



## *Key Concept Four ~ Wise Water Use*

### **Panels and Activities for Key Concept Four ~Wise Water Use**

Wise water use for the Okanagan embraces water conservation at home and in our agricultural and industrial practises.

#### **Poster Panels**

Sharing Our Waters

Wise Water Use Indoors

Wise Water Use Outdoors

Irrigation: Watering Our Land

#### **Activities**

19. How is Water From the Watershed Treated?

20. The Great Water Race

21. Check It Out: Keeping Track of Water Consumption

22. Better than Bottled

23. Greening the Lawn

24. Wise Water Use Outdoors - Doing it Right

25. Paradise or Paved

26. Okanagan Enviro-Ethics

27. Irrigation: Just the Right Amount

#### **Essential Learnings**

1. Okanagan residents, on average, use more water than the average Canadian.
2. People practice water conservation for many different reasons.
3. Precipitation needs to be captured where it falls rather than flowing through city drains as urban runoff.
4. Agriculture uses about 70% of developed Okanagan Valley lands and is the major user of water in the basin.

# Sharing Our Waters

## Background Information

There are so many ways we depend on water.

There are many, many users of Okanagan Basin waters and all are dependent on this limited water supply. So we must protect and share this water.



Geological Survey of Canada Miscellaneous Report 93

### “Not all water use is the same!

Some water use occurs in streams and lakes, such as by wildlife, fisheries, and recreation. Some water is withdrawn from the lake, used and returned. Municipalities return much of the water they use as treated sewage. Much of what is not returned is household water used for gardening— it is lost to the atmosphere through evaporation or plant transpiration.

Likewise, most water used for agricultural irrigation is lost to the atmosphere. Withdrawal of water from streams can reduce flow or even cause them to dry up. Nothing damages a stream more than losing its water!”





# Activity 19

## How is Water From the Watershed Treated?

### Curriculum Connections

Grade 5: Earth and Space Science  
Social Studies: The Human and  
Physical Environment

### Time

1-2 Hours

### Objectives

To demonstrate a simplified model of basic water treatment.

### Materials

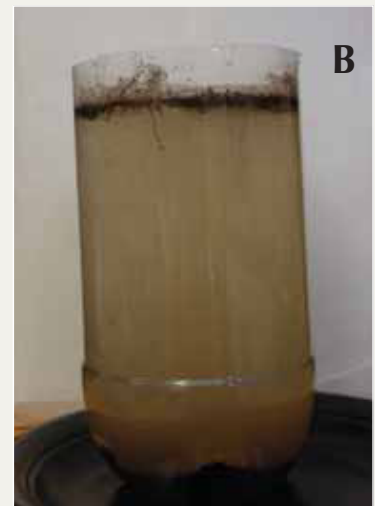
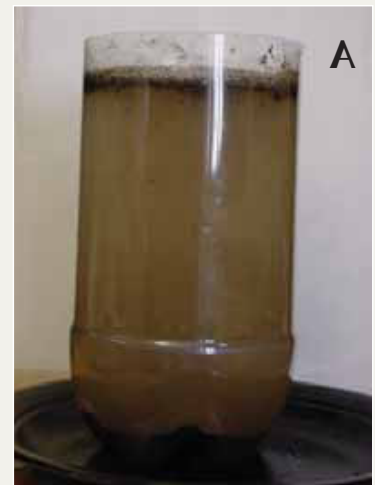
- Four - 1 litre ice cream buckets of dirty water (add 500ml of dirt to 4 liters of water)
- Two litre plastic pop bottle with cap
- Two - Two litre plastic pop bottles, one with bottom cut off and one with top cut off
- Two litre plastic pop bottles with bottom cut off to hold inverted pop bottle
- 1 tbsp alum
- 1/2 cup of fine sand
- 1/2 cup of coarse sand
- 1 cup of small pebbles
- Coffee filter
- Rubber band
- Spoon for stirring

### Key Vocabulary

- aeration
- coagulation
- sedimentation
- filtration
- disinfection
- potable water
- Water Quality Alert
- Boil Water Advisory



Water is treated before it is used and after it has gone down the drain from your house, yard or street.



# Activity 19

## *How is Water From the Watershed Treated? cont'd*

### ACTIVITY

1. Pour the dirty water into the pop bottle with a cap and note the appearance and smell of the water. Place the cap on the bottle and shake for 30 seconds.
2. Pour the water back and forth ten times between the two pop bottles with their tops cut off. Aeration adds air to the water and allows gases to escape.
3. Add two tbsp. of alum to the aerated water. Slowly stir for 5 minutes. Coagulation is the process where alum is used to make dirt and other solid particles stick together to form floc.
4. Allow the water to sit for 20 minutes. Sedimentation is when gravity pulls the particles of floc to the bottom of the container.
5. Make observations every 5 minutes.
6. Construct a filter using the bottle with its bottom cut off. Filtration removes suspended particles that were not heavy enough to settle;
  - Attach the coffee filter to the outside neck of the bottle.  
Note. Clean the filter by pouring clean tap water through it.
  - Pour one cup of pebbles into the bottle.
  - Pour 1/2 cup of coarse sand on top of the pebbles
  - Pour 1/2 cup of fine sand on top of the coarse sand.
7. Carefully, without disturbing the sediment, pour 2/3 of the water through the filter, catching the filtered water in one of the cut off pop bottles.
8. Compare the treated water with the untreated water. Note: disinfectants have not been added to kill any organisms that might be harmful. This water is not safe to drink.

### Guiding Questions

1. Where is the source or headwater of the lake?
2. Where does the water flow?
3. Why does it follow that path?
4. Where does the water pool? What things on the landscape determine the river basin?
5. What determines the boundaries of the watershed?
7. How can nature or people change a watershed?
8. How might (point and non-point source) pollutants enter a watershed?

### Extensions

- Have the students research the water treatment process in their own community.
- Explore what happens to solid waste. See information on Ogogrow in Appendix: Activity Support 3.
- Investigate what determines the quality of drinking water.
- Visit the website of a local water provider and examine what processes they use to notify the public about problems in the systems. Kelowna joint water users at [www.kjwc.org/index.php](http://www.kjwc.org/index.php) has links to the five agencies that provide water to residents in their geographic areas.





# Activity 20

## The Great Water Race

### Curriculum Connections

Grades 7/8: Social Studies, Math

### Time

1 Lesson

1 Week Observation

### Objectives

- Identify how water is used in and out of the home.
- To develop personal awareness about water use and practical ways to conserve water.
- To develop a sense of personal responsibility towards water use.

### Materials

- Water Use Challenge handout
- 4 large rain barrels or garbage pails
- 1 litre plastic containers or pails
- 100 metres of area outside
- Water to fill 2 barrels after race course in place
- Watch with second-hand or timer



photo: web sourced

### ACTIVITY

#### Preparing your students

We can all do more to conserve water. The average Westbank resident uses 789 litres of water every day! If you had to collect that, you'd need to make 98 trips with a full four-litre jug in each hand. Our water use is well above the British Columbia average of almost 500 litres a day and more than double the Canadian average of 374 litres per person each day.

Today, we're going to see what 789 litres of water looks like (and weighs). You are going to work together to carry a day's supply of water 100 metres for one Okanagan resident.

Divide class into two teams. Outside, each team has a 1 litre plastic container, a full rain barrel at the start line, and an empty rain barrel at the finish line (marked at 789 litres).

After the race, discuss the amount of water used each day, and ask students if they think they use more or less water than the average.

Remind students that in some parts of the world people survive on less than 4 litres per day.

# Activity 20 ~ The Great Water Race cont'd

## Implementing the activity

1. Ask the students to predict how much water they might use over the course of one day? One week? How is water used at home, both inside and outside? Rate these activities according to the relative amount of water used, for each activity, from the least to the greatest.
2. Fill a pitcher with water. Have a large beaker available.
3. Measure how much water is poured from the pitcher into the large beaker in 5 seconds while pouring relatively quickly. Record the results.
4. Measure how much water is poured into a large beaker in 5 seconds while pouring slowly. Record the results.
5. Have students compare the relative amount of water poured.
6. Discuss with students how controlling the flow rate of water can help conserve water.
7. Next, introduce the survey as a way to help monitor water use at home. Have students use water as they normally would to have a better understanding of how much water is typically consumed.
8. Explain the survey to students. Have students record their observations on the provided Water Use Challenge handout over the course of a week.
9. Spend a few minutes every day comparing relative water use among students.
10. At the end of one week have students tally the total amount of water used and compare results with each other. Which activity occurred most often? Which activities used the most amount of water?
11. As a class, compile the student data into a class tally chart.
12. Have students create a bar graph showing the relative amount of water used by the various activities at home.
13. Discuss practical ways water can be conserved.
14. Have students work in groups to address water conservation, by planning and implement a water smart program in the school or community.

## Extensions

- Have students follow-up with another week of water monitoring, but this time using water conservation strategies to see how much water they can save by simply changing a few habits, and if possible, fixing leaks.
- Have students investigate the use of water by people in other countries. Would people in drier climates use more or less water? Why?

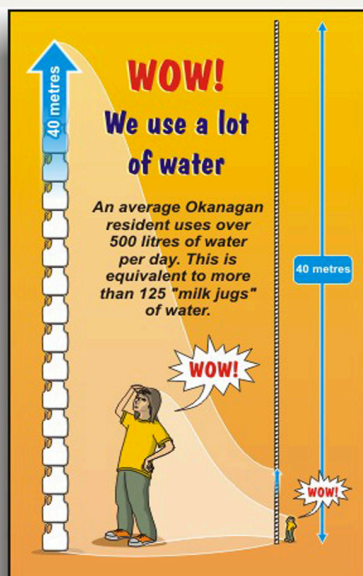
The internet would be a good place to start investigating this question, especially [www.ec.gc.ca/water/images/manage/use](http://www.ec.gc.ca/water/images/manage/use) which lists the average daily domestic water use (per capita) in a number of countries: USA 380 litres, Canada 335 litres, Italy 250 litres, Sweden 200 litres, France 150 litres, Israel 135 litres.

# Wise Water Use Indoors

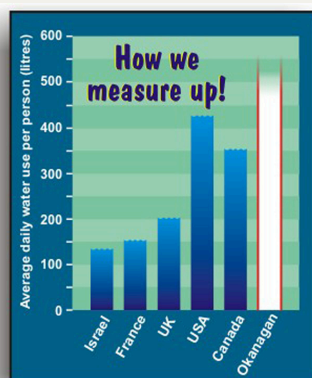
## Background Information

There are many ways we depend on water.

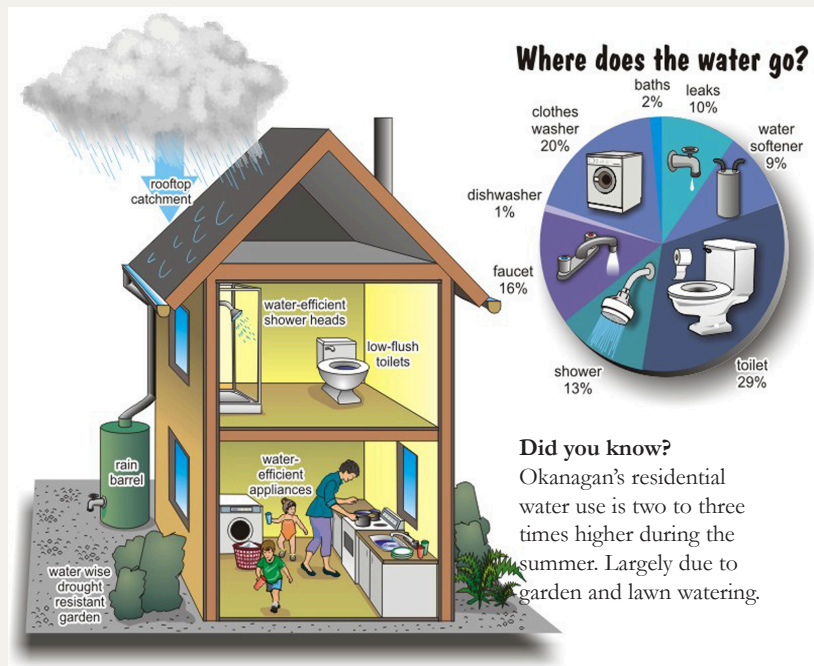
Experts agree that we don't value water enough. For example, we pay less for water per month than cable TV. But which could you not live without? Many say that we should pay for the water we use based on how much we use. That requires water metering. Water meters measure the amount of water that a household, or business, or farmer uses. With water meters, those who conserve are rewarded with lower costs. This way we all have an incentive to use less.



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# Activity 21 ~ Check it Out: Keeping Track of your Water Consumption

## Curriculum Connections

**Grade 5:** Science Processes and Life Science  
Social Studies: Applications and Skills and  
The Human and Physical environment

## Time

2-3 hrs.

## Objectives

- Determine the limiting factors to growing communities.
- Understand the total volume of water used per household and its impact on community planning.
- Show students the effects of using surface water as source water.

**Note:** A student copy of the Water Log below can be found in Appendix: Activity Support

## Materials

**Activity 1:** Water log (below) see appendix maps and illustrations for large format student copy.

## Activity 2: at a creek setting

- Stop watch
- Long measuring tape
- Orange tape or stakes to mark distance
- Large leaves or other floatable objects
- Chart 1 (Average In-stream Flow)
- 1 box measuring 1 cubic meter

## Key Vocabulary

- Stream flow discharge
- Turbidity
- Community planning
- Water log
- Smart Growth

Water log											
WHAT YOU DO	How many times each day							Total times	Average	Actual	Total
	1	2	3	4	5	6	7				
<b>In the Bathroom</b> 65%											
<input type="checkbox"/> toilet flushes									x 18 L		
<input type="checkbox"/> showers									x 100 L		
<input type="checkbox"/> baths									x 60L		
<input type="checkbox"/> teeth brushing									x 10 L		
<input type="checkbox"/> shaving									x 20 L		
<b>In the Kitchen</b> 10%											
<input type="checkbox"/> cooking									x 20 L		
<input type="checkbox"/> dishes by hand									x 35 L		
<input type="checkbox"/> dishwasher									x 30 L		
<b>In the Laundry Room</b> 20 %											
<input type="checkbox"/> washing									x 225 L		
<b>In the Outdoors</b>											
<input type="checkbox"/> Car washes									x 400 L		
<input type="checkbox"/> Gardens/ lawn watering (record number of minutes)									x 35 L/min		
<b>Other</b>											
<input type="checkbox"/> _____									estimate		
								<b>Total Weekly</b>			

reference: [www.ec.gc.ca/water/images/info/pubs/brochure/e\\_log.htm](http://www.ec.gc.ca/water/images/info/pubs/brochure/e_log.htm)

# Activity 21

## Check it Out: Keeping Track of your Water Consumption

### ACTIVITY 1

1. Complete water log
2. Students journalize their regular water consumption
3. Chart each student's water consumption and total consumption for the class
4. Research your community's total water consumption
5. One student in the group releases the leaf on a signal from the student with the stopwatch. A third student calls stop when the leaf reaches the reference point.
6. Record how many seconds it took for the leaf to float by the reference point. Repeat several times to determine average time.
7. Divide volume by seconds to find flow rate ( $m^3/s$ ).

### Guiding Questions

1. How does water consumption fluctuate during the seasons? Determine what factors affect the increase in water demand during the summer months.
2. What factors affect total household consumption? Do homeowners use more/less water than condo dwellers?
3. What benefits/negative impacts does Smart Growth have on your community?
4. Determine which water conserving measures have the greatest impact. Review the Water Log for other water conservation measures.
5. How much water is required for fish flow, human consumption, industry, irrigation?
8. Explain that the measurements are in cubic metres per second and represent how many "boxes" of water are flowing past the reference point per second.
9. Graph the flow data from each group.
10. Discuss the limitations to a community should this creek be their source water. Is there enough water for all the students and fish flow? For example: Calculate the total flow over a 24 hour period (1 cubic metre equals 1000L) as well as the total student water consumption. Is there enough water for human, industry, irrigation and community growth?

### ACTIVITY 2

1. Take students to a local flowing creek or stream. Divide students into groups of 3-4.
2. Measure and mark distance (5-10m) with orange tape or stakes. In circumstances where the creek is running fast, a greater distance is required. Record length.
3. Choose several points in creek and measure width and depth. Calculate and record average volume (length \* height \* width in  $m^3$ ).
4. Give each group a large leaf or other floatable object and a stopwatch.

### Extensions

- How does stream flow data impact community planning?
- Have a community planner come into the classroom to discuss Smart Growth and other community planning issues/concern).
- How does climate change affect total water demand? (it is expected the winters will be dryer and summers hotter, therefore as the growing season is increased so is the total water demand).



# Activity 22 ~ Better Than Bottled

## Curriculum Connections

Grades 5, 6 and 7: Social Studies Skills and Processes,  
Grade 5: Social Studies: Economy and Technology  
Grade 7: Science Processes  
Grade 7,8 and 9: Social Studies Applications

## Time

3 to 4 class periods

## Objectives

In this activity, students will test and analyze a variety of waters and will become aware of the environmental and economic costs of bottled water compared to tap water.

During their research, students will uncover facts about popular brands of bottled water that will lead them to consider how advertising can often mislead consumers.

## Materials

- 2 empty, unlabeled water bottles
- 2 brands of bottled water, with labels removed (approximately 2 litres/each)
- 2 litres of tap water that has been allowed to 'breathe' for several hours for chlorine evaporation
- 2 litres of fresh tap water
- Drinking water: bottles blow' article
- Water quality test kits: nitrogen, phosphate, potassium, salinity, chlorine, PH test. Tests Kits are available through most pet stores or online science resources such as Boreal/Northwest Scientific Supply.

## ACTIVITY

### Preparing your students

Take four unlabelled water bottles. Fill one with fresh tap water, one with tap water that has been left in an open container for several hours, allowing the chlorine to evaporate, and the other two with any of the bottled water brands currently on the market – lots to choose from. Make sure they are all at the same, cold temperature.

Students will take turns doing the taste test. Students will be asked to rate the taste by ranking the bottles from 1 (best taste) to 4 (worst taste). When done, tally up the results to see which one is the winner.

The water with the lowest score will be the victor. Lead the class in a discussion about bottled versus tap water. Everyone talks about the ills of tap water and how much better bottled water is but students need to ask themselves if they are just being taken in by the bottled water “spin doctors.”





## Activity 22 ~ Better Than Bottled cont'd

### Implementing the activity

1. Have students read the attached article, “Drinking water: bottles blow” (Off-Centre Magazine, September 2006). Do students agree or disagree with the article? After a brief discussion with students offering their points of view on bottled versus tap water, conduct a survey of the class. Using a piece of chart paper, draw a line down the centre and label the sections Bottled Water and Tap Water. Have each student choose one of the sections and place a post-it note with their name on it in that section.
2. Have students brainstorm different ways to determine which water is ‘better’—methods should include water quality testing, water quality statistics from municipal treatment facilities, bottled water websites listing FDA standards, economic cost comparison and ecological cost comparison. At any stage in the testing, students may ‘switch sides’ by moving their post-it note.
3. Water testing: students conduct water quality tests on tap water and different brands of bottled water. Nitrogen, phosphate, potassium, saline, chlorine and PH test results can be recorded in tables and charts.
4. Water quality statistics: students research websites and record the water quality statistics for local tap water and for bottled water. Suggested websites include:
  - Rutland Waterworks District  
[www.rutlandwaterworks.com](http://www.rutlandwaterworks.com)
  - Glenmore-Ellison Improvement District  
[www.glenmoreellison.com](http://www.glenmoreellison.com)
  - Vernon Water Services  
[www.greatervernon.ca](http://www.greatervernon.ca)
  - Penticton Water Quality  
[www.penticton.ca/city/public works](http://www.penticton.ca/city/public%20works)
  - Regional District of Okanagan Similkameen  
[www.rdos.bc.ca](http://www.rdos.bc.ca)

- Okanagan Basin Water Board  
[www.obwb.ca](http://www.obwb.ca)
- Canadian Bottled Water Association  
[www.cbwa-bottledwater.org](http://www.cbwa-bottledwater.org)
- Websites for particular brands of bottled water such as Dasani (Coca Cola) and Aquafina (Pepsi)

### 5. Economic Costs of Bottled Water

The bottled water industry is the fastest growing drink industry in the world despite the fact that in most countries, including Canada, tap water is as good or better than bottled water.

- There are more standards regulating tap water than bottled water in Canada.
- Many bottled water brands, such as Aquafina and Dasani, are actually tap water so the only difference is one comes from pipes and one comes from plastic.
- The average cost for 1 litre of bottled water is 80¢. The cost for 1 litre of tap water for residential customers in Kelowna is just slightly over 1/10 of 1¢. In fact, it is less than 0.1¢ since that cost includes wastewater charges as well. Talk about a deal!
- Have students calculate and compare the cost of bottled water to that of tap water over 1 year, 10 years, and their lifetime, based on their daily water consumption.

## Activity 22 ~ Better Than Bottled cont'd

### 6. Environmental Costs of Bottled Water

- Every year, 1.5 million tons of plastic are used to make bottled water. Toxic chemicals are released during the manufacturing and disposal of the plastic bottles.
- There are 90 billion litres of water bottled annually and the majority are shipped. The fuel used for transporting water contributes to acid rain and enhanced greenhouse effect.
- A tremendous amount of water is used in the manufacturing process. For every litre of bottled water produced, it is estimated that approximately 1000 litres of water are used.
- When you are talking about 90 billion litres of bottled water, this takes a very large bite (or gulp) out of our water resources.
- Drinking distilled water, which many bottled waters are, actually drains your body of minerals, whereas, tap water provides many essential minerals.
- Students can calculate their 'ecological footprint' at the following website: [www.waterfootprint.org/](http://www.waterfootprint.org/).

7. After all research, calculations, and water testing has been completed hold a class debate on bottled versus tap water.

### Extensions

- Write an editorial for the school newsletter where you inform people of the possible consequences of the choice to drink bottled water instead of tap water.
- Have students design a school survey and 'taste test' booth in order to collect data about awareness of the economic and environmental consequences associated with bottled water. From the data, make recommendations to the school administrators about the need to encourage the use of reusable bottles and tap water by students and teachers.
- See Global Commodification of Water in Appendix: Readings
- Check out the website for the Kelowna Joint Water Committee:  
[www.city.kelowna.bc.ca/CM/Page394.aspx](http://www.city.kelowna.bc.ca/CM/Page394.aspx)



Photo: Benjamin Rondel

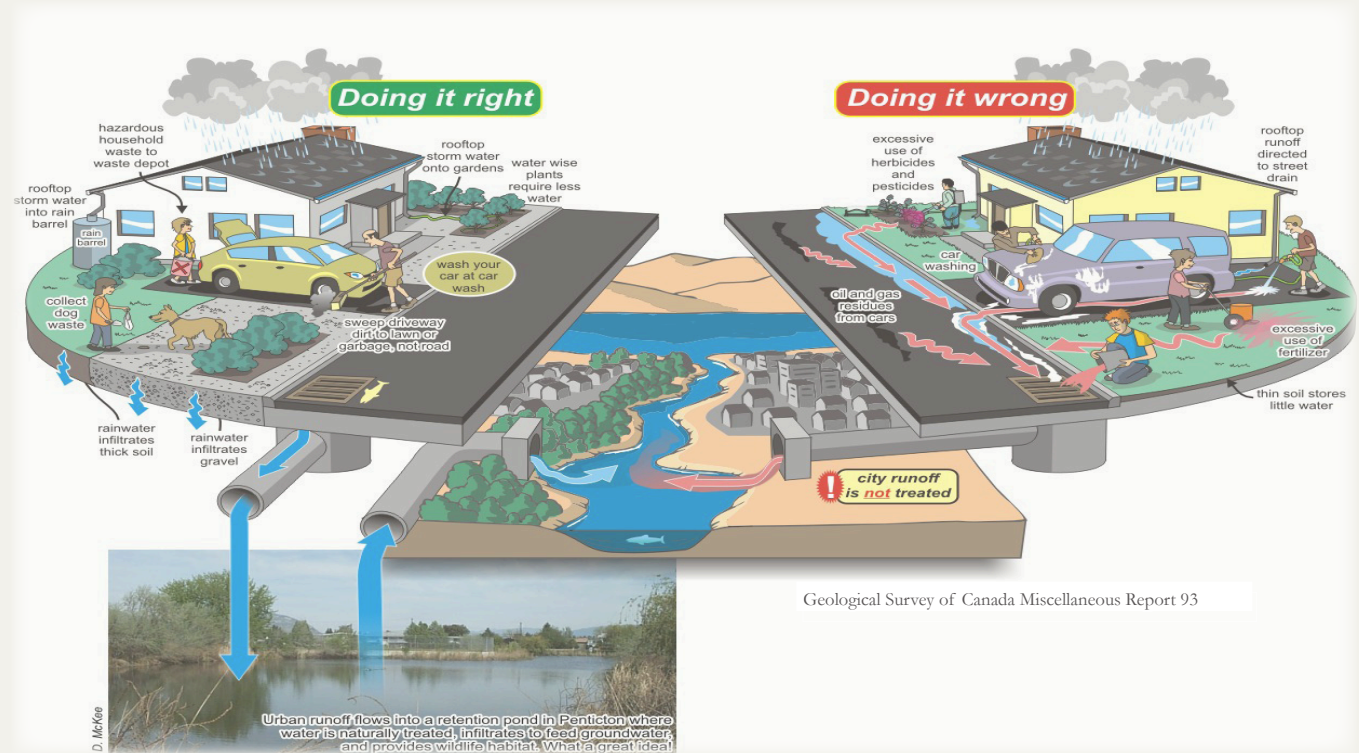


# Wise Water Use Outdoors

## Background Information

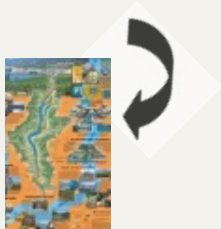
### Urban Myth!

Many believe that street drains flow to wastewater treatment plants. This is not true. Most street drains flow through pipes directly into streams or lakes. These waters can carry urban pollution from streets, driveways, parking lots and backyards. So be careful!



### The solution: Capturing rainfall where it falls.

Experts agree that capturing rain where it falls is an important solution to urban runoff, no problem. Yards need to act like sponges, absorbing and storing rainwater. Lawns with a thick underlying soil at least 12 inches deep work well. So do gravel yards. Later, the roots of the plants and grasses absorb this stored water and return it to the atmosphere.



**Note: the above vector diagram is available in Appendix: Maps and Illustrations.**



# Activity 23

## Greening the Lawn

### Curriculum Connections

Grade 4: Science Processes, Life Science

Grade 5: Processes, Earth and Space Science

Grade 7: Life Science

Grade 8: Science Processes, Earth and Space Science

### Time

1-2 hours

### Objectives

- To determine the minimum irrigation requirements
- To appreciate the benefits of water conservation

### Materials

- Outdoor water tap
- Sprinkler
- Ruler
- Marker
- Several clean tuna fish cans
- Stop watch

### Key Vocabulary

- outflow

### ACTIVITY

1. Attach garden hose and sprinkler to an outdoor tap.
2. Mark all tuna cans with a line at 2.5 cm and place cans around the sprinkler area
3. Start watering and stop watch simultaneously.
4. Time how long it takes to fill tuna can to one inch.
5. Record results.
6. Initiate a class discussion. Ask questions such as:
  - Where does the water come from to water the lawn?
  - What would happen if everyone over-watered their lawns?
  - Why do you think the Okanagan area needs drinking water stations?



photo: Jane Ritchie



# Activity 24

## Wise Water Use Outdoors: Doing it Right

### Curriculum Connections

Grade 5: Life Science, Socials Studies

### Time

One class period

### Objectives

- To help students to become aware of the urban pollution from the way we use water and waste deposits (urban run-off).
- To have students cooperatively come up with a list of how to use water wisely outdoors.

### Materials

- Gossip sheet
- Overhead of Wise Water Use Indoors
- Blackline Master of Overhead of Wise Water Use Outdoors.

### ACTIVITY

1. Put overhead of Wise Water use Outdoors and discuss how to do it right and what happens when doing it wrong.
2. Discuss the Urban Myth from the poster.
3. Hand out Gossip Sheet.
4. Students will go to other students desk and write down one idea on how to do it right so urban runoff will provide healthy wildlife habitat. (Give 2 or 3 minutes for students to write.)
5. Call out Gossip and students move to a new desk where they first read what was written by the previous student and then brainstorm a new idea or add to the previous students idea. (Again 2 or 3 minutes to write.)

6. This should continue until the page is full.
7. Students discuss their Gossip sheet with a partner.
8. Add any new ideas that they have to come up with during the game

### Extensions

- Have students take all the ideas they have collected and write a letter to the City or an editorial to the newspaper convincing readers why everyone should start or continue to “do it right.”
- Journal or discuss what other water sources are available for watering a flower garden? (bath water, grey water, captured rain water..)
- Discuss what factors would influence the quantity of watering time required to maintain landscaping (sprinkler head flow, sprinkler head coverage, soil type), aspect (north south east or west) and position on a slope (top, in slope, foot).

### Water Citation Activity

Students will become aware of how important it is to conserve water through appropriate quantities of irrigation. A useful tool in identifying water waste in their community is the Water Waste Citation Activity (see certificate page 95).

Students can monitor their own home use of irrigation water (lawns, gardens, flower beds etc) as well as in their neighbourhood. Students can complete the citation, recording their information and then share with the class. The data collected, including any photos, could be presented as a power point presentation.

# Wise Water Use Outdoors

## Doing It Right GOSSIP SHEET

Name: _____
Doing it Right _____
Name: _____
Doing it Right _____
Name: _____
Doing it Right _____

Name: _____
Doing it Right _____
Name: _____
Doing it Right _____
Name: _____
Doing it Right _____





# Water Waste *CITATION*



Location of water waste \_\_\_\_\_

Description \_\_\_\_\_

Suggested solution(s) \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Issued by Officer \_\_\_\_\_  
(name)

Date \_\_\_\_\_



# Activity 25 ~ Paradise or Paved

## Curriculum Connections

**Grade 7: Science Processes and Life Science  
Ecosystems**

**Grade 8: Processes and Environment**

## Time

1-2 class periods

## Objectives

- Compare the rate at which water travels down a slope with pavement to one with plant cover.
- Describe where the water goes, if it does not travel down slope.
- Develop an understanding of how plant cover can help filter water and affect the quality and quantity of groundwater.

## Materials (Per group)

- A shallow pan
- 2 sheets of wood or plastic similar in size
- 1 slate tile
- Water, small beaker
- Pebbles, sand, dirt, clay, crushed leaves
- Piece of turf
- Something to prop up the models so they tilt
- Stopwatch
- Measuring cup

## ACTIVITY

### Preparing your students

- Show students pictures of hillsides that are covered with vegetation. Ask them to imagine a gentle rain falling on these slopes. What do they think would happen to the water? Now show photographs of paved roads. How would rainfall affect these areas? Compared to the previous sites?

- Discuss how flowing water carries sediments of different sizes. The faster the flow, the larger the sediment particles that can be carried. As the water slows, the larger particles settle out first. In still water, the finer sediments (clay and silt) will settle to the bottom.

## Implementing the activity

1. Have students prepare the two boards—one with the turf and natural materials and one with the pavement (slate).
2. Have the students predict which board will allow the water to flow more freely, the one with the turf, which represents plant cover or the board the slate. Discuss why.
3. Groups then test their hypotheses by simulating rainfall on first one board and then the other. Students should repeat the experiment several times, recording the runoff times with a stopwatch, and recording the runoff amounts with the measuring cup.
4. Have groups record the results of their experiment and present their findings. Discuss the flow rate. In which model does the water travel faster? How does vegetation act to trap water? Where does the trapped water go?
5. Discuss how the plant cover (turf) in the first race could filter the water as it travels down slope. Have students predict what would happen to the uncovered soil or surface on the other board? How would that affect the water in the watershed? Would there be erosion? Why?
6. Add sediment to the container of water. Ask students to pour water onto the high end of each model. In which model does more sediment settle out? Which would have cleaner water flowing from it?
7. Add soap, oil, or other pollutant to a new container of water. Have students model urban runoff as it passes through the natural soil filtration system and then over a paved surface. Which surface acts to filter the water?

## Activity 25~ Paradise or Paved cont'd

### Extensions

1. How does plant cover within the watershed affect a lake? To introduce how lakes can be affected by surrounding areas with and without plant cover, try the following. Show students a clear glass of water and pour in some sand or soil. Note how materials begin to settle out.
2. Explain that this happens when water is standing in a lake. Discuss how a lake could be affected by an accumulation of sediment. (If sediment continues to be deposited in the lake, over time the lake could become shallow or even fill. High levels of sediment can adversely affect aquatic plants and animals.)
3. Discuss with the students what could be done to decrease the quantity of sediment flowing into the lake. Sedimentation is a part of the process of succession and is natural. Lakes and ponds fill with sediments, become marshes, and eventually grasslands or forests. However, human impacts can unnaturally speed the process.
4. Concrete highways, driveways, parking lots, and areas where the vegetation was removed can cause challenges for our water resources and the organisms living there.
5. Mix the different sediments with water in the quart jar. The jar should be 1/2 to 3/4 full of sediment; top off with water. Have a student shake the jar until the contents are thoroughly mixed and set the jar on a table in front of the class. Have the students predict which sediments will settle faster.

As the class watches the sediments settle, discuss how plant cover within the watershed can reduce sediments in the water. Discuss reasons muddy water can be harmful to wildlife. (Muddy water clogs filter feeders such as clams; clogs and abrades fish gills; smothers fish eggs; blocks sunlight and impairs plant growth; "blinds animals" that hunt for food by sight; etc.)

Would more sediment settle to the bottom if the water were flowing quickly, or slowly? (Slower flow, like a lake compared to a stream, allows even small particles to settle out.)

6. Describe how the particles are settling in the jar. (In layers: largest or heaviest particles settle first; fine or light particles may remain in suspension.)
7. Describe how wetlands at the edge of large bodies of water and their plants can slow and filter the flow of water by simply being in the way.

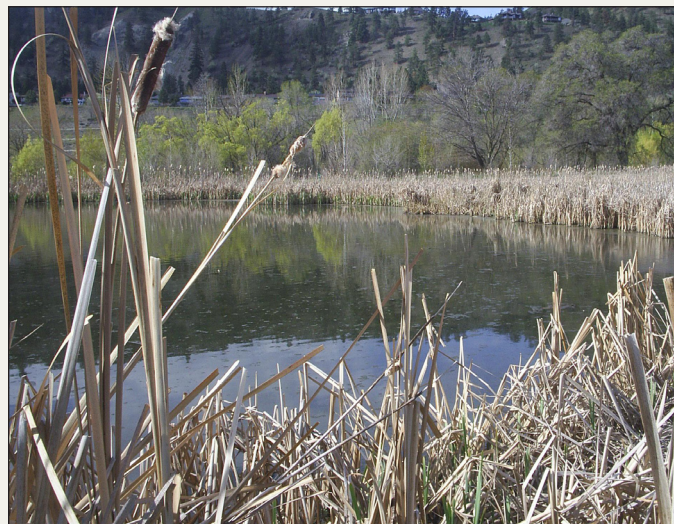


Photo: Shannon Jorgensen



# Activity 26

## Okanagan Enviro-Water Ethics

### Curriculum Connections

- Grade 4: Science Processes, Social Studies  
Grade 5: Social Studies Processes,  
Science: Earth and Space  
Grade 7: Science: Life Science  
Grade 8: Social Studies

### Time

One or two class periods.

### ACTIVITY

1. Involve students in discussion about the impact each of us has each day on aspects of water from using the bathroom to washing our clothes to drinking water.
2. Have each person brainstorm ideas about protecting nature's water needs with a partner.
3. Ask each student to work alone to brainstorm ideas for a "Personal code of Environmental Water Ethics." This code should include daily actions that are harmful to nature's water needs. Explain that students should consciously create their code based on actions they believe are beneficial or not harmful to protecting nature's water needs.
4. Students share their ideas with their partner and make changes as suggestions from partners are always helpful.
5. Students share their code with the class. Encourage students to ask questions about the codes, in the spirit of learning more.
6. Students evaluate their own code and take responsibility for his or her own actions.
7. Encourage students to try using their code and record their progress for a week or two. Have them create a Progress Report to keep track and pay attention to their actions.
8. Have students report back to the class on their progress and how their actions are helping protect nature's water needs.

### Extensions

- Create a poem that will capture the essence of your own "Personal Code of Okanagan Enviro-Water Ethics."
- Each student finds an appropriate song or relaxation music that will reflect their Personal Code of Okanagan Enviro-Water Ethics.

Using the Internet find 6-8 pictures that will best represent the words of the song or music and each student's code. Have students put together a slide show video that will create a visual of their Personal Code of Okanagan Enviro-Water Ethics.



photo: Benjamin Rondel

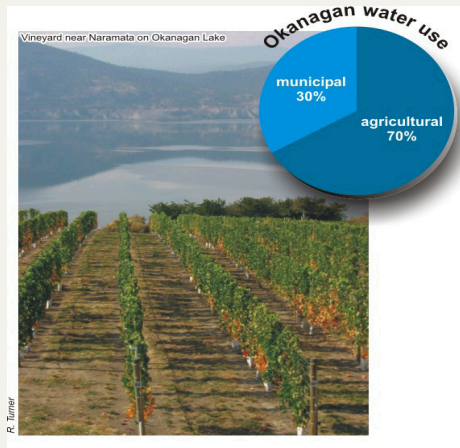


# Irrigation ~ Watering Our Land

## Background Information

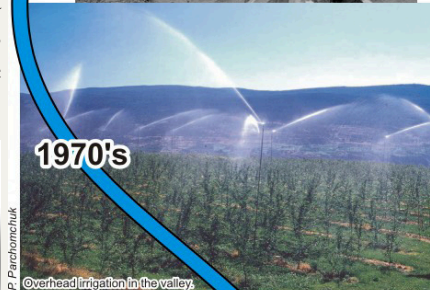
### Agriculture is BIG in the valley!

The Okanagan valley produces 25% of the total value of British Columbia's agriculture. It is BC's major producer of apples, peaches, pears and other tree fruits. It is also famous for its grapes and many wineries that bring tourists from all over North America. Important forage crops are grown in the northern part of the valley that support milk and meat production elsewhere. Agriculture occupies about 70% of the valley lands, and uses the same amount of the total water use.



### Irrigation—Learning to conserve

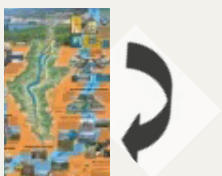
The first irrigation in the valley involved open flumes to transport water. The introduction of pipes reduced leakage and evaporation losses and allowed more water-efficient overhead spray irrigation. Irrigation practices continue to improve. Today, drip irrigation and micro sprinklers are replacing less efficient irrigation techniques and have greatly reduced the water required to grow crops. This allows more crop production while using the same water. Gains from conservation can also be used to protect ecosystems such as streams.



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### Transforming the valley: dry grasslands to watered orchards

When European settlers first came to the Okanagan valley, they farmed the wet lowlands. Early last century, irrigation districts were established to store and divert stream waters for agriculture. A system of highland storage, reservoirs, canals and pipelines supplied water to farmers. Over time, irrigation districts also supplied water to growing communities.





# Activity 27

## Irrigation: Just the Right Amount

### Curriculum Connections

**Grade 7:** Life Science, Ecosystems  
Processes and Skills of Science

### Time

1 class to set up  
1 to 2 weeks observation

### Objectives

- To recognize that irrigation is essential for Okanagan crops and gardens to survive.
- To demonstrate that modest watering of crops benefits by conserving water.
- To demonstrate that plants do not benefit and can even die from over watering.
- To practice making and testing a hypothesis.
- To identify variables and controls in an experiment.

### Materials

- 3 or 4 clear large pop bottles per group
- Measuring cup
- Measuring spoon: 1 tablespoon
- Water
- Potting soil
- 2 types of seeds – radish, lettuce or other fast germinating seeds.

### ACTIVITY

#### Preparing your students

- Okanagan Basin Waterscape Poster shows photo of “Lush irrigated orchard contrasts with dry natural landscape near Oliver”
- Questions to discuss: What colour is the natural vegetation in the lower parts of the valley in the late summer? How does this differ from the colour of the orchard/vineyard/gardens in the area? Why are they different?

If school location and time of year are conducive to being able to see the brown versus vibrant green then students could be taken outside to see.

- Before starting: teacher should explain the procedure. Discussion should include the identification of the variables and controls. (variable 1 = amount of water, variable 2 = type of seed/plant, control = no water) Students should write down their hypothesis then follow the procedure, adapting and modifying where appropriate.

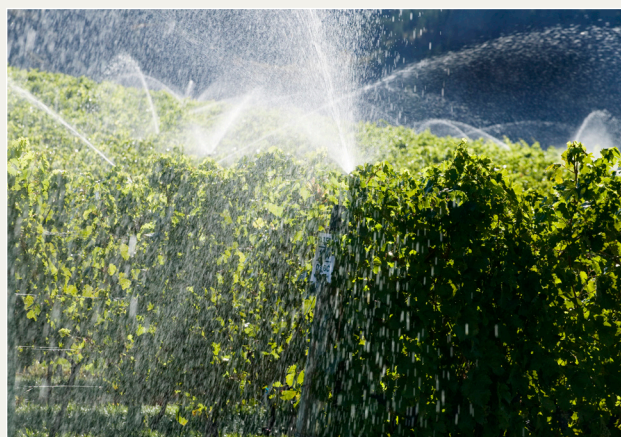


photo: Benjamin Rundel



## Activity 27 ~Irrigation ~ Just the Right Amount cont'd

### Implementing the Activity

1. Cut the top off of each bottle leaving about 15 cm of bottle bottom to use as a planting container.
2. Place about 10 cm of potting soil into each container and press down gently.
3. Evenly distribute 5 radish seeds and 5 of the lettuce seeds on the top of the soil in each container, press gently into the soil and cover with soil to plant the seeds.
4. Place the containers onto a counter where they can stay for the duration of the experiment.
5. Treatments: no water, 1 Tbsp per day, 5 Tbsp per day, 20 Tbsp per day (if several groups are conducting this experiment then set up the watering so that different amounts of water can be used by each. For each group it is important to have a control (no water) and to have an over-watering situation so that the plant growth will be hindered.
6. Label the containers with the amount of "irrigation water" that will be applied each day.
7. Water each day using the same amount of water and make daily observations regarding soil appearance, plant germination and growth at least until plants have sprouted.
8. Follow up and/or writeup should include discussion around the idea that the minimum but appropriate amounts of water should be used to irrigate crops and yards. Water conservation should be stressed – see Panel 4 of Okanagan Basin Waterscape: *"Our lakes: Looks Can Be Deceiving"* for details.

### Extensions

- Research and compare different types of watering and sprinkler systems used in the Okanagan. How many gallons per minute is dispensed by each type of nozzle? With the knowledge that water is in short supply in the Okanagan, which system suits which crop?
- Most homeowners have restricted watering schedules mandated by the cities and municipalities in the Okanagan. Students can check to see what days and times their household, their friends' and local orchardists were permitted to water this past summer. Were severe watering restrictions put in place last year? Are there watering restrictions every year?
- In the Okanagan summer, some crops suffer from sun scald. This is a burning of the fruit so that a significant brown mark appears. Some orchardists have installed overhead cooling/misting systems, in addition to the under-tree irrigation, to use to reduce this injury. Interview an orchardist or vintner to find what kind of irrigation is used in their orchard or vineyard. Find out if apples/ fruit grown in your part of the Okanagan tend to suffer from sun scald and if cooling systems are thought to be needed.
- Compare under-watering to under-eating and over-watering to over-eating, recognizing that each is unhealthy to the organism involved.