

Shower Curtain Watershed



Topic
Watersheds

Grades
3-5

Sites
Outdoors, Indoors

Duration
45-60 minutes

Materials

- Watershed pictures
- Labels or index cards
- Clear plastic shower curtain
- Spray bottles with water
- Sand
- Diluted food coloring
- Cake sprinkles
- Sponges
- Small plastic houses, animals, people (optional)

Vocabulary

nonpoint source pollution, point source pollution, runoff, watershed

Next Generation Science Standards

Practices

Developing and using models

Core Ideas

ESS2.A Earth materials and systems
ESS3.C Human impacts on Earth systems

Crosscutting Concepts

Cause and effect

Performance Expectations

See page 5

Focus Question

Where does rain water go? How do humans affect the health of our watershed?

Overview

What is a watershed? How do our actions affect the health of a watershed? Students explore these questions by analyzing pictures and identifying watershed features. Students then make a watershed model using a plastic shower curtain, a spray bottle of water and themselves!

Objectives

Students will be able to:

- Identify nonliving and living features found in a watershed.
- Understand how human activities can affect watersheds.
- Name three actions they can take to keep a watershed healthy.

Background

No matter where people live, they are in a watershed. A **watershed** is an area where rain, snow and other water is shed from the land into a common waterway. The outer boundaries of a watershed are determined by the tallest landmasses in the area (such as mountains). Precipitation and groundwater drain down to lower-lying areas and eventually into a common waterway. Watersheds can be all shapes and sizes.

Drainage systems are a part of every watershed. A drainage system consists of a network of groundwater, streams and rivers that channel the water, sediment and other materials to a common waterway or outlet. A watershed's outlet is the mouth of a river or major stream. This is where the water flows into another stream, river, lake, estuary or ocean.

Wetlands are a part of a watershed that form a transition zone between dry land and a waterway. There are many types of wetlands, but all are areas saturated with water. This creates a specialized kind of soil and plant and animal community. Wetlands have several ecological functions: preventing floods by catching, storing



VOCABULARY

Nonpoint source pollution: pollution that originates from multiple sources and often as a result of runoff

Point source pollution: pollution that originates from a specific and identifiable source

Runoff: water that flows across the surface of the ground

Watershed: an area of land that sheds water into a common stream, lake, ocean or other body of water

and slowly releasing runoff; protecting coastal areas from storm damage by absorbing the brunt of storms as they hit the shore; recharging or replenishing aquifers by slowly releasing stored water to the underground water supply; and trapping sediments and pollutants that are washed off the land. In addition, wetland plants filter nutrients from passing water and use them for their own metabolism.

Runoff is water in a watershed that flows across the surface of the ground and picks up materials, such as soil, agricultural chemicals and other transportable materials. Eventually runoff reaches a waterway. Many types of pollutants can enter a waterway through runoff. Pollutants are categorized as point source or nonpoint source. **Point source pollution** occurs when pollutants are discharged from an identifiable source, like a pipe, a well or a ditch. Often these pollutants can be traced back to one specific source. **Nonpoint source pollution** does not originate from one specific location but originates from multiple sources and often is spread out over a large area. Examples include excess herbicides and fertilizers from agricultural practices, oil and other toxic chemicals from industrial usage, sediments from construction sites or erosion, salt from irrigating fields and bacteria from livestock and other organic waste.

Nonpoint source pollution may also originate from individuals and can include soap from washing a car or fertilizer from a home garden that washes into the street drain which may flow directly to the nearest creek. People can easily reduce non-point source pollution by being aware of their actions and shifting every day behaviors. Using a carwash (where there is special waste water drainage), purchasing organic and biodegradable pesticides and fertilizers and using them sparingly, disposing of oil, antifreeze and paints in proper receptacles and keeping litter, pet waste and other debris out of the streets are all ways to reduce nonpoint source pollution.

Procedure

Part 1: Watershed Model

1. INTRODUCE A MODIFIED FOCUS QUESTION TO THE CLASS.

Share the question: *Where does rain water go?* You may write it up on the whiteboard or have students add it to their science notebook. Give students time to write their initial thoughts down or discuss with a partner.

2. CHALLENGE STUDENTS TO MAKE A MODEL OF THE AREA THAT THEY LIVE IN.

Ask students to name some land forms and bodies of water that are in the area where they live. Create a word list with their answers. Show students the plastic shower curtain and spray bottles. Ask how they could make a model of their area using those materials. Have them work together to create it. You may need to help facilitate the process. (This activity is best done outdoors, if possible.)



ELL TIPS

Let students experience the activity and see examples of real watersheds before you introduce watershed as a vocabulary word.

Sample Watershed Model

Several students sit on the ground next to each other and raise their knees into the air while keeping their feet on the ground. Spread the shower curtain from the top of their knees over their legs and feet. If you want all students more active, use chairs instead of students. Students can form hills and valleys and the connections between them by shaping the shower curtain.

3. STUDENTS PREDICT HOW WATER WILL FLOW IN THEIR SAMPLE WATERSHED.

Ask the students to predict what will happen when it rains on their watershed model. You may ask guiding questions: *Where will the water go? Will the water form pools? Where might the water travel faster? Slower? How do you know?* Students may write their predictions in their notebooks.

4. CREATE RAIN IN THE WATERSHED MODEL.

Have students spray water over the entire shower curtain including at the top of the mountains to simulate rain. Have the rain continue until students can see where streams, rivers and lakes form. Ask students: *Where are rivers forming? Are any lakes forming? Where might wetlands form? Where might the ocean be? Where is the water going? Where does the water eventually end up?*

5. LABEL NONLIVING FEATURES ON THE WATERSHED MODEL.

Invite students to label different nonliving features of the model (mountains, rivers, lakes, and so on) using index cards or sticky notes.

6. DEMONSTRATE THE IMPORTANCE OF SOIL IN A WATERSHED.

Have students think about the function of soil. Does the plastic of the shower curtain accurately represent soil? Why or why not? (*No, because plastic doesn't absorb or filter water the way soil does*) Show students the rest of the materials available to construct their watershed (sponges, plastic animals, houses, food coloring, cake sprinkles). Ask them what could represent soil and why (*sponges because of absorption*). Add the sponges and create more "rain." Discuss the following questions:

- *What happens when water comes in contact with the soil? How is this similar to a real watershed? How is it different? (In nature, water soaks into the ground. Some of the water remains close to the surface of the soil and is used by plants while some soaks deeper into the ground and becomes groundwater.)*
- *Estimate how much water is stored underground. Do humans use this underground water? For what?*
- *What might the food coloring represent? (Excess fertilizer, soap from car washing, oil and gas residues from roadways, etc.) What might the sprinkles represent? (Pet or live stock feces)*



TEACHER TIP

It might be helpful to place student volunteers in chairs then lay the shower curtain over their entire bodies or use chairs to hold up the shower curtains. This way all students actively participate in adding features to the watershed.



CONSERVATION TIPS

Nearshore animals are especially vulnerable to point and non-point source pollution that travels through our storm drains and watersheds to the sea. Use nontoxic materials in your yard; dispose of trash properly and share what you know. These actions will help keep our coasts and neighborhoods clean.

7. LABEL AND ADD LIVING FEATURES TO THE WATERSHED MODEL.

Ask students: *What living things may be found here? What human development might be found in a watershed? (houses, schools, factories, dams, farms) Where would the best places be for humans to build or live in a watershed?* Have students add some small houses, animals, people, cars or factories to the model with the index card labels. *How might these inhabitants affect the area? How might a dam affect the flow of water in the area?*

8. EXPLORE THE SOURCES OF POLLUTION IN A WATERSHED.

Ask students what the sources of pollution might be in a watershed (*trash from homes and schools, oil from cars, excess fertilizers from gardens and fields, waste from pets and livestock*). You may choose to introduce the terms "point source" and "non-point source." Have students demonstrate pollution with a pinch of sand, diluted food coloring or cake sprinkles. Ask: *What happens to the pollution when it rains?* Use the spray bottles to create more rain and watch the resulting water flow. Discuss how this simulates what happens in a real watershed. How is it different? (*We can't always see the pollutants or know exactly where they are coming from without further investigation.*)

Part 2: Introduce the Concept of a Watershed.

9. COMPARE THE SCHOOL'S WATERSHED TO THE SHOWER CURTAIN MODEL.

Clean up the model watershed and then bring in maps or go outside to identify the watershed of the school. Compare it to the watershed model the students created. You may choose to have a class discussion or have students record their observations in their notebooks. Discussion questions may include:

- *What does our watershed look like?*
- *How is our watershed similar to our shower curtain watershed model? How is it different?*
- *What features are found in our watershed? What physical features (names of mountains, ridges and so on) form the edges of our watershed? When it rains, where does the water flow in our watershed?*
- *Are your homes in the same watershed as our school? Does the water you drink come from this watershed?*

10. AS A CLASS, EXPLORE THE CONCEPT OF A WATERSHED.

Ask the class for their ideas about a watershed. Then share a definition with them: *A watershed is the whole region surrounding and shedding water into a common body of water. That body of water may be a stream, river, lake, wetland or ocean. Do you live in a watershed? (yes) Is there any place NOT in a watershed? (No, all land is a watershed because rain falling on land either soaks in or runs off.)*

11. IN SMALL GROUPS, STUDENTS ANALYZE AND COMPARE WATERSHED PICTURES.

Divide the class into small groups. Pass out a few pictures of watersheds to each group. Ask them to examine the pictures and answer the following questions:

- *What are some of the common features in the pictures? What are some differences?*
- *What living things do you see? What nonliving things do you see?*
- *What are the major parts of a watershed? How do the parts of a watershed interact with or depend on each other?*

12. GROUPS SHARE THEIR WATERSHED OBSERVATIONS WITH THE CLASS.

Have groups share their pictures and observations with the class. Add any new words to the watershed word list you began on the board or chart paper. Ask the class which of these words are familiar and which ones they need to learn more about.

13. AS A CLASS, DISCUSS WAYS TO KEEP THE WATERSHED HEALTHY.

Based on their model of a watershed and the information they've gathered, ask students for their ideas about keeping the watershed healthy. Come up with three actions students can take to help protect their watershed. Try to push them to think beyond not littering and picking up trash. See **Background** for more ideas.

14. RETURN TO THE FOCUS QUESTION.

Now that students have gone through the steps of constructing a watershed and identifying influences on one, have them revisit the question: *Where does rain water go?* Then add to it and ask: *What is a watershed and how do humans affect its health?* Students may think on their own or discuss with a partner. Then in their science notebook, have them draw a line of learning and under it add to their original thoughts about the question.

Extensions

- Use the zip code of their homes or school to locate the students' watershed at "Surf Your Watershed" on the EPA website. Have them look at a satellite image of where they live on Google maps. Ask what they can tell about their watershed from the satellite image. Have them look at a topographical map of where they live. Ask what kind of information this type of map gives about their watershed. Discuss other kinds of maps that might show additional features of their watershed.
- Research where the drinking water comes from in your community. Is it treated? If so, how?

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Resources

Environmental Protection Agency www.epa.gov

Find your watershed using the Environmental Protection Agency web site.

United States Geological Survey http://water.usgs.gov/wsc/map_index.html

Find out about science in your watershed.

Trails.com www.trails.com/maps.aspx

Print a topographical map of your watershed.

Standards

Next Generation Science Standards www.nextgenscience.org

Performance Expectation

Relates to 5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere and/or atmosphere interact

Common Core State Standards www.corestandards.org

Language Arts, SL.3-5.1

Speaking and Listening: Engage effectively in a range of collaborative discussions with diverse partners on grade 3-5 topics and texts, building on others' ideas and expressing their own clearly

