



Getting Your Feet Wet (Learning Experience #1) Lesson Plan



Overview

Students role play the part of residents of Smith Island, whose families have lived on the island since the seventeenth century. Students are challenged to observe the effects of the rising waters and erosion on the island's coastline using historic maps and satellite imaging, research the fate of other previously inhabited islands in the Chesapeake Bay, and predict future changes to the island and its inhabitants based on historical data.

Lesson Essential Question:

How can we use information about sea level rise and erosion to understand the present and predict the future of Smith Island, MD?

Objectives

Students will:

- work productively as a part of a project team.
- use a variety of resources to investigate the background information necessary for this project.
- research and summarize information about climate change as it relates to rising sea levels and its effects on coastal areas.
- research and summarize information from historic maps and satellite images.
- keep accurate, complete records in a journal.
- communicate their ideas and results to classmates.





Materials Needed for Getting your Feet Wet

- One packet containing a copy of each of the following documents per group:
 - *The Last One* (Student Sheet #1)
 - *Lost to the Bay* (Student Sheet #2)
 - *Looking for Patterns* (Student Sheet #3)
 - Charts of Smith Island, 1866 and 2011 (you may order 1866 Smith Island Chart from www.old_maps.com. Smith Island chart from 2011 chart can be downloaded from NOAA website, www.charts.noaa.gov/InteractiveCatalog/nmc.shtml, chart # 12228. Direct URL: <http://www.charts.noaa.gov/PDFs/12228.pdf>)
 - Maryland DNR Shoreline Changes maps (downloadable resource: http://www.mgs.md.gov/coastal_geology/schange.pdf.html)
 - Graphs: Sea Level, Global Greenhouse Gas Emissions, U.S. and Global Temperature, Tropical Cyclone Activity, and Glaciers (source: <http://www.epa.gov/climatechange/science/indicators/>)
- Video: *Smith Island* by National Geographic (http://video.nationalgeographic.com/video/us_smithisland?source=relatedvideo)
- Notebooks or small binders or folders to be used as journals, one for each student
- Chart paper and markers

Grade Level: 8-12

Subject Areas

Climate science, environmental science, geology, technology, history

Timeline

Teacher preparation: 20 minutes

Student learning experience: 180 minutes

Setting

Classroom or computer lab

Skills

Research in print materials and on web sites; organize information; solve problems as part of a team; communicate to team and classmates; search for patterns in natural and man-made phenomena; make predictions based on data; interpret graphs and road maps; calculate percentages



Vocabulary

Climate, climate change, post-glacial subsidence, sea level rise, tropical cyclone, weather



Advanced Preparation Needed

Before starting *Getting your Feet Wet* (Learning Experience #1) with your students, please look ahead to the class modeling experience in *Looking Forward* (Learning Experience #2). Locate a stream table and a nursery or landscaper who has a small roll of sod that may be used in a model of restored marsh land. If this is not an option (due to seasonal availability) and your school has a vocational agriculture program, speak with the teachers as they may be willing to have their students grow rye grass in soil several weeks before you will need the sod for Learning Experience #2.

Procedure

1. Post the essential question for both the scenario and the learning experience. Instruct students to write a preliminary answer in their journals. Students will return to them once the learning experience is complete, so they should leave some space for additional reflection.
2. Focus students' attention on Smith Island by locating on a map the island's position within the lower Chesapeake Bay. Students should also view a satellite photo of the island, noticing the three small towns: Ewell, Rhodes Point and Tylerton. Pose the following questions to the class:
 - a. Have any of you ever lived on an island or visited an island that is inhabited by humans?
 - b. How does life on an island compare to life on the mainland, especially when there is no road bridge connecting the two?
3. Show students the first minute of the National Geographic video, *Smith Island*. Pause the video after 60 seconds and post the following questions to be answered in the students' science journal:
 - a. What do you notice about the elevation of the land on Smith Island? How does the elevation on this island compare to other islands that you may have seen or visited?
 - b. What do you notice about the plants that cover most of the land in the video?
 - c. If you wanted to visit Smith Island, how would you get there?



4. Assign students to project teams of three to four members. Each team member should have a task: researcher (may have two of these), recorder, communicator. Grouping students with a variety of abilities will promote peer teaching and differentiation of instruction.
5. Present the following scenario to the students:

Your teams will be role playing the part of a parents' organization whose children attend the elementary school in the Smith Island town of Ewell. The high school students of Ewell ride the ferry to the Eastern Shore town of Crisfield each day. For the past five years, the younger children and their teachers have dealt with Bay water flooding the school during episodes of especially high tides and storms.
6. Instruct students to respond to the following questions in their journals:
 - a. How could the children handle the flooding of their school and island home?
 - b. What should be done to solve the problem of school flooding?
7. Inform the class that the parent organization represented by each team is preparing requests to both the state of Maryland and the Federal government for funding assistance to prevent the continual loss of land and frequent flooding of Smith Island. Instruct the students to answer the following questions:
 - a. In order to support the funding request, you need to calculate how much of Smith Island has been lost due to both erosion and sea level rise during the past 150 years. Where will you look for this information?
 - b. Instruct student teams to complete *The Last One* (Student Sheet #1).
8. After student teams complete *The Last One*, instruct teams to locate some of the other islands on the eastern side of the Chesapeake Bay that, at one time, were home to small communities.
 - a. Groups should list and locate the following: Holland Island, Barren Island, Poplar Island, Sharp's Island and James Island).
 - b. Each team will be randomly assigned an island (i.e. drawing the island names from a hat) and complete *Lost to the Bay* (Student Sheet #2). By randomly assigning islands to teams, there will be at least one group reporting the history of each island.
 - c. Each team will report to the class on the location and history of their island community. Students should include citations for their information sources.



9. Following the group presentations, instruct the students to write a paragraph in their journals reflecting on the following items:
- What emotions do you think the older generation, who grew up on these islands, may have regarding being forced to move to the Mainland?
 - What may these long-time residents have been willing to do to save their island homes?
10. Lead the class in a discussion about climate change.
- Instruct the students to write definitions in their journals for **climate** and **weather**.
 - What is the difference between the two terms?
 - Which one affects their plans for this weekend, and which one affects the survival of places like Smith Island?
11. Student teams will end the learning experience by completing *Looking for Patterns* (Student Sheet #3).
- Remind the students that the data they are using was gathered through the use of sensors which are positioned in waters throughout the world, and on land and on satellites. The sensors that were used to collect the data for the EPA graphs used for *Looking for Patterns* measure the location of the surface of the ocean relative to the surrounding land.
 - Sea level is a measure of where the surface of the ocean touches the land. Where this measurement is located depends on several variables: how much water is in the ocean, whether the land is rising or subsiding (sinking) relative to the ocean floor, and whether or not the land is being eroded by the ocean (i.e. wave action). Paleoclimatological data comes from indirect sources such as ice cores, pollen samples and tree rings. Students should notice some of the same patterns that climate scientists see as they look for the causes of global climate change and attempt to predict the future.
12. Ask students to return to the essential question and what they wrote in their journals. What kinds of data have been gathered by their team as they prepare to state the case for help for Smith Island? As scientists analyze information about climate change, what does it suggest about the future of coastal and island communities in the Chesapeake Bay? Ask students to write their predictions in their journals.