vital venture
engaging learners • exploring watersheds • connecting communities

Get to Know Your Watershed

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Grade Level: ,

Themes: ,

Activity Type: ,

Setting: ,

Part of the Community Connections Watershed Experience

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QUESTION(S)

What is a watershed?

Where is my watershed?

What/who does my watershed contain?

OVERVIEW

Students define the term *watershed*, and identify their local watershed using Google Earth and US Geological Survey (USGS) topographic maps. Students then identify water bodies and other geographic features, human communities, and habitat types within the boundaries of their watershed.

This activity was developed as part of the Penobscot River Watershed Education Program, a collaborative project led by Maine Sea Grant, the University of Maine Senator George J. Mitchell Center, and the Penobscot River Restoration Trust, working in partnership with Old Town Elementary School and the City of Old Town, Maine. Fifth grade teachers and students at Old Town Elementary School piloted this activity during the 2007-2008 school year.

Multiple Watershed Experiences use this lesson in different ways (see descriptions below). When appropriate, modifications for specific Watershed Experiences will be noted in the Extension Ideas section.

Community Connections to a Maine Watershed

This activity builds on the previous Get to Know Your Community activity, in which students define *community* and reflect on the unique characteristics of the community in which they live. It sets the stage for the subsequent My Watershed Connections activity, in which students explore their personal values for and connections to local watershed resources.

NOTE: This activity is designed as an introduction to the term *watershed*, and as a tool to help students identify features of the watershed(s) in which they live. Please see the resources section below if you are looking for more advanced, skill-building lessons focused on topographic map skills or watershed boundary delineation.

All My Watershed Neighbors

Through this activity, students explore local habitats within their own watershed. A habitat is defined as “the place or environment where a plant, animal, or other species naturally or normally lives and grows” (Merriam-Webster Online).

Students explore their local watershed by studying maps**.** They use Google Earth and US Geological Survey (USGS) topographic maps to identify their watershed boundaries. Students then identify water bodies and other geographic features, human communities, and habitat types within the boundaries of their watershed. They will explore habitats further in My Watershed Habitats.

STANDARDS (MLR)

Science and Technology

A4. Scale

3-5 Students use mathematics to describe scale for man-made and natural things.

6-8 Students use scale to describe objects, phenomena, or processes related to Earth, space, matter, and mechanical and living systems.

B1. Skills and Traits of Scientific Inquiry

3-5 Students plan, conduct, analyze data from, and communicate results of investigations, including fair tests.

6-8 Students plan, conduct, analyze data from, and communicate results of investigations, including simple experiments.

Social Studies

D1. Geographic Knowledge, Concepts, Themes, and Patterns

3-5 Students understand the geography of the community, Maine, the United States, and various regions of the world.

6-8 Students understand the geography of the community, Maine, the United States, and various regions of the world and the geographic influences on life in the past, present, and future.

D2. Individual, Cultural, International, and Global Connections in Geography

3-5 Students understand geographic aspects of unity and diversity in the community, Maine, and regions of the United States and the world, including Maine Native American communities.

6-8 Students understand the geographic aspects of unity and diversity in Maine, the United States, and various world cultures, including Maine Native Americans.

LEARNING OBJECTIVES

Students develop a working definition of *watershed*.

Students use Google Earth and USGS topographic maps to locate their local watershed and identify geographic features, habitat types, and human communities within it.

MATERIALS

Black board, white board, or flip chart paper and writing utensils

Internet connection and computers

Spray bottles filled with water

Access to Google Earth (a free online resource that lets you fly anywhere on Earth to view satellite imagery and maps) and multiple computers, or a computer with a projector

US Geological Survey topographic map(s) of the area around your school or community. You can use printed USGS quadrangle maps, or you can view these same images online using the Basemap page of the Maine Office of Geographic Information Systems (MEGIS) website.

NOTE: if you use printed topographic maps for this activity, make sure the scale is large enough to see individual contour lines and geographic features. A map scale of 1:24,000 with a contour interval of ten feet works well.

TIME NEEDED

Two 40-50 minute class periods

ACTIVITY PROCEDURE

Part I – Define watershed as a class

1. If students are not familiar with this term, it may help them to start by breaking it apart into “water” and “shed,” and have them offer ideas for what they mean when combined. Write these ideas on the black board or a flip chart.
2. Ask a student to visit the US EPA’s *What is a Watershed?* website, and read the two definitions of watershed listed there. URL: http://www.epa.gov/owow/watershed/whatis.html

   wa-ter-shed: the area of land where all of the water that is under it or drains off of it goes into the same place. – *US Environmental Protection Agency*

> **wa-ter-shed**: that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community. – *John Wesley Powell, Famous Geologist and Explorer of the American West*

3. Guide discussion toward the idea of an area of land that "sheds" excess water that is not absorbed by the ground or plants after falling as rain or snow. Ask students to share what they know about how water moves in rivers and streams, and guide them toward the idea that *surface water flows downhill*, where it collects in water bodies (streams, rivers, ponds, bogs, etc.) that are connected to one another, and eventually flows all the way to a lake or the ocean.

   NOTE: This introductory watershed activity does not address the ways in which surface water and groundwater interact within and between watersheds (shallow vs. deep flow of groundwater, local vs. regional flow of groundwater, groundwater recharge as surface water percolates into the ground, groundwater discharge to surface waters, etc.). For information about these topics, please consult the references in the Extension Ideas section below.

4. Ask the students to cup their hands and hold them together like a bowl, with their fingers tilted forward, lower than their palms. Have them take turns using a spray bottle to squirt water into a partner's hands, and watch how the water flows down the creases of their hands into the basin of their palms and then out along the cracks between their fingers. This miniature model of a watershed basin illustrates how surface water flows "downhill" along the topography of the land.
5. Ask each pair of students to join another pair and line up three cupped-hand "watersheds" in a row, all with fingers tilted forward, so their individual "watersheds" form a larger basin made of three small, adjacent watersheds. The fourth student should use the spray bottle to "rain" on the landscape. Ask the students to watch how the water that falls on each student's "watershed" drains down along that person's fingers, and then joins the other students' "runoff" at the point where all the students' fingers meet. Ask them to think of the ridges where their thumbs meet as mountain ranges or hills in this landscape, and imagine three rivers coming together at their fingertips. These ridges are the boundaries, or "divides" between the smaller watersheds.
6. Ask the students to reflect on what they learned through the cupped-hand activity, and compare their ideas on the flip chart or black board with the two definitions on the EPA website. Give them an opportunity to modify their original ideas, based on the activity and the EPA definitions and ask them to decide upon their own working definition of watershed, which they will use as a reference for the rest of the unit.

   NOTE: The cupped-hand activity is an adaptation of a lesson in *From Ridges to Rivers: Watershed Explorations*, which is listed in the References section.

Part II – Explore the unique features of your local watershed using Google Earth and USGS topographic maps.

1. Set up a computer with a projector, so you can work as a class, or break your students into smaller groups, each with a computer and Internet connection.
2. Ask a student (or a student within each small group) to type the name of your town or city into Google Earth and slowly zoom in to a point where you can see the names of roads, towns and bodies of water.
3. Find your school, and ask the students to choose a river or stream nearby, which you will explore in more detail.
4. Zoom in on the river or stream, travel along its length, and then slowly zoom back out to see a larger area. Ask the students to make observations and ask questions as you go.
   Examples of questions that may help draw out students' observations:

   Is the land nearby flat or hilly? How can you tell?

   What/who lives near this river or stream?

   Can you tell where the boundaries of the watershed for this river or stream are located? How? What makes it hard or easy to see where they are?

   What kind of habitats do you see around this river or stream? How many do you see?

   What evidence of human development or other human activities can you see in this watershed?

   How many different communities do you think there are within this river or stream's watershed?

   Does your river or stream connect to any other bodies of water?

   Can you tell which way the water is flowing?

Does this river or stream have any tributaries? You may need to define the word tributary.

Do you see any evidence of humans or animals using the water from this river or stream?

5. Shift students' attention to the USGS topographic map(s) of the same area that includes the water body you have chosen to investigate.

   If you are using printed USGS quadrangles, it works well to get more than one copy of the map, so all of the students can get a close look. A scale of 1:24,000 with contour intervals of ten feet works well for this activity, because it offers sufficient detail for students to make out individual habitat types and geographic features. Depending on the size of the water body your students choose to explore, you may need more than one quadrangle map for them to see the whole watershed.

   If you choose to use the online USGS topographic maps on the Maine Office of Geographic Information Systems (MEGIS) website, and click the "USGS Quadrangles" data layer in the upper right-hand corner of the page. Zoom in to the water body you have chosen. The image should be nearly identical to a printed map for the same area.

6. Ask the students to move slowly around the map and make observations and ask questions about what they see. If they don't ask about them, point out the contour lines, and ask them to explain in their own words what they mean. Help them find the elevation numbers on the lines, if they don't do so on their own, and ask them to figure out the elevation distance between lines ("contour interval") using these numbers.
   Examples of questions to guide discussion:

   How can you tell if an area of land is hilly or flat? And, related: What does it mean when you see contour lines that are very close together, or in rings, stacked on top of one another?

   What do the green, white, and blue colors on the map mean?

   What symbols to you see, and what do you think they mean?

   Do you recognize a place where you have been before? What tells you this is the same place?

   Can you identify different habitats near your water body? How many do you see?

7. Once you have established an understanding of how the contour lines work, ask the students to try to identify the boundaries of the watershed surrounding the river or stream you have chosen. Examples of questions to guide discussion:

   What makes it easy or hard to see the boundaries of this watershed? How is looking at the watershed with the topographic map different from looking at it with Google Earth?

   Can you see evidence of human development or other human activities in this watershed?

   How many human communities fall within the watershed boundary?

   Does your river or stream connect to any other bodies of water?

   Can you tell which way the water is flowing?

   Can you see any tributaries of your river or stream using this map?

   Does this map give you information about ways humans or animals might use the water from this river or stream?

REFLECTION/FORMATIVE ASSESSMENT IDEAS

Part I.

Reflection on the cupped-hands activity is built into the last step of the activity procedure.

Ask the students to reflect on John Wesley Powell's definition of a watershed and rephrase it in their own words. Why do you think he says that patterns of human settlement and communities are influenced by watershed boundaries?

Discuss the idea of a watershed "address." Link this to John Wesley Powell's definition. He might say that every community's watershed "address" is part of its identity. Why?

Part II.

Ask the students to reflect on the similarities and differences between the two ways of looking at a watershed, Google Earth vs. USGS topographic maps. What kinds of information did the Google Earth satellite imagery give you? What kinds of information did the topographic maps give you? Did using both tools give them more information than they would have gotten with only one? Which one did they find easier to use?

Have each student write a short piece (or draw a comic strip) from the point of view of a raindrop that falls on the outer boundary of the watershed you explored and makes its way all the way through the watershed and into the Gulf of Maine.

> What/who did the water drop pass on the way through the watershed? (geographic features, habitat types, human communities, animals, plants, etc.)
>
> What/who might the water drop have helped along the way (i.e. who uses the water in the watershed?)

EXTENSION IDEAS

Find out more about your watershed! Visit the University of Maine's environmental data website called, *PEARL* and use the "Data Search" function to type in the name of your local body of water or watershed and see what data are available (animal and plant species, water quality, land cover, elevation, geology...etc.). Or, visit the *Maine Rivers* organization website, click "River Issues" and then "Watersheds" to find out more about the large watershed system in which your school lies. This site includes historical, cultural, and demographic information, lists of lakes, rivers, and streams within each of the 16 major watersheds in Maine, and links to local watershed and stewardship organizations.

RESOURCES

From Ridges to Rivers: Watershed Explorations, Session 2: Topo Maps. 4-H Watershed Project, 4-H Youth Development Program, San Luis Obispo County, CA. 1999. Pg. 13.

From Ridges to Rivers: Watershed Explorations, Session 3: Topography – Reading Between the Lines. 4-H Watershed Project, 4-H Youth Development Program, San Luis Obispo County, CA. 1999. Pg. 21.

From Ridges to Rivers: Watershed Explorations, Session 4: Where Has All The Water Gone? 4-H Watershed Project, 4-H Youth Development Program, San Luis Obispo County, CA. 1999. Pg. 31.

Maine Rivers. *Watersheds* website

Maine Sea Grant Program. 2006. *Coastal Connections: Field, lab, and classroom experiences focusing on coastal watershed study in Maine*. Lesson 1: Introduction to Watershed Dynamics. Pg. 4.

Maine Sea Grant Program. 2006. *Coastal Connections: Field, lab, and classroom experiences focusing on coastal watershed study in Maine*. Lesson 2: Measuring Watersheds. Pg. 7.

NOAA, National Ocean Service, Office of Response and Restoration, Watershed Database and Mapping Projects.

Project WET Curriculum and Activity Guide. 1995. *Branching Out!* The Watercourse and the Council for Environmental Education. Bozeman, MT. Pg. 129.

Project WET Curriculum and Activity Guide. 1995. *Get the Ground Water Picture*. The Watercourse and the Council for Environmental Education. Bozeman, MT. Pg. 136.

University of Maine, *PEARL: The environmental information source for Maine*.

US Environmental Protection Agency, *Surf Your Watershed* website.

US Environmental Protection Agency, *Watersheds* website.

REFERENCES

From Ridges to Rivers: Watershed Explorations, Session 1: Creek Carvings; Action 2, Watershed in Your Hands. 4-H Watershed Project, 4-H Youth Development Program, San Luis Obispo County, CA. 1999. Pg. 1.

Google Earth.

Maine Office of Geographic Information Systems (MEGIS). *Basemap* website.

US Environmental Protection Agency, *What is a Watershed?* website.

3 Comments

ERIK

DECEMBER 13, 2010 AT 1:28 PM

FYI, the link to the Maine Office of Geographic Information Systems (MEGIS) website is broken.

GAYLE

FEBRUARY 9, 2011 AT 2:16 PM

Thanks Erik! I've updated the links and they're working now.

SUSAN

DECEMBER 16, 2011 AT 8:16 AM

Another great way to show the connection between contour lines and elevation is to make a fist and draw lines on your hand connecting elevations around your hand and knuckles. (You'll end up with 4 mountains for each knuckle) Then when you flatten your hand, you'll have a topographic map of your hand.