toronto ZOO

Teacher's Guide & Student Worksheets

The Toronto Zoo acknowledges and thanks contributions from:

S. Cross, York Region District School Board
M. Follett, Toronto District School Board
S. Hart, Layout and Design
R. Hartwick, Peterborough, Victoria, Northumberland and Clarington Catholic District School Board
A. Hensen-Hewitt, Durham District School Board
M. Lawrie, Peel District School Board
M. Makropolous, Peel District School Board

This project was funded by the Government of Ontario and Royal Bank of Canada

Dear Teachers;

Welcome to the Blue Schools program!

Your involvement in Blue Schools, and the work completed by your students, colleagues and yourself through the program, represents an important shift in the way we relate to aquatic ecosystems. By taking steps to reduce your school's water footprint, achieving Blue Schools certification demonstrates a commitment to protecting our precious water resources - it will have a positive, lasting effect on the aquatic ecosystem and everyone involved in the program.

Blue Schools certification requires the engagement and dedication of you, your students, colleagues, school administration and support staff. Each group will be involved in different capacities at different times and it is essential that everyone is aware of the Blue Schools program process from the beginning in order to ensure successful certification.

The Blue Schools program is structured as a series of activities that are completed in sequence throughout the school year to: introduce the water audit process, complete a water audit in the school, analyze the data collected, prepare an action plan for water conservation in the school and finally, implement the action plan and measure success. Multiple connections to the Science and Technology, Mathematics and Social Studies & Geography curriculum documents are highlighted for each activity. Additionally, each activity is related to a relevant category of the achievement chart (Knowledge and Understanding, Thinking and Investigation, Communication, Application) to allow for flexible assessment based on the dynamic classroom environment. Blue Schools also supports the development of 21st Century Competencies in participating students.

We are excited to have you on board as a partner in water conservation through the Blue Schools program. Program staff at Toronto Zoo are available to assist you and your school throughout the certification process – frequent communication is the key to success! We look forward to working closely with you to protect our aquatic ecosystems and foster school communities that are actively engaged in ongoing conservation efforts.

Sincerely,

Blue Schools Program Staff

Preface

The Toronto Zoo is Canada's national leader in saving wildlife to ensure the rich diversity of nature for future generations. The Zoo also has a strong mandate to improve public awareness with the goal of species conservation, which involves the local delivery of curriculum-based education programs. Since the 1990s Toronto Zoo's highly successful, bilingual Great Lakes Program (GLP) has supported this mandate through bilingual in-class and public outreach, student and teacher resource development, community events and freshwater research.

As an extension of the GLP, Blue Schools fosters a deeper appreciation for water resource use, management and protection through direct, hands-on learning. Taking learning out of the classroom, this STEM-based program involves the entire school from students and educators to support staff, administration and board-level representatives. After completing a water audit in their schools, students work as part of a team including all levels of school operation to develop and implement an action plan to improve sustainable water use practices in the school and raise awareness of local water issues.

PLEASE NOTE: No personal student or staff information is collected through the Blue Schools Program. Water-use data identifying specific schools will not be published or distributed.

Table of Contents

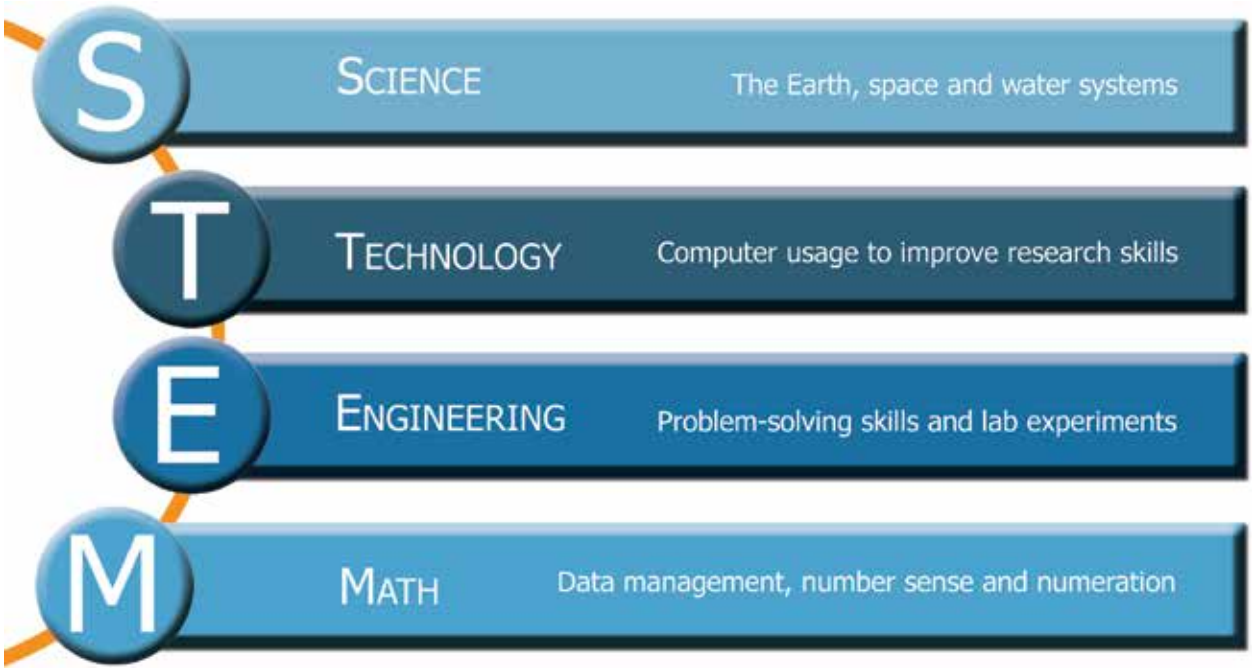
Curriculum Connections

Blue Schools is directly linked to multiple grades and subjects of the Ontario Curriculum. Specific links to curriculum expectations in the following subjects and grades are listed at the start of each activity, and in Appendix 1.

- Science & Technology, Grade 6-8
- Mathematics, Grade 6-8
- Social Studies, History & Geography, Grade 6-8

Blue Schools implementation is not limited to the subjects or grades listed here. Teachers of all grades and subjects are encouraged to participate in addition to extra-curricular clubs such as environmental or social action clubs.

Blue Schools is based on STEM (Science, Technology, Engineering and Math) pedagogy. Additional integration of the Blue Schools program into classroom learning is strongly encouraged.



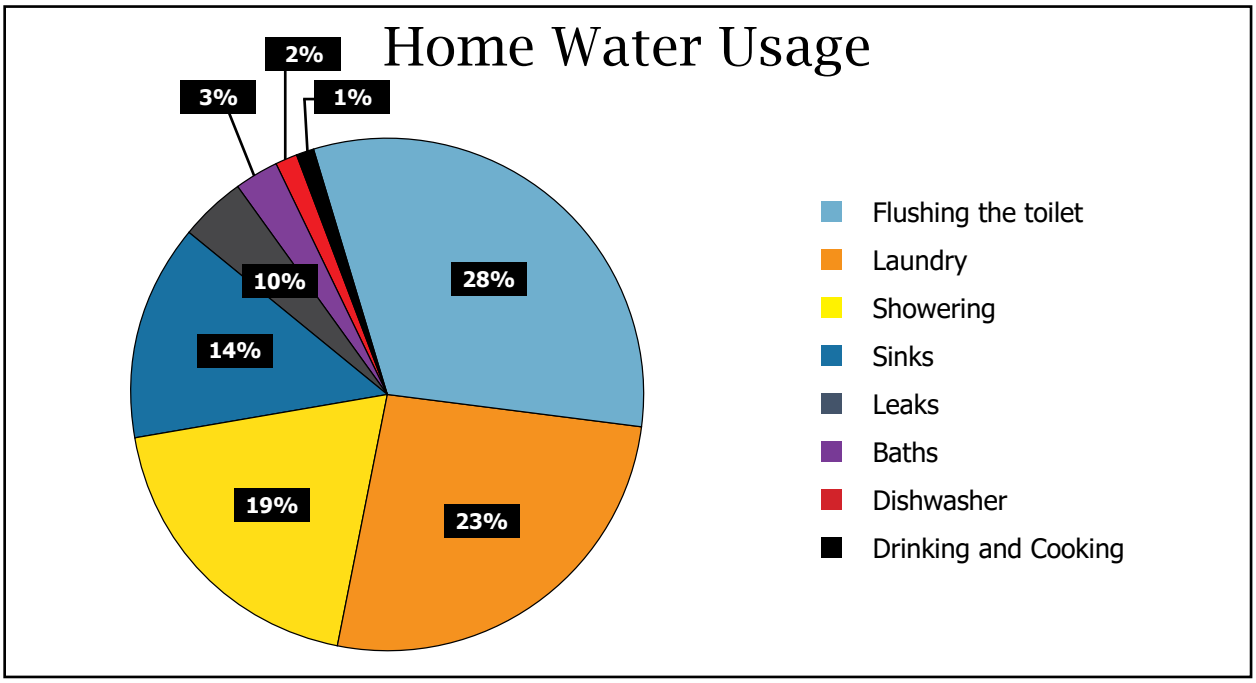
Introduction

Fresh water is one of the most important resources in Canada. The North American Great Lakes represent the largest source of surface freshwater in the world however, they face a number of threats including invasive species, pollution and overconsumption.

Residential water use in Canada is almost the highest in the world, second only to the United States. Canadians use approximately 300 L of water in the home each day, not including water used for the production of goods and services. **Figure 1** illustrates the breakdown of daily residential water use in the average Canadian home.

By completing a water audit and investigating water use in the school, students and staff will have the information necessary to develop an action plan to reduce water consumption in the school. Blue Schools provides the framework and resources to support the water conservation initiatives and strategies in participating schools.

Figure 1: Daily residential water use breakdown.
Modified from Environment and Climate Change Canada.



How to Become a Blue School

The Blue Schools program is divided into 5 consecutive activities that culminate with the implementation of water conservation strategies in the school, the local community and beyond.

Activities

1. Home Water Audit
2. School Water Audit
3. Calculating School Water Use
4. Action Plan Development
5. Action Plan Implementation & Certification

A Blue School is a school committed to protecting our aquatic ecosystems. It is a school that has completed all 5 program activities, is actively implementing water conservation strategies and can demonstrate a reduction in school water use as a result.

View page 3 for more information about Blue Schools Certification

Assessment & Evaluation

Assessment and evaluation of student learning and performance throughout the Blue Schools program is at the individual teacher's discretion. To assist with student assessment and evaluation, specific links to Ontario Curriculum expectations and the categories of knowledge and skills identified in the achievement chart (Growing Success, 2010) are indicated at the beginning of each activity, and in Appendix 1.

Certification

Schools are encouraged to participate in the Blue Schools program annually to progress through the four levels of certification. Recognizing that water conservation initiatives will vary from school to school, certification is based on types of actions implemented.

Level 1
School Level Actions

1. Complete Activities 1-5
2. Implement actions within the school property

Examples may include:
- Awareness campaign
- Install and use rain barrels at the school
- Build or plant a rain garden on school property

Level 2
Community Level Actions

1. Complete Activities 2-3 to measure success of actions implemented in Level 1
2. Identify new actions to add to the action plan developed in Level 1
3. Implement actions at the community level

Examples may include:
- Shoreline garbage clean-up
- Attend a tree planting event
- Communicate Level 1 success at a community event

Level 3
Community to Community Actions

1. Complete Activities 2-3 to measure success of actions implemented in Level 1 & 2
2. Identify new actions to add to the action plan developed in Level 1 & 2
3. Implement actions at the community to community level
4. Maintain actions implemented in Levels 1 & 2

Examples may include:
- Host a fundraiser for a water local conservation group
- Initiate a social media campaign for water conservation
- Host a water-audit workshop for another school

Level 4
National Level Actions

1. Complete Activities 2-3 to measure success of actions implemented in Level 1, 2 & 3
2. Identify new actions to add to the action plan developed in Level 1, 2 & 3
3. Implement actions at the national level
4. Maintain actions implemented in Levels 1, 2 & 3

Examples may include:
- Host a fundraiser for a national water conservation group
- Get involved with an international water charity group

Communicate with Blue Schools program staff for assistance with Action Plan implementation at any level.

Timeline

Blue Schools is a long-term, 8-month program. Suggested timing is September to May.

Sept.- Oct.

- ☐ Establish support (admin, support staff)
- ☐ Make a plan for the academic year
- ☐ Toronto Zoo staff kick-off visit.
- ☐ Activity 1 - Home Water Audit

Nov. - Dec.

- ☐ Activity 2 - Water Audit & Baseline Data Collection
- ☐ Activity 3 - Calculate School Water Use & analyze results
- ☐ Toronto Zoo staff visit

January

- ☐ Activity 4 - Prepare Action Plan to reduce water consumption and protect aquatic ecosystems.

Feb. - May

- ☐ Activity 5 - Implement Action Plan

June

- ☐ Toronto Zoo staff visit for Certification

Following Year

- ☐ Repeat Activities 2 & 3 following the same timeline.
- ☐ Repeat Activity 4 and revise to include new actions.
- ☐ Implement new actions to achieve next certification level

Materials

Blue Schools Water Auditing Kit

Participating schools will receive a Blue Schools water auditing kit (Image 1) including:

- Stopwatch
- Cllipboard
- Graduated bucket

Blank data collection templates are included as needed following each activity.

Additional Materials may include:

- Calculator
- Camera
- Graph paper
- Ruler

Image 1 Blue Schools water auditing kit.

Activity 1

To kick-off the Blue Schools program, this two-day lesson begins with an in-person introduction to the program by Toronto Zoo program staff. This introduction provides context for the Blue Schools program by emphasizing the importance of the Great Lakes ecosystem and our role within it. Students will complete a basic home water audit to begin to understand their personal water use and become familiar with the water audit process. An optional excercise on day three provides an opportunity to practice math skills such as charting and graphing.

Activity 1: Home Water Audit

Learning Goals

- Discover the source of the water you use at home and at school.
- Understand how (and how much) water is used in your home.
- Recognize that your daily water-use practices can affect our Great Lakes ecosystem in different ways.

Success Criteria

- Determine the source of water used in your home and at school through research.
- Complete the 'Snaphot! Home Water Use' questionnaire and calculate the average volume of water used in your home in a typical week.
- Identify 3 ways your daily water-use practices affect our Great Lakes.

Time Required

2 class periods over 2 days and take home questionnaire

Plus

Optional day 3 extension activity

Curriculum Connections

Subject	Grade 6	Grade 7	Grade 8
	Strand		
Science and Technology	Biodiversity	Interactions in the Environment	Water Systems
Mathematics	Number Sense and Numeration Measurement	Measurement	Measurement

See Appendix 1, page 66 for specific expectations.

Day One: Introduction and Take-Home Activity

Time
1 class period.

Materials
Appendix 1 'Snapshot! Home Water Use' questionnaire - 1 per student.

Lesson

1 Inform students of class and/or school involvement in Toronto Zoo's Blue Schools program. Explain the Blue Schools program main stages and end goal of becoming a certified Blue School.

Blue Schools stages

- Introduction and personal water-use
- Conduct a school-wide water audit
- Develop an action plan to reduce water consumption in the school
- Implement the action plan
- Certification

2 Schedule a visit from Toronto Zoo's Great Lakes/Blue Schools program staff to introduce the Great Lakes ecosystem and kick-off the Blue Schools program.

3 Take Home Activity
Following the introduction by Toronto Zoo program staff, distribute take-home questionnaire, 'Snaphot! Home Water Use' (Appendix X) for students to complete.

To schedule a visit from Great Lakes/Blue Schools program staff:
E-mail : greatlakes@torontozoo.ca
Tel: 416.392.6022

Optional

4 Digital/online water calculators
There are different types of online water-calculators for determining water-use in the home. Students may wish to explore the following examples for comparison:
https://water.usgs.gov/edu/activity-percapita.html
http://www.home-water-works.org/calculator

Day Two: Calculate Weekly Water-Use in Your Home

Time

1 class period.

Materials

1 per student of the following materials:

- Completed 'Snapshot! Home Water Use' student questionnaires
- Appendix 2 'Home Water Use Calculation' worksheet
- Scrap or slips of paper

Lesson

1 Instruct students to calculate their weekly home water-use using the values from the completed 'Snapshot! Home Water Use' questionnaires and following the steps outlined in Appendix X – 'Home Water Use Calculation'. This may be a group/class activity for younger students, or independent work for older students.

2 Ask each student to write their total weekly water use on a slip of paper (for anonymity).

3 Select one or two students to collect the slips and write each value on the board.

4. Calculate!

Ask students to calculate the total and class average weekly water use:

Sum of all weekly total values (entire class)

Number of weekly total values

= _____ Class average water use/week

Day Three – *Optional* Extension Activity

Time
1 class period.

Materials
1 per student of the following materials:

- Completed 'Snapshot! Home Water Use' student questionnaires
- Graph paper
- Scrap paper
- And 4 Slips of paper per student

Lesson
1 Distribute 4 slips of paper to each student

2 Instruct each student to label each slip of paper, 1 per category - Toilet, Shower/Bath, Dishwasher, Laundry

3 Ask students to write their value for volume of water used per week on the slips of paper for each corresponding category.

4 Ask one student to make a chart on the board with 4 columns, one for each category. At the same time, ask another student to collect the slips of paper

6 Ask 4 different students to fill in the chart on the board using the values on the slips of paper

7 Instruct the class to add each column and write the totals at the bottom of each column

9 Add a row below the total and instruct the class to calculate the average volume of water used per category and write it in the row below the total

10 Using the average weekly volume of water used per category, instruct students to create a chart or bar graph to illustrate the results

11 In groups, students could brainstorm why some categories are higher than others and develop ideas to reduce weekly water use in the home in these categories

Worksheet: Home Water Use

Name:_____

Home Water Use

Fill in this questionnaire to explore how much water is used in your home each day. This is a quick exercise to estimate home water-use so approximate numbers are ok.

Tip:

Find the volume of water your toilet uses per flush by checking...

Occupancy

Number of people in your home

Toilets

Volume of water used per flush (if available)

_____

L/flush or Ga/flush

Shower/Bath

How many showers happen in your home on a typical day?

How many baths happen in your home on a typical day?

Is your shower head low-flow?

YES/ NO

Kitchen/Laundry

Is there a dishwasher in your home?

YES/ NO

If Yes, how many loads of dishes are washed each day?

If No, how many times are dishes washed each day?

Is there a washing machine in your home?

YES/ NO

If Yes, how many loads of laundry are washed each week?

Name:_____

Worksheet: Weekly Home WAter Use Calculation

Weekly Home Water Use Calculation

Using the values from your 'Snapshot! Home Water Use' questionnaire and the values from Table 1, follow the steps below to calculate the approximate volume of water used in your home each week.

Table 1: Average Volume of Water Used in the Home

NOTE: Averages are highly variable!

Appliance/Item	Average Volume of Water per Use	Average Number of Uses
Toilet – standard	13.6 L/flush	5 times/day/person
Toilet – low flush	6 L/flush	5 times/day/person
Shower – standard	15 L/minute	8 minutes/shower/person
Shower – low flow	7.6 L/minute	8 minutes/shower/person
Bath - standard	130 L/bath	-
Dishwasher - standard	45 L/load	2 loads/week
Washing Machine - standard	150 L/load	2 loads/week

Assumptions

This exercise assumes that all occupants are home each day of the week and that the Average Number of Uses listed in Table 1 are accurate.

Toilets

Calculate the weekly volume of water used by flushing the toilet in your home.
*To convert gallons to litres, multiply by 3.79

1. Volume of water used per flush
   X Average number of flushes/day
   Volume of water used/person/day

   x_____
   L/Person/Day

2. Volume of water used/person/day
   X Number of people in your home
   Volume of water used per day.

   x_____
   L/Day

3. Volume of water used per day
   X Number of days in a week.
   Volume of water used per week

   x_____
   L/Week

Weekly Home Water Use Calculation

Shower/Bath

Select either shower OR bath

1. Average volume of water per use (standard OR low flow)
   X Average number of uses per person (table 1)
   = Volume of water used per person per shower or bath
   x_____ L/Person/Shower

2. Volume of water per person per shower
   X Number of people in your home
   = Volume of water used per day
   x_____ L/Day

3. Volume of water used per day
   X Number of days in a week.
   = Volume of water used per week
   x_____ L/Week

Kitchen/Laundry

If you answered No on questionnaire, use standards from Table 1

1. Average volume of water per use
   X Average number of uses per day
   = Volume of water used per day
   x_____ L/Day

2. Volume of water used per day
   X Number of days in a week.
   = Volume of water used per week
   x_____ L/Week

1. Average volume of water per use
   X Average number of uses per day
   = Volume of water used per day
   x_____ L/Day

2. Volume of water used per day
   X Number of days in a week.
   = Volume of water used per week
   x_____ L/Week

Weekly Water Use (Approximate)

Add volume of water used per week (L/week) for Toilets, Shower/Bath, Dishwasher & Laundry:

_____ + _____ + _____ + _____= x_____ L/Week

Activity 2

The first step in conducting a water audit is to collect baseline data. This establishes the water-use **benchmark** which will be used to demonstrate improvements in water-use practices later on. In this lesson students make their way through the school speaking with custodians, administration and other teachers collecting basic school information integral to the water auditing process. Data collected in this lesson will be used to calculate the approximate volume of water used by the school each day in Lesson 3.

Activity 2: School Water Audit

Learning Goals

- Plan and conduct an investigation into water-use in the school.
- Understand how (and how much) water is used in your school.

Success Criteria

- Investigate water-use in the school building and on school grounds by speaking with school staff and visiting different areas of the school
- Collect and record baseline school water-use data
- Determine volume of water used in different areas of the school

Time Required

Approximate

2 class periods over 2 days

Curriculum Connections

Subject	Grade 6	Grade 7	Grade 8
	Strand		
Science and Technology	Biodiversity	Interactions in the Environment	Systems in Action Water Systems
Mathematics	Data Management and Probability	Measurement Data Management and Probability	Measurement

See Appendix 1, page 66 for specific expectations.

Day One: Brainstorming Water Use in School

Time
1 class period.

Before you begin:

Notify school administration, other teachers and support staff that students will be in the halls during class time and approaching staff to ask questions about water-use in the school as part of the Blue Schools certification process.

Lesson

1 Inform students that this is the first step in the water audit process. The information/data collected in this lesson/ activity determines the rest of the process and will be used to develop the water conservation action plan.

2 Brainstorm as a class all the ways water is used in the school – write all the ideas on the board or chart paper.

3 Brainstorm with the class how to find out how much water is used for each of the ideas. Post answers from 2 and 3 for reference during day 2.

Day Two: Baseline Data Collection

Time
1 class period.

Materials
Baseline Data Collection Sheets 1-10 - 1 per group
Clipboard - 1 per group
Pencils - 1 per student
Stopwatches - 5-6
Measuring cup (500mL min) - 2
Bucket(graduated) - 1

Lesson

1 Divide students into groups of 2-4 students depending on class size.

2 Assign a different area of water use to each group. (May need to assign more than one water-use area to some groups depending on class size.)

3 Ensure that students know where/how to find the information they need to complete their data collection sheet. Refer to brainstorm list from day 1.

4 Release students to collect data and complete their area-specific data sheets.

5 Once all the data sheets have been completed, re-group as a class to complete the Master Data Sheet.

6 Ask a representative from each group to write the name of their water-use area and their final volume or flow rate (from the blue box on the data collection sheet) on the board.

7 Enter these final volumes and flow rates into the Master Data Sheet. Keep this sheet for use in Lesson 3.

8 Debrief with students to discuss the data collection process as a class, including any challenges or difficulties encountered while searching for water-use information in the school.

Activity 2

Day Three: Optional Water Bill/Water Meter Comparison

Time

1 class period.

Materials

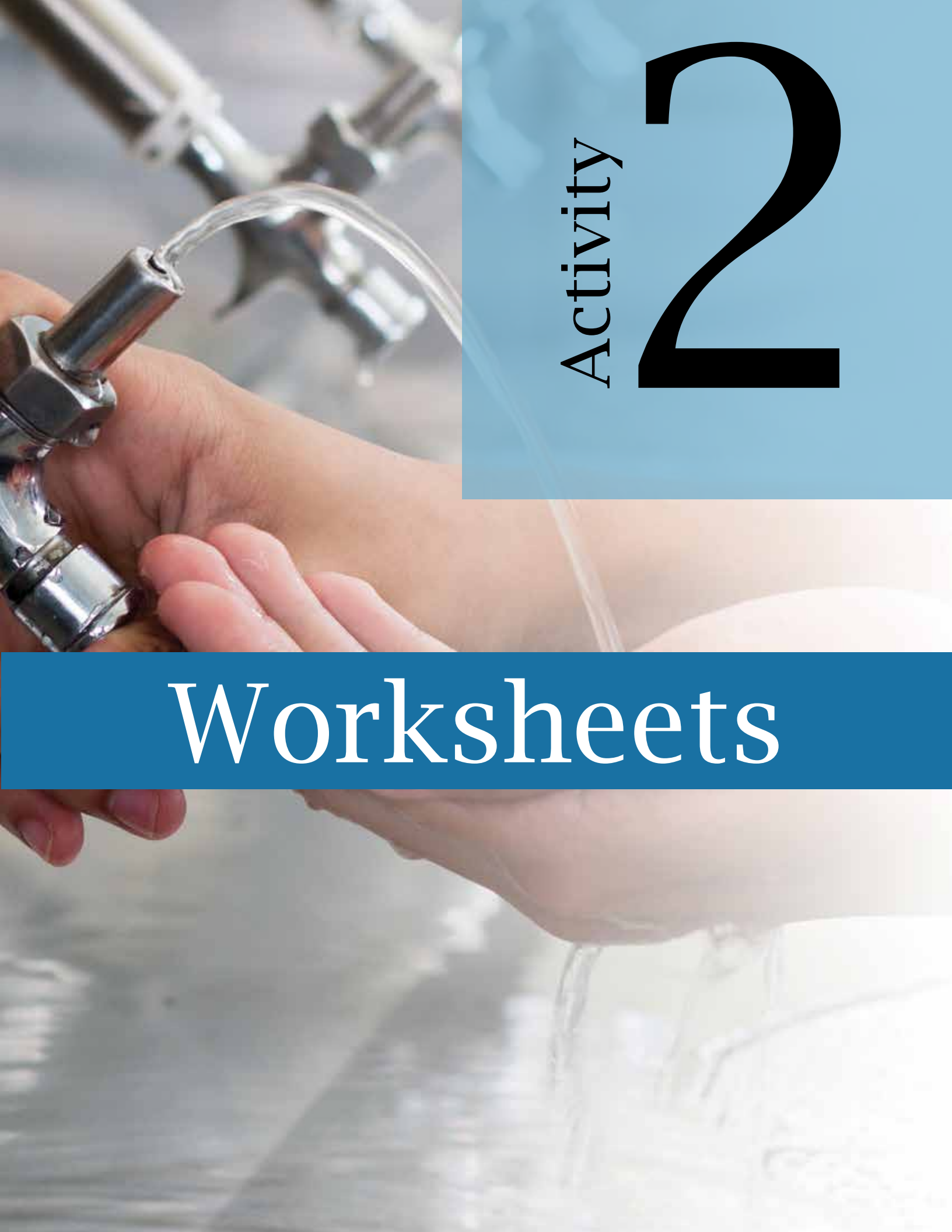
- School water bill or water meter data
- Pencils
- Rulers
- Graph paper

Lesson

1 Obtain water bill or water meter readings from school Administration or Custodians – may have to inquire with school board.

2 Using this data students prepare graphs to illustrate school water use throughout the school year.

3 Using this data students calculate the average monthly water use in the school and compare with the baseline data they collected on Day One.



Activity 2

Worksheets

Name:_____

Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

School basics

Number of students in the school	
Number of teachers in the school	
Number of staff in the school (administration and support staff)	
Total number of people in the school	
Number of females in the school (students + teachers + staff)	
Number of males in the school (students + teachers + staff)	
Number of days the school is used each year	

Name:_____

Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Toilets

Volume of water used by toilets per flush Toilet type 1	L/flush
Volume of water used by toilets per flush Toilet type 2	L/flush
Volume of water used by toilets per flush Toilet type 3	L/flush
Volume of water used by toilets per flush Toilet type 4	L/flush
Volume of water used by toilets per flush Toilet type 5	L/flush
Average volume of water used by toilets per flush	L/flush

TIP: Volume of Water used Per flush can be found inside the toilet tank (remove lid) or Printed on the toilet bowl behind the toilet seat.

Tank

Bowl

See reverse for more instructions.

Baseline Data Collection

Toilets - continued

If the volume of water per flush is not printed anywhere on the toilet,

follow these steps to calculate volume of water used per flush.

1. Get a stopwatch
2. In pairs, one person hold the stopwatch, the other will flush the toilet
3. Press START on the stopwatch when the flush handle is down
4. Press STOP on the stopwatch when the water in the toilet is at its lowest point
5. Record time in seconds in the table below. In general: 1 second of flush = 1 litre of water
6. REPEAT steps 1-5 two more times and record the results in the table below
7. Add the total for the Time and Volume columns
8. Calculate the average of your three tests to find the average volume of water (litres) used per flush

Flush number	Time (seconds)	Volume (litres)
Flush #1	s	L
Flush #2	s	L
Flush #3	s	L
Total		

Average volume of water used per toilet per flush:

_____	/	3	=	_____
Total volume (L)		Number of flushes		L/flush

Name:_____

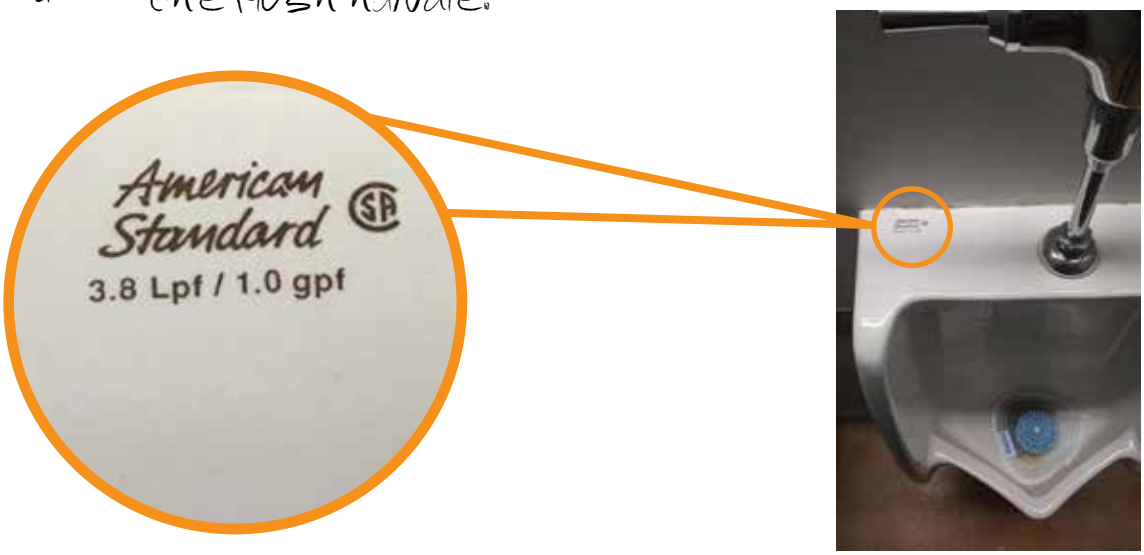
Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Urinals

Volume of water used by urinals per flush Urinal type 1	L/flush
Volume of water used by urinals per flush Urinal type 2	L/flush
Volume of water used by urinals per flush Urinal type 3	L/flush
Average volume of water used per flush	L/flush
Are urinals sensor or timer activated?	L/flush
If timer activated, how often do they flush?	L/flush

TIP: Volume of water used per flush may be found near the flush handle.



See reverse for more instructions.

Baseline Data Collection

Urinals - continued

If the volume of water per flush is not printed anywhere on the urinal,

follow these steps to calculate volume of water used per flush.

1. Get a stopwatch
2. In pairs, one person hold the stopwatch, the other will flush the urinal.
3. Press START on the stopwatch when the flush handle is down
4. Press STOP on the stopwatch when the water stops flowing from the top.
5. Record time in seconds in the table below. In general: 1 second of flush = 1 litre of water
6. REPEAT steps 1-5 two more times and record the results in the table below
7. Add the total for the Time and Volume columns
8. Calculate the average of your three tests to find the average volume of water (litres) used per flush

Flush number	Time (seconds)	Volume (litres)
Flush #1	s	L
Flush #2	s	L
Flush #3	s	L
Total		

Average volume of water used per urinal per flush:

_____	/	3	=	_____
Total volume (L)		Number of flushes		L/flush

Name:_____

Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Faucets

Flow rate of the student washroom faucets	L/sec
Flow rate of the staff washroom faucets	L/sec
Flow rate the science room faucets	L/sec
Flow rate of other faucets 1	L/sec
Flow rate of other faucets 2	L/sec
Flow rate of other faucets 3	L/sec
Total flow rate of other faucets (1+2+3)	L/sec

Supplies

To calculate volume of water used by faucets you will need:

- Measuring cup (minimum 500 mL)
- Stopwatch
- Extra paper
- Pencil

Procedure

1. Select a faucet type from the table above, and turn faucet 90° (or ¼ turn)
2. **At the same time,** place measuring cup under the water and press START on the stopwatch.
3. Press 'STOP' on timer when water reaches top fill line (ex: 500 mL)
4. Record time in the table on the next page next to 'Trial #1'.
5. Repeat steps 1-4 twice more for a total of **three** time values to complete the table
6. Calculate the average of your three trials to find the average time it takes to fill the measuring cup.

See reverse for more instructions.

Baseline Data Collection

Faucets - continued

Trial Number	Time student WR faucet	Time staff WR faucet	Time science rm faucet	Time other faucet 1	Time other faucet 2
Trial #1	s				
Trial #2	s				
Trial #3	s				
Total					

Calculate average time to fill measuring cup:

	/	3	=	sec
Total time (s)		Number of trials		

7. Calculate the faucet flow rate by dividing the volume of the measuring cup by the average time recorded in step 6.

EXAMPLE using a 500mL measuring cup:

Volume of measuring cup	500 mL
Average time to fill measuring cup	÷ 7.3 seconds
Faucet flow rate	= 68 mL/sec

Calculate faucet flow rate

	/	sec	=	mL/sec
Volume of measuring cup		Avg. time to fill measuring cup		

Convert to L/sec

	/	1000	=	L/sec
flow rate mL/sec		mL		

8. Record faucet flow rate in L/sec in the table on the previous page next to the corresponding faucet type.
9. Repeat steps 1-8 for each different faucet type in the school

Name:_____

Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Drinking fountains

Flow rate of drinking fountains	mL/sec
Volume of water used by water bottle refill stations each day	L/day

Supplies

To calculate volume of water used by faucets you will need:

- Measuring cup (minimum 500 mL)
- Stopwatch
- Pencil

Procedure

1. Turn the fountain knob all the way open.
2. **At the same time,** place measuring cup under the water AND press START on the stopwatch.
3. Press 'STOP' on timer when water reaches top fill line (ex: 500 mL)
4. Record time on the table below.
5. Repeat steps 1-4 two more times for a total of three time values to complete the table.

Trial Number	Time (seconds)	Volume (litres)
Trial #1	s	mL
Trial #2	s	mL
Trial #3	s	mL
Total	s	mL

See reverse for further instructions.

Activity 2

Baseline Data Collection

Drinking fountains - continued

Procedure - continued

6. Calculate the average time to fill the measuring cup

Average time

_____	/	3	=	sec
Total time (s)		Number of trials		

7. Calculate the flow rate by dividing the volume of the measuring cup by the average time recorded in step 6.

EXAMPLE using a 500mL measuring cup:

Volume of measuring cup		500 mL
Average time to fill measuring cup	÷	7.3 seconds
Faucet flow rate	=	68 mL/sec

Calculate faucet flow rate

_____	/	sec	=	mL/sec
Volume of measuring cup		Avg. time to fill measuring cup		

Convert to L/sec

_____	/	1000	=	L/sec
flow rate mL/sec		mL		

8. Record drinking fountain flow rate in L/sec in the table on the previous page.

Baseline Data Collection

Water bottle refill stations

Procedure

1. Record volume of water or 'number of water bottles saved' from station display (if available) first thing in the morning
2. Record the value again at the end of the day
3. Repeat this process for 5 days.
4. Calculate the difference between the morning and afternoon values for each day, then calculate the average to find the average volume of water used by refill stations daily.

_____	+	_____	+	_____	+	_____	+	_____	=	_____
Day 1		Day 2		Day 3		Day 4		Day 5		Total

_____	/	5	=	L/day
Volume used in week 1		Days		Avg. volume used each day

If refill station display shows 'water bottles saved', multiply difference between #1 and #2 for each days by 500mL (average water bottle volume). The result is volume of water used by refill stations.

Name:_____

Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Floor cleaning

Are the floors cleaned with a mop and bucket or with a floor cleaner?	
Volume of water used each time floors are cleaned	L/use
How often are the floors cleaned each day?	

Procedure

1. Speak to the custodian to find out how the floors are cleaned (floor cleaning machine or mop and bucket) and how often
2. Find out how much water is used in the floor cleaning machine and/or the bucket each time

Image 2 Floor cleaning machine.

Image 3 Floor cleaning machine

Image 4 Mop bucket

Name:_____

Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Dishwashers

Number of Dishwashers in the school	
Volume of water used by dishwashers per cycle	
How often are the dishwashers used each day?	

Procedure

1. Open dishwasher door and locate product sticker (Image 5).
2. Record the Model Number
3. Look up the Model Number on the internet
4. Find the user manual for your dishwasher model
5. Look in the manual for water use information

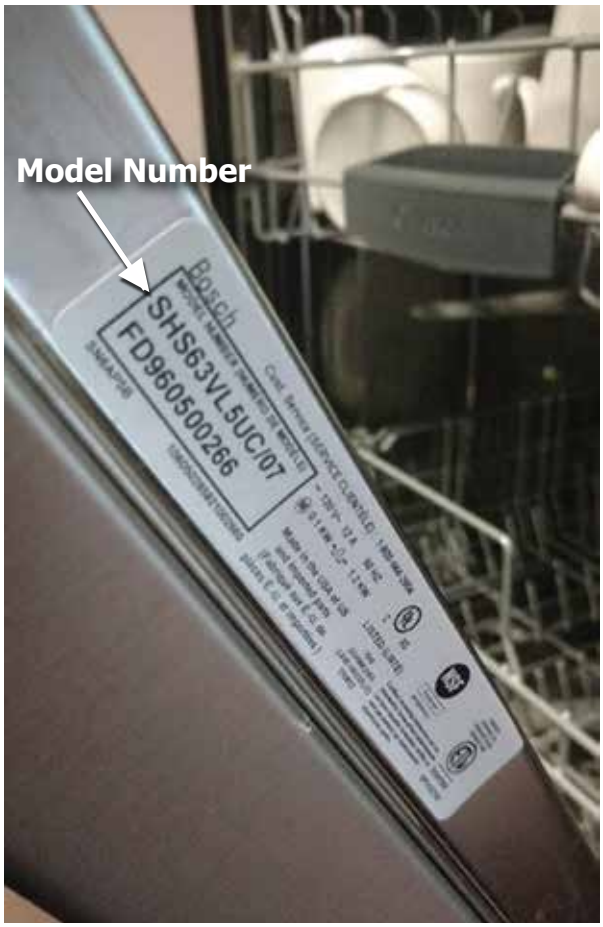


Image 5 Dishwasher product sticker

Activity 2

Name:_____

Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Washing Machines

Number of washing machines in the school	
Volume of water used by washing machines per use	
How often are the washing machines used each day?	

Procedure

1. Open washing machine door and locate product sticker (Image 6)
2. Record the Model Number (Image 7)
3. Look up the Model Number on the internet
4. Find the user manual for your washing machine model
5. Look in the manual for water use information

NOTE: If you are unable to locate water-use information, use the standard 60 L/use

Image 7 Washing machine model number

Image 6 Washing machine product sticker

Name:_____

Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Showers

Are there showers in the school?	
Flow rate of showers	L/sec
How often are showers used each day?	

Supplies

To calculate volume of water used by showers you will need:

- Graduated bucket
- Stopwatch
- Baseline Data Collection - Showers sheet

Procedure

1. One person turn shower faucet 90o (or ¼ turn) to start water, while holding the bucket.
2. Place bucket under the water AND another person press 'START' on the stopwatch at the same time.
3. Press 'STOP' on timer after 15 seconds AND turn water off at the same time.
4. Record volume in table on the next page.
5. Repeat steps 1-4 two more times for a total of three volume values.
6. Calculate the average volume using the table and equation on the next page.

See reverse for further instructions.

Baseline Data Collection

Showers - continued

Procedure - continued

Trial Number	Time (seconds)	Volume (litres)
Trial #1	**15s**	L
Trial #2	**15s**	L
Trial #3	**15s**	L
Total	**45s**	L

6. Calculate the average volume

Average time

_____	/	3	=	L
Total volume		Number of trials		

7. Calculate the flow rate by dividing the volume of the measuring cup by the average time recorded in step 6.

EXAMPLE using a 500mL measuring cup:

Volume of measuring cup		500 mL
Average time to fill measuring cup	÷	7.3 seconds
Faucet flow rate	=	68 mL/sec

Calculate faucet flow rate

_____	/	15 sec	=	L/sec
Avg. volume collected (L)		Time per trial		

8. Record faucet flow rate in the table on page 1
9. Repeat steps 1-8 for each different shower faucet type in the school

Name:_____

Baseline Data Collection

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Irrigation and School Grounds

Is there an irrigation or sprinkler system used on the school grounds?	
If yes, what is the volume of water used each time?	
How often is the irrigation system used per day?	

Activity 3

In Activity 3 students use the results from their data collection in Activity 2 to calculate the approximate volume of water used in the school each day and each year. This two-part activity offers flexibility for schools with less access to water-use information. Alternatively, both parts of the activity may be completed as an extension activity to compare between water-use results based on standardized water-use data and water-use results based on student calculations in Activity 2. The results of Activity 3 will be used to identify water conservation opportunities in the school and the development of the Action Plan in Activity 4.

Activity 3: Data Entry and Other Water-Uses

Learning Goals

- Consolidate and organize data.
- Investigate other water-uses in the school.

Success Criteria

- Investigate water-use in the school building and on school grounds by speaking with school staff and visiting different areas of the school.
- Collect and record data on stormwater runoff from school property and other areas of water use in the school.
- Calculate volume of water used in the school on a daily and annual basis.

Time Required

Approximate

2 class periods over 2 days

Curriculum Connections

Subject	Grade 6	Grade 7	Grade 8
	Strand		
Science and Technology	Biodiversity (1.1)	Pure Substances and Mixtures	Systems in Action Water Systems
Mathematics	Data Management and Probability	Measurement Data Management and Probability	Data Management and Probability

See Appendix 1, page 66 for specific expectations.

Day One: Calculate Daily and Annual School Water Use

Time

1 class period.

Materials

- Baseline Data Master Data Sheet - completed (Activity 2)
- Daily and Annual Water Use Calculation - Excel spreadsheet

Lesson

1 Set-up a computer/projector so the entire class can see and participate in the data entry process.

2 Open the 'Daily and Annual Water-Use Calculation' Excel spreadsheet.

3 Begin filling in the 'Value' column, highlighted yellow, of the 'Master Data Table'. Start with 'School Basics'.

4 Start filling in the 'Value' column, highlighted yellow, for each Area of Water-Use in the School. These values were calculated in Lesson 2 and compiled into the 'Baseline Data Master Data Sheet'.

5 As you fill in the 'Value' column, water-use per area in the school will be automatically calculated in the 'Water-Use Breakdown' table below.

6 Once the Master Data Table has been filled in, total daily and annual school water use will appear at the bottom of the 'Water-Use Breakdown' table, highlighted blue and green respectively.

NOTE:
Values in the 'Frequency (Daily)' column, highlighted orange, have been included based on standard values for each water use area. Modify these frequency values where possible to match water use patterns at your school for a more accurate calculation of daily and annual water use.

NOTE for 'Showers':
The formula to estimate water-use of showers assumes that ¼ of the student population uses the showers once per day. This is noted in the formula bar as '(B7/4)' where 'B7' is the total student population at the school. Modify this formula as necessary.

NOTE for Standard Water-Use Values
table: Values in this table may be substituted for values in the 'Master Data Table' where data is missing or unavailable.

Activity 3

Day Two: Calculate Volume of Other Water-Use Areas

Time

1 class period.

Materials

- Clipboards
- Data Collection sheets (1 per group) - 'Impervious Surfaces')
- Pencils
- Calculator
- Measuring tape and/or measuring wheel
- Computer Access

Activity

So far students have investigated the common ways water is used in the school, but what are other areas in the school that use water and should be included in the investigation?

1 Ask students to brainstorm as a class other areas of water-use in the school that have not yet been examined. Write their ideas on the board.

2 Once a list is compiled, break students into groups and assign an area from the list to each group.

3 Ask students to brainstorm the impacts (positive and negative) of water-use in their assigned area.

4 Take up the brainstorming results as a group

Heating and cooling systems, swimming **pools** and **stormwater runoff** are just a few of the other ways schools use and interact with water on a regular basis. These three areas will be investigated in this lesson and if possible, include any additional areas of water used identified in step 1.

Enter data collected in this lesson into the Master Data Sheet in the 'Other Water Uses' tab.

Day Two Continued: Stormwater Runoff

1. Meaure Area of Impervious Surfaces

Divide students into groups to measure area of:

a. School building footprint (to determine roof area)
b. Parking lot footprint
c. Outdoor running track footprint
d. Outdoor basketball court footprint
e. Footprint of any additional permanent structures or paved areas on school property

Distribute corresponding data collection sheets to each group.

> Note: Assign one group to collect data on swimming pool water-use during this section if applicable to your school. See 'Swimming Pool' section for details.

2. Data Collection

Students may wish to use any one of the following methods to measure area for items 1a-e, or use a combination of methods and then compare the accuracy of the results between methods used. Students record surface details and area on data collection sheets provided.

a. Google Maps (or other mapping software)
Using 'Create a Map' in the 'My Maps' section of Google Maps, students can zoom in on the school property using the Satellite map view. Then using the 'Draw a line' or 'Measure distances and areas' tools students can trace buildings and surfaces to determine the area.

b. School Schematics
Students may speak to school custodians to obtain area values from school schematics.

c. Manual Measurement
Students physically measure the perimeter of school buildings and surfaces using measuring tapes or measuring wheels.

Add the values from each group to get the total area of impervious surface on school property.

> NOTE: The area values can also be entered into the corresponding lines in the Other Water Uses tab of the Master Data Sheet. The Total Impervious Surface Area will be automatically calculated.

Day Two Continued: Stormwater Runoff

3. Calculate Runoff

a. Conduct an online search to determine the average annual rainfall for your area. Possible websites include:
I. Weather Network
II. Environment Canada
b. Enter hte value from a into the Average Annual Rainfall line in the Other Water Uses tab of hte Master Data Sheet
c. Annual runoff from impervious surfaces will be automatically calculated (gallons and litres).

4. Calculate Total Annual School Water Use

a. Add volume of runoff from school property calculated in 3c. to 'Total Annual School Water Usage' calculated in Activity 2.

Swimming Pools (If applicable to your school)

Note: During the Stormwater Runoff data ccollection process, one group should be assigned to collect swimming pool data if applicable to your school.

Ontario Regulation 565, Health Protection and Promotion Act R.R.O. 1990 outlines guidelines for water turnover in public pools as necessary to maintain health and safety standards and good water quality for swimmers.

Some important regulations include:
- Water must be topped up with make-up water by a minimum of 20L per bather per operating day.
- 15% of the total pool water-volume must be capable of being withdrawn from the gutter or skimmer lines daily and discharged to waste

To determine how much water your pool uses on average each day and annually to meet these criteria, students will need to collect data on:
- Number of days the pool is in operation each year
- Average number of bathers per day of operation
- Total pool volume
- Volume of waste discharged from the pool each day*

*If it is not possible to determine the exact daily volume of water discharged as waste from the pool, assume the minimum 15% of total pool volume is discharged each day.

Instructions

Using the "Data Collection – Swimming Pools" data sheet, one group of students can collect data on swimming pool water use as part of the Stormwater Runoff data collection process, or complete swimming pool data as a class.

Activity 3

Worksheets

Names:_____

Data Collection: Impervious Surfaces

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

School Building (Roof)

Measurement method (circle one)

- Online or map software
- School schematics
- Manual measurement

Area (m2) School Building: _____

Area = Length x Width

Names:_____

Data Collection: Impervious Surfaces

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Parking Lot

Measurement method (circle one)

- Online or map software
- School schematics
- Manual measurement

Area (m2) Parking Lot: _____

Area = Length x Width

Names:_____

Data Collection: Impervious Surfaces

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Outdoor Running Track

Measurement method (circle one)

- Online or map software
- School schematics
- Manual measurement

Area (m2) Outdoor Running Track: _____

Area = Length x Width

Names:_____

Data Collection: Impervious Surfaces

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Outdoor Basketball Court

Measurement method (circle one)

- Online or map software
- School schematics
- Manual measurement

Area (m2) Outdoor Basketball Court: _____

Area = Length x Width

Names:_____

Data Collection: Impervious Surfaces

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Outdoor Tennis Court

Measurement method (circle one)

- Online or map software
- School schematics
- Manual measurement

Area (m2) Outdoor Tennis Court: _____

Area = Length x Width

Names:_____

Data Collection: Impervious Surfaces

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Other Surface/Structure

Measurement method (circle one)

- Online or map software
- School schematics
- Manual measurement

Area (m2) Other Surface/Structure: _____

Area = Length x Width

Activity 3

Names:_____

Data Collection: Swimming Pool

If applicable to your school

BEFORE COLLECTING DATA: Get permission from your teacher before exploring the school to collect data and always knock before entering a classroom, office or washroom.

Total swimming pool volume Multiply gallons by 3.79 to find volume in litres	L
Volume discharged daily to waste	L/day

If unable to obtain volume of water discharged use equation below:

_____ L (Volume of measuring cup) x _____ 0.15 (Avg. time to fill measuring cup) = _____ L/day

Number of days the pool is in operation (annually)	days

Number of swimmers per day of operation (average)

_____ (Sum of daily swimmers) / _____ (Number of days in operation) = _____ ppl/day

Volume of make-up water used per day of operation

_____ (Avg. number of swimmers/day) / _____ (Litres of make-up water/person) = _____ L/day

Total volume of water used daily

_____ (Vol. of discharge water) + _____ (Volume of make-up water (daily)) = _____ L/day

Total volume of water used annually

_____ (Total volume of water used daily) + _____ (Number of days of operation) = _____ L/year

Activity 4

In Activity 4 students use the results from their calculations of daily and annual water-use in the school from Activity 3 to identify areas to develop water conservation actions. Specific water conservation goals and actions will be identified in Activity 4 in addition to timelines for completion and individuals responsible for carrying out the actions. Examples of action items for each level of certification are listed on page 58 and new ideas are always encouraged!

Activity 4: Action Plan Development

Learning Goals

- Create a plan of action outlining how to contribute to more sustainable natural resource use (Gr. 7 Geog).
- Describe possible features of a sustainable building or community (Gr. 8 Geog).
- Propose actions that can be taken to protect biodiversity (Gr. 6 Biodiversity).
- Analyze costs and benefits of strategies for protecting the environment (Gr. 7 Interactions in the Environment).
- Propose a plan to address water sustainability issues (Gr. 8 Water Systems).

Success Criteria

- Identify areas in the school to target water conservation strategies.
- Prepare a detailed action plan to reduce water use in 3-5 areas of the school.

Time Required

Approximate

2-3 class periods

Curriculum Connections

Subject	Grade 6	Grade 7	Grade 8
	Strand		
Science and Technology	Biodiversity (1.1)	Interactions in the Environment	Water Systems
Social Studies & Geography	People & Environments	Physical Patterns in A Changing World	Global Settlement: Patterns & Sustainability

See Appendix 1, page 66 for specific expectations.

Day One: Water Conservation Brainstorming

Time

1-2 class periods

Materials

- Water Conservation Action Plan Brainstorming template
- Completed Daily and Annual Water-Use Spreadsheet including Other Water Uses from Activity 3.
- Computer/Projector.

Activity

1 Set-up a computer/projector so the entire class can see the completed Master Data Sheet (from Activity 3) and all the water-use values for your school.

2 Group students according to their data collection groups from Activity 2 (should be 8-9 groups total).

3 Distribute 1 Water Conservation Action Plan Brainstorming sheet per group.

4 As a class, rank areas of water-use in the school from highest to lowest based on values recorded on the Master Data Sheet.

5 As a class, select 3 areas of water use that will become the focus of Action Plan water conservation strategies. Sugestions for area of water use selection:

- Select based on volume of water used (ex: select the 3 highest areas of water use).
- Select based on likelihood of achieving water use reductions (ex. ease of action implementation; low cost or few resources needed etc.).

6 In groups, students record the 3 areas of water use selected on the Water Conservation Action Plan Brainstorming sheet next to Area of Water Use #1, 2 and 3. Volume of Water Used for each area should also be recorded.

Day One Continued: Water Conservation Brainstorming

NOTE:
Computer access may be required in step 7 for students to conduct research into their water conservation ideas and determine approximate costs and resources needed.

7 Each group brainstorm ideas to reduce water consumption for each of the areas selected. Brainstorming should include approximate time needed to implement the ideas, staff and students required for implementation, approximate cost and resources needed.

NOTE:
Water conservation ideas that are not directly linked to a specific Area of Water Use should be included under 'Other Water Conservation Ideas'. Examples of Other Ideas may include: litter clean-ups, awareness campaigns, tree plantings, etc.

8 After each group has developed at least 1 idea per Area of Water Use, collect the Brainstorming sheets and combined the ideas for each Area of Water use (written on the board, chart paper, on a digital spreadsheet etc.).

9 As a class, select 3-5 Water Conservation Ideas to include in the Action Plan in Activity 5. Selection should be based on:
Cost
- Time required
- Resources required
- Volume of water conserved

Day Two: Action Plan Development

Time

1 class period

Materials

- 3-5 Water conservation Ideas from Activity 4, Day One
- Blue Schools Action Plan Template
- Computer/Projector

Activity

1 Set-up a computer/projector so the entire class can see the selected Water Conservation Ideas from Activity 4, Day One, and the Blue Schools Action Plan.

2 As a class, transfer each Water Conservation Idea to the Blue Schools Action Plan by outlining important details as specified in each column of the Action Plan template.

3 Make copies of the final Action Plan as needed (for school administration, support or custodial staff) and post the Action Plan in a prominent location in the classroom reference.

Activity 4

Worksheets

Water Conservation Action Plan Brainstorming

Area of Water Use #1	Volume of Water Used:							
Water Conservation Idea	Time Required	Who is involved?	Resources Needed	Approximate Cost	Notes			
Area of Water Use #2	Volume of Water Used:							
Water Conservation Idea	Time Required	Who is involved?	Resources Needed	Approximate Cost	Notes			

Water Conservation Action Plan Brainstorming Continued

Water Conservation Idea	Time Required	Who is involved?	Resources Needed	Approximate Cost	Notes
Area of Water Use #3			**Volume of Water Used:**		
Other Water Conservation Ideas			**Volume of Water Used:**		

Blue Schools Action Plan

Date Prepareded: _____ Prepared by: _____

Area of Water Use Addressed	**Objectives** What do we want to achieve?	**Specific Tasks** What do we need to do to ahieve our objectives?	**Persons Involved** Who needs to be involved to achieve our objectives?	**Success Criteria** How will we measure our success?	**Start Date**	**End Date**	**Resources Required & Approx Cost**
EX. Other Water Conservation Ideas	Reduce the number of single-use water bottles used in the school.	• Create signs for a 'bring your own bottle' campaign • Include messaging in school announcements • Sell reusable bottles	• Classroom teacher • Students • Principal • Custodian	• Check recycling bins for water bottles before and after campaign.Students. • Take a poll of students. • Count number of reusable bottles sold.	Sept. 1, 2018	Dec. 31, 2018	• Materials to make signs: paper, markers, paint, etc. • Reusable water bottles to sell. • Approx cost: $300

Area of Water Use Addressed	**Objectives** What do we want to achieve?	**Specific Tasks** What do we need to do to ahieve our objectives?	**Persons Involved** Who needs to be involved to achieve our objectives?	**Success Criteria** How will we measure our success?	**Start Date**	**End Date**	**Resources Required & Approx Cost**

Activity 4

Examples of Water Conservation Strategies

NOTE: Communicate with Blue Schools Program staff when selecting water conservation strategies for possible support with funding and the acquisition of materials/equipment.

Level 1: School Level Actions

- Awareness or Action campaigns. Examples may include:
  - Banning single-use water bottles in the school.
  - Proper recycling in the school
  - No littering
  - Litterless lunch
  - Participate in 'Yellow Fish Road' as a class
  - Participate in 'Stream of Dreams' as a class
- Install and use rain barrels at the school to reduce runoff
- Build a rain garden on school property to reduce runoff from paved areas
- Plant trees or native vegetation on school property
- Install water-saving hardware such as:
  - Aerators on faucets
  - Faucets with motion sensors
  - Low or dual-flush toilet valves
- Adjust or modify existing hardware such as:
  - Spring in toilet flush valve to reduce water used per flush
  - Flush timers for school urinals (ex: set to only run during the hours when the school is occupied; set to be motion sensitive instead of a constant timer).

Level 2: Community Level Actions

- Conduct or participate in a shoreline clean-up
- Conduct or participate in a tree planting event
- Attend or host a water-themed community event to promote water conservation

Additional Options for Level 2 Certification

In addition to at least 1 community level action

- Enhance or expand actions completed in Level 1, for example:
  - Install additional water-saving hardware
  - Run a new awareness campaign
  - Plant more vegetation on school property
- Address anothe water conservation issue at your school that has not yet been addressed.

Activity 4

Examples of Water Conservation Strategies

NOTE: Communicate with Blue Schools Program staff when selecting water conservation strategies for possible support with funding and the acquisition of materials/equipment.

Level 3: Community to Community Actions

- Start a social media campaign about water conservation.
- Create a water conservation website.
- Mentor anothe rschool working on Level 1 certification.
- Host a fundraiser to support an Ontario water conservation organization.
- Lake Ontario Waterkeeper
- Ontario Streams

Additional Options for Level 3 Certification

In addition to at least 1 community to community action

- Enhance or expand actions completed in Level 1 & 2, for example:
  - Install additional water-saving hardware
  - Run a new awareness campaign
  - Plant more vegetation on school property
  - Participate in another shoreline clean-up event
  - Participate in another tree planting event
  - Attend or host another water-themed event.
- Address another water conservation issue at your school that has not yet been addressed.

Activity 4

Examples of Water Conservation Strategies

NOTE: Communicate with Blue Schools Program staff when selecting water conservation strategies for possible support with funding and the acquisition of materials/equipment.

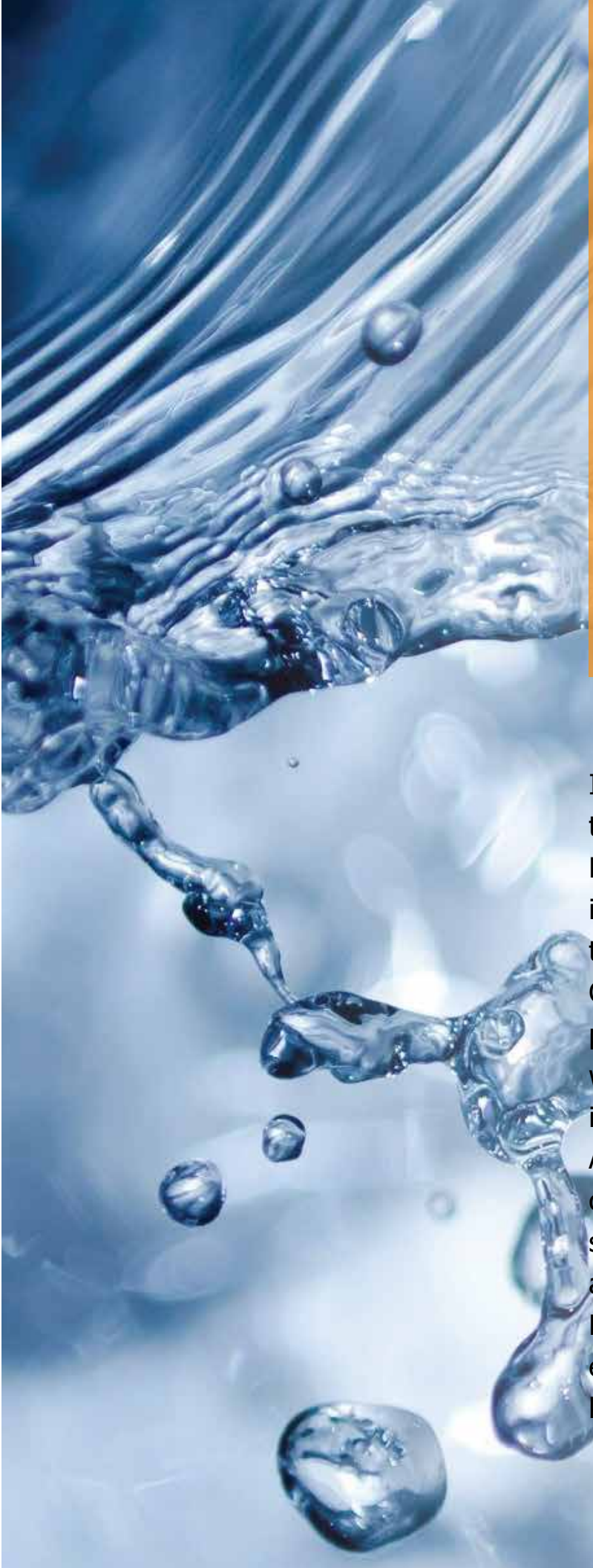
Level 4: National & International Level Actions

- Host a fundraiser for a national water conservation group, for example:
  - Swim. Drink. Fish. Canada
  - World Wildlife Canada
  - Nature Conservancy Canada
- Get involved with an international water conservation organization, for example:
  - World Fish Migration Foundation
  - World Wildlife Fund
  - International Union for Conservation of Nature (IUCN)
  - Nature Conservancy

Additional Options for Level 4 Certification

In addition to at least 1 national level action

- Enhance or expand actions completed in Level 1, 2 or 3 for example:
  - Install additional water-saving hardware
  - Run a new awareness campaign
  - Plant more vegetation on school property
  - Participate in another shoreline cleanup event
  - Participate in another tree planting event
  - Attend or host another water-themed event
  - Host a fundraiser for a different water conservation group
  - Get involved with a new international water conservation organization
- Address another water conservation issue at your school that has not yet been addressed.



Activity 5

In Activity 5 students and staff use the details outlined in the Action Plan developed in Activity 4 to implement water conservation actions throughout the school and beyond. Communication with Blue Schools program staff throughout Activity 5 will help ensure successful Action Plan implementation. Following successful Action Plan implementation and through consultation with Blue Schools program staff, Blue Schools certification will be awarded to schools reaching this stage. Participate in the Blue Schools program each year to build on your success and keep up your water conservation efforts!

Activity 5: Action Plan Implementation & Certification

Learning Goals

- Act on a proposal to preserve biodiversity.
- Describe possible features of a sustainable building or community (Gr. 8 Geography).
- Propose actions that can be taken to protect biodiversity (Gr. 6 Biodiversity).
- Analyze costs and benefits of strategies for protecting the environment (Gr. 8 Interactions in the Environment).
- Propose a plan to address water sustainability issues (Gr. 8 Water Systems).

Success Criteria

- Identify areas in the school to target water conservation strategies.
- Prepare a detailed action plan to reduce water use in 3-5 areas of the school.

Time Required

Approximate

Variable

Curriculum Connections

Subject	Grade 6	Grade 7	Grade 8
	Strand		
Science and Technology	Biodiversity (1.1)	Interactions in the Environment	Water Systems
Social Studies & Geography	People & Environments	Physical Patterns in A Changing World	Global Settlement: Patterns & Sustainability

See Appendix 1, page 66 for specific expectations.

Action Plan Implementation

Time

Variable. Due to the range of actions that may be implemented, timing could range from as little as 1 class period to as much as several months.

Materials

Variable. Spreak to Blue Schools program staff for assistance with acquiring materials and resources to meet your action plan implementation needs.

Activity

1. Ensure that the Specific Tasks outlined in your action plan and identified for implementation have been approved by school administration and discussed with additional school staff (custodians, support staff, other teachers etc.).
2. Notify staff and students involved in each Specific Task of their roles, timelines, objectives and success criteria of each task.
3. Organize smaller sub-groups if necessary and assign a Specific Task to each group.
4. Communicate with Blue Schools program staff to assist with acquisition of materials and resources necessary to complete Specific Tasks and achieve Action Plan Objectives.
5. Begin implementing Specific Tasks!
6. Maintain ongoing communication with Blue Schools staff for assistance with Action Plan implementation.

Activity 4

Certification

Blue Schools certification is awarded to schools upon successful implementation of water conservation strategies outlined in the Action Plan. The level of certification awarded is based on the type of actions implemented. Refer to page 58 for examples of water conservation strategies for each certification level.

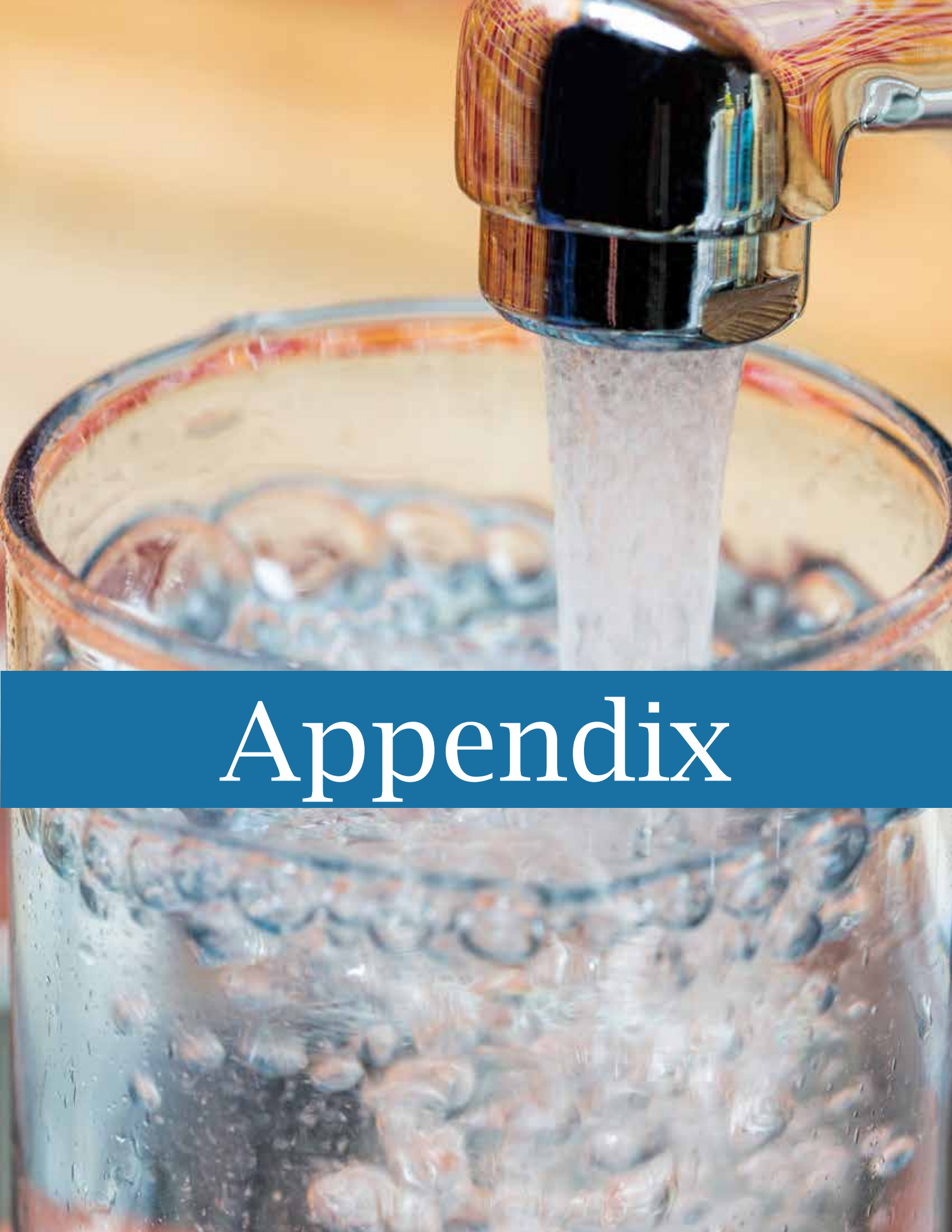
Level 1 – School Level Actions

Level 2 – Community Level Actions

Level 3 – Community to Community Actions

Level 4 – National and International Actions

Blue Schools program staff will support you throughout Action Plan implementation and a special visit to award certification will be arranged for schools demonstrating measureable water conservation results.



Appendix

Appendix 1: Curriculum Connections

Blue School Activities 1-5 support teaching and learning in multiple areas of the Ontario Curriculum particularly in these subject areas: Science and Technology, Mathematics and Social Studies & Geography.
Links to Ontario Curriculum expectations applicable to Activities 1-5 are summarized in the following tables.

NOTE: Curriculum connections listed in Tables 1.1 - 1.3 are examples. Teachers are encouraged to explore additional opportunities to integrate the Blue Schools program with classroom learning.

Table 1.1: Science and Technology, 2007

Grade 6	Grade 7	Grade 8
Biodiversity	Interactions in the Environment	Water Systems
Big Idea: Humans make choices that can have an impact on biodiversity **Specific Expectations:** 1.1 Analyze a local issue related to biodiversity	**Big Idea:** Human activities have the potential to alter the environment. Humans must be aware of these impacts and try to control them. **Specific Expectations:** 1.1 Assess the impact of selected technologies on the environment 2.4 Use appropriate science and technology vocabulary 3.8 Describe ways in which human activities and technologies alter balances and interactions in the environment	**Big Idea:** Water is crucial to life on Earth. Water is an important resource that needs to be managed sustainably. **Specific Expectations:** 1.1 Evaluate personal water consumption and propose a plan to reduce personal water consumption 2.4 Use scientific inquiry/ research skills to investigate local water issues 2.7 Use a variety of forms to communicate with difference audiences and for a variety of purposes. 3.3 Explain how human and natural factors cause changes in the water table

Table 1.2: Mathematics, 2005

Grade 6	Grade 7	Grade 8
Number Sense and Numeration; Measurement; Data Management and Probability	Number Sense and Numeration; Measurement; Data Management and Probability	Number Sense and Numeration; Measurement; Data Management and Probability
Number Sense and Numeration: Solve problems involving the multiplication and division of whole numbers, and the addition and subtraction of decimal numbers to the thousandths Demonstrate an understanding of relationships involving percent, ratio and unit rate **Measurement:** Estimate, measure and record quantities, using the metric measurement system **Data Management and Probability:** Collect and organize discrete or continuous primary data and secondary data and display the data using charts and graphs including continuous line graphs. Read, describe, and interpret data and explain relationships between sets of data	**Number Sense and Numeration:** Represent, compare, and order numbers, including integers Demonstrate an understanding of proportional relationships using percent, ratio and rate **Measurement:** Report on research into real-life applications of area measurements **Data Management and Probability:** Collect and organize categorical, discrete, or continuous primary data and secondary data and display the data using charts and graphs, including relative frequency tables and circle graphs Make and evaluate convincing arguments, based on the analysis of data	**Measurement:** Research, describe and report on applications of volume and capacity measurement **Data Management and Probability:** Collect and organize categorical, discrete, or continuous primary data and secondary data and display the data using charts and graphs, including frequency tables with intervals, histograms, and scatter plots Apply a variety of data management tools and strategies to make convincing arguments about data

Table 1.3: Social Studies, History & Geography, 2013

Grade 6	Grade 7	Grade 8
SOCIAL STUDIES: People & Environments: Canada's Interactions with the Global Community	GEOGRAPHY: Physical Patterns in a Changing World; Natural Resources Around the World: Use and Sustainability	GEOGRAPHY: Global Settlement: Patterns and Sustainability
Use the social studies inquiry process to investigate some issues of political, social, economic, an/or environmental importance, their impact on the global community, and responses to the issues.	**Physical Patterns in a Changing World:** Demonstrate an understanding of significant patterns in Earth's physical features and of some natural processes and human activities that create and change those features. **Natural Resources Around the World: Use and Sustainability** Demonstrate an understanding of the sources and use of different types of natural resources and of some of the effects of the extraction/harvesting and use of these resources.	Analyze some significant interrelationships between Earth's physical features and processes and human settlement patterns, and some ways in which the physical environment and issues of sustainability may affect settlement in the future. Demonstrate an understanding of significant patterns and trends related to human settlement and of ways in which human settlement affects the environment.

21st Century Competencies

21st Century Competencies: Foundation Document for Discussion: Phase I Towards Defining 21st Century Competencies for Ontario. Winter, 2016.

The Blue Schools program supports the development of 21st Century Competencies or, transferrable knowledge and skills, in participating students including:

- Critical Thinking & Problem Solving
- Innovation, Creativity, and Entrepreneurship
- Learning to Learn/Self-Aware & Self-Directed Learning
- Collaboration
- Communication
- Global Citizenship

Students will be engaged in deeper learning through the Blue Schools program as they use and develop skills associated with the cognitive, interpersonal and intrapersonal learning domains such as:

- Analyzing
- Decision-making
- Flexibility
- Teamwork
- Leadership