



Pre-festival Lesson 3.1 Watersheds Work Lesson Plan

Investigative Question:

- How do we manage a watershed to make sure our water is clean and sustainable?
- How do the parts of a watershed interact with the water cycle?

Summary: Students use maps and modeling to characterize what a watershed is; to identify the key parts and functions of watersheds; to determine watershed boundaries; to describe how water flows in a watershed.

Reference: adapted from "Seeing Watersheds," *Project WET Curriculum and Activity Guide 2.0*, 2nd edition, 2011, pg. 187-202.

Time Frame: 40 minutes

Cross Cutting Concepts Demonstrated:

- cause and effect
- scale, proportion, and quantity
- systems and system models
- stability and change

Science and Engineering Practices Integrated:

- develop and use models
- construct explanations and design solutions

Materials Needed:

- Spray bottles
- 2 pieces of 8-1/2 by 11 white paper per student (scrap paper can be used if blank on one side)
- Water soluble markers (green, blue, brown, red, purple)
- Scotch Tape

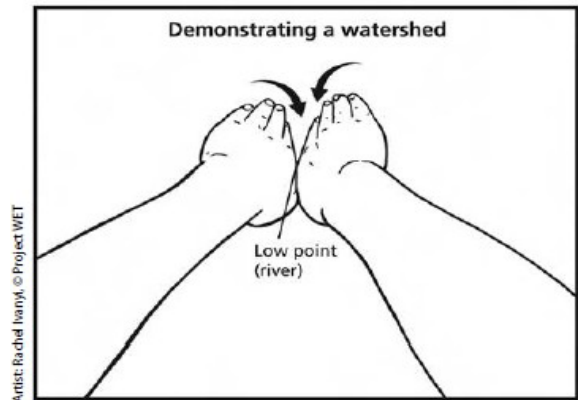
Warm Up:

Feel free to use the slides provided above. Ask students: **What is a watershed?** Students will probably not be able to answer this yet. Split the word in two and ask, **what is water?** (we are just looking for a simple definition here). **What is a shed?** They will likely know that sheds store something. **What does a watershed store?** Water. Then, think about shed as a verb. **What does it mean to shed?** They will likely be able to relate the word to a pet. A pet sheds hair. **What do you think watersheds shed?** Water. We relate this to water running off the land. **Do you think a watershed looks like a toolshed?** No.

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1. Have students stand up and tell them, **I'm going to give you a definition of a watershed and I'd like you to repeat after me and do hand motions.**

Hold your hands straight out in front of you in line with your shoulders, with palms down. Say: "A watershed is a land area that drains to the low points." As you say this, move your hands along one plane as you say "land area" and then slowly move them together as you bend down and form a "V" with palms still facing down while



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saying "that drains to the low points." Do this one more time and then let the students lead.

2. **What marks the edge or boundary of a watershed?** Have them review the definition again. Where did their hands start out? The high points.

Lesson Sequence:



Investigation:

We are going to make a model of a land area.

- 1) Put a piece of 8 ½ by 11 white paper down on the table in front of you (blank side up if using scrap paper).
- 2) Crumple the second piece of 8 ½ by 11 white paper (blank side facing out if using scrap paper).
- 3) Un-crumple the paper until you can find all four corners, it should **not** be perfectly flat.
- 4) Tape all four corners of the crumpled paper onto the flat piece of paper in front of you. Leave the crumpled paper as high as you want. It should now look like mountains or a raised relief map.
- 5) Using **water soluble** markers, draw symbols that represent different features on your relief map using the following key:
 - a. **Green** marker to draw a line along all the ridges (the up folded areas).
 - b. **Blue** marker to draw a line along all the valleys (the down folded areas).
 - c. **Red** marker to indicate any abandoned mines with a * symbol.
 - d. **Purple** marker to indicate cities with a # symbol.
 - e. **Brown** marker to indicate a farm with a colored-in area.
- 6) You have made a model of the land surface or a raised relief model.
- 7) Predict how water is going to flow on your model when we spray them with water. **What**

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- 8) **Are there areas on your model that have no outlet and will store water?**
- 9) Have students take their models outside where they will spray their model with a spray bottle, in other words they are going to make it rain!



While Outside:

Have students form a circle and place their models in front of them toward the middle of the circle. Share spray bottles and give all students time to make it rain on their models. After students have sprayed their models, ask students to recall the definition of a watershed. **What is the edge or boundary of a watershed?** The high points. **What color are the high points on the model or map that you made?** Green.

- **Use your finger to follow the high points, or the green lines, on your map. How many watersheds or partial watersheds are shown on your map?** Demonstrate how to do this as you go around the circle.
- **What are the parts of your watershed?** Have them point out their answers on their maps. The water, the city, the farm, high points, low points, etc. **What is the white area?** If they don't know, ask: **What is the definition of a watershed?** Give them time to think about this. The white is the land area. **What could be on the land area other than cities, old mines and farms?** Forests, deserts etc.
- Do a circular gallery walk so that students can view other students' models. **How are they the same? How are they different?**
- Point out a very flat map of the US (you may need to go back to the classroom if you do not have a portable map). **Does it still show watersheds?** Yes. **How do you know?** A watershed is a land area that drains to the low points and it still does on this map.
- Point out on the map the large ridge going all the way across the middle. **Has anyone heard of the continental divide?** This is a ridgeline that cuts the United States from north to south. To the right, or east of this ridgeline, all the water flows east eventually to the Atlantic Ocean. To the left, or west of this ridgeline, all the water flows west eventually to Pacific Ocean.
- Discuss each of the following questions with your students. **Did any of your cities flood? If there was pollution on your city streets, could it get into your farm field? Could excess pesticide or fertilizers from your farms go into your cities? Could old mines affect water coming into cities or farms?**
- **What is a watershed again? Do you think you live in a watershed?** Yes, we all live in a watershed.
- **What is a watershed a part of?** Give them time to think about this, talking with the person next to them. A landscape or bigger land area, our community, our water supply. It can also be a part of another watershed.



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Alternatively, students can watch the watershed video to learn how to make their own watershed model at home or teachers can use the video to facilitate the lesson. This video describes the parts of the watershed and uses systems thinking to think deeper about the watershed. <https://youtu.be/zFM9mYg05w>

Wrap up:

Back in the classroom, ask students: **What do you think we manage when we talk about watershed management?** Have them recall the definition with hand motions and talk to the person next to them about their thoughts. It is really the **land area** or land use that we manage to maintain a clean and plentiful water supply! For instance, tell students that we manage forests in our watershed. Have students imagine a fire burning all the trees on an entire hillside above a lake. **What do you think would happen when it rains?** The black soot from the fire would come into the lake. Runoff is water that flows over the land surface. It can pick up pollutants and soil along the way and bring them into the river or lake.

*Students should complete the Lesson 3.1 section of their AWF Water Notes handout to record evidence and construct explanations based on that evidence. Students will also look at the lesson from the perspective of systems and system models. A System is a set of parts that work together and form a whole. System Models use a model to understand how those parts work together to make the whole.

Other Resources:

Health and Function of Arizona Watersheds:

<https://storymaps.arcgis.com/stories/0f244e635ef5479394d3eefc81032a79>