

EXPLORE

4 | Watershed Orientation

GRADE LEVEL

4-8

**summary**

Students orient themselves to the Great Lakes using maps and learn about watersheds, including point and nonpoint source pollution, by building a model.

objectives

- Identify the Great Lakes watershed on a map.
- Describe a watershed.
- Locate local watershed(s) on a map.
- Discuss point and nonpoint source pollution.

prerequisite

Lake Connection, Maps of Home

vocabulary

Watershed: all the land that drains into a particular river, lake or other body of water

Basin: synonym for watershed

Great Lakes basin or watershed: all the land draining into the five Great Lakes

setting

Indoors – or an outdoor sandbox or sandy area of a park, playground, or beach.

**subjects**

Environmental Science, Geology, Geography

standards

This Great Lakes in My World activity is aligned to the Common Core State Standards and to state learning standards in:

Illinois
Indiana
Michigan
Minnesota
New York
Ohio
Pennsylvania
Wisconsin

This alignment is available on your Great Lakes in My World CD in the "Standards" folder and on-line at <http://www.greatlakes.org/GLiMWstandards>.

materials

- 4 spray bottles
- Journals
- Pencils
- Plastic tarp/tablecloth
- Plastic bags
- Highlighters
- 5 toothpicks
- Food coloring
- Maps: world map; Great Lakes watersheds map (one for each student plus one for the classroom); local watershed map (one for each student)

background

A watershed is the area of land drained by a body of water. For example, all of the water that falls in the Great Lakes basin eventually drains into one of the Great Lakes. All land is a part of a watershed. Watersheds are nested within each other. The United States could be divided into Atlantic and Pacific watersheds, then into smaller watersheds of rivers and lakes and then even smaller watersheds of the tributaries of rivers. The Great Lakes basin is the land that makes up the Great Lakes watershed. Within the basin, each lake has its own watershed (see map). Within the lake watersheds are smaller watersheds of land that drain into rivers.

Point source pollution is when pollutants enter the waterway through a specific entry point, such as a drainpipe draining directly into a river or lake. Industrial water discharges and sewage treatment plants are the main culprits of this type of pollution. Point source pollutants can include many different organic and inorganic substances, including human waste and toxic metals. Point source pollution can be traced to a specific discharge point and owner; therefore, it has been the easiest source of pollution to control and regulate, although it continues to be a problem.

In contrast, nonpoint source (or NPS) pollution comes from many different diffuse sources and is extremely difficult to regulate and control, which makes it a hazard facing the Great Lakes today.

NPS pollution is mainly caused by runoff, when rain and snowmelt move over the land, picking up pollutants along the way and eventually dumping the pollutants into rivers and lakes. Some common NPS pollutants include fertilizers and pesticides from agricultural lands and homeowners; oil, grease and salt from highways; sediment from construction sites and eroding shorelines; and animal and human waste.

Atmospheric pollution (or air deposition), which comes from the sky, is another form of nonpoint source pollution. As water moves through the hydrologic cycle, it falls as rain or snow and then evaporates into the air from land and surface water. Pollutants emitted into the air, such as through smoke stacks, follow this same path, and can be carried through the atmosphere and deposited into waterways hundreds of miles away from its source. Acid rain is a well-known form of atmospheric pollution.

The major sources of atmospheric pollution include coal-burning energy plants and waste incinerators. The combustion of fossil fuels and waste (such as from hospitals) produces large amounts of mercury in the air, a toxic chemical that is fatal to humans and animals in large quantities. Phosphorus and polychlorinated biphenyls (PCBs) are also transported to waterways via air deposition.

procedure

What is a watershed?

1. Clear a space large enough for the plastic tarp/tablecloth and all of the students to stand around it.
2. Option 1: Have students use a plastic tarp. Plastic bags and other items can be bunched underneath the tarp to form its shape.

Option 2: Have students use sand in a sandbox or kiddie pool filled with sand. Allow students to form a landscape. The landscape should have a lot of variety, using mountains, ridges, plains and depressions.
3. Choose three places on the landscape to sprinkle water, simulating rain. Mark them with toothpicks. Ask students to guess where the water will go when sprinkled on the landscape. Have them draw arrows on the tarp or in the sand to mark the water flow. At each of the marked locations, use spray bottles or sprinkling cans with colored water (add food coloring) to gently pour water over the landscape. Students should watch carefully to see where the water goes. Did it follow their arrows? Why did the water flow the way it did? *Water will flow down hills and collect in basins. If you chose to use sand, some of the water will sink in. This mimics water flow in the natural world. Gravity is the force affecting this flow.*
4. Have students point out bodies of water and rivers that formed. Explain that the area drained by a body of water is called a watershed. Have students find the watershed for the larger bodies of water in their landscape. Ask students if they notice anything about water poured over the tops of their mountains or ridges. *Water poured over the top of a point will probably flow in both directions, into different watersheds. These points mark the boundaries between watersheds.* Students can outline the watershed boundaries in the sand, or on the tarp with markers. Consider using cocoa powder instead of colored water or food that will melt or has colors that will run (chocolate chips, or other candy) to place in the landscape and simulate pollution and animal waste in the ecosystem. You can also make marks with dots of food coloring or markers that are not waterproof to indicate pesticides and insecticides. Re-spray the landscape and have the students observe and discuss what happens.
5. Ask students to think of watersheds in the natural landscape. What body of water is nearby? What land do they think is a part of its watershed? Are they standing in a watershed now? *Every place is in a watershed!* Tell students that they will look at maps to find their watersheds. If desired, have students sketch the landscape they've created.

procedure continued

Where are the watersheds?

1. Hang a world map in the classroom. Ask students to find the Great Lakes on it. Wait until everyone thinks they can find them, then ask a volunteer to point them out. Ask students to describe the characteristics that make the Great Lakes easy to find. *The lakes are very large (the largest source of freshwater in the United States). What shapes can the students find? Lake Superior looks like the head of a wolf, and Lake Michigan looks like a mitten.*
2. Now show students a map of the Great Lakes watershed or basin. Explain that all of the water in this area of land ultimately drains into one of the Great Lakes.
3. Ask students to find their town and decide which lake watershed it is in or figure out how far they live from a Great Lake's watershed. Explain that all of the water that falls on the ground or runs through the rivers in their town ultimately drains into that lake. Have students mark their watershed on the map with a highlighter. Now find your smaller watershed. The lake watershed is made up of wetlands, rivers, and streams that have their own watersheds.

Optional for grades 4-8: watersheds online

1. You may do this research in advance or with the class. Go to <http://cfpub.epa.gov/surf/locate/index.cfm> to locate your watershed and find out information about it.
2. Have students mark their watershed on a Great Lakes map with a highlighter. These maps are not very detailed, so you may wish to use them in conjunction with more detailed maps of your area. Comparing the two maps, have students find their watershed on the more detailed map. This will give students a better orientation—they can look for their school and homes on the map as well. Topographic maps are great for this.
3. To find out more about your watershed, click on: *Environmental Websites Involving This Watershed*. Scroll through the list of web sites and look for a general site about your watershed. Click on the link. The screen will say: *You are now exiting the EPA web server*. Click on the blue link. If you do not find a general web site about your watershed, try www.great-lakes.net.

wrap-up

1. Hang one watershed map in the classroom for students to look at while they are studying the Great Lakes.
2. Discuss what it means to live in a watershed and some of the responsible behaviors people can choose to keep the watershed healthy. *Suggestions might include picking up after pets, using environmentally friendly products for yards, parks, car washing and cleaning supplies.*
3. In their journals, have students draw a picture of their local watershed and answer the questions.
4. Students in grades 6-8 can write a short essay explaining what a watershed is, the connection between their local watershed and the Great Lakes, and what is important to know about living in a watershed.

assessment

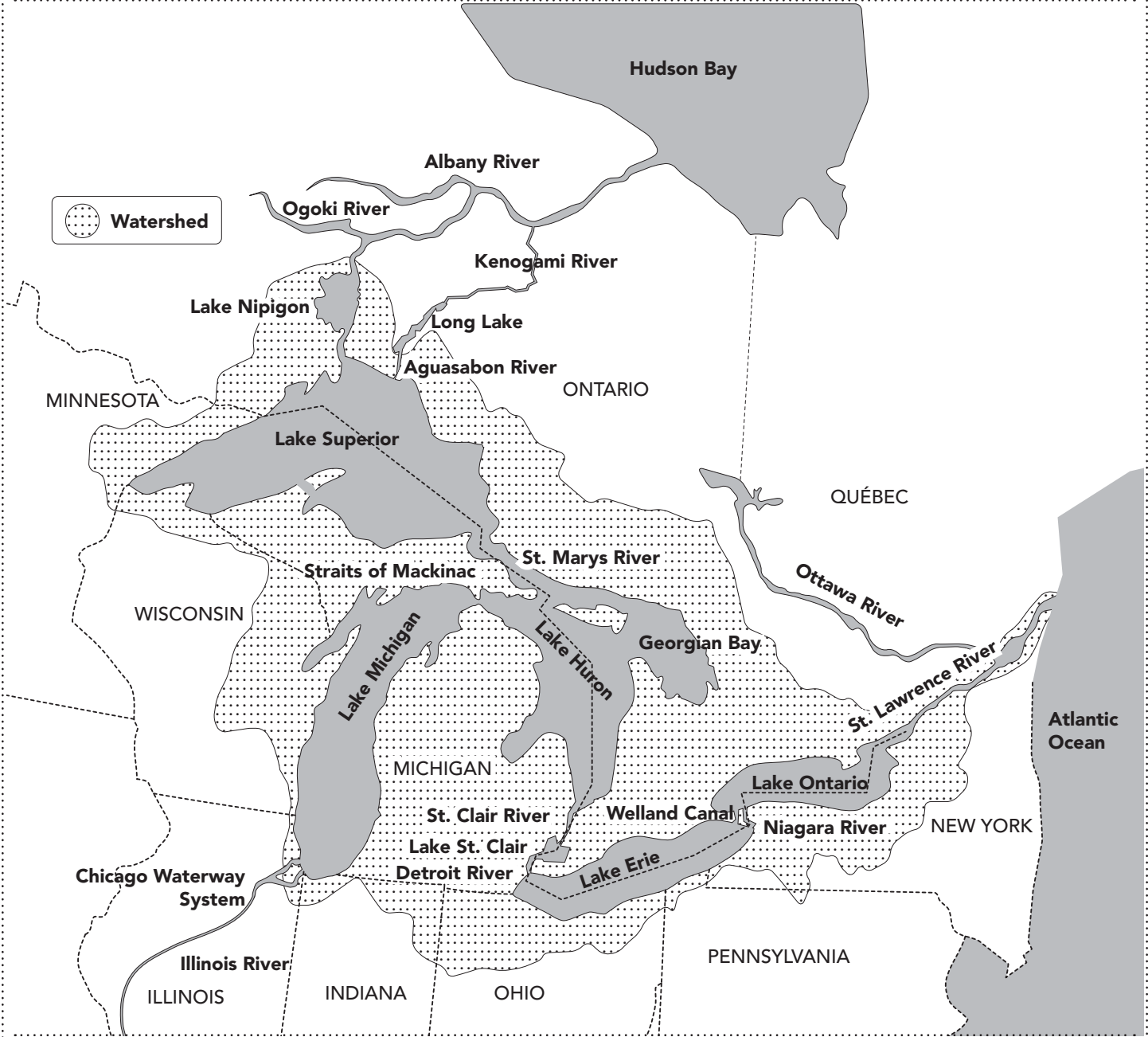
Rubric on page 83



We value your thoughts and feedback on Great Lakes in My World. Please let us know about any oversights, errors or omissions you find, or if there are things you or your students particularly like.

Send your comments to: education@greatlakes.org

The Great Lakes Watershed



4 | Watershed Orientation

FIRST NAME																				
LAST NAME																				

[1] Your teacher will tell you to draw a map of either: your local watershed, your Great Lake and its watershed or the classroom demonstration. Draw arrows to show where the water drains.

[2] Describe the water flow in a watershed.

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[3] What are the problems associated with point and nonpoint source pollution?

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[4] What can you do to decrease problems with pollution in your watershed?

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