Lesson: Science Grades 4-6
Natural River Hazards

What Happened to the River?

Overview:

Students work in teams of 4 to help the townspeople deal with natural hazards that affect the performance and appearance of the river. Using data and inferences based upon that data, the groups will meet contract obligations that they developed with the town as they prepare a visual presentation and written summary of their recommendations.

Learning Outcomes:

National Standards:

- Earth and Space
  - Structure of the Earth system
  - Properties of Earth materials
- Life
  - Characteristics of organisms
  - Organisms and their environment
  - Structure and function in living systems
  - Regulation and behavior
  - Populations and ecosystems
- Physical
  - Properties and changes of properties of matter
- Science and technology
  - Abilities of technical design
  - Understanding about science and technology
- Science in Personal and Social Perspectives
  - Types of resources
  - Science and technology in local, national, and global; challenges
  - Changes in environments
  - Natural hazards
- Scientific Inquiry
  - Abilities necessary to do scientific inquiry
  - Identify questions and concepts that guide scientific investigations
  - Communicate and defend a scientific argument
  - Understanding about scientific inquiry
- History and Nature of science
  - Nature of science

Ohio Strand Benchmarks:

Earth and space		
Benchmark B	Grade 4	Indicators 8, 10
Benchmark C	Grade 5	Indicator 6
Life science		
Benchmark C	Grade 5	Indicators 4, 5
	Grade 6	Indicator 8

Science and Technology

Benchmark A	Grade 5	Indicator 1
Benchmark B	Grade 5	Indicator 3

Scientific Inquiry

Benchmark B	Grade 4	Indicator 2
Benchmark B	Grade 6	Indicator 3
Benchmark C	Grade 5	Indicator 3

Scientific Ways of Knowing

Benchmark C	Grade 6	Indicator 3

Getting Started:

Materials:

- Diagram of section of the river including data on the depth, width, features, date, etc. 1 per group and one enlarged for the class
- Situation cards, examples included, run on colored card stock and laminate to be used again
- Posterboard, chart paper, mural paper, for presentations
- Markers, crayons, pencils, colored pencils, etc.
- Group contract 1 per group
- How to start instructions 1 per group
- Envelope or folder for each group to keep all of their materials
- Plastic overlay large enough to cover the class map of the river section

Technology:

Charts/ graphs for the presentation as well as written summary could be computer produced

Use websites as research for vocabulary, concepts, and environmental background information

Use video or digital camera to tape parts for the presentation if natural setting Allows

PowerPoint/Hyperstudio could be used for the presentation

Suggested infromational websites:

www.curriculumvisions.com/river/RiverGlossary.html
www.riverresource.com/text/RIVER_SYSTEMS.html
www.tec.org/tec/terms2.html

Vocabulary:

- Erosion
- Deposition
- Natural hazard
- Sediment
- Ecosystem
- Renewable and non-renewable resources

Lesson:

Orientation activity:

1. Use video segments and or pictures of actual river systems and settings for student to identify examples of erosion, deposition, sediment, flood conditions, etc.

Learning activity

1. Select or assign groups. Assign or allow groups to select the situation card they will work with during the investigation. Review and complete contract with groups. Use a personal stamp to notarize the group signatures to the contract.

2. Handout aerial views or diagrams of the river taken or created on a previous date. Handout "How to start?" instructions to the group. Provide time for the group to read over the instructions and then conduct class discussion/review of the assignment. Set presentation time based upon suggestions from the class and your own timetable. Answer individual group questions about the process/assignment.

3. Monitor progress of the groups. All students should be involved in the discussions and planning. Ask probing questions to help them get going. What does the existing map show you about the river and its resources? How is this important to the townspeople? What data in the situation gives you a starting point? Why do you think that you should start here? What do you need to find out? What can you infer based upon the data that you have at this time?

4. As groups continue, act as a facilitator guiding them toward the resource and or solution the group has determined. Provide materials for presentation as needed. Explain how the plastic overlay will be placed over the original map, class size, and their "changed" map will be shown as well as the original.

5. Presentations to the class are made on assigned dates. Develop a rubric that outlines the requirements for the written summary and the presentation based upon the objectives your students need work on at this time. You might include visual aides that are readable from 5-6 feet, clear and bold lettering, compatible color combinations, illustrations and labels, etc. Written summary should have a basic list of "always include" in your writing and no more than 3 focus areas., these focus areas should represent, organization, mechanics, and presentation skills being worked on at the time of this study.

<u>Handouts:</u>

- Map of river segment
- How to start instructions
- Situation cards
- Contract

Evaluation and Follow-Up:

Assessment tools and methods:

Observation of students during data review and presentation preparation shows their ability to follow procedures, cooperate within the team and class, and participate in activities. These make great observational notes.

The final presentation should be assessed using a rubric as mentioned in the procedures. The group would earn a specific rating. You could ask each individual student to share their opinion of the results and the process in written form as a reflection on the activity for an individual grade.

Interdisciplinary connections:

Math

Students review data associated with the distance from shore to shore and river depth. Measurement of river width and depth. Time periods also contribute to their evaluation of the situation and recommendations.

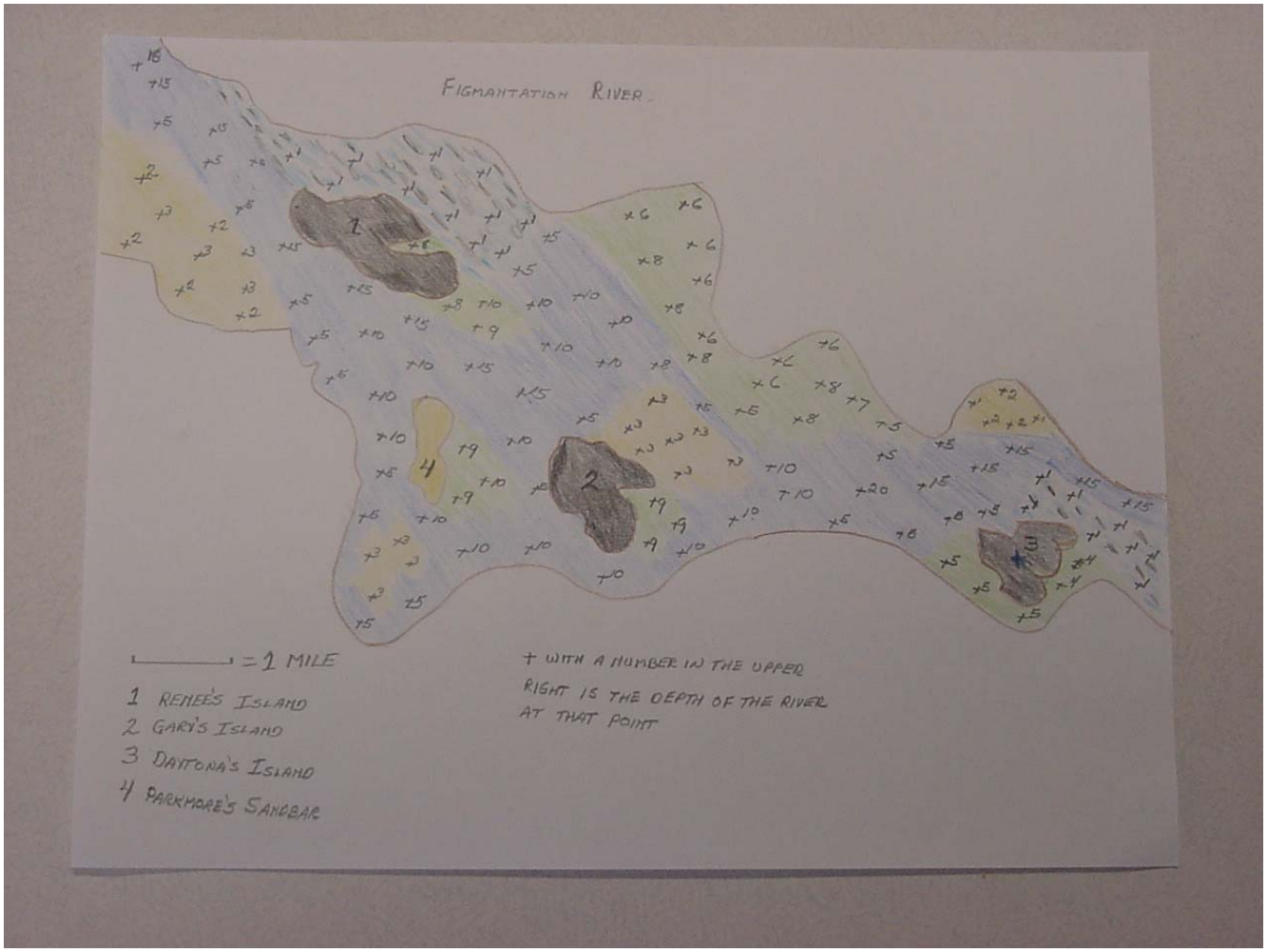
Language Arts

Presentation and written summary from each group provides opportunity to reinforce and expand specific focus areas in the writing process and skills. Some classes may be able to construct their own rubric for this purpose.

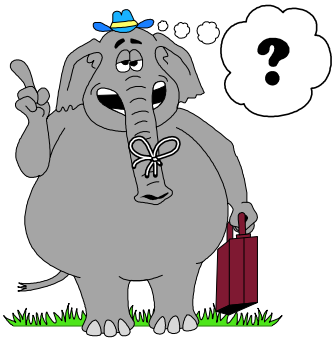
Social Studies

Map reading, interpretation, and creation skills will reinforce and apply previous concepts.

Sample Map for *What Happened to the River* Lesson. Draw and label the map according to the skills that your students already have and those that you want them to apply during the lesson. The colored areas indicate the following: tan= sandbars/sandy areas green= areas with vegetation that may interfere with water movement blue= free flowing water white/blue/ black lines= rapids, rocks below the surface of the water. The depth of the water as indicated on the map should represent these areas accordingly.



How To Start?



Your group now has a situation that is very important to the townspeople. They are relying on your expertise, data collection, and inference skills to guide them in the direction that will help them solve the problem they face. Work as a group to meet your contractual obligations to the town. You will present your findings and recommendations on _____. This checklist will guide your work, but feel free to modify it if your group needs to do so.

- ☐ Make a list of observations and inferences drawn from the original map of the area.
- ☐ Review your contract and rubric to know where you are headed and what requirements you must meet.
- ☐ Read your situation card multiple times. Identify the important data it contains. Make inferences based upon this data.
- ☐ Brainstorm the effects of the situation on the river area. Use scientific logic and knowledge to determine which are the most relevant in the areas your contract requires.
- ☐ Brainstorm recommendations for the situation. Evaluate the importance and validity of each. Decide which would be the best to recommend to the townspeople per your contract.
- ☐ Prepare your presentation. Remember the visual aide must include a map of the river following the situation and at least a chart/table/graph of the data. Your written summary must address all of the areas outlined in your contract. All group members must be prepared to defend your decisions.

The townspeople have become concerned and turned to your group of experts for help. The worst flood in decades sent the river over its banks for a 27-mile stretch. Floodwaters reached 11 feet above flood stage totally destroying dozens of homes along the river and flooding nearby streets. The swift current and debris in the river made it impassable for small boats. Finally, the water started to recede leaving quite a mess. Besides the family cleanup, the river itself must be assessed. That's your job. Follow the contract points that you signed with the town.

The townspeople have become concerned and have turned to your group of experts for help. It is so hot that people say you could fry an egg on the street. It hasn't rained in 6 weeks and people are saying that upriver the conditions are even drier. The crops are really suffering especially since the spring rains were so light that they had a rough start anyway. The fields are cracked and the plants are wilting quickly. So far, the river located just a short distance away has been of no help. Its current has slowed and its banks look different. Surely the river could help. That's where you come in. Follow the contract points that you signed with the town.

The townspeople have become concerned and have turned to your group of experts for help. Brr!! It's so cold that people are walking across the river to the local store instead of driving to the bridge downstream. Even grandpa cannot remember a time when the river was frozen like this. After 6 weeks of sub-freezing weather we cannot wait for Spring which is only a week away, at least on the calendar. The storekeeper says that upriver the Spring thaw has already started but the temperature here is still below freezing. Surely the river will be kind to us. That's where you come in. Follow the contract points that you signed with the town.

The townspeople have become concerned and have turned to your group of experts for help. The local gossip is that the framers upstream have blocked the tributaries of the river to use the water to irrigate their fields. Here, the framers are so busy keeping crops alive that they cannot make the journey to check it out. The river is changing almost daily. The children said that the fish just weren't biting and that the smell along the river is terrible. The boats traveling along the river are staying really close to the deepest part of the river. Lots of logs and other debris are collecting along shallow water and the banks. Surely the river could help. That's where you come in. Follow the contract points that you signed with the town.

Binding Contract

We, _____, _____, _____, and _____, better known as _____ do hereby agree to evaluate the current situation by comparing it to past records and other data. We will present our findings and recommendations, visually and in a written summary, to the townspeople on _____.

We understand that the following questions/ concerns/ points must be addressed in this presentation.

A. What renewable and non-renewable resources can be found in this area? How has this situation affected them? What recommendations can be made to maintain them?

B. The river could be looked at as an ecosystem. How has this situation affected the members of the ecosystem? What recommendations can be made to control, eliminate, maintain, and/or correct the changes?

C. What physical characteristics of the river have changed? What earth changing processes caused these changes? What recommendations can be made to maintain, control, eliminate, and/or correct the conditions?

D. What overall significant impact did the situation have on the river community? Where does the community go from this point?

This contract serves as the basis for our presentation.

Signed and dated:

_____ _____

_____ _____

_____ _____

_____ _____