops, glaciers move slowly downhill and across the land. As they move, they pick up everything in their path, from tiny grains of sand to huge boulders.

The rocks carried by a glacier rub against the ground below, eroding both the ground and the rocks. Glaciers grind up rocks and scrape away the soil. Moving glaciers gouge out basins and form steep-sided mountain valleys.

Several times in Earth's history, vast glaciers covered parts of the Northern Hemisphere. These glacial periods are known as ice ages. Glaciers carved much of the northern North American and European landscape. They scoured the ground to form the bottom of what are now the Finger Lakes in the U.S. state of New York. They also carved fjords, deep inlets along the coast of Scandinavia.

Today, in places such as Greenland and Antarctica, glaciers continue to erode the earth. These ice sheets, sometimes more than a mile thick, carry rocks and other debris downhill toward the sea. Eroded sediment is often visible on and around glaciers. This material is called moraine.

Erosion and People

Erosion is a natural process, but human activity can make it happen more quickly. Trees and plants hold soil in place. When people cut down forests or plow up grasses for agriculture or development, the soil washes away or blows away more easily. Landslides become more common. Water also rushes over exposed soil rather than soaking into it, causing flooding.

Erosion control is the process of reducing erosion by wind and water. Farmers and engineers must regularly practice erosion control. Sometimes, engineers simply install structures to physically prevent soil from being transported. Gabions are huge wire frames that hold boulders in place, for instance. Gabions are often placed near cliffs. These cliffs, often near the coast, have homes, businesses, and highways near them. When erosion by water or wind threatens to tumble the boulders toward buildings and cars, gabions protect landowners and drivers by holding the rocks in place.

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