

Session 1

Watershed Detectives

Educator's Guide



Getting out into the neighbourhood, and exploring how water moves in the area surrounding your school, is a great way to get your students thinking about the watershed!



The Big Question:

What is our direct connection to the watershed?

Through the inquiry-based activities in this session, learners will become aware of the flow of water through the developed environment. The sense of interconnectedness emerges when learners begin to look more intentionally at the street gutters, water drains and culverts, bridges, and other elements they might pass by every day, but never really see.

By exploring their neighbourhoods through a watershed lens, learners discover that familiar things we know as common parts of human development (e.g., culverts, drains, bridges, and dikes) are part of a larger system called a watershed. They are also vulnerable parts of the watershed, because of all the human activity going on around them.

Indigenous Knowledge Element

Mukw' stem 'i utunu tumuhw, 'o' huliitun tst,
Everything on this Earth is what sustains us,
mukw' stem 'i 'utunu tumuhw 'o' slhiilhukw 'ul'.
everything on this Earth is connected together.

from a list of teachings worked on by Quw'utsun elders called "The Cowichan Teachings"

Ideally, you will have an Elder or Knowledge/Culture-Keeper come in a talk about interconnectedness. There is often a great deal of local knowledge about how the local river and stream systems flowed in the past. It is interesting to hear how Indigenous communities lived in the past, to harmonize with the flow of water. For example, many cultures had different village sites that they used in different seasons.

Preparation

Materials and resources that you will find useful/need for this session include:

- › An assortment of maps of your local neighbourhood. These include street maps, storm drain system maps, topographical, and historical maps
- › Grade-level appropriate textbooks and reference materials
- › *Why Fish Need Water* video from the Cowichan Watershed Board: youtu.be/ZsD4X1zPmTw
- › The label sheet for the *Watershed Detectives* session (*Learner's Guide—Session 1*, page LG1-7)
- › *Watershed Detectives* "Watershed Wiz Quiz" game cards (this guide, page AP1-4)

Learners will need:

- › Cameras or cell phones
- › Tools for making notes in the field (cell phones, notepads, pencils, etc.)

Introducing the Concept

Your students may have never considered that their everyday surroundings are part of a big, complex system like a watershed. We suggest getting them thinking about this by starting with some questions, such as:

- › Do you think we are in a watershed right now?
- › Where do you think a watershed starts?

After asking a few of these opening questions, direct your learners to read through the introductory section of the *Session 1: Watershed Detectives* Learner's Guide.

Learning the Content

Activity 1 turns your learners into local watershed detectives. In small groups, they will first learn the session words and terms in preparation for their detective work. Then they will explore the neighbourhood and look for urban watershed clues (which are the terms explored in this session). They will take pictures and make notes, bringing these back to the classroom for further discussion and comparison with local current and historical maps. Refer to the activity session plan for step-by-step guidance in this activity.

Words and Terms

Culvert a tunnel (with or without a pipe) carrying a waterway (stream or ditch) under a road or railroad.

Dikes a long wall or embankment built to prevent flooding from the sea or other bodies of water.

Ditches a narrow channel dug in the ground, typically used for water drainage alongside a road or the edge of a field.

Impervious or Impermeable a surface or substrate that does not allow fluid to pass through.

Interconnectedness the idea that all living and non-living things in the world are connected.

Perimeter Drains drainage system designed to collect the water that accumulates next to the foundation wall of a home. The drain is installed around the exterior or interior of a home to divert water away from the foundation and into the surrounding environment.

Pervious or Permeable a surface or substrate that allows fluid to pass through.

Storm-drains infrastructure designed to drain excess rain and groundwater from impervious surfaces such as paved streets, car parks, parking lots, footpaths, sidewalks, and roofs.

Evaluating the Learning

Watershed Wiz Quiz Game

This is an optional activity. For instructions, see session Activity Plan (page AP1-3).

Watershed Reflection

The “Watershed Reflection” activity gives learners the opportunity to process what they have learned and make connections to their own life and experience. It is also a valuable way to help you assess the level of learning and comprehension in your group, and to provide some guidance towards ideas you may want to revisit through the rest of the projects and beyond.

There are several key learning outcomes to look for within the reflection component of this session. Students will be able to:

- Express how we are connected to the watershed
- Explain the difference between a ditch and a culvert
- Explain the purpose of a storm drain
- Describe the purpose of a perimeter drain
- Understand the role of bridges and dikes

Sharing Circle

This valuable exercise involves taking a few moments to sit in a circle, and invite participants to share something from their “Watershed Reflection”.

Watershed Detectives: Grade Curriculum and Competency Connections

For detailed information visit <https://curriculum.gov.bc.ca/curriculum/science>

Grade Level and Subject	Content Connections	Curricular Competencies
Grade 9 Science	<ul style="list-style-type: none">• Matter cycles within biotic and abiotic components of ecosystems• Sustainability of systems• First Peoples knowledge of interconnectedness and sustainability	<ul style="list-style-type: none">• Questioning and predicting• Planning and conducting• Processing and analyzing data and information• Evaluating• Applying and innovating• Communicating
Grade 9 Social Studies	<ul style="list-style-type: none">• Physiographic features of Canada	<ul style="list-style-type: none">• Use Social Studies inquiry processes and skills to ask questions; gather, interpret, and analyze ideas; and communicate findings and decisions

Grade Level and Subject	Content Connections	Curricular Competencies
Grade 11 Earth Science	<ul style="list-style-type: none"> • The hydrologic cycle • First Peoples knowledge of climate change and interconnectedness as related to environmental systems • Water as a unique resource • First Peoples knowledge and perspectives of water resources and processes 	<ul style="list-style-type: none"> • Questioning and predicting • Planning and conducting • Processing and analyzing data and information • Evaluating • Applying and innovating • Communicating
Grade 11 Environmental Science	<ul style="list-style-type: none"> • Energy of water flow through ecosystems • First Peoples ways of knowing and doing 	<ul style="list-style-type: none"> • Questioning and predicting • Planning and conducting • Processing and analyzing data and information • Evaluating • Applying and innovating • Communicating
Grade 11 Science for Citizens	<ul style="list-style-type: none"> • Scientific processes and knowledge inform our decisions and impact our daily lives • Scientific understanding enables humans to respond and adapt to changes locally and globally 	<ul style="list-style-type: none"> • Questioning and predicting • Planning and conducting • Processing and analyzing data and information • Evaluating • Applying and innovating • Communicating
Grade 12 Environmental Science	<ul style="list-style-type: none"> • Human actions affect the quality of water and its ability to sustain life • Human activities cause changes in the global climate system • Living sustainably supports the well-being of self, community, and Earth 	<ul style="list-style-type: none"> • Questioning and predicting • Planning and conducting • Processing and analyzing data and information • Evaluating • Applying and innovating • Communicating
Grade 12 Specialized Science	<ul style="list-style-type: none"> • Biodiversity is dependent on the complex interactions and processes between biotic and abiotic factors • Climate change impacts biodiversity and ecosystem health 	<ul style="list-style-type: none"> • Questioning and predicting • Planning and conducting • Processing and analyzing data and information • Evaluating • Applying and innovating • Communicating

Notes

[illegible]

Activity Plan

Session 1: Watershed Detectives



Big Idea/Inquiry

What is our direct connection to our watershed?



Time

Approximately 2.5 hours

Indigenous Knowledge Element: All Things are Connected

Mukw' stem 'i utunu tumuhw, 'o' huliitun tst,
Everything on this Earth is what sustains us,
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Purpose

The purpose of the session is for students to learn how a watershed flows through developed areas, that the natural flow has often been greatly changed by human development, and that we are interconnected with the watershed.



Handouts/Materials

- *Learner's Guide—Session 1: Watershed Detectives*
- Grade-level appropriate text books and resources
- Maps from Municipality or Regional District
- Historical maps of your area (can often be found through community archives/historical societies, etc.)
- "Watershed Detectives" labels (see Learner's Guide, page LG1-7)
- "Watershed Wiz Quiz" game cards (in this guide, page AP1-4)



Equipment Needed

- Cameras or cell phones
- Note-taking materials



Learning Goals

- To become more aware of how natural watersheds are modified by conventional human development
- To understand some of the consequences of altering the natural flow of our watersheds
- To explore the idea of 'interconnectedness'

Learning Outcomes

Students will be able to:

- › Express how we are connected to the watershed
- › Explain the difference between a ditch and a culvert
- › Explain the purpose of a storm drain
- › Describe the purpose of a perimeter drain
- › Understand the role of bridges and dikes
- › Explain why watersheds are important to Indigenous peoples

Key Learning Points

- › Watersheds flow through every area, we often overlook them, but we are interconnected with watersheds
- › These are important habitats for fish and other creatures
- › Watersheds provide food, medicine, and natural protection for Indigenous peoples
- › Waterways in the urban environment are especially vulnerable, because they are exposed to more human impact
- › Altered and degraded watersheds impact humans through flooding and erosion

Introducing the Topic

Direct learners to read through the introductory section of their *Watershed Detectives* Learner's Guide either independently or in small groups.



Activity 1: Watershed Detectives

Part 1	<ol style="list-style-type: none">1. Break into small groups (2-3 learners) and have each group look up the session words and terms in preparation for their detective work2. Next, take a few minutes to look over the map of your neighbourhood as a group3. Then take a walk around your neighbourhood and identify the features of the watershed in your neighbourhood. If possible, split into groups of three and go in different directions.4. Direct learners to complete the "Watershed Detectives" activity questions in the Learner's Guide and have them take pictures and/or make notes of ditches, culverts, and storm drains.
Part 2	After you return from Activity 1, have each group share what they discovered and add the information to the maps using the session labels. If possible, compare what they discovered with historical maps from your area from 50-100 years ago. Note any changes in where rivers and streams flow.

Closing the Session

Summarizing and Reflecting Activities: Have learners complete the following activities.



Activity 2: Watershed Wiz Quiz (optional)

Play “Watershed Wiz Quiz” using the “Watershed Detectives” session cards.

- Think ahead about who will start, depending on works best for your group dynamics.
- To play, the learner picks a card (a vocabulary word or term) and matches it with an example on one of the maps.
- They briefly explain what it is in their own words (see the “Words and Terms” definitions in this Educator’s Guide, page EG1-3).



Activity 3: Watershed Reflection

Recommendations for transitioning to this activity:

- Share a bit about what you are reflecting on at this stage of the session.
- Direct learners to page LG1-6 of their Learner’s Guide to work independently through this activity.

Review each student’s entry to help in evaluative.



Activity 4: Sharing Circle

Take a few moments to sit in a circle and invite participants to share something from their “Watershed Reflection”.

Watershed Wiz Quiz

"Watershed Detectives" Words and Terms

Interconnectedness	Culvert
Ditch	Bridge
Dike	Impervious or Impermeable
Perimeter Drain	Pervious or Permeable
Storm Drain	