

Lesson Plans



MOSS

McCALL OUTDOOR SCIENCE SCHOOL

University of Idaho

College of Natural Resources



Title: Build Your Watershed
Grade Level: 5th – 8th grade

Topic:	Watersheds
Background:	A watershed is an area where water drains into a common waterway, usually a stream, river, lake, aquifer, wetland or even the ocean. All parts of land are also part of a watershed.
Next Generation Standards:	ESS 2.C, ESS 3.A, ESS 3.C
Goals:	This lesson explains what a watershed is, why watersheds are important, and why it can be difficult to provide all the water that people want and need along a river. What is a watershed? Why do the choices we make with water matter? Why does what happens upstream matter to people and wildlife downstream? What does a topographic map show?
Objectives:	Enduring Understandings <ul style="list-style-type: none"> • Students will understand that water sources are connected. Decisions made concerning water upstream will have consequences downstream. • Students will understand that people need water for many things: consumption, recreation, wildlife, agriculture, raising animals and industry. • Students will be able to point out areas of higher and lower elevation on a topographic map.
Materials:	<ul style="list-style-type: none"> • 1 container of Playdoh per group or sand if a beach is available • 4 foot long sheet of paper • Markers, crayons, pencils • Wetland game cards • Topographic map of Lake Payette for each group • Aluminum foil • Food coloring • Spray bottle for each group • Topographic map of Colombia River Basin for each group
Set up:	On a 4 foot long piece of rolled paper draw a long curvy river from one end to the other. This can be as simple as a squiggly line from one end of the paper

	<p>to the other. Cut the paper into equal parts; of the same number of groups that you will have. Number the pieces of the river so that when the groups have completed their portion the river can be easily pieced back together.</p>
<p>Classroom Time:</p>	<p>Session is designed to be 1 hour long.</p>
<p>Introduction (Engage):</p>	<p>Split the students into small groups (3-5 students) to work together. Ask students where the closest river to them goes. Rivers and other bodies of water converge, usually with larger bodies of moving water and flow into other water sources. In this case, the Colombia flows into the ocean. Ask students to use the map of the Colombia River Basin to trace the route the water takes to the ocean. On this map trace your route to the ocean. How did you get there? How many rivers can you see that empty into the Colombia? How did Lake Payette get here? What could have made the water flow and collect here? Lake Payette was formed thousands of years ago when a glacier started to move through this area as it melted, carving out a depression for water to collect, and then filling the depression as the glacier melted. Crumple up the piece of aluminum foil then open it back up without flattening it out. This aluminum represents a watershed. Where do you think the water would collect? Where would it flow? Use spray bottle to spray the whole of the piece of foil until water begins to collect and flow in areas of lower elevation. All groups of students should look at their topographic map. Does anyone recognize this watershed? It's Lake Payette and the surrounding area. Elevation is shown on a topographic map with lines. Lines that are closer together indicate a greater increase in elevation. Make a fist and draw contour lines around your knuckles with the largest knuckles having the lines closest together. Then flatten hand and show students the contour lines on</p>

	<p>your knuckles and what they look like flat. Using the topographic map and the Playdoh your group will build this watershed. You can use the (sand, Playdoh) to create the high and low points shown on the map.</p> <p>Let the small groups work together to create their versions of the Payette Lake watershed on the map.</p>
<p>Activity (Explore):</p>	<p>In this next activity students will build developments along the river and work to understand how river use can affect entire watersheds.</p> <p>Tell the students that they have just won this stretch of river in a lottery. You can now build anything you want along the river. You plan to live on the river- so remember to provide somewhere that you can live. What is an example of something you could build? Each group can build whatever they want on the river. Amusement park, farm, factory etc. Each student will receive a card which is something that the group needs to include on their river. If there are less than 10 kids in the entire class, have each student pull 2 cards. Whatever is on the card must be included, but beyond that the students can include whatever else they would like along the river.</p> <p>Give the students 20 minutes or so to complete their sections of the river.</p> <p>While they are drawing hand out the Development Card Effects Sheet, but tell the students not to turn it over until the teacher lets them know.</p> <p>After all groups have completed their section of the river collect all sections and tape them up on the board in order so that they are visible to all of the students.</p> <p>Each group should present what they had on their cards as well as what they included by choice in their section of river. For each of the structures built along the river use the chart in the supplemental materials to address the effects on the section of</p>

	<p>river that is downstream. As each development is listed, write the blue pollution numbers in one column on the board, and the green water flow numbers in another column.</p> <p>After all groups have shared, tally the complete effects on the river including new developments that the students may have made. Have the students turn over the answer sheets and as they describe the developments read the numbers associated with the things they built from the cards. For new developments the teacher can use the estimation guidelines below. For many other developments the teacher will need to use their own discretion to estimate the pollution addition and/ water flow reduction</p> <p>Estimations for water (+/-) and pollution (+/-)</p> <p>Very large developments (amusement park, international airport, etc.)</p> <ul style="list-style-type: none"> • +30% pollution • -20% water flow <p>Large developments (factory, large farm, subdivision, etc.)</p> <ul style="list-style-type: none"> • +20% pollution • -15% water flow <p>Medium-sized developments (small farm, hotel, etc.)</p> <ul style="list-style-type: none"> • +10% pollution • -10% water flow <p>Small developments (additional housing, etc.)</p> <ul style="list-style-type: none"> • -5% water flow • +5% pollution
<p>Explanation</p>	<p>Have each group explain the impact of what they built on the water quality.</p> <p>Challenge students to explain not only the negative effects of building things along rivers, but positive effects as well. If students do not automatically describe why a dam or a subdivision is useful, ask them why these things are useful.</p> <p>Ask guiding questions after students have explained</p>

	the effects of development and river usage. The idea is to get them considering how water is a precious resource, and difficult to distribute evenly and fairly.
Elaboration:	<p>Have your students look at a topographic map of the body of water closest to the school.</p> <p>Where does the water on the map come from? Where does it go?</p> <p>Is there anything on the map that you can see that might alter the course or health of the water? Can you think of something that YOU can do to help protect the watershed of the place where you live?</p>
Evaluation:	Write a paragraph about the story of water. Talk about how water moves through a watershed; where it might come from and where it might go. Then describe effects of upstream river pollution and overuse on downstream wildlife and people.

Development Card Effects—Build Your Watershed

Build a dam

- +20% sedimentation (pollution)
- +20% water increase in this section only
- -5% water flow decrease in all sections following this one

Build a subdivision

- -5% water flow
- +5% fertilizer runoff (pollution)

Build a subdivision

- -5% water flow
- +5% fertilizer runoff (pollution)

Build a dairy farm

- +20% fecal matter runoff (pollution)
- -10% water flow

Build an agricultural farm

- -10% water flow
- +10% fertilizer and pesticide runoff (pollution)

Build an agricultural farm

- -10% water flow
- +10% fertilizer and pesticide runoff (pollution)

Build a canal removing water from your river and taking it to a city nearby

- -30% water flow

Build a hotel

- -1% water flow

Build a paper factory

- -5% water flow
- +10% warm water runoff (pollution)

Draw a tributary- another body of water emptying into your river

- +10% water flow

Build a golf course

- -5% water flow
- +5% fertilizer runoff (pollution)

Build a wildlife refuge

- -15% pollution (cleaned by protected flowing water)

Draw mountains with snow melt water draining into your river

- +5% water flow

Build a house for your friends

- -1% water flow
- +1% pollution

Build a house for your friends

- -1% water flow
- +1% water pollution

Build a house for your friends

- -1% water flow
- +1% pollution

Build a waste water treatment plant

- -20% pollution

Build a restaurant

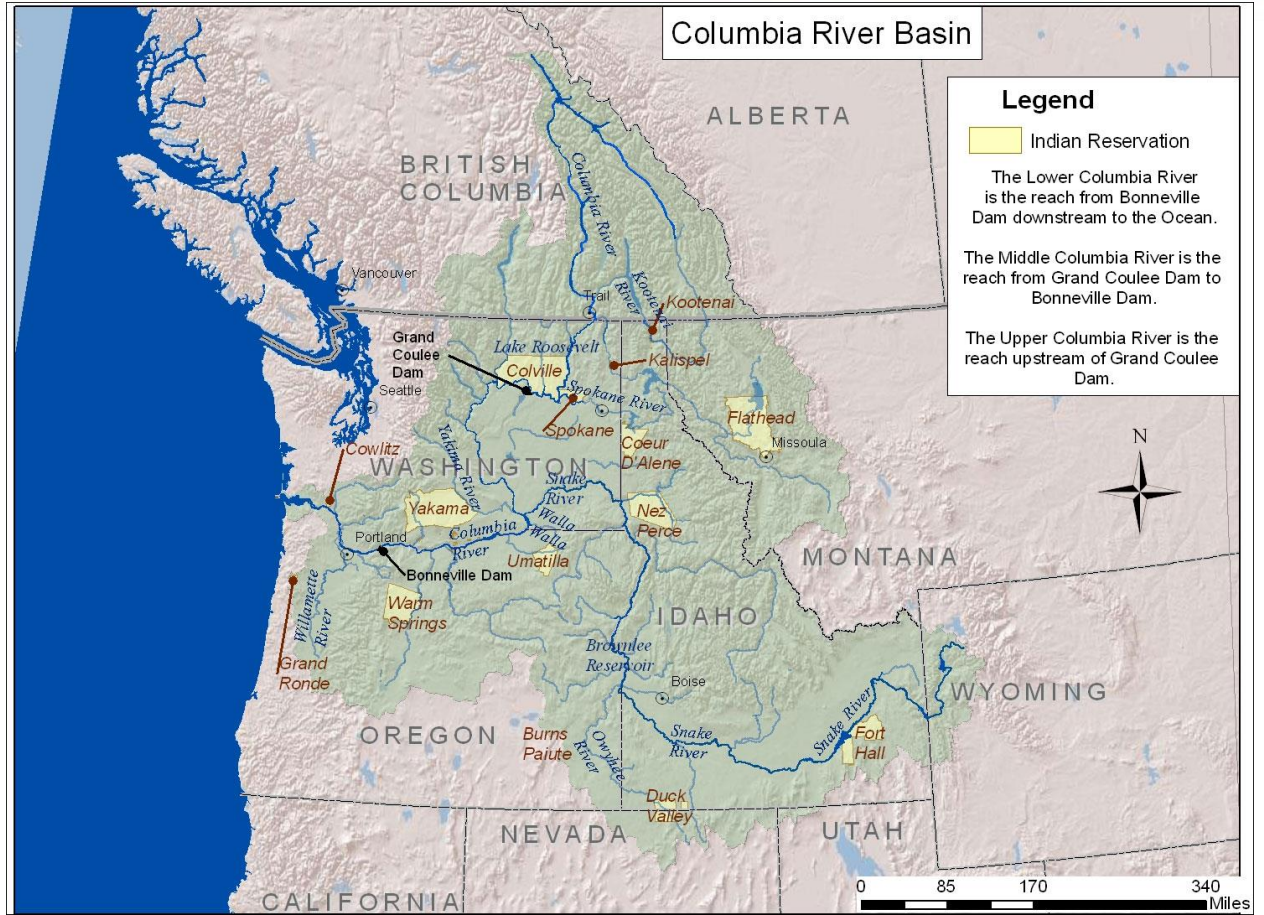
- -5% water flow

Build a Leave No Trace campground

- No action required

Build a wetland

- -20% pollution





Additional resources:

<http://water.epa.gov/polwaste/nps/watershed/concept.cfm>

<http://water.epa.gov/type/watersheds/index.cfm>

http://www.watershedatlas.org/fs_indexwater.html