

6. Water Water Everywhere

Source: “Earth’s Water to Go,” adapted from *The Outward Bound Earth Book*
“Now that we have it, how do we use it?” adapted from *Every Drop Counts*. See Resources.

Description

These activities combine to help students understand that there is a finite amount of water available for human use, learn about how much water is needed for everyday activities, and communicate ideas for conserving water.

Background Information

All the water we have on Earth right now is all we will ever have - it exists in a limited quantity, and gets moved through the water cycle again and again. We all have water in us that may once have been part of dinosaurs, saber tooth tigers, and ancient oceans. However, most of the water on the Earth is unusable (salt water, glacial ice) or polluted. This leaves a very small amount of drinkable water that we rely on and some of this is hard to access. This activity focuses on groundwater which is the source of drinking water for most people in the world. Groundwater is the term used for water that is stored in rocks under the earth. A well is a simple example of groundwater.

Groundwater is a very important source of fresh water. Water taken from groundwater reserves will not return to this system anytime soon. Shallow groundwater has a renewal rate of about 300 years; deep groundwater, over 1000 metres deep, may renew itself in about 4600 years. Currently there is an increasing drain on the groundwater supply: as groundwater dries up, streams’ flows are reduced, ponds and marshes dry up and plant and animal species suffer.

Materials

- ▶ 19 litres (5 gallon) pail of water
- ▶ clear glass bowl
- ▶ metric measuring cups
- ▶ list of estimated litres of water used (Appendix D)
- ▶ metric measuring spoons
- ▶ eyedropper
- ▶ 1-litre milk or juice carton or 2-litre pop bottle for each student

Time Allotment

Introduction: 10 minutes

Brainstorming and discussion: 10 minutes

Conservation commercials: 15 minutes

Discussion: 5 minutes

This can be a great outdoor activity.

Teaching/Learning Strategies

1. “*Earth’s Water to Go!*”

- a) This demonstration activity illustrates why water conservation is important.
- b) Fill the 19 litre (5-gallon) pail with water, and place in clear view for the students.
- c) Explain that this represents ALL of the water on the Earth.
- d) With student participation, take out 500 ml of water from the bucket and put it in the bowl — this represents all the fresh water in the world; the water remaining in the bucket is salt water.
- e) Have a student remove 375 ml of water from the bowl — this represents the freshwater that is frozen in the polar ice caps and glaciers. The remaining 125 ml represents all of the accessible fresh water on Earth.
- f) Have a student take out 1ml of water from the bowl — this represents all the water in the Earth’s fresh water lakes (including our own Lake Ontario!).
- g) Have a student take 1/2 drop of water from the 1 ml — this represents all the fresh water in streams and rivers. The water remaining in the bowl is groundwater found beneath the Earth’s surface.

2. “*Now that we have it, how do we use it?*”

- a) Discuss with the students their reactions to this demonstration. Do they feel that water is a valuable resource? Can any life survive without water?
- b) Brainstorm students’ daily water use.
- c) Introduce the concept of *invisible water use*. Huge amounts of water are being used to produce the things that we use everyday,

yet we don’t link these items to water use (e.g., making one new car, including the tires, uses 148,000 litres of water; to produce one kilogram of beef requires 12,000 litres of water).

- d) Give each student a 1-litre juice or milk carton or 2-litre pop bottle full of water. Use the list “Estimated Litres of Water Used” (Appendix D) to give students an idea of the volume of water used in daily activities. For each item that uses water, ask students to guess how much water that item uses. Then reveal the answer and get that number of students to stand up with their filled carton or bottle. If having the containers filled with water seems impractical, the container itself can represent the volume, though it will be a less vivid demonstration.

3. *Communicate Conservation*

- a) Brainstorm a list of ways that students can conserve water.
- b) At this point, based on the list generated, break the students up into small groups and ask each group to choose one conservation idea that interests them. Give them 10 minutes to generate a 30 second to 1 minute commercial to share their chosen conservation message with the other students. Key points for the commercial:
 - ▶ everyone must be involved
 - ▶ ensure that the message is very clear
 - ▶ humour or ‘gimmicks’ are very effective
- c) Each group should have the opportunity to present its commercial, and the audience will try to identify the particular water conservation message being conveyed.

Follow-up Discussion Questions

- ▶ Why is it important to conserve water? What are the benefits?
- ▶ Why do people waste water?
- ▶ How can you help others learn about ways to save water?
- ▶ What change can you make in your life that will have the biggest impact on water conservation?

Extensions for additional classroom projects/ activities

- ▶ With the help of the school custodian, locate the school's water meter. Track the water use of the school for one week. Launch a water conservation campaign by sharing your commercials at a school assembly or creating posters on water conservation.
- ▶ Do a month-long home or school water use study. Set a goal to decrease water use each week for a month through new water conservation habits. Share successes and challenges with the class.

Curriculum Connections: Clustering of Expectations

GRADE 2: SCIENCE & TECHNOLOGY—Air and Water in the Environment (2007)

- 1.2 assess personal and family uses of water as responsible/efficient or wasteful, and create a plan to reduce the amount of water used, where possible
- 3.4 identify sources of water in the natural and built environment (*e.g., natural: oceans, lakes, ponds, streams, springs, water tables; human-made: wells, sewers, water-supply systems, reservoirs, water towers*)
- 3.6 state reasons why clean water is an increasingly scarce resource in many parts of the world

GRADE 4: SCIENCE & TECHNOLOGY—Habitats and Communities (2007)

- 1.1 analyse the positive and negative impacts of human interactions with natural habitats and communities (*e.g., human dependence on natural materials*), taking different perspectives into account (*e.g., the perspectives of a housing developer, a family in need of housing, an ecologist*), and evaluate the ways of minimizing the negative impacts
- 3.10 describe ways in which humans are dependent on natural habitats and communities (*e.g., for water, medicine, flood control in wetlands, leisure activities*)

GRADE 5: SCIENCE & TECHNOLOGY—Conservation of Energy and Resources (2007)

- 1.1 analyse the long-term impacts on society and the environment of human uses of energy and natural resources and suggest ways to reduce these impacts (*e.g., turning off the faucet while brushing teeth or washing and rinsing dishes conserves water...*)

GRADE 8: SCIENCE & TECHNOLOGY—Water Systems (2007)

- OE 1 assess the impact of human activities and technologies on the sustainability of water resources
- 1.1 evaluate personal water consumption, compare it with personal water consumption in other countries, and propose a plan of action to reduce personal water consumption to help address water sustainability issues
- 3.1 identify the various states of water on the earth's surface, their distribution, relative amounts, and circulation, and conditions under which they exist (*e.g., water is a solid in glaciers, snow and polar ice-caps; a liquid in oceans, lakes, rivers, and aquifers; and a gas in the atmosphere*)

Appendix D Estimate Litres Of Water Used

Source: *Every Drop Counts*, City of Toronto

<i>Toilet</i>	Regular tank – 13 litres per flush or more Water efficient model – 6 litres per flush
<i>Shower</i>	Regular head – 100 litres per five minutes Low-flow head – 55 litres per five minutes
<i>Bath</i>	“Full” tub – 200 litres “Quarter” tub – 70 litres
<i>Brushing Teeth</i>	Tap on one minute – 11 litres Tap turned off while brushing – 2 litres
<i>Hand/Face Washing</i>	Tap on one minute – 11 litres Partially filled basin – 3 litres
<i>Food Preparation</i>	Tap on five minutes – 55 litres Basin or pot method – 5 litres
<i>Washing Dishes by Hand</i>	Tap on 10 minutes- 110 litres Basin method for wash and rinse – 10 litres
<i>Dishwasher</i>	Full cycle – 47 litres Short cycle – 32 litres
<i>Drinking 1 Glass</i>	Tap on 30 seconds – 5.5 litres From jug in fridge – 1/4 litre
<i>Laundry</i>	Average 105 litres per full load
<i>Car Washing</i>	Hose on 15 minutes – 165 litres Bucket or shot-off nozzle – 20 litres
<i>Lawn Watering</i>	Sprinkler on one hour – 660 litres Sprinkler on 1/2 hour – 330 litres

Canadians and Water Around the World

- *Canadians are the second highest water users in the world.*
- *The average Canadian uses approximately 350 litres of water a day.*
- *Canadians use more water than people in dry countries such as Spain or Italy.*
- *Canadians use 2 times the amount of water that people in Britain use.*
- *People who live in areas with set water rates (charges for the exact amount of water used) use 40% less water than those who pay a flat rate for water (regardless of how much they use).*