



# Exploring our Watersheds and Discovering Connections

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## Teacher Planning & Activity Guide

How to make your visit to the watershed  
meaningful and memorable



DRINKING WATER  
WATERSHED  
PROTECTION





## **Why we care about your students?**

The Regional District of Nanaimo and its partner municipalities are committed to developing and delivering programs and services to achieve regional sustainability-driven goals.

The Drinking Water and Watershed Protection program team is proud to deliver this resource as part of an educational program that helps students in our region know where their water comes from, understand the value of this resource, recognize their connection to it, develop a sense of pride in our watersheds, and become champions for sustainability in our region.

Our thanks and recognition go out to Metro Vancouver, who originally developed this program and have generously shared it.

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## What teachers are saying about the program:

- *It went perfectly with the prescribed learning outcomes from the BC Ministry of Education.*
- *This was our jumping off point for our 6-week inquiry into water and quality of life.*
- *This fit nicely with the science curriculum.*
- *I love taking my students outdoors, and I knew this would be a beneficial field trip I could not provide.*

*\*\*Comments are from teachers and students that have participated in the Metro Vancouver program. The RDN has adapted this program for our region with permission.\*\**

To see more comments go to [www.metrovancouver.org/region/teachers/fieldtrips/Pages/lscr.aspx](http://www.metrovancouver.org/region/teachers/fieldtrips/Pages/lscr.aspx)



## About the Program

*This program is about a special place where water is protected, collected and prepared for our taps.*

This is a program that engages the senses, stirs curiosity, builds confidence and inspires ongoing learning. Topics focus on unique features and processes related to tap water and sustainability and each participant makes connections that are relevant and meaningful for them.

### What makes this program extraordinary?

It:

- is fun, interesting and discovery-based,
- reflects prescribed learning outcomes and the unique opportunities of this place,
- works for non-specialist teachers,
- uses proven approaches,
- sets you up with tools and step-by-step instructions before, during and after your visit.

### How will my class benefit from this program?

Students will:

- see the mountain landscape where the water cycle is illustrated before their eyes,
- experience the vastness of the landscape rarely seen by the public,
- develop new perspectives as they share the day with plants and animals they wouldn't see anywhere else,
- make connections every time they turn on a tap,
- understand why it's important to protect special places.

***It will be an experience they will never forget.***

### **I'm not experienced with this content nor teaching outdoors. How does this program work for me?**

Your guide will lead the day and, together with your students, you will explore and discover amazing things. We count on you to help us manage the class. You can also help students work through assigned steps or questions when they're working in small groups with techniques that allow them to discover content and ideas themselves.

### **What have you done to make it easy for me?**

We've assembled materials to reduce prep time.

### **How does the program work?**

There are three main parts for student learning:

**Exploring Expectations—Part 1** is about preparing for the day. We've mapped out the 'best of the best' activities to help you ready students to make the most of their visit with us. Our goal is to have you introduce the topic and stir-up a sense of wonder by getting students predicting, and guessing about the visit.

**Experiencing a Special Place—Part 2** is their special day in a very special place. We provide the bus and guide your group through the watershed and activities. We've mapped out a variety of ways to engage learners. We focus on small group formats so you can get involved easily, and learn right alongside your class.

**Reflecting & Connecting—Part 3** is about reflecting on experiences and making meaningful and relevant connections, while creating opportunities for student assessment.

### **What if I have more questions?**

Visit [www.dwwp.ca](http://www.dwwp.ca) > Projects > School Education for tools, links and background information.

Contact staff to discuss booking arrangements at [waterprotection@rdn.bc.ca](mailto:waterprotection@rdn.bc.ca) or 250-390-6586.

*"Direct experience with the environment, both individually and in groups, is an important and vital way to learn about sustainability. These opportunities must be provided for the studies to be relevant, because they help provide students with a deeper understanding of natural systems and the impact humans have on those systems."*

BC Ministry of Education Environmental Learning and Experience: An Interdisciplinary Guide for Teachers (2007)  
[www.bced.gov.bc.ca/environment\\_ed/](http://www.bced.gov.bc.ca/environment_ed/)

## Check-lists

### A. Before your visit

- Read through this Activity Guide.
- Complete Part 1 with students. You may need more/less time than what this guide suggests.
- Send Parent/Guardian Consent form home with students.
- Organize at least one adult to accompany you and the class, but a maximum of three.
- Explain to adult volunteers how they can best support you and your students on the day of the program. Ensure they, along with your students, dress in layers appropriate for the weather, bring appropriate footwear, and bring a litterless lunch as there are no facilities to purchase anything nearby. *Outhouses are located at each stop.*
- Complete your evaluation of the Watershed Discovery kit, pre-trip activities.
- Email a reminder about how to prepare your children to the parents the day/night before the program.
- Make nametags (ideally waterproof) for students to wear on the day of the field trip.



### B. Field trip—the day of your visit

- Organize students into two groups – one on the left and one on the right side of the bus.
- Submit WATERSHED PLEDGE forms from each student for check-in at security gate.
- Bring completed ADULT DECLARATION form.
- Provide two copies of your class list with school name, contact person and phone numbers (one copy to leave at security gate and one for education staff).
- Bring student lunches, snacks, drinks and extra supplies for those who may forget or need additional.
- Bring extra clothing for cold and wet conditions (gloves, toques, mitts).
- Optional: Hand sanitizer (there is no running water). Outhouses are located at each stop.
- Return the Watershed Discovery Kit. Hold on to one satellite map, this planning guide and a set of wildlife cards if you would like.

### C. After your visit

- Complete Part 3 with students.
- Please complete the evaluation survey that will be emailed to you.
- Please let other teachers know about your experience and how to book!
- Share student work and success with us. Email: [jpisani@rdn.bc.ca](mailto:jpisani@rdn.bc.ca)

## How to reach us

For information, program registration, or to adjust your program booking, contact:

Drinking Water & Watershed Protection, Regional District of Nanaimo

Attn: School Program, 6300 Hammond Bay Road

Nanaimo, BC V9T 6N2

tel: 250-390-6560, fax: 250-390-1542, email: [waterprotection@rdn.bc.ca](mailto:waterprotection@rdn.bc.ca)

## PART 1 - Exploring Expectations

### PRE-TRIP ACTIVITIES

We suggest doing these activities within a week or so of your visit.

#### What you do

1. There are 5 activities outlined here that will help prepare your class visit to the watershed.
2. Read to understand what's involved to complete each activity.
3. Examine the Watershed Discovery Kit to see what's included.
4. Decide how they fit best into your schedule.
5. Some activities have student pages to assist you.

#### What else you can do

You may wish to enhance this recommended approach with additional activities. Consider selecting those which stir student curiosity and reinforce the goal of Part 1 (i.e. preparing for a day of exploration).

Read Part 3 (post-visit activities) for a complete picture of what the field trip will and will-not cover.

#### Watershed Discovery Kit (to be returned on the day of your visit)

- 6 large SATELLITE maps\*
- WATERSHEDS MYSTERY bag (6 items inside)
- WATER LINE-UP cards & answer key
- WATER WATCHER cards & answer key
- MONTHLY WATER USAGE chart
- WATER CLOCK envelopes
- WATERSHED WILDLIFE cards\*
- ADULT Watershed Security DECLARATION form (all adult volunteers must sign this)

\* Keep one for reference after your visit.

#### Prepare, for each student, a copy of:

- Parent/Guardian CONSENT form
- WATERSHED PLEDGE form
- GETTING READY student worksheet

The purpose of this activity is to introduce your students to their field-trip destination.

### Our Best Tip

*We've noticed that students who did one or more outdoor activities before they came on the trip got more out of the day. We think that's because they seem more comfortable and ready to learn. Check out the Get Outdoors! sample package included in the Watershed Discovery Kit, for some activities to prepare students for learning outdoors.*

#### What teachers appreciate about the program:

(source: Metro Van)

*...the opportunity for students to see their drinking water source.*

*...the time and effort that staff put into preparing and guiding us.*

*...that students were outside and used their senses to appreciate the watershed; that they weren't given worksheets to complete; that they visited 3 distinct areas.*

*...the walk through the [regional park] gave students a multi-sensory experience of the habitat, which really helped with teaching other concepts in our unit.*

## Activity One

## WATERSHED &amp; THE WATER CYCLE



The purpose of these activities is to introduce students to

- the concept of a watershed
- how water moves through a watershed
- how people are connected to watersheds and the water cycle

**PART A - GET ON THE MAP: Exploring the satellite map of our region**

1. Divide students into 6 groups. Provide each group with map and a copy of the Student Page. (1 per group)
2. Give your students time to find the different features on their maps (3 different kinds of water – fresh, salt, and snow). Make sure everyone has found all of the features.
3. Allow your students to work on questions 2-6 and then ask each group to share their answers during a class discussion. The following is a short list to help you add to the discussion:

**Q3** *Advantages:* High up so gravity aids in distribution; close to where we live so easy to access, natural landscape

*Disadvantages:* Still need to move it into cities through pipes

**Q4** Pollution, disease, people wanting to use the water for other purpose, to keep us healthy; also protects wildlife habitat.

**Q5** Water erosion marks on hills, lake (reservoir), creeks and rivers

**Q6** An area, usually defined by an elevated ridge, within which all water flows into the same collecting body such as a river or lake

**PART B - THE WATER CYCLE**

1. Provide each student with photocopy of “The Water Cycle” diagram. Examine the picture/chart as a class. Discuss and define a watershed.
2. Ask your students to imagine they are a raindrop that has landed on the top of a mountain and all they want to do is to get to the lake below. If a watershed was nice, flat rock from top to bottom then getting down would be easy. However, watersheds in the Regional District of Nanaimo are full of living and non-living things that might slow, stop, or redirect a raindrop on its journey. With your students, brainstorm lists of living and non-living things that might waylay a raindrop. Have students label these things on their chart.
3. Review the three major processes of the Water Cycle: Evaporation, Condensation, and Precipitation (a kettle of boiling water and glass bowl full of ice can quickly and easily demonstrate all three processes). For a fun review, visit YouTube and enter “Bill Nye Water Cycle Jump” into the search box and turn the volume up. Label these processes with arrows that show direction on their diagram.
4. Have students consider how humans fit into this cycle. Label where we live, play, shop, go to school, etc.
5. Ask students to consider all ways water is used by people, how it is used and where it goes.

**TIME**

PART A 30 min

PART B 60 minutes

PART C 1-2 days  
(mostly  
observation)

**MATERIALS**

PART A Satellite maps

PART B A copy of  
“The Water  
Cycle” diagram  
for each student  
Coloured pencils

PART C Queen Anne’s  
Lace or white  
Carnations work  
best (celery  
will also work),  
water container,  
dark blue or red  
water-soluble  
food colouring

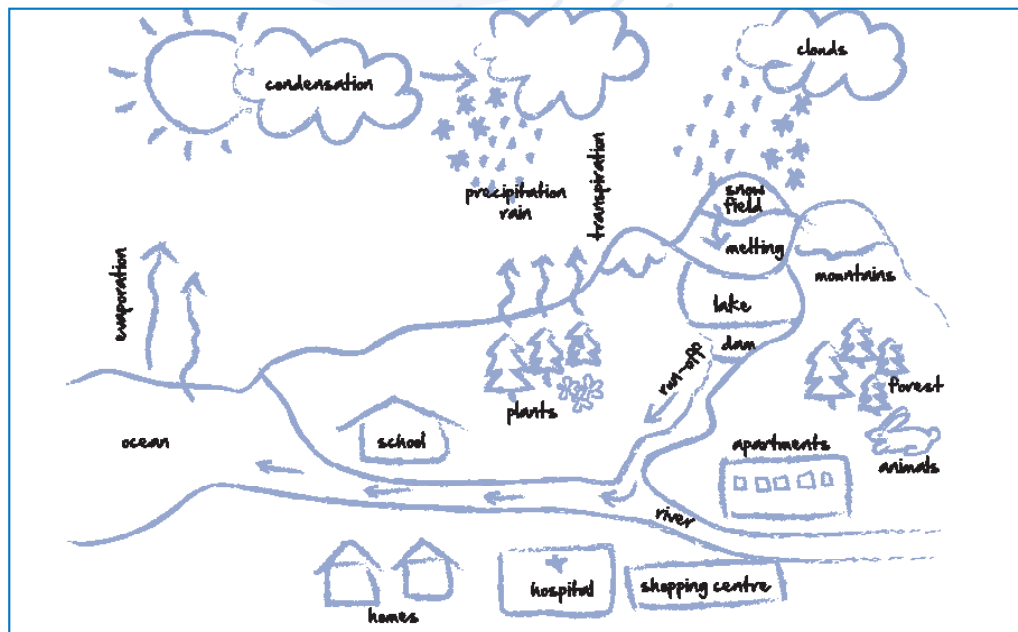
**Key Message**

*Humans borrow water from the water cycle. We need to take care of it because we cannot create new water. It’s like borrowing your friend’s sweater. You should return it as clean as when you first got it.*

## Activity One

### WATERSHED & THE WATER CYCLE

An example of what a Water Cycle diagram might look like:



#### PART C - PLANTS & THE WATER CYCLE

##### Transpiration Demo:

1. Fill the container  $\frac{1}{2}$  way with water and add several drops of food coloring. Place the flowers or celery in the container stems down.
2. Observe over a 6-12 hour period. If possible, start at the beginning of the day so that students can note the progression of the coloured water hourly.

##### Explanation:

Up to 99% of water that plants take in at the roots will end up travelling up and out through their leaves or petals and back into the air. This process, called transpiration or evapotranspiration, helps move nutrients and water vertically within the plant and is responsible for moving the dyed water up and into the top of the carnation/celery you observed. Transpiration is also a very important part of the Water Cycle. A large oak tree can transpire over 400 litres of water into the atmosphere in one day – imagine how much water a whole forest puts into the air.

##### Making it an Inquiry:

- a. Have your students predict what would happen if they split the bottom of a carnation stem into 2 or 3 vertical lengths long enough to place each length into a separate container filled with differently coloured water (blue, red, yellow). Observe, evaluate the results, explore why.
- b. Have your students predict the effect of temperature on the rate of transpiration. Using water kept at room temperature, warm water and fridge water, measure the movement of the dyed water every hour. Deduce which season has the greatest and lowest rates of transpiration.
- c. Have your students predict whether different amounts of dissolved sugar will affect the rate of transpiration. Place the flowers in normal water, water + 1% sucrose (table sugar) and in a 5% sucrose solution. Observe, evaluate the results, explore why.
- d. Have your students predict whether the colour of dye affects the rate of transpiration.



Student Page  
The Water Cycle



Student Page  
The Water Cycle



## Activity One

## GET ON THE MAP: Explore the satellite map of our region



## Part A

1. Search and find these features on the map:

• Land	• Roads	• Major Rivers (at least 3)
• Water (3 different kinds)	• Our school neighbourhood	• Lakes (at least 5)
• Farms	• Mountains	• Ocean
• Cities/ Towns		

- There are over 85,000 people living in the City of Nanaimo. Every one of these people needs safe drinking water provided by their water service area on a daily basis.
  - Using the map, identify at least 3 possible sources of drinking water these people could use.
- Look in the legend for the dam facility symbol. Find the dams and the large lakes they are connected to. These lakes help supply our drinking water.
  - What do you think are some advantages and disadvantages of using these lakes for our drinking water supply?
- Look in the legend for the red watershed boundary line. Trace the boundaries of the watershed areas surrounding our drinking water supply. These huge areas of land are owned by forestry companies, and managed in cooperation with the City to keep our drinking water safe.
  - Why does our drinking water need protection?
- Trace the watershed boundary lines again. Most of these lines run along the tops of mountains.
  - When it rains in a watershed, where do you predict all of the rainwater ends up?
  - Can you find any evidence that shows how rainwater moves through a watershed to end up where you predicted?
- As a group, decide how to explain what a watershed is to someone who doesn't know.



## Activity Two

### MYSTERIOUS ITEMS FROM A SPECIAL PLACE: Examine clues for connections to our visit



1. Divide your students into 6 small groups. Ask each group to make connections between the item they pull from the watershed mystery bag and Parksville or Nanaimo’s Watersheds. Suggest that they consider the function or origin of the item they’ve chosen before considering how it relates to our Watersheds.
2. Ask each group to share their ideas or connections with the rest of the class and invite any additional connections they can think of.
3. Included in the chart below is a question you can ask that can help your students think more deeply about these items and the connections to their lives.

**TIME**

20 - 25 min

**MATERIALS**

WATERSHED  
MYSTERY bag

Item	Examples of CONNECTIONS
lock & keys connections	<p>“Locks provide security for people, places and things. Access to our drinking watersheds is restricted and monitored by security staff. <i>Why might people want or need access to the upper watershed and reservoir?”</i></p> <p><i>A: Wants: hike, fish, camp; Needs: build and maintain infrastructure, security, monitor/sample water to ensure quality, minimize impact to ecosystem, education programs.</i></p>
pipe connections	<p>“Pipes move water from one place to another. Water enters large pipes at the drinking water reservoir and travels through smaller and smaller underground pipes until it exits the small pipes connected to our taps at home. <i>How far does water travel to get to your home?”</i></p> <p><i>A: Nanaimo manages approximately 500kms of mainline water pipes to transport water across the city. Parksville manages about 85kms of water mains that serves 5,000 lots. The distance to your house depends on how far away you live from the reservoirs.</i></p>
measuring tape connections	<p>“There are a lot of things that are measured in the watershed: reservoir depth, rainfall, snowpack, and even how dirty the water is. <i>Why are these measurements important?”</i></p> <p><i>A: Plan, predict and monitor to ensure a clean, reliable supply is available all year round.</i></p>
tree cookie connections	<p>“These tree cookies came from Watershed trees. Healthy forests help to keep our drinking water supply clean and healthy by preventing soil erosion. <i>What other jobs are there that Watershed trees do?”</i></p> <p><i>A: They store large volumes of water and release it slowly, part of the water cycle through evapotranspiration. Roots act as nets and sponges to hold soil on banks and filter water.</i></p>
can of salmon connections	<p>“All of the rivers and lakes in our Watersheds are home to salmon and other fish species. <i>Why are salmon important here on the West Coast of Canada?”</i></p> <p>-</p> <p><i>A: Keystone species; their presence is crucial in maintaining the organization &amp; diversity of their ecological communities. They are important traditional food for the First Nations.</i></p>
plug or cork connections	<p>“Just like a plug can hold water in a sink, a dam holds water in a reservoir. With 18,000 people living in Parksville/Nanosee and 85,000 people living in Nanaimo, dams and reservoirs are needed to store enough water for everyone’s daily needs. <i>With the population of our region rapidly growing, how can we make sure to have enough drinking water for everyone?”</i></p> <p><i>A: Conserve it. Meter it/ charge more for it, look for new reservoirs, mandate stricter building codes.</i></p>

4. With your students discuss the positive and negative consequences of: i) building a dam on a river or lake, ii) building a drinking water delivery system? Are our needs for clean, safe water important enough to justify building the required infrastructure?



## Activity Three

### WHERE IS WATER IN THE WATERSHEDS?

#### Three stations to do in small groups



#### TIME

40 - 60 min

#### STATION A:

WATER CLOCK

envelopes

#### STATION B:

WATER LINE-UP cards

WATER WATCHER cards

#### STATION C:

WATERSHED WILDLIFE

cards

Copy of "Watershed  
Pledge" for each student

The purposes of these activities are to help your students discover the different ways that water can move throughout a watershed and how water moves differently depending on the season.

#### What to do

1. Set up six stations around the edge of your classroom as follows: Station A, B, C, A, B, C. (Included are enough materials for six groups but you may wish to set up only 3 stations if you have a small class.) Using this layout allows student groups to visit 3 different stations regardless of the direction you have them rotating around the room in.
2. Explain to students that they will be rotating through three different stations and will have 10 minutes to complete each activity. Each group will also be responsible for writing down 1 question they'd like to "ask an expert about" related to the activity they just completed.
3. Provide students with a brief description of each activity and indicate the direction they will move in from one station to the next. Signal students when their 10 minutes is up so that they can take a minute or two to generate their questions before rotating to the next station.

#### Reflection

4. With your class, debrief Station A by asking a couple of students to share something they learned while completing it. Then ask all of the groups to share the questions they generated for that station and record these on the board.
5. After reviewing all of the stations and capturing all of those questions, provide your students with their own copy of the "Watershed Pledge" form (page 19). On side 2 of the pledge form is space for them to record their "Watershed Wonders". Ask them to write down their three favourite questions from those generated by the class or they can write down new ones they've thought of.

#### The Pledge

6. Before asking your students to fill in and sign side 1 of the "Watershed Pledge" form, have your students read it over first. Does everyone understand the 4 points they are agreeing to? Does anyone have any other questions?
7. Collect your students' "Watershed Pledge" forms and place them into the WATERSHED DISCOVERY KIT so they are ready to hand in at the gate when you arrive for your visit.



## Activity Three

### WHERE IS WATER IN THE WATERSHEDS?

Three stations to do in small groups

Water Clock: When do we get water in the watersheds?		
<b>Station A</b>	MATERIALS for each station	DESCRIPTION
	<ul style="list-style-type: none"> <li>• A copy of the “Monthly Water Usage” chart</li> <li>• A set of “Average Monthly Precipitation” cards</li> <li>• “Where Water Goes” pie chart</li> <li>• Student Instructions</li> </ul>	<p>At this station, students will attach the “Average Monthly Precipitation” cards to the “Monthly Water Usage” chart but will have to fill in the unlabelled cards on their own. The point is to illustrate that our greatest water demand happens when we have the least amount of precipitation, and to consider how we use water and when.</p>
WATER LINE-UP: Sort and Match Watchwords		
<b>Station B</b>	MATERIALS for each station	DESCRIPTION
	<ul style="list-style-type: none"> <li>• 1 set of WATER LINE-UP cards</li> <li>• 1 set of WATER WATCHER cards</li> <li>• student instructions</li> <li>• answer key</li> </ul>	<p>At this station, students will arrange a set of cards describing the path water takes as it moves from clouds to tap. They will then match up a collection of words and images that introduce students to vocabulary about what Parksville and Nanaimo staff monitor to ensure our drinking water is safe.</p>
Water Web: Where does Water hang-out in our Watersheds		
<b>Station C</b>	MATERIALS for each station	DESCRIPTION
	<ul style="list-style-type: none"> <li>• A set of WATERSHED WILDLIFE cards</li> <li>• student instructions</li> <li>• large writing surface and pencils or pencil crayons</li> </ul>	<p>At this station, students will develop a “water web” which is the same as a food web but the connections are used to illustrate the many different ways that the living components of the ecosystem they will be visiting can delay water on its journey through the watershed.</p>

## Activity Three

### WHERE IS WATER IN THE WATERSHEDS?

Three stations to do in small groups



#### Station A

#### WATER CLOCK: When do we get water in the Watersheds?

##### WORK as a TEAM

1. Take a look at the MONTHLY WATER USAGE chart to see how our consumption changes throughout the year.
  - a. When do we use the least?
  - b. The most?
  - c. With your group, think of some activities that increase our water consumption at that time of year.
2. On your table is a WATER PIE chart showing where we use water inside our homes.
  - a. As a group, decide how many litres of water one person would use each day for every activity.
  - b. Add them up. What is the total for all of the activities together?
3. On your table is a bag with AVERAGE MONTHLY PRECIPITATION markers inside. There are 12 monthly precipitation markers altogether but only 9 of them are labelled. Your challenge is to fill in the unlabelled markers correctly and complete the year.
4. Now take a look at how the MONTHLY WATER USAGE and the AVERAGE MONTHLY PRECIPITATION compares.
  - a. How much precipitation do we receive during periods of high consumption?
  - b. What kinds of problems might this cause?
  - c. How can we help to reduce these problems?
5. Return the materials to the correct bags and set the station up for the next group.



## Activity Three

### WHERE IS WATER IN THE WATERSHEDS?

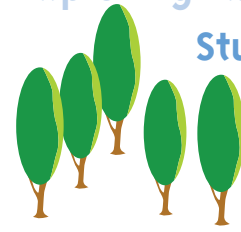


#### Station A

#### WATER CLOCK: When do we get water in the Watersheds?

##### WORK as a TEAM

- Take a look at the MONTHLY WATER USAGE chart to see how our consumption changes throughout the year.
  - When do we use the least? **Winter**
  - The most? **Summer**
  - With your group, think of some activities that increase our water consumption at that time of year.  
**Lawns, gardens, outdoor swimming pools, car washes, golf courses**
- On your table is a WATER PIE chart showing where we use water inside our homes.  
**Background: Did you know that Canadians are one of the biggest water users in the world? How we use water:**
  - As a group, decide how many litres of water one person would use each day for every activity. **The daily average for Nanaimo residents is 198 L/person/day for home indoor water use.**  
Here's the breakdown for residential indoor water use:  
21% bathing and showering  
28% toilet  
23% laundry  
13% kitchen and drinking  
5% cleaning (hand washing with tap running: 8L, brushing teeth with tap running: 10L)  
10% leaks
  - Add them up. What is the total for all of the activities together?  
**On average, water use is 251 L/person/day in Nanaimo if we include use outside (irrigation, car wash) and 470 L if we include malls, schools, hospital.**
- On your table is a bag with AVERAGE MONTHLY PRECIPITATION markers inside. There are 12 monthly precipitation markers altogether but only 9 of them are labelled. Your challenge is to fill in the unlabelled markers correctly and complete the year.
- Now take a look at how the MONTHLY WATER USAGE and the AVERAGE MONTHLY PRECIPITATION compares.
  - How much precipitation do we receive during periods of high consumption?  
**Missing months: April 68 mm, July 19 mm, November 179 mm**
  - What kinds of problems might this cause? **Supply and demand are not equal.**
  - How can we help to reduce these problems?  
**We need to especially consider conservation in the summer.**
- Return the materials to the correct bags and set the station up for the next group.



## Activity Three

### WHERE IS WATER IN THE WATERSHEDS?

Three stations to do in small groups

#### Station B

#### WATER LINE-UP: Sort and match Watchwords

WORK as a TEAM

##### PART 1 - WATER LINE-UP cards

1. Work with either pictures or words. It is your choice.
2. Put these cards in order to show how water moves from the sky.
3. Compare your order with the answer key.
4. Discuss these questions:
  - a. What helped your team figure out the order?
  - b. What was the most difficult card to place in order?
  - c. What steps or cards could be added?
5. Close the answer key, shuffle the cards, place them back in the bag and set it aside

##### PART 2 - WATER WATCHER cards

6. Match as many pictures and words as you can.
7. Make your best guess for any words you don't know or use a dictionary.
8. Compare your matches with the answer key.
9. Discuss these questions:
  - a. What was the easiest match to make?
  - b. What was the hardest?
  - c. Why do you think you were given these words?
10. Close the answer key, shuffle the cards, place them back in the bag and set the station up for the next group.







## Activity Three

### WHERE IS WATER IN THE WATERSHEDS?

Three stations to do in small groups

## Station C

### WATER WEB: Where does Water hang out in our Watersheds?

#### WORK as a TEAM

1. Open the bag with the “WATERSHED WILDLIFE Cards” and pass around the different plants, animals, and fungi that live in the Watershed you’ll be visiting.
2. As a group, split the cards into two different piles according to:
  - a. *Wildlife you’ve heard of vs. Wildlife you’ve never heard of*, **OR**
  - b. *Wildlife you’ve seen before vs. Wildlife you’ve never seen before*
3. Gather the cards, shuffle them and then deal them face down to all players.  
**DO NOT LOOK AT YOUR CARDS YET!**
4. Your group is going to build a “Water Web” 1 card at a time. A Water Web is the same as a food web only we are looking at how water moves when it is inside living creatures:
  - a. The youngest person (player 1) goes first, drawing a card from the top of their pile and laying it in the centre of the table.
  - b. Player 2 draws their card next (player 2 is clockwise from player 1).
  - c. As a group decide if the wildlife on that card is connected to the first card by asking “Does one consume the other?”
  - d. If the answer is “yes”, then draw a line between the two cards with an arrow pointing at the consumer. This shows the direction that water is travelling in the Water Web.
  - e. If the answer is “no” then place the card somewhere else on the paper. Eventually enough cards will be drawn that everything will become part of the Water Web.
  - f. The next player should draw their card and repeat step “c”. Continue until everyone’s cards are on the table.
5. Were there any cards that couldn’t be connected to the Water Web?
  - a. Why couldn’t they be connected?
  - b. Do you think the unconnected cards hold onto their water forever?
  - c. Which cards appear to collect the most water in the Watersheds?
6. When you are finished place the cards back in the bag and set the station up for the next group.



## Activity Four

### COMMON SENSES:

## Learning how to experience the Watershed



#### TIME

30 - 60 min

#### MATERIALS

Pencils or pencil crayons

Recipe or index cards

(4 x 6)

#### Sound Mapping

1. Provide each student with a 4 x 6 index card and ask them to draw a tiny stick person in the middle.
2. Explain that this card is going to be their sound map and that the person they've drawn in the middle represents them. A sound map is different from a regular map because it shows where sounds are instead of things like streets or landforms. Point out that their sound maps are blank right now but soon they will be outside listening carefully and filling their maps in.
3. Before your students go outside, explain to them the process of sound mapping using a whiteboard or other means to demonstrate the process:
  - a. First your students need to quickly find a place to sit or stand for 5-10 minutes somewhere within the outdoor space you have available to use (i.e. schoolyard). The faster they find a place, the less chance they will have of distracting others with noisy footfalls.
  - b. The point of this activity is to listen carefully to the world around them and the best way to do this is to keep their eyes closed whenever they aren't drawing.
  - c. When they hear a new sound, they should try to "capture" that sound on their map. Capturing the sound means making marks on their papers that show where the sound happened and what made the sound. These marks should be very simple but recognizably different from each other. For example: a droplet to represent the dripping faucet nearby, a small "m" shape to represent a bird calling, or a line with two circles to represent the car that drove by. The point of this activity is to spend more time listening than drawing.
  - d. To aid in their listening, have the students cup their hands behind their ears to increase the amount of sound they can capture. If they cup their hands in front of their ears facing the opposite direction, then students can also hear what is happening behind them without having to turn around. It is worthwhile practicing this in the classroom before you take everyone outside.
  - e. Ask your students to spread out as much as possible to generate a variety of maps and sounds. After 5-10 minutes are up, call the group back together and ask your students to share and explain their sound maps with a partner.
4. Ask your students the following questions:
  - a. How many different sounds did you hear?
  - b. Which sounds did you like best? Why?
  - c. Which sounds did you like least? Why?
  - d. Which sounds had you never heard before? Do you know what made the sounds?
5. As a group, make a list of the 5 most common sounds that were captured during this activity.
  - a. What do these sounds tell us about the place we were in?
  - b. *Do you think we will hear these sounds in the Watershed?*
  - c. *What sounds do you think we might hear?*

# Activity Five

## GETTING READY - How to best enjoy your Watershed visit



**TIME**

Part A – 10 - 20 min

Part B – 20 - 40 min

**MATERIALS**

GETTING READY worksheet

Your pre-packed backpack

**PART A – SIDE 1**

1. As a class, discuss the type of weather we could have and the kinds of shoes and clothing we should bring to stay warm and dry.

*Scenarios*

- a. It might be a warm, sunny day. What clothing and supplies should we bring?
- b. We may have some hills to climb and trails to follow. What footwear should we bring?
- c. In the Watersheds, the weather can change suddenly. If it becomes cold, wet and stormy, what extra clothing would be smart to bring? What extra footwear would be smart to bring?
- d. Outhouses are the only facilities available

*NOTE TO TEACHER:* Your students and chaperones are not allowed to bring umbrellas with them on this trip; therefore some kind of rain gear will be essential for their comfort in the event of bad weather. We do have a small supply of emergency ponchos that students who do not own rain gear can borrow.

**Part B – What should we bring?**

2. Ask students for their ideas by asking “What do you need to pack in your backpack?” OR unpack a backpack you’ve prepared and ask students to suggest reasons why each item is included. (You can add funny inappropriate items to get them thinking too.)
3. Have students complete the “Getting Ready” worksheet.

**Teachable Moment**

*You may want to discuss the pros and cons of choosing a reusable container for water/drink versus a single-use water bottle.*

**Did you know?**

*Plastic water bottles create garbage. Millions of single use water bottles end up in landfills every year.*

**Suggested items for student backpack:**

- BIG lunch
- drink in a reusable container (1 litre bottle recommended)
- several snacks
- hat
- gloves
- warm socks\*
- camera
- sunscreen
- bag for your garbage

*The watersheds are often colder than where we live.*

## Activity Five

### GETTING READY - What should I pack in my backpack?

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1. When you visit the watershed you need to be prepared to be outside for more than three hours. What will you need to bring on your trip?
2. Draw or write each item beside the backpack below.
3. Take this page home to help make sure your backpack is packed correctly.

Parents: Umbrellas are NOT suitable for this trip.



# My Watershed Pledge



Your pledge helps protect our watersheds and reservoirs.

I, \_\_\_\_\_ agree to:  
(print your name)

- Pack out everything I bring
- Use the toilets provided
- Respect plants and animals
- Stay with my group

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

This pledge also allows you to enter the watershed. Watershed Security will collect your pledge when you arrive. Your official business is to explore and learn about the watershed with us so you can share this with others.

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- Use the toilets provided
- Respect plants and animals
- Stay with my group

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

This pledge also allows you to enter the watershed. Watershed Security will collect your pledge when you arrive. Your official business is to explore and learn about the watershed with us so you can share this with others.

## My Watershed Wonder



Questions I have...

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## My Watershed Wonder



Questions I have...

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## My Watershed Wonder



Questions I have...

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## My Watershed Wonder



Questions I have...

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Note: This form must be returned in order for your child to participate.

# Parent/Guardian Consent Form

## Exploring our Watersheds & Discovering Connections

Dear Parents/Guardians,

On \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, our class will be travelling to  
(day) (month) (date) (year)

\_\_\_\_\_ Watershed for a SPECIAL day of outdoor learning connected to school curriculum.

This watershed is one of the major sources of our region’s tap water. These areas are generally restricted to the public except for education through organized school programs and occasional public tours.

Students will have the opportunity to learn about the unique features of this area and become champions for sharing what they learn. They will learn about biodiversity and ecosystems by hiking in a protected regional park, see some of the complex systems in place to provide safe drinking water and discover how people work to protect our tap water.

Please be advised that students will be walking distances on un-surfaced trails. It is important that they wear comfortable footwear. We are fortunate to share the watershed land with wildlife including black bears and cougars. Every attempt will be made by our educators to keep your child safe during their visit. They each are trained in level 1 First Aid. Many safety techniques will be employed throughout the field trip, along with a chance for students to learn more about these great creatures and their habitat. Please encourage your child to follow the instructions provided to ensure a safe and enjoyable program for all.

The watershed is a large forested environment and **students will be outside for the duration of the program** (about 4 hours). It is often wetter and cooler in the watershed area than in the city or countryside. There are no facilities to purchase anything. Only outhouses are available.

**THE BEST WAY YOU CAN HELP YOUR CHILD IS TO MAKE SURE THEY WEAR/BRING:**

- layers of clothing
- comfortable walking shoes or boots (not flip-flops please)
- a RAINCOAT
- an extra sweater, socks, hat and sunscreen
- a BIG LITTERLESS lunch, water in a reusable container and extra snacks (The fresh air makes everyone more hungry than usual!)  
All garbage must be taken home with the students as part of our ‘pack out what you pack in’ policy.

Students will leave the school at \_\_\_\_\_ am by bus, and return to the school at approximately \_\_\_\_\_ pm. They will be accompanied by \_\_\_\_\_ teacher(s) and \_\_\_\_\_ adult volunteers. One watershed educator will be assigned to each group of 15 students. The trip is provided at no cost to the students or schools, by the Regional District of Nanaimo.

Please return the bottom of this form to the school no later than \_\_\_\_\_.

I, \_\_\_\_\_, give permission for my child, \_\_\_\_\_,  
(print name) (print name)

to attend the Regional District of Nanaimo watershed field trip on \_\_\_\_\_.  
(date)



Signed: \_\_\_\_\_

# Adult Declaration Form

## To enter watershed area

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### The City of Nanaimo, City of Parksville, Island Timberlands, TimberWest - Cooperative Watershed Guidelines

The following rules and requirements are for the protection of the water sources from pollution and fire. Access is restricted and those who participate in education programs or tours are expected to adhere to the same rules and guidelines in place for everyone with specific jobs to do in the watershed areas.

It is absolutely essential that everyone realize that the water supply is potentially vulnerable to microbiological and chemical contamination through their actions and that they make every effort to prevent contamination by complying with these rules. Failure to adhere to the requirements of these shall be grounds for immediate eviction from the watershed and may result in permanent cancellation of entry privileges.

Date of your visit: \_\_\_\_\_

- We will:
- follow the instructions of our guides and watershed personnel
  - stay with the group
  - use toilets provided
  - pack out whatever we pack in
  - not smoke

The names and signatures of the teacher(s) and all adult volunteers on the education program are listed below with signatures.

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Class Teacher \_\_\_\_\_ Signature \_\_\_\_\_

Other Teacher \_\_\_\_\_ Signature \_\_\_\_\_  
(where applicable)

Adult Volunteer \_\_\_\_\_ Signature \_\_\_\_\_

Adult Volunteer \_\_\_\_\_ Signature \_\_\_\_\_

Adult Volunteer \_\_\_\_\_ Signature \_\_\_\_\_

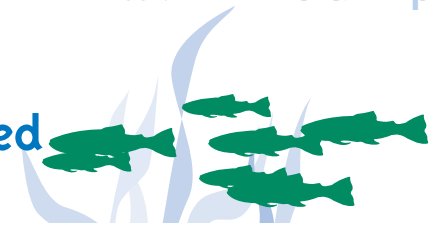
Adult Volunteer \_\_\_\_\_ Signature \_\_\_\_\_



DRINKING WATER  
WATERSHED  
PROTECTION



## PART 2: Field Trip - Your visit to the watershed



### What can we expect the day to look like?

Timing	What happens?	What's that look like?
8:30 - 9:00 (depending on where your school is located in relation to the watershed)	Bus arrives at your school. Meet your driver.	<ol style="list-style-type: none"> <li>1. Bring 2 copies of your class lists of students and the completed ADULT DECLARATION form.</li> <li>2. Bring student PLEDGE forms to receive permission to enter the Nanaimo River Upper Watershed.</li> <li>3. Bring 5 satellite maps and kit supplies from Part 1 to return to education staff. (Keep one satellite map for your classroom.)</li> </ol>
15 minutes later	On the bus and ready to go.	Conduct head count, other school-related prep and protocols, etc.
8:45 - 9:15 (varies)	Depart the school.	Invite students to have a snack at around 9:30 or 9:40 am, while en route.
9:45 - 10:00	Stop at Morrell parking lot.	Pick up the education team and begin program.
5 minutes	Education team will set up the day.	<ol style="list-style-type: none"> <li>1. Hand in class list and adult declaration forms. These are provided so there is a record of who entered the watershed.</li> <li>2. Hand in student PLEDGE forms and the Watershed Discovery kit.</li> <li>3. We make a big deal about entering through the security gate with the students when we come to it.</li> </ol>
10:05 - 11:00	Travel to first site: Jump Lk Dam.	Play a game on the bus. Welcome to our Water Bus. We've equipped it with games and fun surprises to make the day interesting....even if it's raining or snowing!
20 minutes	Participate in opening activity.	A good stretch will be good for everyone after a long bus ride. We'll select something related to the theme of the day to get the brain warmed up too! Use the outdoor washroom.
40 minutes	Do a variety of activities.	<p>Digging into the place - where does our water come from?</p> <p>Digging into the content - what is a watershed?</p> <p>Getting students engaged with both.</p>
Approx. 12:00 to 1:00 (drive to 2nd site)	Bus to Regional Park.	<p>Replenish energy with a snack on the bus.</p> <p>Soak in views.</p> <p>Games and trivia for prizes.</p>
20 minutes	Use toilet & eat LUNCH at Park. Split into 2 groups for activities.	<p>Nourishment by the riverside.</p> <p>Reenergized and ready to get into the content.</p> <p>Getting students engaged with this second site, reflect on morning.</p>
1:20 - 2:00	Variety of activities at the Park, reflection activity.	We'll focus on ecology and senses, bringing their experiences and excitement together.
2:10	Bus leaves for school.	This is a good time to share highlights with one another on the bus and dig into any uneaten snacks!



## PART 3 - Reflecting & Connecting

### POST-TRIP ACTIVITIES

**We suggest doing these activities within a week or so of your visit.**

We hope that you've enjoyed your field trip experience into the Nanaimo River or Englishman River Watershed. We would now like to strongly encourage you to take the following actions:

1. Complete some or all of the activities we've provided for you in this third part of our watershed school program experience. Research shows us that students, parents and administrators place greater value on student field trip experiences when they are perceived to complement related classroom-based activities. Post-visit activities help to:
  - Identify and correct any misconceptions the students may have developed to this point;
  - Extend student engagement by addressing questions, providing opportunities for reflection, and enhancing the relevance of what they've just experienced; and,
  - Model the value of informal learning experiences (such as field trips) for students who might otherwise view them as frivolous or of limited value.
2. Complete any feedback forms you've been provided with and return them to the RDN as soon as possible. This allows us to continuously improve the experience for yourself and for future field trips (we hope this includes you!)
3. Let other teachers know about this by directing them to [www.dwwp.ca](http://www.dwwp.ca) > *Projects* > *School Education*.

The following activities are designed to help your students extend their understanding of the amazing resources that are the Nanaimo River and Englishman River Watersheds. Now that your students better comprehend the value of a well managed Watershed for providing safe drinking water, the following activities will help them better understand how that water is treated and delivered safely to their taps.

## Activity One

### Watershed Reflections



Create a postcard to tell someone about your watershed experiences and your most memorable moments!

#### Student Postcard

Use a photo of your choice – we'd suggest your class photo from the trip! Your students should write what they want but we've included a couple of ideas to get them started.

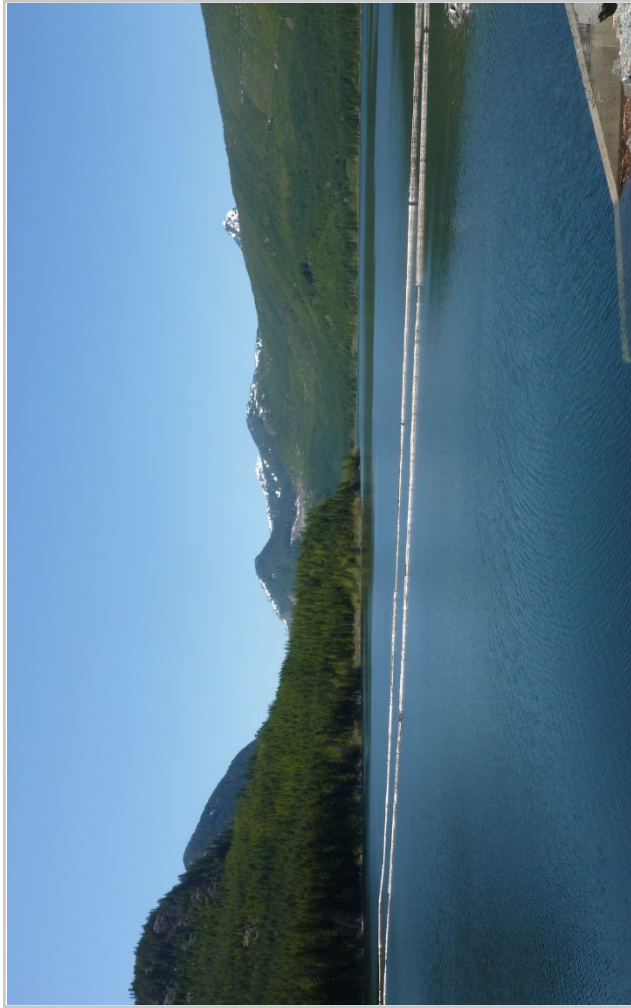
We would love to see these. If you'd like to share them, please send to:

Drinking Water & Watershed Protection Program, Regional District of Nanaimo

6300 Hammond Bay Road, Nanaimo, BC, V9T 6N2

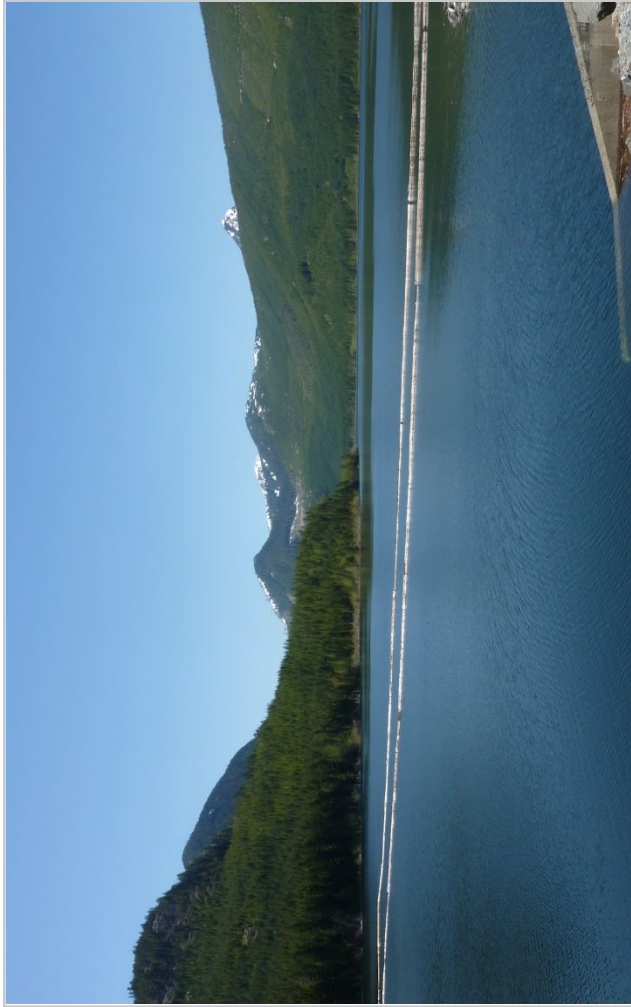
#### MATERIALS

Postcard front  
(or similar)



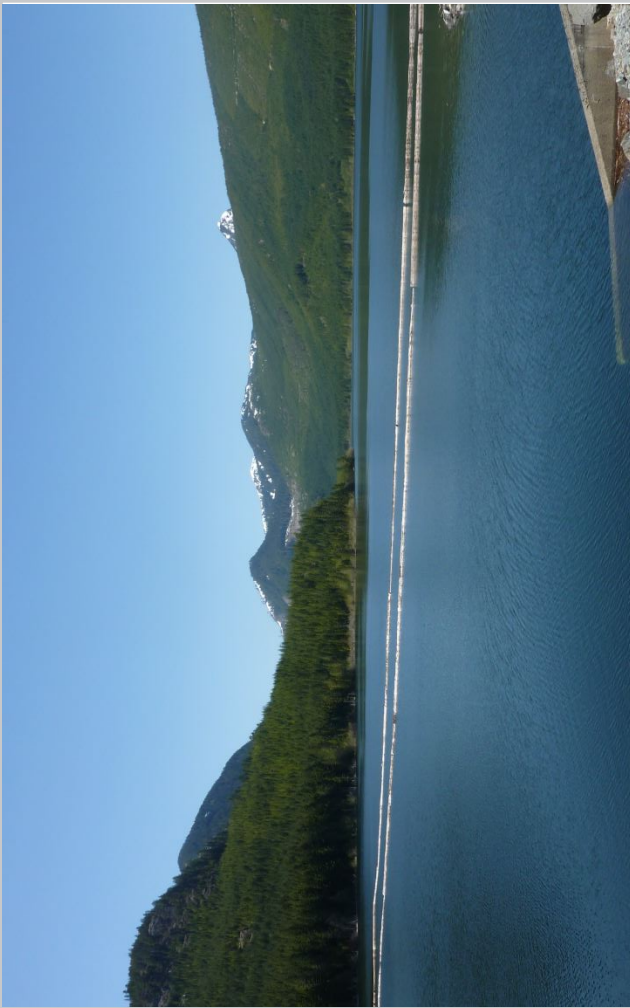
DRINKING WATER  
**WATERSHED**  
PROTECTION

**Hello From...**



DRINKING WATER  
**WATERSHED**  
PROTECTION

**Hello From...**



DRINKING WATER  
**WATERSHED**  
PROTECTION

**Hello From...**



DRINKING WATER  
**WATERSHED**  
PROTECTION

**Hello From...**

Here's my class in the:

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My favorite part of the day was:

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I'd love to show you:

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From:

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Here's my class in the:

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My favorite part of the day was:

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I'd love to show you:

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Here's my class in the:

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Here's my class in the:

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## Fabulous Filters- Background information



How does the South Fork Water Treatment Plant produce our drinking water?



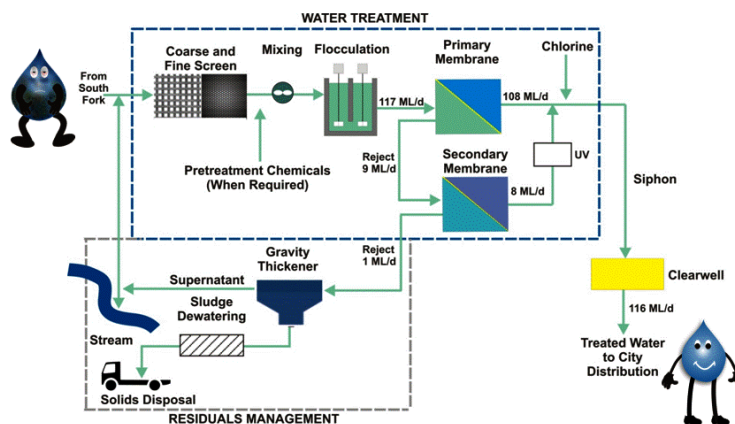
Water from Jump Lake begins its piped journey towards the filtration plant downstream at South Fork dam. It enters a big (2.3 metre-wide) pipe called a water main through an opening in the dam called an intake. The intake has a rotating screen that prevents much of the debris floating in the water from entering. This step reduces the amount of work necessary to treat the water.

Gravity and pressure then move the water downhill through the water main for approximately 20 km to the treatment plant at the city boundary. As it enters the plant, chemicals called coagulants and flocculants are mixed into the water. These chemicals affect the way that tiny particles in the water behave – they help the tiny particles stick together to form larger particles (called floc). Floc is more easily removed by the filters than the tiny particles would be on their own.

After the chemicals are properly mixed, the water then flows on and into the filter membranes. The filter membranes consist of hollow fibers that trap microscopic particles and bacteria in its ultra tiny pores. As the water moves through a series of these filters, first the primary and then the secondary membrane, 99.9% of the impurities are left behind. The clean water continues to flow downwards and eventually drains out and into another pipe leading to the Ultra-Violet (UV) disinfection chamber.

The UV chamber is lit by powerful lamps that bombard any remaining particles in the water with UV light. Anything living that might have made it through the filtration process is no longer a worry after UV treatment. UV treatment and a tiny bit of chlorine ensures that the water leaving the treatment plant by pipe to the city is safe to drink and it tastes great! The South Fork Water Treatment Plant will be up and running by 2015.

### South Fork Water Treatment Plant Processes





## Fabulous Filters

### Ask your students to:

1. Work together in pairs to collect all of the materials they want to use to filter water with.
2. Place the top half of the pop bottle upside-down inside the bottom half so that water can funnel through it. The top half will become the filter and the bottom half will collect the filtered water.
3. Before they begin layering the filter materials into the top half of the bottle, students should consider:
  - Will this layer be good at filtering smaller or larger particles?
  - What is the best order to place the filter layers in?
  - How thick should each layer be?
4. Predict how the appearance of the water will change after it goes through their filters. Pour the dirty water through the filter. Were their predictions correct?
5. Take their filters apart and to examine the different layers. Can they see what the different filter layers removed from the water?
6. Empty the filtered water into a separate container. Label it with the combination of filter materials they used for that trial. Do this for each trial.
7. Clear the filter materials from their filters and clean the bottle halves before the next trial. They should only change 1 variable for each trial, such as:
  - the order of the layers
  - the thickness of each layer
  - reducing or increasing the number of layers you use
8. Compare the results of at least three different filter trials.
  - Which combination of materials was the most effective for cleaning their water?
  - Why do they think it was more effective

### TIME

40 minutes

### MATERIALS

- Porous materials to create filter layers with: washed gravel, washed sand, coffee filters, paper towels, cotton balls, beads, grass, paper strips, cloth (brainstorm more with your students)
- 2-litre pop bottle cut in half
- “Dirty” water – add soil, sand, clay, leaves, sticks, grass, pieces of paper (keep it safe!)
- Containers for the filtered water

### Did you know?

A typical Canadian household uses about 450,000 litres of water a year.

### Did you know?

At least one billion people must walk 3 hours or more each day to collect water.  
(Stockholm Water Foundation)

One lawn sprinkler uses about 1,300 litres of water an hour.



## Wearing Water

In Canada we have some of the highest per capita water consumption rates in the world. In 2012, Nanaimo used 470 litres per person per day. This is calculated by dividing total water use in the region (water losses and leakage, water use at home, work and school, and all non-residential use such as industrial, commercial, institutional and agricultural users) by the total number of people the city supplies water to. This number does not include the many other ways that we tend to consume water in our daily lives.

### Time

30 minutes

### Materials

- Toy car
- Pair of jeans
- Butter
- Disposable coffee cup with lid
- Bottled water
- 1 egg

### Did you know?

2.8 million paper coffee cups are thrown away every day, based on just one cup a week among coffee drinkers.

### Ask Your Students To:

1. Think of other ways that our society uses drinking water beyond normal household uses.
2. Divide your class into six smaller work groups and provide each group with one of the items you've collected to represent the items listed in the "Props" section below.
3. Ask groups to make a list of how water might be used in making their item and to come up with a total for the amount of water they think was used. They should consider:
  - materials used
  - farming or mining
  - cleaning or making
4. Ask a student from each group come to the front of the class with their item and to line up from the most water used to the least water used. Capture these on the board.
5. When the students have returned to their seats, write the actual amount of water used beside their guess. Have a discussion with your students considering the following:
  - What item's water use surprised you the most? Why?
  - What items would be easiest for you to stop using?
  - Why do people drink bottled water?

### Background

Paper = 5,000 litres required to produce 500 sheets

Chocolate = 12,000 litres required to produce 0.5 kg of chocolate

New pair of jeans = 6,814 litres required to produce enough cotton

Apple Juice = 225 litres required to produce 1 cup

Rice = 1700 litres required to produce 0.5 kg

Bottled Water = 7 litres to produce a 355ml plastic bottle

\* Source:

<http://environment.nationalgeographic.com/environment/freshwater/embedded-water/>

# Vocabulary List

Some of the following vocabulary words have more than one definition. We have provided the definition that is the most relevant for your Watershed Field Trip experience.

<b>Chlorine</b>	an element often used in small amounts to treat drinking water because of its ability to kill microorganisms that could otherwise sicken drinkers
<b>Condensation</b>	the process of a gas changing into a liquid
<b>Contamination</b>	when a substance becomes less pure because another substance has been mixed into it
<b>Corrosion</b>	the process by which a material (usually a metal) is eventually destroyed through chemical reactions with its environment
<b>Dam</b>	a structure built to reduce or stop the flow of water (such as a river) in order to create a reservoir
<b>Ecology</b>	the study of the relationship of living things to one another and the environment
<b>Erosion</b>	the wearing down or washing away of the land's surface by water, wind or ice
<b>Evaporation</b>	the process of a liquid changing into a gas
<b>Filtration</b>	to pass something (liquid, gas, light, or sound) through a device that removes unwanted materials from it
<b>Microorganisms</b>	any organisms too small to be seen by the eye alone
<b>Ozone</b>	a gas made from the element oxygen often used in small amounts to treat drinking water because of its ability to kill microorganisms that could otherwise sicken drinkers
<b>pH</b>	is a measurement of how acidic or basic a liquid is
<b>Pollution</b>	any substance that decreases the ability of the environment to provide what is needed without harming those that need it
<b>Precipitation</b>	water falling from the sky in a liquid (rain) or solid (snow) state
<b>Reservoir</b>	a large volume of water (such as a lake) stored for future use
<b>Resource</b>	any material, found naturally or created, that is desired and therefore valued
<b>Sediment</b>	solid pieces of material often eroded and small enough to be carried by water, wind, or ice
<b>Transpiration</b>	the process by which water that has been absorbed by plants is evaporated into the air from the plant surface (usually the leaves)
<b>Turbidity</b>	a measure of the cloudiness of water created by small, suspended particles within it
<b>UV</b>	stands for "ultraviolet" and refers to a specific kind of light used to treat drinking water because of its ability to kill microorganisms that could otherwise sicken drinkers
<b>Watershed</b>	an area, usually defined by an elevated ridge, within which all water flows into the same collecting body (such as a river or lake)
<b>Water cycle</b>	the path water takes through its various states (gas, liquid, and solid) as it moves through the air, the land, fresh and salt water, and living and non-living things on the Earth





## Field Trip Location

Jump Lake Dam &  
Nanaimo River Regional Park  
(SD68- Nanaimo, BC)

-or- Englishman River Watershed &  
Englishman River Regional Park  
(SD69 - Parksville, BC)

## We'd love to hear from you and your students!

Please share your students' work or comments and send them to:

Watershed Education, RDN Drinking Water & Watershed Protection Program

6300 Hammond Bay Road

Nanaimo, BC V9T 6N2

Send us your postcards!



## How to reach us

For payment information, program registration, or to adjust your program booking, contact:

Drinking Water & Watershed Protection Program, Reg. District of Nanaimo  
6300 Hammond Bay Rd.

Nanaimo, BC V9T 6N2

tel: 250-390-6560, fax: 250-390-1542

email: [waterprotection@rdn.bc.ca](mailto:waterprotection@rdn.bc.ca)

To speak to the program coordinator, call 250-390-6586.



