

Crumpled Paper

Watershed

A Model of a Watershed

Overview:

Students will be able to observe how surface water moves over land, and how the shape of the land determines its movements. Students will investigate the characteristics of a watershed and the impacts of human land use decisions.

Lesson plan:

Time Required : 15-30 minutes

Key Concepts/terms: Watershed, runoff, landforms, pollution, land use, water cycle, hypothesis

Prerequisites: Basic understanding of the water cycle

Setting : Indoors (on a desk or table), Individual/Student pairs

Learning Objectives:

After completing this activity, students will be able to...

- Define the term watershed.
 - Use a model to demonstrate an understanding of a watershed.
 - Describe how pollution can get into our waterways via runoff.
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Materials Required :

Provide the following materials per group or individual:

- Copies of *Student Sheets* (pages 5-9)
- 2 pieces of plain scrap paper (8.5 X 11)
- Spray bottle
- Water
- Water-based markers

Teacher page

Instructions and guiding discussion questions:

Ask students to clear off their desks, things may get wet!

Discuss:

“What happens to rainwater after it falls? Where does it go?”

Student answers should include the concept that some rain goes into the ground and some runs downhill.

If needed, discuss pollution ask students if they are familiar with the term or if they need a definition.

Ask them for examples of different kinds of pollution?

ie: plastic, soil, air, water pollution.

Instructions for beginning the activity:

Pass out Student Sheets – Crumpled Paper Watershed (pg. 5), two sheets of 8.5 X 11 paper, and markers to each student/group.

This activity can be conducted in two different ways, as detailed below:

Teacher-directed: You can work through the instructions on the Student Sheets as a class, with the teacher giving instructions orally and demonstrating the steps as necessary, or **Self-Directed:** Students can read and follow the instructions on the student sheets at their own pace, with the teacher monitoring student progress throughout the activity and offering assistance when needed.

Discuss the results found in *Analyze your Data and Draw Conclusions* section of the student sheets.

Use completed student sheets for evaluation.

Optional: Ask students to create models of a watershed using other materials such as modeling clay or aluminum foil.

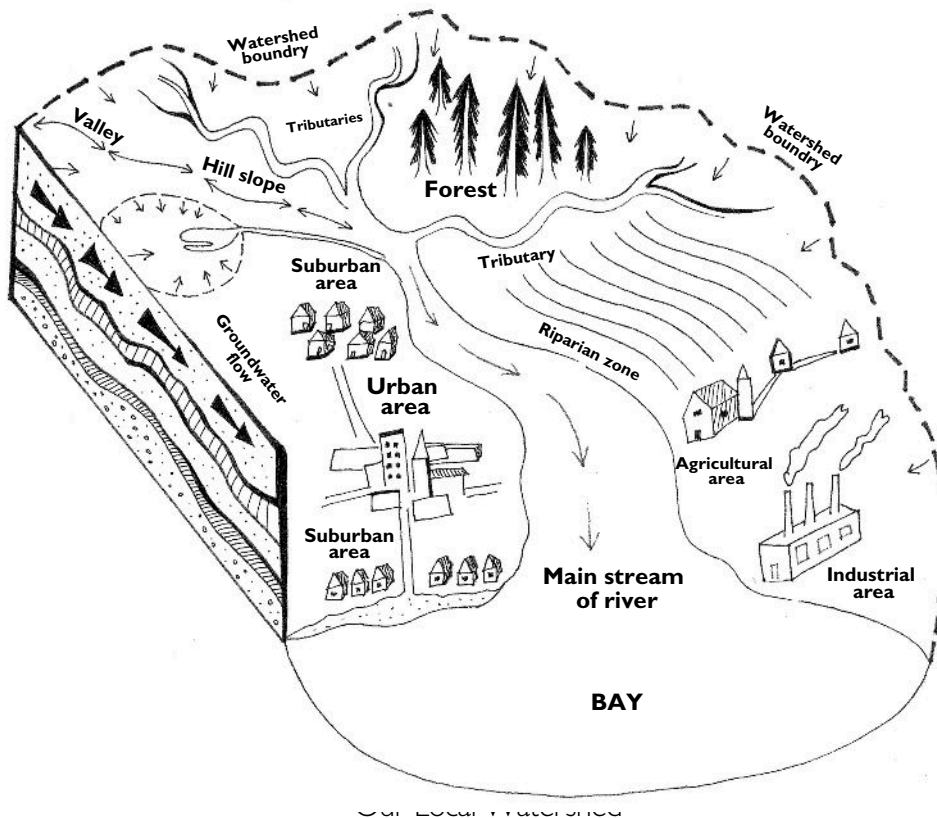
Answers for multiple choice questions (page 9) : 1. b 2. c. 3. d

Background information:

What is a watershed?

A watershed is all of the land that drains runoff (from precipitation) into a body of water, such as a creek, river, lake, bay or ocean. The boundary of a watershed is the ridgeline of high land surrounding it, like the edge of a bowl.

Another term for watershed is “drainage basin.” As rainwater and snowmelt run downhill, they carry whatever is on the land, such as oil dripping from cars, trash and debris on streets, or exposed soil from construction or farming to the nearest water body.

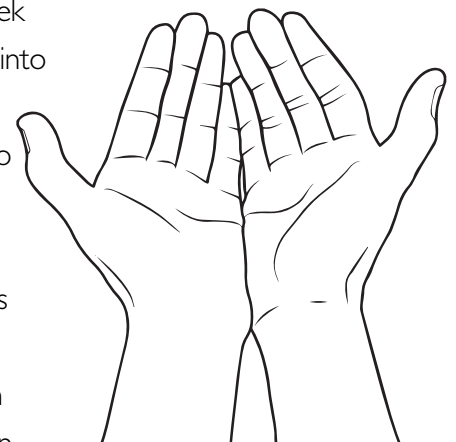


Everyone lives, works, and plays on land that drains to a body of water, like a creek or river. Our local watershed may lead to a tiny creek, but that eventually drains into a river, bay, or ocean.

For teachers: Look up your local watershed, and offer some local landmarks to students to help them visualize the boundaries, or show them an illustration.

Making a water shed with your hands:

Have students cup their hands together like they are holding water. Your thumbs and finger tips are the watershed boundaries. The high areas are the ridgelines. Water flows down from the ridge lines to the low points of their palms. You can image that the gaps between the fingers are tributaries, or smaller creeks that run down mountain slopes and hills. These smaller tributaries join bigger rivers that are the wrinkles of the palms.



Student Sheets – Crumpled Paper Watershed

Map Key:

I colored my ridge lines _____

Set Up

Experiment #1 Follow the instructions below to set up the experiment.

1. Crumple up the piece of paper your teacher gave you, and then smooth it back out most of the way. It should still be a bit crumpled, showing small ridges (high points) and valleys (low points).
 2. Imagine that this paper is a section of land, and find the ridgelines (the tops of the fold-lines.)
 3. Use a washable marker (not permanent) to color along the ridgelines on your “land”.
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Make Your Hypotheses

You are going to “rain” (with a spray bottle) on your landform. Answer the following questions to make your hypotheses before conducting the experiment.

1. What do you think will happen to your land when it “rains”?

2. What will happen to the ridge lines you colored?

3. Where will the “rainwater” travel?

Student Sheets -- Crumpled Paper Watershed

Run the
Experiment

Follow the directions below to conduct the experiment.

1. Use a spray bottle of water to create a “rainstorm” over your land. You want to create gentle sprays of mist.
2. Observe what happens after every misting.
3. As your “rainfall” collects, observe the pathways where the excess “rainfall” travels.

Record Your
Observations

In the space below, record your observations about what happened (Use words and pictures if you wish).

Analyze Your
Data and
Draw
Conclusions

Answer the following questions or complete the activities to analyze and draw conclusions about your data.

1. Explain how your hypotheses were or were not accurate.
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2. How did the “rainfall” travel over your land? Describe with words and or illustrate.

Student Sheets -- Crumpled Paper Watershed

Analyze Your
Data and
Draw
Conclusions
(continued)

3. Where did the water collect? Explain why this happened.

4. Find an area on your land where water collected. This is a lake, and you get to name it! My lake is called Lake _____.

5. Look for the major stream running into your lake. Name this stream as well. My stream is called _____.

6. This stream may have several tributaries (small streams which run into the larger stream). How many does your stream have? _____

7. With your finger, trace your stream all the way back up to where it starts at the top of the ridge. (This should be a path of ink from the marker you chose.) When you reach the top, this is the edge of the watershed for your stream and lake.

8. Trace the entire edge of the watershed with your finger, by following the ridgeline. This will be something like tracing the edge of a bowl. All of the inside, downward-sloping area you have just outlined is the watershed for your stream and lake.

9. Draw a picture of your watershed below. Label your stream and lake.

10. How many other watersheds can you find on your "land?" _____

11. How would you define the word "watershed?"

Student Sheets -- Crumpled Paper Watershed

Set Up

Follow the instructions below to set up the second experiment.

Experiment #2

1. On a fresh sheet of paper, draw some of the ways people use the land. Include a house/community, farm, factory, and some streets/highways. Put an "X" on your paper to show where you live.

2. Using the color key below, color your areas with markers.

Use this color...	To Represent...	What Might be on this Land that You Wouldn't Want in the Water?
	Farms	
	Landfills & Factories	
	Houses & Streets	

3. Crumple this paper, and smooth it in the same way you did the first one.

Make Your Hypotheses

Make hypotheses about what you think will happen when you "rain" (spray) on your land this time.

Run Your Experiment

Gently mist your new land with water from your spray bottle. Observe what happens, and how the water travels.

Record Your Observations

Record your observations (in words and pictures) here.

Analyze the Data and Draw Conclusions

Answer the following questions to analyze and draw conclusions about your data.

1. What happened in your second experiment? Describe with words or illustrate.

Student Sheets -- Crumpled Paper Watershed

2. What do you think the colors you chose could represent in real life?

- What color did you choose for farms? What could the color represent?

- What color did you use for landfills and factories? What could the color represent?

- What about for homes and streets? What could the color represent?

3. Describe where each color ended up.

4. Where are you in this watershed? What kinds of pollution do you think you add to the watershed?

Student Sheets -- Crumpled Paper Watershed

Checking For
Understanding

Circle the letter of the correct answer for each of the following questions to show you understand the information in this activity.

1. Choose the best description for the watershed of a stream:

- a. The water of a stream and all the tributaries that feed into it, including wetlands.
 - b. All the land that slopes toward the stream and drains rain and melting snow into the stream.
 - c. a large wet area of land that completely surrounds the stream.
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2. You are hiking along a trail in a hilly countryside. You know that you have reached the watershed of a different stream because:

- a. The ground changes from soggy soil to dry forest
 - b. You can see another stream.
 - c. You are standing on a high spot, a ridgeline, and the land starts to slope downward again, but this time in a different direction.
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Challenge question!

3. Which of the following are watersheds:

- a. The earth!
 - b. A puddle!
 - c. A melting glacier.
 - d. All of the above.
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