

Crumpled Paper Watershed

Introduction	Students create a model of a watershed and observe how the contours of the land determine the flow of surface water. Students investigate the physical characteristics of a watershed and the effects of human land-use decisions on the watershed.
Level	Grades 5-8
Time	45 minutes
Prior Knowledge Required	Students should be familiar with the <i>water cycle</i> , including terms such as <i>hydrosphere</i> , <i>evaporation</i> , <i>precipitation</i> , <i>surface runoff</i> , <i>transpiration</i> , <i>condensation</i> , and <i>runoff</i> .
Background Information	A watershed is all the land that drains runoff (from precipitation) into a body of water, such as a brook, river, lake, or ocean. The boundary of a watershed is the ridgeline of high land that surrounds it, like the edge of a bowl.
Anticipated Student Preconceptions/ Misconceptions	Many students think of the word “shed” and imagine a structure (as in a shed in someone’s back yard). In this case, the word relates to the verb <u>to shed</u> , as in what happens to the hair of a dog or cat in warmer weather. You may explain this in a slightly humorous way as a way to break the ice at the beginning of the lesson.
Frameworks	MA Earth and Space Science, Grades 3-5. 10. Describe how water on earth cycles in different forms and in different locations 12. Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering
Materials Needed	2 pieces of 8.5 x 11 paper per student or group Student Sheets (attached) water-based markers spray bottles, water
Pre-Activity Preparation	Cover desks/tables with plastic bags or craft paper to soak up water. Create a crumpled paper watershed to use as a model.

Guiding Question	What is the role of a watershed in the water cycle, and its role in shaping the landscape?
Objectives	Students will be able to: <ul style="list-style-type: none"> • Define what a watershed is. • Describe how rainwater and snowmelt carries rocks, soil, and possibly pollutants through the process of erosion.
Activity	<ol style="list-style-type: none"> 1. Have students clear their desks, since their desks will get wet during the activity. 2. Review vocabulary (see <i>Prior Knowledge</i> section). 3. Ask: what happens to rain, sleet, or snow after it falls as precipitation?

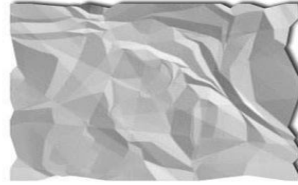
	<p>Where does it go? Answers should include the concept that some rain goes into the ground and some runs downhill.</p> <ol style="list-style-type: none">4. Pass out <i>Student Sheets</i>, one sheet of 8.5 x 11 paper, and markers.5. Guide the students, according to their abilities, through the <i>Student Sheet</i> instructions.
Assessment	The short answers on the <i>Student Sheet</i> serves as an assessment of student learning.
Adapting the Activity for Other Grades	<p>Younger students: You can work through the instructions on the <i>Student Sheet</i> as a class, giving instructions orally and demonstrating the steps as necessary.</p> <p>Older students: Students can read and follow the instructions on the <i>Student Sheet</i> at their own pace, while you monitor their progress. Throughout the activity, provide assistance when necessary. Give students the choice to add features such as homes, schools, stores, etc., and have them make observations of how rainfall and erosion effect the built environment. For 8th graders, challenge students to predict what effect rising global temperatures might have on watersheds.</p>

Crumpled Paper Watershed

Student Sheet

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 remain a bit crumpled, showing small ridges (high points) and valleys (low points).



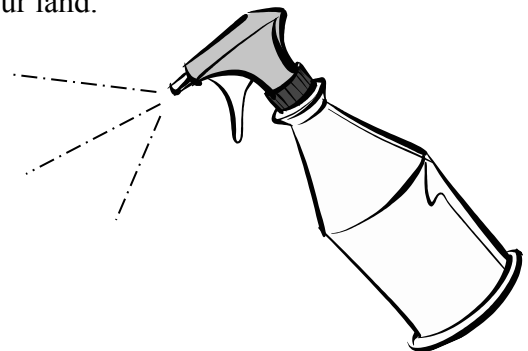
2. Imagine that this paper is a section of land. Find the ridgelines (the tops of the fold-lines).
3. Use a washable blue marker (not permanent) to color along the ridgelines on your land. The blue color from the marker will help you follow the path of the precipitation.



1. You are going to “rain” on your landform. Answer the following question to make your **hypothesis** before conducting the experiment. What do you think will happen to the precipitation as it meets your land?

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. Spray the bottle once, and observe the precipitation. Has it begun to travel on your watershed?
If **yes**, go to Question 3.
If **no**, then spray again. Continue misting. One spray at a time, until the precipitation starts traveling on your watershed.
3. As your rainfall accumulates, observe the pathways where the excess rainfall travels.

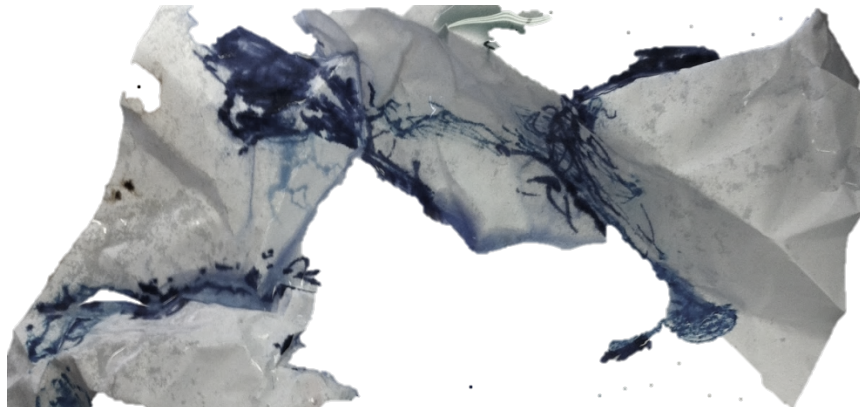


Record your observations.

2. In the space below, record what happened in your watershed. Use words and pictures if you wish.

Locate your watershed.

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 blue ink). When you reach the top, this is the edge of the watershed for your stream and lake.



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. Everything inside, the downward-sloping area you have just outlined is the watershed for your stream or lake.

Analyze the data and draw conclusions.

Answer the following questions and complete the activities.

3. Explain how your hypotheses were or were not accurate.

4. How did the “rainfall” travel over your land?

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

6. Find the largest area on your land where water collected. This is a lake, and you get to name it!
My lake is:

7. Look for a major stream running into your lake. Name this stream as well.
My stream is:

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

9. Define the word “watershed.”

**On the back of this piece of paper, draw a picture of your watershed.
Label your stream and lake.**

