

The Ever-Changing Surface of the Earth - Part 1: Erosion

By Laura G. Smith

¹ If you've ever had the privilege of traveling to foreign countries or even across the United States, you've certainly observed the many different landforms that make up the fascinating surface of our Planet Earth! But there's something about these landforms that is impossible to notice with just a casual glance. From the vast plains and plateaus to the rolling hills, towering mountains, and deep valleys, the Earth's surface is very gradually, but very constantly, being molded and worn down by a process called erosion.



² Erosion happens when running water, sea waves, wind, or glaciers pick up materials from the Earth's surface and carry them to other locations. The actions of erosion and deposition work together to alter existing landforms and create new ones. Deposition occurs when silt, sand, and other materials are carried by flowing water and deposited at other places on the Earth's surface.

³ Moving water, such as rivers and streams, are the most important natural agents of erosion. Whenever it rains, water washes over the land, picks up loose soil, and carries it away. Water also washes weathered rocks (rocks altered through a process called weathering) into rivers and streams. We'll learn more about how weathering impacts the erosion process in Part 2 of "The Ever-Changing Surface of the Earth."

⁴ Gravitational pull plays a major role in the process of erosion and can cause huge amounts of soil or rock debris to be carried down a slope, such as in the case of a mudslide. This occurrence is referred to as a mass movement. Another type of mass movement is when certain areas of the Earth's surface are pulled by gravity and sink below ground level.

⁵ Gravity also naturally pulls water in rivers and streams downhill. Most of these streams carry silt, clay, and sand that are suspended in the water. Pebbles and granules are rolled, tumbled, and bounced along a stream's bed - the part of the land covered by a river or stream. All of the rocks and minerals that a stream carries are called its load. Little streams pass their loads along to bigger streams, and bigger streams pass their loads along to rivers.

⁶ When the sediment contained in these loads is deposited at the mouth of a river, a delta (or low-lying plain) is formed. Sometimes the sand, clay, and silt sediments from these fan-shaped deltas are picked up and dropped onto surrounding land areas by floodwaters, creating very fertile farmland. For this reason, deltas have been important to major civilizations since prehistoric times! In recent years, geologists have discovered that much of the world's petroleum resources are found in ancient deltaic rocks. Some rivers have no deltas because powerful sea currents and waves whisk the sediment away before it can build up.

⁷ Sea waves are very active agents of coastal erosion. As waves pound against the cliffs at the water's edge, they break off pieces of rock, dragging them back into the ocean. Other waves catch the rocks and hurl them back at the bases of these cliffs. Little by little, the

cliffs lose their support and collapse into the ocean. As these waves are carving away the shoreline, others are depositing sand and pebbles that were brought to the ocean by rivers. This constant, powerful action of erosion and deposition causes substantial, noticeable change to our rocky shores and sandy beaches.

⁸ In contrast to rapidly flowing rivers and waves, glaciers are agents of erosion that move very slowly over the Earth's surface. Glaciers form in polar regions, such as Antarctica and Greenland, and in high mountains where low temperatures cause large amounts of snow to build up and turn into ice. A glacier flows down slope because of the pull of gravity, usually moving less than a foot per day. These huge masses, ranging in thickness from about 300 to 10,000 feet, pass over the land and shape its features by plucking, transporting, and depositing rock debris from the size of blocks or boulders to sand and clay. As the debris piles up, it forms uneven ridges called moraines. Several kinds of moraines are recognized, including lateral moraines along the sides of the glacier, and terminal moraines at its leading edge. Many other landforms are associated with glaciers, the most famous of which are found in Europe.

⁹ Wind plays a key role in the process of erosion in arid regions like deserts, as blowing sand breaks down rock and dislodges surface sand from unprotected sand dunes. As sand and silt are lifted, larger materials, such as pebbles and cobbles are left behind. Over time, these pebbles and cobbles pack closely together forming a desert pavement. The removal of large amounts of sand and silt is called deflation, which lowers the landscape slowly. The Dust Bowl of the 1930s is an example of deflation, which occurred over an area of 50 million acres in the Great Plains region of the United States. This series of dust storms destroyed the protective cover of vegetation that had already been weakened by poor farming practices and the grazing of too many animals.

¹⁰ Some historians believe that soil erosion has impacted various population shifts and has caused the fall of certain civilizations. Ruins of towns and cities have been found in arid regions, such as the deserts of Mesopotamia, indicating that agriculture was once widespread in the surrounding territory.

¹¹ The natural process of erosion is slow and sure. It's an amazing occurrence that, over the course of hundreds of thousands of years, can wear away a mountain until it is level with the plain, or cut a steep-sided gorge out of a cliff to form a wonder of nature such as Niagara Falls. Today, and in the years to come, the surface of the Earth will continue to be altered by the many active agents of erosion.

The Ever-Changing Surface of the Earth - Part 1: Erosion

<p>1. List three of the major agents of erosion.</p> <p>_____</p> <p>_____</p>	<p>2. Erosion and _____ work together to alter existing landforms and create new ones.</p> <p>_____</p> <p>_____</p>
<p>3. When gravity causes huge amounts of rock or soil to be carried down a slope, this form of erosion is referred to as a _____.</p> <p><input type="radio"/> A) Glacier</p> <p><input type="radio"/> B) Mass movement</p> <p><input type="radio"/> C) Landform</p> <p><input type="radio"/> D) Rock pile</p>	<p>4. Sediments deposited at the mouth of a river create this fan-shaped landform.</p> <p><input type="radio"/> A) Bay</p> <p><input type="radio"/> B) Ocean floor</p> <p><input type="radio"/> C) Basin</p> <p><input type="radio"/> D) Delta</p>
<p>5. When comparing the movement of sea waves with the movement of glaciers, which of the following statements is true?</p> <p><input type="radio"/> A) Sea waves carry pebbles, and glaciers just carry ice chunks.</p> <p><input type="radio"/> B) Sea waves move much faster than glaciers.</p> <p><input type="radio"/> C) Sea waves break down and build up landforms, but glaciers just make the land flatter.</p> <p><input type="radio"/> D) Sea waves move constantly, but glaciers only move once in a while.</p>	<p>6. As glaciers deposit rock debris, uneven ridges called _____ are formed.</p> <p><input type="radio"/> A) Crevasses</p> <p><input type="radio"/> B) Peaks</p> <p><input type="radio"/> C) Ledges</p> <p><input type="radio"/> D) Moraines</p>
<p>7. The Dust Bowl, which occurred during the 1930s in the Great Plains region of the United States, is an example of _____.</p> <p><input type="radio"/> A) Inflation</p> <p><input type="radio"/> B) Deflation</p> <p><input type="radio"/> C) Wind erosion</p> <p><input type="radio"/> D) Both b and c are correct.</p>	