Saving Our Streams

Grade Cluster - 6-8

NETS-S - 4 - Critical Thinking, Problem Solving, and Decision Making

Quick Look:

Students work collaboratively in teams to develop solutions and recommendations for stream bank preservation through erosion prevention on a river in their community. They collect data, research solutions, and raise funds to employ their solutions.

Scenario:

As a group of students hike along the Browns River at Moore Park (a local park in the community), they notice serious stream bank erosion similar to other examples they had learned about in science class. The next day, the students share their observations in class and other students add to the conversation, sharing similar examples they've noticed along other sections of the Browns River. The conversation quickly generates interest and enthusiasm for taking action to improve the riverbank's conditions and protect the river. Realizing that this is a big project to tackle, the class acknowledges that this will be a multi-year project and they need some help. So, together as a class, they create a concept map on their *SMART board* using *Mindomo* to brainstorm what kinds of data they will collect, how they will collect the data, and who they can contact as resources to help with the project (4a, 4b, 6a).

The next day, students set up a wiki to plan additional investigations of the different areas along Browns River in order to collect specific data (4b, 6a). Using *Google Earth* and *Google Maps*, they identify different locations along the river that they could easily access (such as other parks, pubic land, or private land owned by students' families) and arrange themselves in groups to study each location (4a, 4b). Students also use the *wiki* to brainstorm a list of tools that they can use including digital cameras, *Flip cameras*, *GPS units*, and *Smart phones* to collect quantitative and qualitative data along the river (4b). With the help of their teacher, students e-mail the diverse group of local and state field experts they identified earlier, including members of the Conservation Commission, Vermont Department of Forests, Parks, and Recreation, and Vermont Natural Resources Council, to guide and assist them in their studies. In addition, they also *Skype* with various professors at UVM (botany, geology, biology, etc.) who give them access to databases of information previously collected which the students can analyze, and also pair them up with college students who volunteer to assist with their project (4b). The middle school students invite their UVM partners to collaborate with them on their *wiki*.

Throughout the next two weeks, students and volunteers visit their designated areas along the Browns River to document the problem. They take pictures, videos, GPS coordinates, and anecdotal notes (4c, 6a, 6c). They use *Google Earth* and their GPS coordinates to placemark the locations they studied along the river. Students add pictures, videos, and notes to their placemarks and assemble them into a *Google Earth* tour (4c, 6a, 6b, 6c, 6d). They use PhotoShop to overlay photos in two layers, in order to

compare older aerial photos with current photos to identify differences in erosion (to compare older aerial photos to current photos, and identify the actual linear feet of erosion in the same areas (4c, 6a, 6c).

Together with UVM student volunteers and field experts, students analyze the data they collected and determine that the Browns River stream banks are changing and showing great evidence of erosion (4c). Upon consultation and collaboration with their expert contacts, they use the Internet to research plant species and different erosion control strategies that could help preserve the banks of the Browns River (4c, 4d).

Student groups use *Google Docs* to collaboratively compile a report of their findings and recommendations for stream bank restoration and preservation to accompany their *Google Earth* tour of the Browns River (4b, 6a, 6b). The reports and the *Google Earth* tour are published to a web site and shared with the Underhill community, Conservation Commission, Vermont Department of Forests, Parks, and Recreation, and Vermont Natural Resources Council in order to let others know about the river's condition (6a, 6b). Students present their findings and recommendations at a town meeting to urge the community to support the continuation of their project by raising funds to implement their restoration strategies.

Over the following months, students raise money to support their project and begin restoration efforts. They plan to extend the project over future years by passing on their information and resources to younger classes for continued data collection.

Resources

Vermont Department of Forests, Parks, and Recreation http://www.vtfpr.org/
University of Vermont (botany, ecology, geology, biology, etc. departments)
Vermont Natural Resources Council http://www.vnrc.org
Underhill Conservation
http://www.underhillvt.gov/index.asp?Type=B_BASIC&SEC=%7B417CF2DB-A72B-4146-BEA3-588A82DA6FFF%7D

Student Standards – The following NETS-S are noted in the Scenario:

1. Critical Thinking, Problem Solving, and Decision Making —A, B, C, D
6. Technology Operations and Concepts—A, B, C, D

Teacher Standards –Teachers who teach this unit address the following NETS-T:

1. Facilitate and Inspire Student Learning and Creativity—A, B, C, D
2. Design and Develop Digital-Age Learning Experiences and Assessments—A, B, C
3. Model Digital-Age Work and Learning—A, B, C, D
4. Promote and Model Digital Citizenship and Responsibility—B
5. Engage in Professional Growth and Leadership—A, B

Content Grade Expectations

The scenario writer has identified the following content grade expectations that s/he felt might be assessed in this scenario. In most of these scenarios, there may well be opportunities to assess other or additional content grade expectations across a variety of disciplines. If you are interested in developing a unit or lessons based on the following scenario, and you don't see any grade expectations in your content area, we encourage you to capture the ideas presented in the scenario and make it your own by adding components that address the grade expectations you are most interested in assessing.

S7-8:3 Students demonstrate their understanding of experimental design by…

- Writing a plan related to the question and prediction that includes:
  a. A diagram labeled using scientific terminology that supports procedures and illustrates the setup.
  b. A procedure that lists significant steps that identify manipulated (independent) and responding (dependent) variables.
  c. A control for comparing data when appropriate.
  d. Identification of tools and procedures for collecting data and reducing error.

S7-8:4 Students demonstrate their ability to conduct experiments by…

- Using technology to collect, quantify, organize, and store observations
- Recording multiple perspectives to scale

S7-8:5 Students demonstrate their ability to represent data by…

- Using technology to enhance a representation.

S7-8:7 Students demonstrate their ability to explain data by…

- Sharing conclusion/summary with appropriate audience beyond the research group.

S7-8:8 Students demonstrate their ability to apply results by…

- Explaining relevance of findings to the local environment
- Devising recommendations for further investigation and making decisions based on evidence for experimental results.

S7-8:9 Students demonstrate their understanding of Processes and Change within Natural Resources by…

- Investigating natural resources in the community and monitoring/managing them for responsible use.

Researching the impact of different human activities on the earth's land, waterways and atmosphere, and describing possible effects on the living organisms in those environments.