Lesson 3

Watershed

Overview

Investigation 3.1 will introduce watersheds. Students create a model watershed and use land form vocabulary to describe the physical features. They build on Lesson 2 (water cycle) by describing the water cycle as it applies to their watershed models. Students will view a topographical map of some local landforms in the Columbia River watershed to make connections with their model to familiar landforms.

Student Learning Targets

I can construct a model watershed and compare it to local landforms.

I can discuss the differences between the model watershed and the Columbia River Watershed.

I can locate and name landforms on a topographic map.

I can identify at least three landforms near my community.

Teacher Background Information

When the ground is saturated or impermeable to water during heavy rains or snowmelt, excess water flows over the surface of the land as runoff. Eventually, this water collects in channels such as streams. The land that drains water into channels is called the watershed or drainage basin. "*Project Wet" pp. 129-130*

The Columbia River is much more than the water flowing between its banks. Like any river, it is ecologically inseparable from its watershed. A watershed is the land area that delivers runoff, sediment, and dissolved substances to a river and its tributaries. In turn, the health of the watershed affects the temperature, flow rate, aquatic life, and other physical components of the river.

The Columbia's watershed spans seven states and one Canadian province. The northernmost reach of the watershed is found in the high glaciers of the Canadian Rockies. From

Disciplinary Core Ideas

Science

4ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.

4PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, **heat**, and electric currents.

Social Studies

Geography 3.1.2
Understands the physical, political, and cultural characteristics of places, regions, and people in the Pacific Northwest…

Scientific and Engineering Practices

Developing and using models

Crosscutting Concepts

Systems and system models

there, the main body (or stem) of the Columbia River runs over a thousand miles before reaching the Pacific. As the river runs south and west, it is fed by many smaller rivers before it is joined by the Snake River in Pasco, Washington. Near the confluence of the Snake River the Columbia River turns sharply west, forming a natural border between Washington and Oregon. On this leg of its journey, other rivers join the Columbia before it reaches the sea.

Of the rivers that feed into the Columbia, the Snake is the largest. In fact, the streams and small rivers feeding into the Snake represent 49% of the Columbia River Basins watershed below the Canadian border.

The watershed covers nearly 260,000 square miles, an area the size of France. Abundant precipitation from the hydrologic cycle, which is described in the section "What Makes The Columbia River Basin Unique," provides the watershed with its seasonal supply of water.

Precipitation that does not infiltrate into the ground becomes runoff, and runoff from the watershed becomes the rivers, streams, wetlands, and lakes that we care about and enjoy. Some precipitation that seeps into the ground evaporates, but gravity pulls other water deeper into the earth. Sometimes this creates an underground river. This groundwater gathers in layers of underground rock and eventually becomes an aquifer, of which there are many in the Columbia River Basin.

Materials

For each student

River of Power science notebook

Academic Vocabulary

Confluence: A place where two streams or rivers flow together.

Ridge: A long, narrow rise of land such as a chain of hills or mountains.

Tributary: A stream flowing into a larger stream or body of water.

Watershed: Area from which all precipitation or snowmelt flows to a set of streams.

Snowpack: An area packed snow that accumulates annually in a mountainous area and usually melts during the warmer months.

For each two students
2 sheets of white paper
16 Underpads

For each four students
1 Blue Vis a Vis Pens
1 glue stick

For class
4 spray bottles to share

Preparation

1. Prepare a sample demonstration model (Fig 3.1)
2. Determine your student pairings.
3. Set up materials distribution center.
4. Fill spray bottles with water up to half full.
5. Prepare document camera or projector to show Local watershed map available at end of lesson.
6. If your building has a plastic raised relief map, plan to use it in the demonstration

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Photo of water shed model and materials.

1. [illegible] models. Review what they know about models, systems and subsystems (parts). This time they will be making a model of a watershed. Students will use the model to see how water behaves within a watershed.

2. Demonstrate how to make a model watershed using the lesson supplies. First put your name on the base sheet of paper. Next demonstrate making a mountain range by crumpling the printer paper into a linear ridge, gluing it to a flat paper for the base, then tracing along the major ridgelines with blue pens in kit; then placing it on an underpad and spraying it until marker runs and starts to pool forming rivers and lakes. (Names should be on model)

3. Explain that the crumpled paper represents a landscape of mountains and valleys. Point out an example of a **ridge,** a **tributary** and show an example of a **confluence**. The spray bottles represent rain and snow that falls. Point out how you have lots of high and low parts in the model.

4. Explain that the class will be divided into pairs. Each pair will construct a model watershed. The group needs to decide what type of mountains they'd like to build, using crumpled papers. Students may want to build high mountains that will allow for lakes and several streams to be able to form. Show them how to clear space on desk, place pad and use pen to color along ridges before squirting water.

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5. Explain that each pair will be giving the whole class a tour of their watershed. It might be fun for students to name their mountains, lakes, and rivers to make their tour more interesting.

6. Ask students to take turns repeatedly squirting their model (about 6 squirts). Remind students that the water in the squirt bottle represents rain or melting snow and only goes on the model mountains, not on each other!

7. Divide the class and let each group begin. Rotate between groups, asking students to describe to you the water flow patterns visible on the model (i.e. water flows downhill, water flows in low places, water flows come together, ridges separate water flow).

8. Once all watersheds are working, gather the class and take your tour or have pairs bring their model to show under a document camera. Invite the watershed creators to demonstrate the flow of water in their model, telling the story out-loud about where the water moves in their watershed. Point out **ridges, confluences,** and **tributaries** in each model. Compare and contrast some differences among the models.

Final Activities

1. Show students the local watershed map via document camera or projector. Ask them to identify how the map maker illustrated the map to show the geographic features. (blue water, white mountain tops and dark canyons) Explain that this map is drawn at an unusual perspective so that it looks like they are high above Badger Mountain looking toward Seattle and the earth has been made to look flat so they can see the features. Again refer to the Chelan County maps from an overhead perspective to see how the map makers created the map to show topography.

2. Ask students if they can see by looking at maps how the water would run into the Columbia River. Draw arrows to follow flow through parts of the Columbia River Watershed. Note that not all water flows down the mountains at once but as the snowpack melts it traverses its way to the Columbia throughout the summer months giving us a continual recharge of water to the river.

3. If you have access to a plastic raised relief map, show it to your class. You can spray it with water to show that water runs downhill.

4. Have students label ridgelines, confluence of streams and tributaries after model dries.

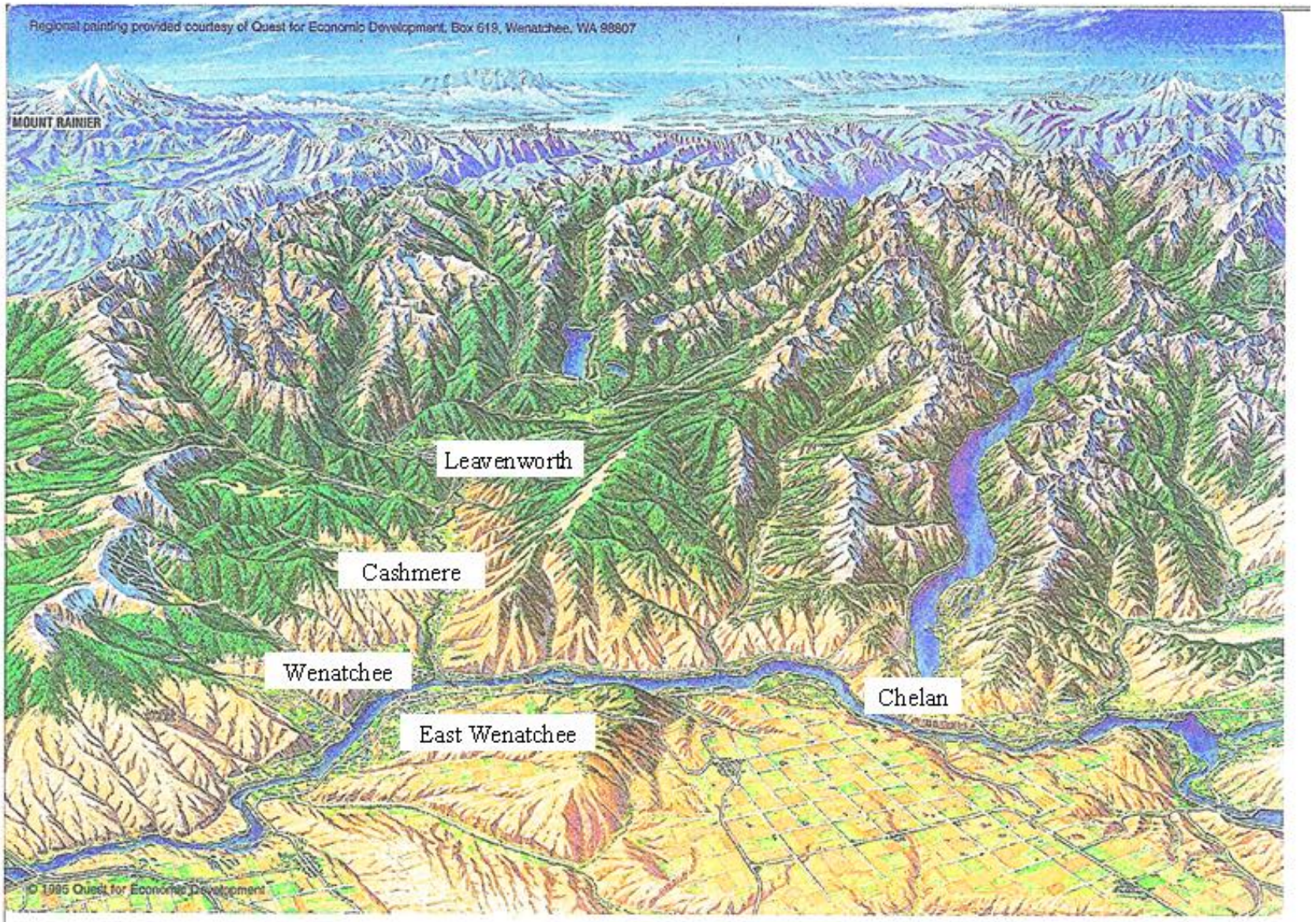
Extensions

- Take overhead photos of student watershed models and print copies for students to label and paste into their journals. They should label any ridgelines, confluence of streams, and tributaries.

- *River of Words* is a non-profit organization based in California which helps educators incorporate observation-based nature exploration, and the arts, into their work with young people. Each year, in affiliation with the Library of Congress Center for the Book, *River of Words* conducts a free international poetry and art contest for youth on the theme of watersheds. The contest is designed to help youth explore the natural and cultural history of the place they live, and to express through poetry and art, what they discover. (www.riverofwords.org).

Resources

Adapted from WSD River-of-Power (original)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