

Wave Erosion Lesson



Target Grade Level: 4th

Objective: To determine the effects of waves on coastal land.

Students will:

1. realize that water may change the appearance of land formations.
2. acquire more knowledge about the concept of erosion.

Materials: 1 large rectangular container (approximately 8" x 12" x 6")
1 wooden block (4-5" 2x4 for example)
Sand
Water
Ruler
Watch or clock with a second hand
Paper and pencil to take recordings/make sketches
Toy houses (optional)

Scientific Explanation:

Erosion is comprised of natural, physical, and chemical processes by which the earth's rocks and soil are continuously worn down. Running water is also a major cause of erosion. Stones carried with a river's current scour and abrade the banks and beds. Ocean waves and currents erode rocky cliffs and sandy beaches, especially during storms. When an area receives more water than the ground can absorb, the excess flows to the lowest level, carrying loose soil with it. Erosion causes constant changes in land.

Procedure:

1. Fill the container with about one inch of water and let stand until still.
2. Add sand to one end of the container until it rises above the water level to simulate a coast. Make sure to only add it to one end. Place houses on the sand above the water line. Take a measurement of how high the sand level is and record it on your paper. Also, make a sketch of your beach profile.
3. Place the wooden block in the opposite end of the container and move the block back and forth to create SMALL waves, just enough to move the sand a little bit. Do this for ten seconds and then stop.

4. Measure the sand level now and record the new measurement, then make a sketch of how the new beach looks. Is the beach different than before the waves?
5. Repeat the wave procedure once more, but make the waves slightly larger this time. Take another measurement and make a new sketch after thirty seconds. Are your findings different than the previous time?

Important Points to Understand:

There are many causes of coastal erosion that include storms, changes in permafrost, flooding, sea level rise, and waves.

The retreat of coastal land can cause irreversible damage to the coastal environment and quality of life by destroying both natural habitats and human establishments present on the coast.

Short-term reduction in erosion can be accomplished by hardening a cliff face or beach or building a breaker. To harden a cliff face, a narrow cylinder is drilled a few meters into the face and a rock bolt with a meter-wide plate on the head is cemented in place to help hold the cliff together. A breaker is a structure built offshore for the waves to break on instead of the beach or cliff. Given time however, the breaker may become unstable and break away or fall apart releasing pieces that can help to erode the beach or cliff.

Extension:

Glacial Erosion

Collect the following materials: ice cube, sand (about 1 spoonful), modeling clay, paper towel, pencil, and paper. Press the ice cube lightly on the flat surface of the modeling clay. Move it back and forth several times. Does anything happen to the clay? To the ice? Place a small pile of sand on the surface of the clay. Place the ice cube over the sand on the clay. Let it sit for about one minute. Pick up the ice cube and look at the surface that had been on the sand. Describe what you see. Place the ice cube back in the same position and move the ice back and forth on the sandy surface of the clay a few times. Remove the ice cube and gently wipe the excess sand off the surface of the clay. Describe the surface of the clay when it was rubbed by the sand and ice. How would this compare with the surface of the land when a glacier drags rock and other materials over it?

Extension from: <http://askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Science/Geology/GLG0016.html>