WHERE DOES MY WATER COME FROM?

INSTRUCTIONS

(MODIFIED FOR ADEED)

Overview:

After listening to a story about a river, students are introduced to watersheds by simulating a watershed with crumpled paper, ink, and water. They investigate the sources of home drinking water in their community, through home inquiry and an actual or virtual field trip. They discuss their experiences and ask questions to help them understand the interconnections in their local watershed.

The big ideas and concepts for this lesson are:

1. Water from the tap comes from the watershed.
2. Science questions may be created by observation and reflection and answered through investigation.

*(**Note:** This is the first investigation from the science unit "Rivers to the Sea and Back Again" Online investigation can be found at http://seagrant.uaf.edu/marine-ed/curriculum/grade-3/investigation-1.html)*

Essential Questions:

- How are we connected to wetlands, rivers and the sea?
- What is the salmon's life journey through the wetlands, rivers and the sea?
- Where does our local water come from and where does it go?

Enduring Understandings:

- Watersheds, rivers, wetland and the one big ocean of the world are an interconnected system.
- Salmon depend on the rivers and the ocean during parts of their life cycle.
- Science is a way to help us study the many connections in our world.

Targeted Alaska Content Standards:

2nd Grade Standards Addressed:

Science as Inquiry and Process

SA Students develop an understanding of the processes and applications of scientific inquiry.

SA1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.

SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

Concepts of Earth Science

SD Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.

SD1 Students develop an understanding of Earth's geochemical cycles.

SD2 Students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.

History and Nature of Science

SG Students develop an understanding of the history and nature of science.

SG4 Students develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.

Targeted Alaska Grade Level Expectations:

Science

[3] SA1.1 The student develops an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring and communicating.

[3] SA1.2 The student develops an understanding of the processes of science by observing and describing their world to answer simple questions.

[3] SA2.1 The student will demonstrate an understanding of the attitudes and approaches to scientific inquiry by answering, "how do you know?" questions with reasonable answers.
[3] SD1.2 The student demonstrates an understanding of geochemical cycles by describing the water cycle to show that water circulates through the crust, oceans, and atmosphere of Earth. The student demonstrates an understanding of the forces that shape the Earth by:
[3] SD2.1 The student demonstrates an understanding of geochemical cycles by identifying and comparing a variety of Earth's land features (i.e., rivers, deltas, lakes, glaciers, mountains, valleys, and islands).
[3] SG4.1 The student demonstrates an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base by asking questions about the natural world.
[4] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating
[4] SA1.2 The student demonstrates an understanding of the processes of science by observing, measuring, and collecting data from explorations and using this information to classify, predict, and communicate.

Materials:

- Butcher paper, newsprint, or white copy paper
- Water-soluble color markers (not permanent ink)
- Spray bottle(s) filled with water
- Chart paper and markers or chalkboard for graphing activity
- Colored pencils or markers for student maps
- Student Handouts
- Science notebooks
- Items for Group Display
- At least one of the following books: *River of Life* by Debbie S. Miller, *Go Home, River* by James Magdanz, *Where the River Begins* by Thomas Locker.
- Classroom location where crumpled watersheds can be sprayed with water.

Teacher Background Information:

The first lesson in this unit focuses on two concepts: (1) the water cycle and (2) the watershed. Both concepts are included in science textbooks.

The water cycle involves precipitation, evaporation, and condensation.

Useful Web sites to provide additional background information and downloadable diagrams located at:
http://seagrant.uaf.edu/marine-ed/curriculum/grade-3/teacher-background.html

Prior Student Knowledge:

1. Students should be capable of writing to express and find meaning.
2. They should be given an opportunity to surface and extend their knowledge about what good reflective questions look and sound like.
3. They should recognize that water flows downhill, and should have some sense of the general topography of their neighborhood or the school neighborhood. It might be helpful to show them a contour map and point out the contours.
4. Finally, they should be able to read a simple graph.

Activity Preparation:

1. Class Time Required: 3-4 class periods
2. 60 minutes to read, view web sites, copy and prepare materials Prior Student Knowledge

3. Useful vocabulary words for this lesson are: Contour, elevation, gradient, peaks, ridges, watershed
4. Check your school and/or community library for books listed. Contact "experts" who work with water systems in your community to find out who might be available to visit your classroom.
5. Investigate possibilities for field trips or virtual field trips to a water utility.
6. Read through all of the materials for the investigation, and practice the crumpled paper watershed activity.

Tips from Teachers:

1. Have students keep a "reporter's notebook" in their journal and write a newspaper article about their field trip to the water plant and/or watershed.
2. Add a grade for the "reporter's notebook" to the rubric.
3. Pose this question for students to think about: "How long does it take a watershed to replenish itself after a dry spell?"
4. Begin by reading a picture book called Beaver Pond/ Moose Pond, by Jim Arnosky. This book is not about rivers, but it does address the interconnectedness of organisms in a water system, and their reliance on one another, and on clean water.
5. Have the school maintenance person come in to show how the water system works in your school.
6. You may need to use a simpler definition of watershed for your students, depending on their abilities.
7. Check your school and/or community library for books listed. Contact "experts" who work with water systems in your community to find out who might be available to visit your classroom. This could include community water caretakers or officials, village elders, a commercial well driller, or a water service contractor/engineer. Investigate possibilities for field trips or virtual field trips to a water utility.
8. Read through all of the materials for the investigation, and practice the crumpled paper watershed activity.
9. Science notebooks will be used for reflection, to report the results of a home investigation, and to generate questions for a guest speaker or online guest expert.

Curricular Connections:

1. Math. In addition to graphing responses to the question of where water comes from, students might do activities to track water consumption. See Down the Drain for some examples of activities.
2. Art. How do local landscape painters show contour with value?
3. Social Studies. Are there any relationships between major watersheds in your region and the routes that people travel(ed) now or in the past? Do ancestral trading routes follow watersheds? How do and did indigenous peoples manage and regard the water in your area?

Lesson Credit:

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Activity 1:

Focus Question: Where does our local water come from and where does it go?
What is a watershed?
Where does your drinking water come from? How do you know?

Procedure:

Engagement (1-2 class periods):

1. To set the broad scope for the unit, read one of the picture books listed above to the class. Ask students to give a signal for a personal connection as they listen to the story: thumbs up if something reminds you of something you've seen before or know something about, two thumbs up if this brings up a question. Stop intermittently or at the end of the book to allow students to share connections and ask questions.2. Record questions on the board, on chart paper, or by a class scribe.
3. Acknowledge questions and tell or remind students that scientists make their life work from the asking of questions. Ask students to write a science notebook entry brainstorming questions about a local water body that they thought about during the reading.

Crumpled paper watersheds

4. Give each child a piece of white paper, or a piece of butcher paper with the shiny side down. Ask students to fold the paper so that a deep crease (bottom of the watershed) forms in the center of the paper. Ask them to imagine a river system, or even their neighborhood as the center of the paper and make all the hills and mountains by crumpling up the paper on either side of the crease.
5. Once students have made a rough three-dimensional surface, have them color the peaks and ridges with water-soluble color markers. Ask them to sketch and label their crumpled paper landscapes in their science notebooks.
6. Next, students should use a spray bottle to wet the colored marker until it runs down the peaks, and sketch and describe what happens in their science notebooks.
7. After the sketches are complete, stimulate reflection with questions like the following:
   - What did you notice when you sprayed the water on your model?
   - In what ways is this similar to or different from what happens when it rains in your neighborhood or around the river you were thinking of?
8. If students reflect in writing, allow time for group (or pair sharing) of their entries.
9. Introduce the term "watershed," noting how the colored ink was "shed" or run off from the high places and collected in at least one common fold or body of water.
10. Watershed definition: An area of land from which rainwater and snowmelt drain into a particular river, stream, or lake, which is the lowest point in the surrounding landscape. All watersheds are connected, directly or indirectly, to the ocean.
11. Ask students to write the definition of "watershed" in the glossary section of their science notebooks.
12. The teacher may conclude this engagement sequence by using a topographic map or Google Earth to trace the area around the school, showing connections to the crumpled paper activity.

Exploration (2 class periods):

13. Ask students to find out where the water in a glass of water comes from at their home. Ask them to sit down with someone at home and share a drink of tap water, then ask that person where the water comes from. Have them record the answer and draw a map/diagram showing where the water comes from, on a sheet to be pasted into the science notebook.

14. Lead the class in a graphing activity of the categories of answers. (Answers might range from the tap or the well to the creek or city water system, to the sky, ocean, etc.) Pose this question to the students: "How will we find out if our answers are correct?" Lead them in completing a Think-Pair-Share activity.
15. Help students construct a plan to investigate the sources of home drinking water in the area. Plans might include:
    - A visit from or with the community water caretakers (or village elders) or department.
    - A visit from or with a commercial well driller or water service contractor/engineer.
    - A field trip (or virtual field trip via the Internet, if necessary) to the local water utility.
16. To prepare for the visit, field trip, interview, or Web search, students should compose questions in their science notebooks. Encourage them to think of questions that will help them understand how the water gets from its source (the sky, creek, etc.) to their house.

Explanation (15 minutes):

17. After the visit, field trip, interview, or Web search, students should revisit their original maps showing how water gets to their homes. Ask them to use a different color pen or pencil to add to their original maps, and/or create a new map to show what they think is the accurate path. Ask them to explain changes or why they made a new map AND to list any questions the new map raises for them.

Elaboration: (1 class period)

18. Choose one or more of the following activities to help students apply and extend their knowledge of watersheds:
    - Generate questions that lead to interconnections to other water systems, and investigate.
    - Revisit the story you read at the beginning, to discuss who lives in their watersheds and how those organisms interact to form a system.
    - Compare watershed or water supply observations with another community or even another school via the Internet. The Global School Net Foundation hosts a Project Registry as a way to find project partners from afar.
    - Allow students to play the Watershed Game at Minnesota's Bell Museum, to learn more about why watersheds are important and how they can be protected.

Evaluation:

19. By sharing sample science notebook entries (from volunteers or from samples provided at Science Notebooks in K12 Classrooms), students and teacher can design a simple rubric for science notebook activities.
20. The rubric might include the following:
    - Notebook setup (dates, page numbers, "lines of learning," etc.).
    - Evidence of completion of home inquiry and classroom observation activities.
    - Evidence of reflection.
    - Quality of reflection.
    - Evidence of questions.
    - Quality of questions.
21. A sample rubric has been provided.

WATERSHED AND WATER SOURCES
WHAT MAKES FOR A GOOD SCIENCE NOTEBOOK?

RUBRIC

Adapted from http://www.sciencenotebooks.org

	Strong	Okay	Needs More Thinking
Water Flow and Water We Drink	In my science notebook, I have good thinking about where and why the colors flowed where they ended up. I have detailed information on where my drinking water comes from. I use and clearly understand the term "watershed."	In my science notebook, I show where the colors flowed and where they ended up. I have information on where my drinking water comes from. I use the term "watershed."	In my science notebook, I have some missing pieces. Entries have been started or notes have been taken, but it's hard to follow my own thinking and hard for someone else to understand.
Asking Questions	To get ready for a visit with an expert, I have written questions that will help me understand things I don't yet know about my drinking water or our watershed. The questions come from the work in my science notebook.	To get ready for a visit with an expert, I have written questions that will help me nderstand things I don't yet know about my drinking water or our watershed.	I may have written a question or two but they don't seem to come from my own written thinking.
About my Thinking (Reflection)	In my science notebook, I have lots of thinking about what I have drawn and recorded. This section of my notebook shows how I have added to, changed, or revisited my thinking. I do this through using different colored pens or pencils, writing in the margins, and/or adding clearly labeled sections.	In my science notebook, I have done the required drawing and responses, but it can be hard to find new thinking, or questioning.	The science notebook shows only recording and not much or no thinking.
Scientific Drawing	Required drawings are MOSTLY large, accurately labeled, and have specific detail.	Required drawings are there but may have incorrect labels, or may not be carefully drawn or drawn with good detail.	Drawings are missing or seem so rushed that they are hard to understand.
Notebook Organization	Sections are labeled and dated. They are entered in the table of contents. My handwriting is USUALLY the best I can do. I have my notebook ready every time I need it.	Sections are mostly labeled and dated. They are entered in the table of contents. My handwriting is USUALLY the best I can do. I have my notebook ready nearly every time I need it.	Labels and dates of entries are hard to find and/or not entered in Table of Contents. My handwriting is often hard to read. I have my notebook ready only some of the times I need it.