

TOPOGRAPHIC WATERSHED MODEL

Oregon Science Content Standards:

3.1 Structure and Function: Living and non-living things vary in their characteristics and properties.

3.2 Interaction and Change: Living and non-living things interact with energy and forces.

3.2P.1 Describe how forces cause changes in an object's position, motion, and speed.

3.2E.1 Identify Earth as a planet and describe its seasonal weather patterns of precipitation and temperature.

3.3 Scientific Inquiry: Scientific inquiry is a process used to explore the natural world using evidence from observations and investigations.

Ocean Literacy Principles:

1. The Earth has one big ocean with many features.
2. The ocean and life in the ocean shape the features of the Earth.
3. The ocean is a major influence on weather and climate.
4. The ocean and humans are inextricably interconnected.

Goals:

- To have students understand how water moves across the terrain, including how rivers and lakes form.
- To make working models of a physical process.
- To use models to test predictions.

Concepts:

- A watershed is the land area where all the water drains to the same place.
- Scientists often use models to help study large areas or processes.
- Topography is the detailed mapping of an area, showing its elevation.

Materials:

- Trays (one per student)
- Construction paper (1 large blue, 3 small green, 3 small brown per student)
- Plastic wrap (enough to cover each student's watershed)
- Scotch tape (to help hold down saran wrap if needed)
- Spray bottles filled with blue water (a few to share)
- Blue food coloring (one bottle)
- Blank paper and pencil for drawing maps (one per student)
- Blue pencils or crayons (one per student, or shared)

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- Pictures of branching patterns of rivers and trees
- Map of Oregon Watersheds <http://coastfork0.tripod.com/mapstatesubbasin.htm>, http://www.oregon.gov/OWEB/WSHEDS/wsheds_councils_list.shtml

Lesson Plan:

➤ **Introduction to watersheds:**

1. Ask the students a question: where does all the water in rivers come from? It comes from rain and melting snow (and springs)! But how does it end up in a river? It falls as rain or snow and ends up draining into small creeks and streams that flow into bigger streams that eventually flow into rivers that flow into bigger rivers. Where do the bigger rivers flow? Into estuaries and then out into the ocean!
2. From the sky, this looks like a branching pattern, like the branches of a deciduous tree in winter. Show examples.
3. A **watershed** is the land area where water drains into one river or lake. Show map of Oregon watersheds, pointing out the one the students live in.

➤ **Experiment--building model watersheds:**

4. Explain to the students that they will now build their own watershed models and make a map of where the water flows. Ask them when they have built models before. Examples: model airplanes, model cars, Lego spacecraft. Explain that scientists use models to help them understand things. Scientists conduct experiments on models when they cannot do so on actual objects (because they are too small, too big, too complex, etc.).
5. Have the students build their watershed models.
 - a. To make the watershed models, the students will get a large sheet of blue paper (representing water), and three smaller sheets of green paper (plants) and three small sheets of brown paper (soil).
 - b. Tell them to think about what they want in their watershed -- it can have mountains, lakes, rivers, estuaries, etc., -- but they need to think about how the parts would likely fit together. (Show a pre-made model.)
 - c. Have the students crumple or fold their paper into shapes and put them together on their tray.
 - d. Go around and cover the students' watersheds with plastic wrap to make them waterproof. Make sure that the plastic is loose and have the students press the wrap down well to follow the contour of the paper.
6. Hand out blank sheets of paper and have each of the students use a plain pencil to sketch a birds-eye-view of their watershed model. Draw an example. Draw in the high and low points and label with H or L. Draw in and label all the major water bodies and mountains.
7. Explain that their models will experience a rainstorm. Where do they think the water will flow? Will it end up in the high points or low points? Have the students draw predictions (arrows) on their map to show where the water will flow.

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8. Have each student spray blue water onto their models by squirting the bottles several times.
9. Where did the water flow in their model? Have them use the blue crayon/pencil to draw the actual pattern of water flow on their map.
10. Did anyone accurately predict where the water would flow? If not, what did they learn about water flow?
11. Remind the students that a watershed is the land area where water drains into one river or lake. Point out that if they have more than one river or lake in their model, they have more than one watershed. How many watersheds do they have?

Tips:

- It is useful to bring in a few examples of models – like an airplane, the solar system, etc.
- It is helpful if the class has already discussed maps and map keys. You can then have the students use symbols on their maps to represent rivers, trees, mountains, etc.
- Talk about and show topographic maps and explain that we can figure out where water flows based on the topography of the land. If this works well, the students could draw topographic maps of their watersheds.

Assessment: Discussion of their maps. The students can design a second map incorporating what they learned about water flow from their first map.

Source: This lesson is modified from The Watercourse and the Council for Environmental Education. 1998. *Branching Out!*, pp 129-132, Project WET Curriculum and Activity Guide.