

Erosion and Deposition along Rivers and Seashores - Part 2: Hunting from Space

Lesson Focus: Erosion and Deposition

Learning objectives:

- Students will learn to recognize landforms found on Earth.
- Students will understand the causes and effects of erosion, deposition, and weathering.
- 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:

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)

- Maps and Atlases of Georgia
- Google Earth capable computer (one for every 2 students)
- One per student: "Erosion and Deposition along Rivers and Seashores" worksheet
- One per class: Promethean board or projector that can be connected to a computer

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. Review the concepts of erosion and deposition from Part 1. Discuss the results of the investigation using the pictures taken of the sand formations formed during Part 1 to remind everyone of the results.
2. Inform the students that in Part 2 they will be trying to find similar formations in the real world by looking at images taken by satellites in Earth orbit.
3. Launch Google Earth (GE) on the computer and zoom in somewhere along the coast of Georgia. Have the students do the same on their computer. Point out some rivers, marshes, and barrier islands. Show where the latitude and longitude indicators are located at the bottom of the GE screen. Also show where the Eye Altitude indicator is located on the lower right hand side of the screen.
4. Review how to use latitude and longitude. Point out that even though GE shows the coordinates to the hundredth of a minute, the coordinates they will be using are estimated to the nearest minute.
5. Hand out the "Erosion and Deposition along Rivers and Seashores Worksheet", read the introduction and demonstrate how to "fly" to the proper coordinates and altitude by doing A.1., A.2., and having the students fly along on their computers. Describe what they are viewing. Concentrate on the features caused by moving water.
6. Have the students complete the worksheet by working in groups.
7. After the groups finish, review each site discussing how the landforms and surrounding topography have been affected by erosion and deposition.

Evaluation:

1. Evaluate the student's completion of the worksheet. Emphasis should be given to the completeness of the descriptions and whether they indicate an understanding of constructive and destructive effects of water.
2. Have the student find one example of erosion or deposition anywhere on the planet. Have them write a paragraph describing the visible evidence of erosion and deposition.

Extensions:

1. Have the students build a model of a landform shaped by erosion or deposition. Have them explain the part played by wind, water, ice, or human actions in its formation.
2. Have the students investigate whether erosion and deposition are possible on any other planet. Why or why not?
3. Have students locate and describe erosion and deposition events in our Ocean.

Resources:

- Google Earth (ver. 5)
- www.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. <http://www.nrcs.usda.gov/>
- “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 and Deposition along Rivers and Seashores

Worksheet

Now that you have modeled erosion and deposition in the classroom and have seen it up close on the playground, let's see if you can recognize how these processes, and the landforms they affect, look like from space. You will be using the computer and Google Earth to "fly" over areas on Georgia's rivers and coast to see how these processes can build and destroy.

A. Fly to the latitude / longitude coordinates and the eye altitude given to see some examples of the constructive and destructive power of water.

1. Coordinates: $31^{\circ} 22' 55''$ N / $81^{\circ} 16' 39''$ W Eye Alt: 6,000 ft
Description: Sand being deposited on the south end of Sapelo Island
2. Coordinates: $31^{\circ} 08' 08''$ N / $81^{\circ} 23' 04''$ W Eye Alt: 500 ft
Description: Rip-Rap (big rocks) being used on Saint Simons Island to protect houses from beach erosion caused by the Ocean.
3. Coordinates: $31^{\circ} 24' 34''$ N / $81^{\circ} 28' 33''$ W Eye Alt: 5,000 ft
Description: Loop in Cathead Creek near Darien, GA Filled in by sediment (deposition).
4. Coordinates: $31^{\circ} 56' 36''$ N / $82^{\circ} 18' 40''$ W Eye Alt: 9,000 ft
Description: Altamaha River eroded through the neck of a loop creating an "ox bow" lake.
5. Coordinates: $31^{\circ} 57' 22''$ N / $82^{\circ} 32' 32''$ W Eye Alt: 9,000 ft
Description: Sandbars built up on the slower "inside" of turns where the Alcovy and the Oconee Rivers meet to form the mighty Altamaha River.
6. Coordinates: $30^{\circ} 42' 57''$ N / $81^{\circ} 26' 30''$ W Eye Alt: 22,000 ft
Description: Sand being deposited along the south face of the Cumberland Island jetty at the mouth of the St. Mary's River.

B. Now that you know how to fly go to the following coordinates and altitudes and describe what you see that may be caused by erosion or deposition

1. Coordinates: $33^{\circ} 10' 42''$ N / $84^{\circ} 01' 00''$ W Eye Alt: 1,700 ft

Description: (Hint: Open the pictures!)

2. Coordinates: $33^{\circ} 48' 17''$ N / $84^{\circ} 84' 09''$ W Eye Alt: 5,000 ft

Description:

3. Coordinates: $32^{\circ} 04' 07''$ N / $84^{\circ} 54' 30''$ W Eye Alt: 600 ft

Description: (Hint: See hint above)

4. Coordinates: $31^{\circ} 27' 00''$ N / $81^{\circ} 13' 43''$ W Eye Alt: 22,000 ft

Description:

C. Now find four examples of erosion and deposition on your own. Two must be in Georgia and the other two can be from anywhere else on Earth. Give the coordinates, the eye altitude and a description of the landform.

1. Coordinates: _____[°] _____' _____" N / _____[°] _____' _____" W Eye Alt: ____

Description:

2. Coordinates: _____[°] _____' _____" N / _____[°] _____' _____" W Eye Alt: ____

Description:

3. Coordinates: _____[°] _____' _____" N / _____[°] _____' _____" W Eye Alt: ____

Description:

4. Coordinates: _____[°] _____' _____" N / _____[°] _____' _____" W Eye Alt: ____

Description: