

Mapping Your Watershed

Summary: Students use a topographic map to define the boundaries of the watershed around their school.

Background

Watersheds can be large or small, and smaller watersheds are usually part of larger watersheds. For example, the watershed of the South Fork of the American River is part of the larger American River watershed, which is part of the even larger Sacramento River watershed, which is part of the vast Sacramento-San Joaquin Delta watershed that drains water from over 40% of the area of California, all flowing through the San Francisco Bay Estuary.

The network of streams, rivers, and lakes in a watershed begin somewhere at a higher elevation, as underground water comes to the surface and flows downhill. Each creek is a tributary of the bigger creek into which it flows. Each tributary moves the runoff downhill, closer to the largest body of water in the watershed, and finally to its outlet, such as the San Francisco Bay or the Pacific Ocean.

The boundaries of a watershed are defined by the highest points of the surrounding land. These hills, mountains, ridges, and passes delineate one watershed from the adjacent watershed. A topographic map can help determine the boundaries of a watershed. By drawing lines to connect the high peaks and ridges that separate a creek, it's possible to mark the boundary between watersheds.

Note: Mapping their watershed helps students to understand where their stream or creek originates, and how individual actions impact the health of the creek and whole watershed, and connects them to other communities in the watershed.

Grades 4-12

Time: 60 minutes

Setting: Classroom

Materials: (enough for pairs of students to each have their own set)

- Various topographic maps with keys/legends (of any area, not necessarily of your region)
- Topographic maps of your region, including school
- Road map, including school area
- Clear sheets of plastic (such as transparency sheets) the size of your maps
- Tape
- Dry erase markers and eraser or tissues

Guiding Question

What is the size and scope of our watershed?

Key Concept:

Watersheds can be large or small, and smaller watersheds are usually part of larger watersheds, which eventually drain into the ocean.

Objectives:

Students will:

- Learn how to read a topographic map
- Find their watershed boundaries
- Draw a watershed area and describe it

Activity

1. Introduce guiding question: What is the size and scope of our watershed? Have students share ideas in small groups. Note: if students have not already explored what a watershed is, we recommend our activity: Watershed in Your Hand. *Definition: a watershed is an area of land that drains (or “sheds”) into a body of water*
2. Have students study different topographic maps to become familiar with the markings on the maps and what they mean.

Ask: How do these maps help us determine the highest (example: a mountain or hill top) and lowest points (example: a valley or plain)?

 - If students need more support or guidance in learning about topographic maps, consider working through these questions with your students:
 - What is a topographic map? (*it is a flat representation of a three-dimensional geographic area*)
 - What are the lines on a topographic map and what do they show? (*these are called contour lines; each line joins points that are of equal height [or elevation] above or below sea level*)
 - How can you find the elevation of a particular point on the map? (*the key or legend on a topographic map will indicate a contour interval, which is the distance [in feet or meters] between contour lines. Often, some contour lines will be labeled at a particular elevation*)
 - What is shown when contour lines are close together? (*indicates a steep slope*)
 - What is shown when contour lines are spread apart? (*indicates a gradual slope*)
 - Have students find examples of both of these on the topographic map.
 - What is a landmark? (*an object or feature of a landscape/town/area that is easily seen and recognized*) What are some examples that you can think of?
 - What are landmarks on this topographic map? (Ex. buildings, parks, schools, intersections, etc.)
3. Pass out regional topographic maps (those that include your school site) and sheets of plastic to pairs or small groups of students.
4. Direct students to cover the topographic map with plastic and tape both to the top of a desk so both the map and plastic are in fixed positions.
5. Have students work with a partner to locate their school on the map and mark it with a dry erase pen on the plastic. You may decide to provide students with additional maps like a street map to help orient them to the topographic map.
6. Ask students to find bodies of water (creeks, streams, reservoirs, marshes, lakes, bays, oceans). Have the students trace or circle these in blue on the plastic.
7. Ask students to investigate their maps and locate the highest and lowest points around your school. Use the contour lines and numbers on the map to help you determine where these points are located (at what elevation/height are these above sea level). Mark the highest points with large X's.
8. Starting at each of the X marks, instruct students to draw arrows on the map to show the direction runoff will flow.
 - Note that water always flows downhill and it usually takes the easiest path.

9. To identify the boundary of your school's watershed, use the X markings that indicate the highest points on the map, and draw a line through the marks to connect all the highest points around your school.
 - The area inside the line is your watershed because rain falling inside the line will drain down to the body of water near your school.
 - Try to locate any creeks inside this line.
 - You may find that water has carved out areas of the land already. Try to find the places where the runoff will meet up with another body of water.
10. Direct students to look at the way water flows from other high points on their map and ask: Can you identify other watersheds? Are there some that are the same size at the one we identified? Are some bigger or smaller than our watershed?
11. Ask students to investigate where the water in this watershed will drain to. Does it drain to a creek? A lake? A bay or ocean? Have students identify the path of the water with their blue dry erase marker.
12. Direct students to review all the maps they have looked at so far and mark any landmarks they recognize on their own maps.
 - *Define a landmark if you haven't done so already: an object or feature of a landscape/town/area that is easily seen and recognized.*
13. Once all maps are complete, have students take them outside to see if they can observe any of the landmarks they found on the map.
14. Encourage your students to discuss the following questions with a partner, or in small groups, and incorporate their ideas into their maps, as appropriate based on the questions.
 - What are the natural features of the landscape that determine and affect your watershed? What are some human-made features that might have an impact on the watershed?
 - What materials might water pick up as it flows through your watershed (dirt, leaves, fertilizers, litter, oil, etc.)? Where will these materials eventually be deposited?
15. Return to the guiding question: What is the size and scope of our watershed? Invite students to share their responses. Ask: How can our actions affect our watershed?
16. For clean-up, the sheets of plastic can be cleaned with erasers or tissues.