ROLLING DOWN THE RIVER: TEACHER GUIDE

Subject: Earth Science
Grade Level: Middle School
Last Updated: October 17, 2008

Case Summary

Donna woke up to find the river in her backyard had completely disappeared. What will the townspeople do now that the river has rerouted itself after a flood? Should they re-route it back or leave it? And what will this do to the land? The final decision will be left to a vote after the townspeople debate both sides.

Credits

This case was written by Elizabeth Sheehan (PhD student, Psychology, Emory University, Atlanta, GA) and Antione L. Ford (teacher, Bethune Middle School, Atlanta, GA) fellows of the Emory University PRISM program (http://www.prism.emory.edu). Authors may be contacted at elewis2@emory.edu

This case was inspired by a story published in the New York Times, *A River Cuts a New Course, Leaving a New Hampshire Town High and Dry* (Zezima, 2006 May 29).

Zezima, Katie. (2006, May 29). A river cuts a new course, leaving a New Hampshire town high and dry. *New York Times*. Retrieved September 15, 2008 from http://www.nytimes.com/2006/05/29/us/29river.html

Map used in ***Student Materials*** was made by Chad Wittkop, Department of Environmental Services.

Wittkop, C. (2006). Map of the Suncook River's usual course. In Whether to tame a wayward river, *New Hampshire Public Radio*. Retrieved September 15, 2008 from http://www.nhpr.org/node/10963

The student evaluation sheet in the ***Student Materials*** was reproduced from *Out of Breath* (DeLoney, 2006).

DeLoney, D. Y. (2006). *Out of breath*. Retrieved October 03, 2006 from Emory University, CASES Online Web site: http://www.cse.emory.edu/cases/casedisplay.cfm?case_id=543

Learning Objectives

Upon completing the case, students will be able to:

1. Define the terms erosion, sediment, flood plain, and deposition.
2. Describe how a river erodes the land over time.
3. Gather facts and support for one side of a debate.

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Georgia Performance Standards

S6CS1. Students will explore 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. (NSES Content Standard A)

a. Understand the importance of—and keep—honest, clear, and accurate records in science.

b. Understand that hypotheses are valuable if they lead to fruitful investigations, even if the hypotheses turn out not to be completely accurate descriptions.

S6CS2. Students will use standard safety practices for all classroom laboratory and field investigations. (NSES Content Standard A)

a. Follow correct procedures for use of scientific apparatus.

b. Demonstrate appropriate techniques in all laboratory situations.

c. Follow correct protocol for identifying and reporting safety problems and violations.

S6E3. Students will recognize the significant role of water in the earth processes. (NSES Content Standard D)

S6E5. Students will investigate the scientific view of how the earth's surface is formed. (NSES Content Standard D)

c. Describe processes that change rocks and the surface of the earth

e. Explain the effects of physical processes (plate tectonics, erosion, deposition, volcanic eruption, gravity) on geological features including oceans (compositions, currents, and tides).

Assessment

Students were instructed to present a cogent defense for why the river should be re-routed or not be re-routed. They should be able to support their position with evidence from their research on the erosion caused by a water force.

Additionally, students completed two labs from their textbook to investigate the ways rivers/water may impact the surface of the earth. These labs were completed on days 1 (soap lab) and 2 (river lab). During these labs, they recorded observations and formed hypotheses that will be turned in at the end of the lab. These labs can be found in Exline et al., 2001.

Exline, J. D., Pasachoff, J. M., Simons, B. B., Vogel, C. G., Wellnitz, T. R. (2001). *Science Explorer: Earth Science.* Needham: Prentice Hall.

At the end of the case, each group handed in a box chart from Scene 1 and hypotheses/observations from two labs.

Debate:
Good participation in the debate included points backed by evidence such as:
"I oppose the dam because it would be expensive – depending on the size it would be 1 million to 1.5 million." Or "I am for the dam because you could use the dam for hydro-electric power which would benefit the town."

Unsatisfactory participation in the debate included general statements or statements not backed by research such as: "a dam would be too expensive" or "the dam is not worth it because it would break". This also includes outbursts and interruptions.

Implementation Strategy
This case was designed for a class with block scheduling and followed the schedule below:

Day One (1 hour 30 minutes)
Read Scene 1 (10 minutes)
Create Box Charts (15 minutes)
Assign learning issues (15 minutes)
Research learning issues (45 minutes)
Report back to their group. (15 minutes)

Day Two (60 minutes)
Take a position for debate and create argument (60 minutes)

Day Three (60 minutes)
Debate

Case Notes

What went well:

1. The use of labs in this case was a hit. The students enjoyed the hands-on nature of the labs. We extended the soap lab by adding an addition check at the end of class so they could see some of the long-term effects of erosion. Pictures are included in the lab section on what the soap should look like after the water dripping. The students also enjoyed the second lab and although they played around in the mud at the end, they stayed on task and made their observations.
2. Instead of debates in the small groups, we had a class debate. The students got very excited and Mr. Ford served as the town mayor and lead the debate. Students were instructed to raise their hand to speak and to stand when called on. For the most part, this went well but some of the students got distracted. The students were respectful of their peers during the debate and we ended it with a classroom vote.
3. We had library time assigned for student research and the librarians created a webpage with links that aided the students in their research.
4. Giving the students a partially filled in box chart guided them during their search for learning issues and facts. By giving them some information to build on, the students were less distracted by extraneous information that may not pertain to the objectives of the case.

What could be changed:

1. During the debate, students became stuck on the idea of how much it would cost to build a dam. Because it seemed like a large sum to them, this became their main reason for not building the dam and no one really came up with a good defense on why to build the dam, even with questioning from the facilitators. It would be good to split the class up next time and assign positions for the debate so that both sides are represented.

2. Additionally, they need to have specific research to back up their position. To aid in this, positions for the debate should be assigned early on in the case and before they are done with their research time so they can look up additional information, if needed.

Facilitator Guide

Here is a sample box chart. The items in bolded text were provided for the students to get them started.

Facts	Hypotheses
• **The river rerouted itself.** • **There was a flood.** • No homes or buildings were damaged by the river's new route. • All that is left in the river's old path is a muddy ditch.	
Learning Issues	**Questions**

• **What is the definition of path of least resistance?** • What will the new river's path do to the land? • **What is erosion? How does erosion affect earth's surface?** • What is sediment? • What are deposits? • What will it take to put the river back on its original path? • How expensive is a dam? • What is a flood plain? • **What will happen to the wildlife and fish as a result?** • **If the river is returned to its original path, what will happen in the next flood?**	

Resources

Exline, J. D., Pasachoff, J. M., Simons, B. B., Vogel, C. G., Wellnitz, T. R. (2001). *Science Explorer: Earth Science.* Needham: Prentice Hall.

Wittkop, C. (2006). Map of the Suncook River's usual course. In Whether to tame a wayward river, *New Hampshire Public Radio*. Retrieved September 15, 2008 from http://www.nhpr.org/node/10963