

Erosion and Deposition along Rivers and Seashores - Part 1: Modeling in the Classroom

Lesson Focus: Erosion and Deposition

Learning Objectives:

- Students will learn to recognize landforms found on Earth.
- Students will recognize that Earth's landforms may change slowly.
- Students will understand the causes and effects of erosion, deposition.
- Students will explain how water, wind, and plants all cause landforms to change.

Enduring Understandings for the Lesson:

- Georgia has different types of landforms, including mountains, plateaus, beaches, barrier islands, ridges and river valleys.
- Landforms are made by constructive and destructive processes.

Georgia Performance Standards Addressed:

S5CS1. Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.

- a. Keep records of investigations and observations and do not alter the records later.
- c. Offer reasons for findings and consider reasons suggested by others.

S5CS5 Students will clearly communicate scientific ideas and activities.

- b. Make sketches to aid in explaining scientific procedures or ideas.

S5CS8 Students will understand important features of the processes of scientific inquiry.

Students will apply the following to inquiry learning practices:

- a. Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.

S5E1. Students will identify surface features of the Earth caused by constructive and destructive processes.

- a. Identify and find examples of surface features caused by constructive processes: deposition, (deltas, sand dunes, etc.); volcanoes; faults; earthquakes.
- b. Identify and find examples of surface features caused by destructive processes: erosion (water- rivers and Ocean, wind); weathering; impact of organisms; earthquake; volcano.

Grade level: 5th

Materials: (per each group of four to six students)

- Large aluminum baking pan
- Two bricks
- Two kg of play sand
- Spoon
- Modeling clay
- Two 10 cm x 2cm x 1cm strips of kitchen sponge
- Half liter of water
- Baster
- Plastic measuring cup
- Copies of Erosion/Deposition Observational Chart
- Digital camera (if available)

Time needed: One 1.5 hour period

Background Information:

Erosion is the process by which solids such as rocks and soil are broken down and transported. Erosion is usually driven by wind, by ice in the form of glaciers, or by water in the form of rainfall, stream flow, waves or flooding. Erosion may also be caused by living organisms or by the force of gravity alone pulling soil particles down a slope. Erosion is a natural process, but rates of erosion may be affected by human activities such as agriculture, construction, and mining. In fact, some scientists say that humans cause erosion to occur 10-15 times faster than it would occur naturally.

On the other end of erosion is **deposition**, which is the laying down of sediment that was transported by wind, water, or ice. As wind, water, or ice loses its kinetic energy, it can no longer carry the sediment and the sediment is deposited back onto the land. How sediments are transported and deposited depends on the volume and the velocity of the wind, water, or ice transporting those sediments.

All of these processes are driven in some way by the force of gravity. For example, as a river flows downstream it carves out a river valley by scouring away some of the rock and sediment through which it flows. Larger volumes of water flowing down steeper slopes and through narrower channels will have more kinetic energy and will therefore pick up more sediment. As the river nears the coast and the slope levels out, the flowing water loses energy and slows down, depositing the largest sediments first and carrying smaller particles of sand, silt, and mud out to form river deltas and beaches.

Erosion and deposition are responsible for the formation of landforms such as valleys, canyons, cliffs, oxbow lakes, floodplains, beaches, river deltas, sandbars, and barrier islands, among others.

Learning Procedure:

1. Write the words “Erosion, and Deposition” on the board and ask students what they think the words mean. Record all ideas.
2. Take students to the playground and show them examples of erosion and deposition. Have them record their observations in their Science Journals.
3. Have students verbally describe what they observed. Discuss possible causes for what they observed. Have them propose and record their hypotheses.
4. Return to classroom. Do “Erosion and Deposition Investigation”:
 - Have the students copy the Erosion/Deposition Observational Chart (or hand out photocopies) in their journals.
 - Set up: Tilt the baking pan by placing a block of wood or textbook under one end. Cover the slope of the pan with a thin layer of clay. Shape the clay to form a shore line and a beach. Form a channel in the clay to model a river bed. Place the sponge strips parallel to and close to the shoreline to model marshes. The top of the sponge should be even with the surface of the clay.
 - River:
 - Spread sand on the bottom of the river channel. Then fill the baster with 100 ml of water.
 - Place the baster at the top of the river channel. Squeeze the bulb to release the water.
 - Release the water several times changing the speed of flow.
 - Observe the behavior of the sand and water as the mixture runs down the channel. Record observations in the Observation Chart. Have students sketch results.
 - While the students are recording and sketching, walk around the room and take photographs of some of the different formations for use in Part 2 of the lesson.
 - Discuss the following points:
 - What happened to the sand when it reached the bottom of the river in the model?
 - How was the speed of the mixture related to the erosion and deposition of the sand?
 - Shore:
 - Spread sand evenly on the shoreline and beach. Then fill the baster with 100 ml of water

- Place the baster at the top of the shore line. Squeeze the bulb to release the water.
- Release the water several times changing the speed of flow.
- Observe the behavior of the sand and water as the mixture runs down the shore.
- Record observations in the Observation Chart.
- Take photographs of results for use in Part 2.
- Discuss the following points:
 - What happened to the sand when it reached the shoreline in the model?
 - How was the speed of the mixture related to the erosion and deposition of the sand?
 - What happened when the mixture hit the sponge?
- Wrap-up:
 - Discuss that scientists learn by observing.
 - Have the students share what they observed about how sand is moved and deposited by water.
 - What do these observations tell us about the way water changes land?
 - Using what we observed in our model, what can we infer about what we observed on the playground?
 - Have the students review their hypotheses.
 - Take students back out to the playground. Have them find and identify examples of erosion and deposition. Are they able to identify more examples now? Can they relate what they see on the playground to what they observed during the experiment?
 - Have them record their observations and descriptions in their Science Journals, then compare to their previous observations.

Evaluation:

1. Evaluate the student's pre and post lesson observations and descriptions as recorded in their Science Journals.
2. Have the students write (with illustrations) a description of erosion and deposition and how these processes can constructively and destructively change landforms.
3. Have the students identify at least five landforms in Georgia that have been influenced by erosion and deposition.

Extensions:

1. Discuss what effects erosion may have on coastal ecosystems.
2. Lead students through the *Can't See the Bay for the Dirt: An Experiment with Sediment* activity from <http://baytrippers.thinkport.org> extension activities

about the effects of erosion and deposition on the water quality of the Chesapeake Bay.

3. Have students explore the effect of other variables on erosion by having them change their models to represent different conditions such as making their river channels more or less windy or more or less steep, etc.

Resources:

- Geology.com: a wealth of internet links to all things geological.
- Natural Resources Conservation Service (NRCS). Part of the USDA. Has great information on erosion as well as many links to erosion related lesson plans and activities.
- "Humans have huge impact on erosion". Associated Press. 12/1/2006.
http://www.msnbc.msn.com/id/15993162/ns/us_news-environment
- Fundamentals of Physical Geography:
<http://www.physicalgeography.net/fundamentals/10ac.html>

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Erosion/Deposition Observational Chart

A. River.

Trial	Speed of Flow	Observation
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1	Slow	
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2	Medium	
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3	Fast	
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4		
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B. Shoreline

Trial	Speed of Flow	Observation
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1	Slow	
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2	Medium	
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3	Fast	
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4		
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