



wise

WATER INNOVATION & STEWARDSHIP EDUCATION KIT

Teacher's Guide



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ALBERTA INNOVATES

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..... WELCOME TO WISE

Congratulations! As an enthusiastic teacher and supporter of water education, you have been selected to explore Inside Education's WISE kit: a hands-on investigation of **Water Innovation and Stewardship Education!**

What are the goals of this resource?

- To connect your students with their personal water use
- To introduce tools and innovations that can be used to conserve water
- To promote water stewardship and encourage positive action

Who is this resource intended for?

It's for you and your students! The kit was designed with a grade 4-9 audience in mind but we know teachers are experts at adapting great resources to fit within their unique classroom situations. There are tons of links that can be made to science, social studies and math curriculum as well as general environmental education topics.

What's included in this resource?

The WISE kit is an interactive set of tools designed to enhance water literacy and engage students in water conservation. For a complete list of items found in the kit, please refer to page 15.

This accompanying learning guide is full of 'Did you know?' fun facts and 'Try it' activities that connect directly to the items found in the kit.

We wish you tons of fun learning and exploring!



Important: *Some of the activities in this guide require permission from the school administration and custodial staff. Ensure your whole school team is on board before diving in.*

WATER AUDITOR

Take a minute to consider the many ways you use water at school.

Drinking, washing, flushing, cleaning, cooking, watering.



TRY IT

Create a blueprint of your school and map all of the fixtures that use water.



DID YOU KNOW?

Each day, Canadians use an average of 328 litres of water! Picture a 4 litre milk jug. How many jugs of water would that be? That's right...82!!

An **audit** is a useful tool for determining how much water your school uses. These measurements and observations can be helpful in finding places where you might conserve water.

Water Logged

From the time you wake up in the morning to the minute you go to sleep at night, how much water are you using?



TRY IT

Connect to your personal water use by keeping a water log. Record how much water you use over the course of a week using Master #1. Compile the results to find your total classroom usage.

MAKE CONNECTIONS

Take an average - find the mean, median and mode for your class' total water usage.

Multiply - using the average, find out how much water the class uses in a month, year.

Graph - create a visual representation comparing the water usage of various activities (using a standard vs. low-flow shower head).

Detecting Leaky Faucets



DID YOU KNOW?

A tap leaking at a rate of one drop per second can waste more than 25 litres of water every day. That's clean H₂O going down the drain.



TRY IT

To find leaks in your school, have a team of detectives check the faucets in the washrooms, kitchens and utility areas. If a leaky faucet is found, the repair may be as simple as replacing a worn-out washer, costing only cents to fix.

Use the **drip vial** to calculate how much water that leaky faucet or pipe is wasting. Hold the measuring vial under the drip for 60 seconds and observe the amount of water collected.

To find how much water is wasted in a day, multiply the amount by 1440 minutes.

_____ mL / min x 1440 minutes = _____ mL / day

*If you don't have a leaky faucet - **congratulations!** You can still do this activity by slightly turning on the tap and creating a drip.*

Detecting Leaky Toilets



DID YOU KNOW?

A toilet leak can be a *big* problem. A 'running' toilet can waste up to 200,000 litres of water per year - that's enough to fill a swimming pool. Large leaks are often visible or audible - if the water looks or sounds like it's running, you know you've got a leak. Small, silent leaks are harder to identify but still a concern.



TRY IT

Use the leak detection tablets (or a few drops of food colouring) to conduct a simple leak test. *If your student washrooms have tankless toilets, get permission to check the infirmary or staff washroom.*

Instructions:

1. Remove the toilet tank cover.
2. Drop a dye tablet (or 4-5 drops of food colouring) into the water tank.
3. Wait 5 minutes.

If the dyed water shows up in the toilet bowl without flushing, you've got a leak. Check the flapper valve in the toilet tank; it may need to be cleaned or replaced. Make sure to inform the maintenance staff of all detected leaks.

Measuring Flow



DID YOU KNOW?

Flow describes the movement of a fluid and is a measurement of volume over time.



TRY IT

Use the flow rate bag to find the volume of water your school's faucets use every minute.

Instructions:

1. Turn on the faucet and adjust the flow to your normal use.
2. Hold the bag open under the faucet for exactly 5 seconds (use a stopwatch for accuracy).
3. Read the measurement on the bag in LPM (litres per minute).
4. Empty the bag* and repeat the test to confirm results.

*Put the collected water to good use - water plants or use it for washing.

The recommended flow rate for bathroom and kitchen faucets is 5.7 LPM.

How do the faucets in your school compare? Are some of the faucets using more water than others?

Can you think of ways you might reduce the flow to use less water?

H2O Habits

More information leads to better habits. Learn where you can conserve water, so you can make a plan and take action.



TRY IT

Answer the following survey questions to find your school's water consciousness score. Determine which action phase your school falls under for each of the following activities and tally your points using Master #2. Thinking (**1** point), Planning (**2** points), Doing (**3** points)

- Students and staff are encouraged to conserve water through education activities.
- Water consumption is measured, recorded and communicated to students and staff.
- Faucets and toilets are checked regularly for leaks.
- Low flow toilets (<6 L per flush) are installed.
- Aerators are used on bathroom & kitchen faucets.
- Students fill reusable water bottles rather than drinking from the fountain.
- Rainwater is collected to water plants & gardens.
- Landscaping and outdoor garden beds are watered during the coolest part of the day to reduce evaporation.
- Plants selected for the schoolyard are native or drought resistant.
- Students practice the 3 R's (Reduce, Reuse, Recycle). Remember: water goes into everything we make!

Now that you've calculated your total score, set a goal. How many points would you like to achieve by the end of the month? By the end of the year? Celebrate when you've achieved your Water Consciousness Goal!

GET INNOVATIVE

We all know how important water resources are, so let's explore simple water conservation ideas that can be implemented today. First, we can change our behaviors to help save water, but we can also use some cool technology.

Important: *Obtain permission from the school administration and custodial staff before implementing any of these devices.*

Install an aerator



DID YOU KNOW?

Faucet aerators can reduce the flow of water from your kitchen or bathroom tap by up to 50%. Aerators work by mixing the water with air. They maintain water pressure but use a lot less water.



TRY IT

Install the low-flow aerator included in this kit on a bathroom or kitchen faucet. To increase your impact, add aerators to every tap in the school. More can be purchased at the hardware store for a few dollars a piece.

Put a tummy in your tank



DID YOU KNOW?

If replacing old toilets is not an option, consider adding a water displacement bag (also known as a toilet tummy) to your existing toilet tank. This device saves approximately 2 litres of water every time the toilet is flushed.



TRY IT

This water displacement bag is simple to install. Fill the bag with water, hang it inside the toilet tank and start saving water. For detailed installation instructions, follow the steps on the bag.

*Disclaimer: retrofit devices can affect how well the toilet functions and can reduce the toilet's effectiveness at clearing waste. Toilet tummys should not be used on low-flow toilets.

FOLLOW THE FLOW

Where does your school's water come from? And what happens to that water when it goes down the drain?
Where does the water come from that creates our shoes, our clothing, our text books?

Ins & Outs



DID YOU KNOW?

Communities across Alberta have unique ways of managing their water supply. Some communities get water from nearby lakes, rivers, streams or wetlands, others pump water from underground. Towns and cities also have different methods of cleaning their intake water and treating their wastewater.



TRY IT

Find out more about your local water supply & treatment processes by visiting your community website. You may need to dig deeper to find the answers you're looking for. Plan a field trip to your water or wastewater treatment plant. Often contacting the town office is a good place to start.

Additional education resources:

Calgary: <http://www.calgary.ca/UEP/Water/Pages/Youth-education/Teacher-Resources.aspx>

Edmonton: https://www.edmonton.ca/programs_services/for_schools_students_teachers/drainage-education.aspx

Grande Prairie: <http://www.cityofgp.com/index.aspx?page=1083>

Lethbridge: <http://www.lethbridge.ca/living-here/water-wastewater/pages/water.aspx>

Red Deer <http://www.reddeer.ca/city-services/water-wastewater-and-storm/>

Wood Buffalo: www.rmwb.ca/living/services-and-utilities/water

Hidden Water Calculator



DID YOU KNOW?

Although we don't see it, millions of litres of water go into the products we buy, use, and throw away. Manufacturers of everyday material like paper, plastic, metal and fabric depend on water to make and clean their products and machinery. This water is known as "hidden water" or "virtual water." Some people say this virtual water will become important to consider as manufacturing countries deal with varying water supplies in the face of climate change.

TRY IT



Find out more about your water footprint by doing an internet search for a water footprint calculator. Alternatively, research how much water goes into producing your favorite meal or your favorite outfit.

Additional education resources:

<http://www.waterfootprint.org/en/resources/interactive-tools/personal-water-footprint-calculator/>

TAKE IT OUTSIDE

Now it's time to think beyond the walls of the school. How is water used outside?



DID YOU KNOW?

During the spring/summer season, outdoor water use can increase by 50%. Lawns and plants require water to grow but would you believe much of this is lost due to over-watering and evaporation?

Measuring Precipitation

Do the trees and plants in your schoolyard need regular watering? Does the rain and snow provide enough moisture to keep them healthy and growing?



TRY IT

Using the rain gauge provided, measure the amount of natural precipitation your schoolyard receives in one week.

Instructions:

Position the rain gauge in an open area of the schoolyard.

Check the rain gauge each day and record the amount of rainfall over the period of a week.

How much water do you think our lawns require each week? How thirsty is the grass?



DID YOU KNOW?

The grass only needs 2.5 cm of water each week. Any excess water is likely lost to evaporation or run off.



TRY IT

Use the flying disk included in this kit to monitor precipitation - notice that it's about 2 cm deep. Place the disc upside down on the grass to make sure your schoolyard is getting enough water but not being over-watered. Who knew a flying disk could be such a handy tool?



DID YOU KNOW?

Another way to help retain moisture and keep weeds down in your grass is to leave clippings on the lawn after mowing.

Ways of Watering

When we think of watering our lawns or garden we might use the sprinkler approach: set it and forget it. A sprinkler can use significant amounts of water and if we are not monitoring it carefully we can end up overwatering or even watering our sidewalk or driveway. So, how can we water our plants more wisely?



TRY IT

Use the Pop Bottle Watering Cap to create a simple watering tool. Simply attach the cap to the top of a 2L pop bottle. Turn the bottle upside down to provide a sprinkle of water to your garden plants.

Other considerations might be to use a control nozzle on the end of your garden hose or an automatic shut-off timer on your sprinkler. Even better, collect your own supply of water in a rain barrel and water by hand.

Timing is Everything

What is the best time of day to water your grass?



DID YOU KNOW?

The sun is most intense during the school day meaning 40-60% of the water applied to lawns and garden between the hours of 10am-4pm will end up evaporating. It's best to water in the early morning or evening when it is cooler and less windy.



TRY IT

Measure and compare the evaporation rate of water during the school day to the amount of evaporation that occurs overnight.

Instructions:

School Day Measurement

1. At 8:30 am fill the rain gauge to the 2 cm line.
2. Place it outside in a space that will receive sun all day.
3. At 3:30 pm record the volume of water remaining in the rain gauge.

Overnight Measurement

1. At 3:30 pm refill the rain gauge to the 2 cm line.
2. Place it outside in the same space.
3. The following morning, record the volume of water remaining in the rain gauge.

How do the evaporation rates compare? Are you surprised? *Keep in mind; the daytime measurement covers 7 hours, where the overnight stretch is 17 hours.

Species Selector

Do some plant species need more water than others? Of course! There are plants that are adapted to desert conditions and others that will only grow in the rainforest.

Plants that are naturally tolerant to drought make them water-wise choices for schoolyards in Alberta (especially in the southern part of the province where it tends to be more dry). Plants with gray, fuzzy or waxy leaves like daylilies, flax, lavender and bellflowers thrive even in dry conditions.



DID YOU KNOW?

Xeriscaping is a word used to describe creative landscaping that eliminates the need for watering.



TRY IT

Plant a drought resistant species. The seeds included in this kit will help get your native plant garden started.

Visit www.edmontonnativeplantgroup.org for more information and general planting instructions.

TESTING FOR QUALITY

Good enough to drink? We assume the water coming into our school is of good quality - clean and potable. Conduct some simple tests to find out more about your school's water supply.

? Total Hardness

DID YOU KNOW?

Total hardness is a measurement of the calcium and magnesium minerals found in water; tested by finding the concentration of calcium carbonate (CaCO_3). Water with high hardness levels cause scale build up on pipes and drains, making them less efficient. If water is too hard it also decreases the washing ability of soaps and detergents and can negatively affect the taste.

Total Hardness	Equivalent Concentration of CaCO_3
Soft	<60 mg/L
Medium	60 mg/L to < 120 mg/L
Hard	120 to < 180 mg/L
Very hard	180 mg/L or greater

Hardness levels between **80 and 100 mg/L** of CaCO_3 are considered optimal.

? Total Chlorine

DID YOU KNOW?

Chlorine is a chemical added to drinking water to ensure the quality is maintained. The chlorine reacts with organic materials, like bacteria and viruses, and will reduce or eliminate microorganisms such as E.coli.

How much? Canadian Guidelines state that water should have a minimum concentration of **0.5 mg/L** total chlorine content.

pH



DID YOU KNOW?

pH is a measure of the hydrogen ions (H^+) found in a substance. The pH scale ranges from 0 - 14, with 7 being neutral. When the pH of water is too low (acidic), it will lead to corrosion of pipes. If the metal from the pipes leaches into the water this can lead to health problems. The water may also have a bitter and metallic taste. If the pH is too high (basic), the water has a baking soda taste and feels slippery. It will also leave scale deposits on pipes and fixtures, which decreases the efficiency of the plumbing system.

How much? Canadian Guidelines state the acceptable pH range for drinking water is between

6.5 - 8.5, with the ideal being around 7.4.



TRY IT

Test Total Hardness, Total Chlorine & pH of your school's tap water.

Instructions:

1. Take a test strip from its package.
2. Holding the end of the strip immerse the reagent pads into a 250 mL water sample for 5 seconds and gently move the strip back and forth.
3. Remove the strip and give one shake to remove excess water.
4. Wait 20 seconds and match the test strip to the corresponding colour chart included in the kit.

There are 30 test strips in each WISE kit. You may like to test your school's water supply at different times of the year or compare your drinking water test results with measurements taken from an outdoor water source (melted snow, rain or from a nearby water body).

Can you think of substances that might change the quality of our water?

What are three ways we might impact our water supply?

How can we improve our practices to avoid adding unwanted chemicals to our water?



ALL ABOARD THE STEWARDSHIP

Being a **steward** means that you are taking care of something that is important to you.

Local Stewardship

There are dozens of organizations committed to water stewardship and education in Alberta. Explore some of the work that's being done by visiting the following websites.

The Sacred Relationship - www.sacredrelationship.ca

"The Sacred Relationship brings Aboriginal worldview right into your classroom and community. Download easy-to-teach lesson plans based on series of fifteen educational videos. The videos feature perspectives on water from Aboriginal Elders, leaders and Western Scientists."

Ducks Unlimited Canada - www.ducks.ca/education

"Educating youth about wetlands and waterfowl is a big part of our mission at Ducks Unlimited Canada (DUC). To protect and sustain the health of precious natural resources like wetlands and watersheds, we need to make sure young people understand conservation concepts and practices."

Yellow Fish Road - www.yellowfishroad.org

"Yellow Fish Road is a nation-wide environmental education program designed and managed by Trout Unlimited Canada. The Yellow Fish Road program's goal is to help Canadians understand that storm drains are the doorways to our rivers, lakes and streams. Preventing pollutants from entering our storm drains is critical to protecting and improving our watersheds, water quality and aquatic habitat."

Alberta Water Portal - www.albertawater.com

"The Alberta WaterPortal provides inclusive research, community engagement, and educational activities to improve the public's understanding of the importance of water in Alberta, as well as providing Albertans with the knowledge needed to make better water management decisions."



DID YOU KNOW?

Each major watershed in Alberta has a Watershed Planning and Advisory Council (WPAC - "double-u pack"). These non-profit organizations are designated by the government to assess watershed conditions and work with stakeholders to prepare management plans to address watershed issues. They are also involved in educational and stewardship activities, and may be a great place to start to find out more about your own watershed! Do an internet search to discover your local WPAC.



Water in Action



TRY IT

There are numerous ways **you** can take stewardship action. Here are a few project ideas that will take water literacy to the next level.

Adopt a local body of water – organize a clean up, make education signs to help visitors learn more about the area, or plant native species in the riparian area (along the water’s edge) to reduce soil erosion.

Educate others – get creative! Host an event, put on a play, create a display or write a song to share your passion about water with others.

Update your facilities – start a campaign to replace outdated fixtures or install innovative devices that can save water in your school.

Connect with your local government – if you have identified a water issue that is impacting your community, write a letter or send a short video documenting your concerns.

Practice the 3R’s - remember, water is a part of everything. Any action we take to reduce, reuse or recycle, lowers our consumption of natural resources and energy and it also helps to save water.

General Project Outline:

1. Choose a project
2. Create a plan for action
3. Ask experts for help
4. Stay on track
5. Celebrate your success.

Congratulations! You’ve taken another great step on your journey as a water steward!

Master #1

Water Logged

Activity	Flow rate or Litres per use	Number of Uses or Minutes	Total Water Used (Litres)
Toilet flush	Standard - 15 L		
	Low Flow - 5 L		
Shower	Standard - 12 L /min		
	Low Flow - 8 L /min		
Bath	90 L		
Hand washing	8 L		
Teeth brushing	10 L		
Outdoor watering	35 L /min		
Automatic dishwashing	40 L		
Dishwashing by hand	35 L		
Clothes washing	Top Load - 130 L		
	Front Load – 40 L		

What surprised you most about the water you use?

What are 3 steps you can take to reduce the amount of water you consume?

Master #2

H2O Habits Questionnaire

Activity	Thinking (1 pt.)	Planning (2 pts.)	Doing (3 pts.)
Students and staff are encouraged to conserve water through education activities.			
Water consumption is measured, recorded and communicated to students and staff.			
Faucets and toilets are checked regularly for leaks.			
Low flow toilets (<6 L per flush) are installed.			
Aerators are used on bathroom and kitchen faucets.			
Students fill reusable water bottles rather than drinking from the fountain.			
Rainwater is collected to water plants and gardens.			
Water is used outdoors during the coolest part of the day to reduce evaporation.			
Plants selected for the schoolyard are native or drought resistant.			
Students practice the 3 R's (Reduce, Reuse, Recycle). <i>Remember water goes into everything we make.</i>			

WISE Kit Contents:

Drip vial
Flow rate bag
Leak detector tabs
Faucet aerator
Toilet displacement bag
Rain gauge
Frisbee
Native plant seeds
Pop bottle watering cap
Water quality tests



Where can I find replacement materials?

Native Plant Seeds
Edmonton Native Plant Group
www.edmontonnativeplantgroup.org

Water Conservation Materials
New Resources Group
www.nrgideas.com

Water Quality Test Strips
OMEGA
www.omega.ca

Who should I contact for more information?

Inside Education
www.insideeducation.ca
info@insideeducation.ca
P. 780 421 1497
 facebook.com/insideeducation
 [@insideeducation](https://twitter.com/insideeducation)

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