

# Best Water Ways

## Watershed Literacy, Stewardship, and Restoration Place-Based Learning Resources



### Learner's Guide

By Stephanie Cottell, MSc Education for Ecological Sustainability



This initiative was inspired and developed within the unceded Traditional Territories of the Quw'utsun, Penelakut, Halalt, Malahat, Stz'uminus, and Lyackson People. Huy tseep q'u Siem! Thanks to you all with respect and honour!

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# Session 1

## Watershed Detectives

### Learner's Guide



*What happens when the natural flow of a watershed meets the areas of land where people have established and expanded towns and cities?*



## Today's Big Question:

## What is our direct connection to the watershed?

### Introduction

Welcome to this learning project. It is called *Best Water Ways*, and it is about watershed literacy, stewardship, and restoration. It is focused on the exploration of our place in the world, through inquiry, research, and local hands-on projects.

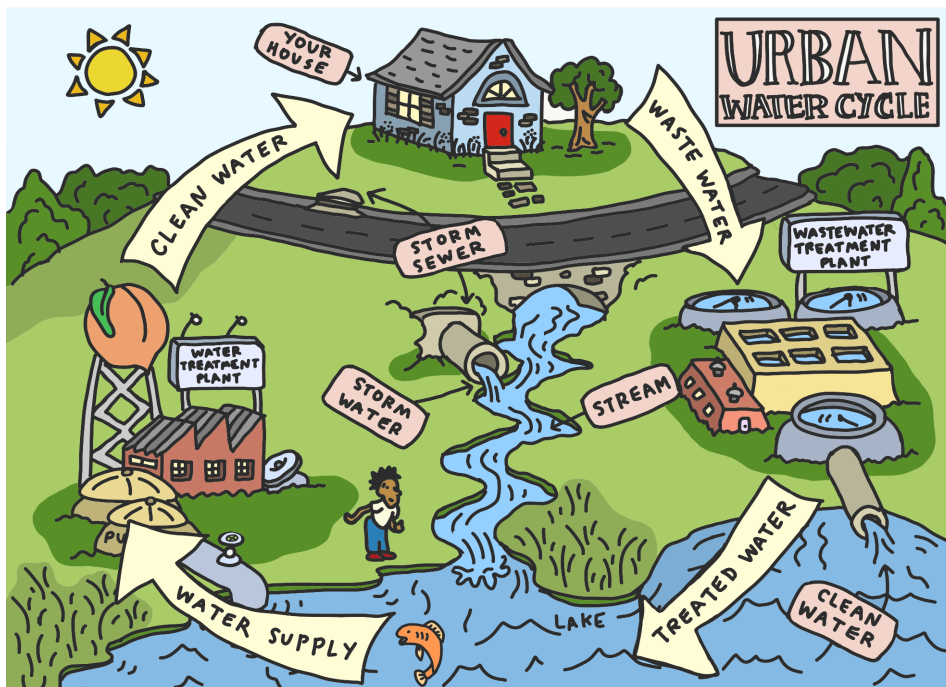
### What is a watershed?

Do you know that you live in, and are an active part of a living system? It is called a watershed. We will explore the big picture of watersheds in future sessions, but today we are going to focus on your connection to your watershed. We are going to explore where you are right now, in the neighbourhood where you spend most of your time each day. You will not have to go far to find a clue that connects you to the watershed, even if there isn't a river, lake, or stream in sight.

Everywhere that rain falls, and water flows on the earth, is part of the earth's big water collection, storage, and distribution cycle. So, when you see drops hit the pavement outside your house or drip down the gutters of your home, you are in the watershed.

Watersheds are important to Indigenous peoples, as they offer food, medicine, and natural protection. A common belief held by many Indigenous peoples is that 'all things in life are connected'. This means that what we humans do impacts other parts of life around us, and that, in turn, has an impact on us.

What happens when the natural flow of a watershed meets the areas of land where people have established and expanded towns and cities? Complete the following *Watershed Detective* activities to explore this question.



Source: Diane Kelment,  
Watershed Learning Network,  
University of Georgia:  
[http://wln.ecology.uga.edu/  
index.php/potentially-useful-images-  
video-links/](http://wln.ecology.uga.edu/index.php/potentially-useful-images-video-links/)





Quadrant counting of eelgrass in a local estuary.

*Photo: Stephanie Cottell*



## Activity 1: Watershed Detectives

In this activity, you are going to explore parts of the watershed closest to you and how you are connected to it.

### Part I

Break into groups of two or three. In these groups, look up the session's words and terms (listed below) to prepare you for your detective work.

### Your Words and Terms

Research each of the following words and terms. What do they mean?

- › Interconnectedness
- › Culvert
- › Ditch
- › Bridge
- › Dike
- › Impervious or Impermeable
- › Perimeter drain
- › Pervious or permeable
- › Storm drain

## Part 2

Now, you are all set to stake out the neighbourhood around your school and identify the features of the watershed around you. If possible, split into groups of three and go in different directions.

Look for any rivers, streams, creeks, ditches, culverts, dikes, and storm drains. Take pictures (if possible) of these watershed features, and make notes of their locations.

1. Check out the surrounding landscape. Did you see any storm drains marked with yellow fish icons?
2. Are there any identifiable riparian areas?
3. Do you see any presence of fish?
4. Is there evidence of flooding or blocked water flow? If so, what does it look like?
5. What else draws your attention?
6. Why are watersheds important to Indigenous peoples?

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins or other markings on the paper.

## What is a riparian area?

A riparian area refers to the area of land that is next to a water body. A healthy riparian area is made up of a community of plants, shrubs, and trees that help protect the water body and provide a healthy habitat.



### Part 3

After you return from your walk, each group will share what they have discovered. You will also compare what you have seen to the local maps provided by your teacher. Consider and answer the following questions:

1. How does what you have detected compare with what you see on the maps?

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2. Do you notice any differences in where rivers and streams flow on the map compared to what you saw in your exploration? What are these differences?

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3. How do you think the watershed might be affected by human activity in your area?

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## Activity 2: Watershed Wiz Quiz

For this session's "Watershed Wiz Quiz", you will take turns selecting a vocabulary word or term card. These are the words or terms you researched today. Match the word or term with an example from your exploration and explain a bit about it in your own words.



## Activity 3: Watershed Reflection

Write or draw about facts and ideas that stood out for you in today's session about watersheds. Include your thoughts on what you have learned.

In your reflection, touch on three or more of the following themes:

- › How you are connected to the watershed
- › The difference between a ditch and a culvert
- › The purpose of a storm drain
- › The purpose of a perimeter drain
- › Why we build bridges and dikes

### **Watershed Reflection:** *Watershed Detectives*

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## Labels for mapping *Watershed Detectives* discoveries

River	River	River
Wetland	Wetland	Wetland
Stream/Creek	Stream/Creek	Stream/Creek
Culvert	Culvert	Culvert
Culvert	Culvert	Culvert
Ditch	Ditch	Ditch
Ditch	Ditch	Ditch
Bridge	Bridge	Bridge
Bridge	Bridge	Bridge
Dike	Dike	Dike
Dike	Dike	Dike
Perimeter Drain	Perimeter Drain	Perimeter Drain
Perimeter Drain	Perimeter Drain	Perimeter Drain
Storm Drain	Storm Drain	Storm Drain
Storm Drain	Storm Drain	Storm Drain

## Notes

[illegible]



## Session 2

# Wading In

### Learner's Guide



*You'll be taking some time to think about water as a mysterious, yet essential, substance in our Earth's biosphere, and how water moves as cyclical systems through geophysiological pathways known as watersheds.*





# Today's Big Question: What is a watershed?

## Introduction

Welcome back to your *Best Water Ways* project! This session is called *Wading In*, and it looks at what unusual stuff water is, and how it moves through our lives and our world.

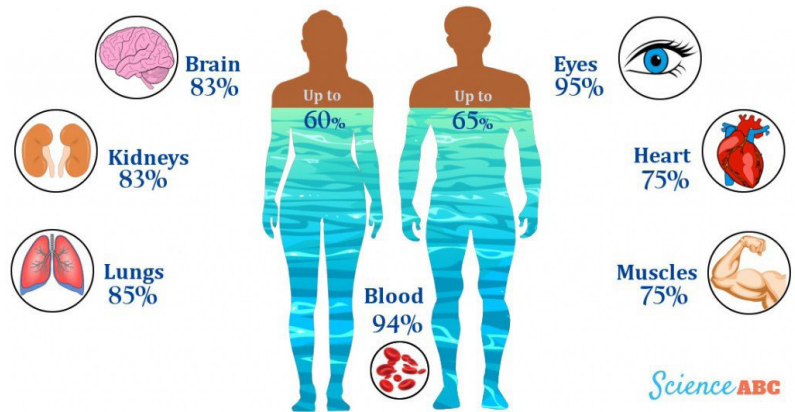
## What is Water?

Water is an essential part of life. Did you know that your body is made up of about 60-65% water? Water makes up over half your body composition!

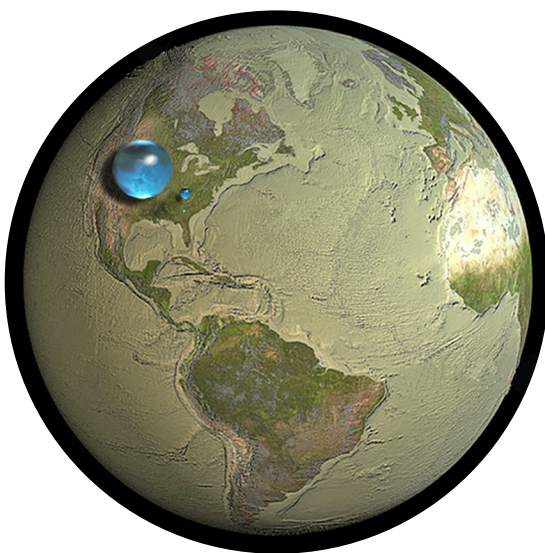
Look at this water composition graphic to see how reliant our bodies are on water.

Like your body, the Earth is a watery place. Approximately 71% of the Earth's surface is water-covered, and the oceans hold about 96.5% of all Earth's water. Water also exists in the air as water vapour, in rivers and lakes, in icecaps and glaciers, in the ground as soil moisture and aquifers, and in creatures like you. All biological life (humans and other mammals, fish, birds, insects, plants, and microbes) rely on clean, uncontaminated water.

Even though all life depends on water, there really isn't very much of the stuff when you compare it to the Earth itself.



Source: <https://www.scienceabc.com/humans/long-can-survive-without-water.html>



Source: <https://www.usgs.gov/media/images/all-earths-water-a-single-sphere>

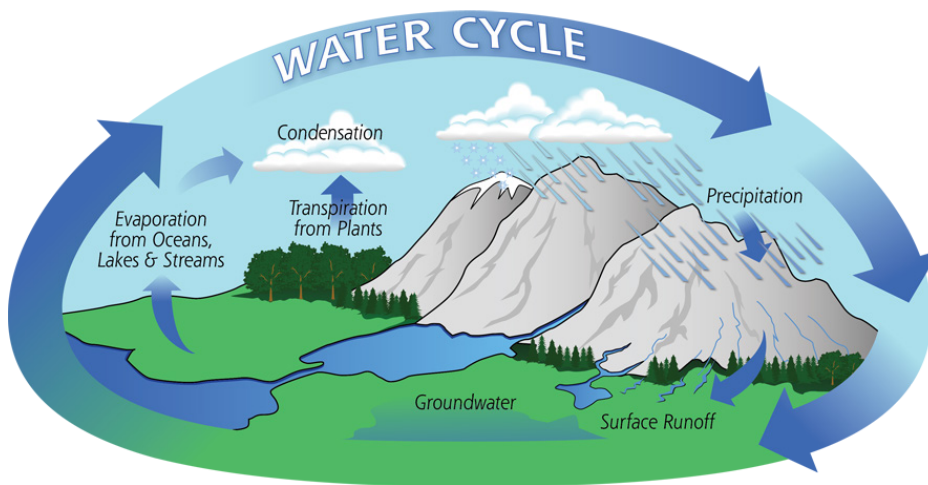
Check out the image on the left. It shows Earth's water volume relative to its size.

The largest blue sphere is all the water, including atmospheric and what is contained in creatures like us, compared to the Earth.

The next largest blue sphere represents the world's liquid fresh water.

And that teeny-tiny blue dot below it represents the fresh water in all the lakes and rivers on the planet.

Most of the water that all the people and other life on Earth need every day comes from these surface-water sources shown in this teeny-weeny sphere.



Source: <https://gpm.nasa.gov/education/water-cycle>

In this learning project you will explore the important role of watersheds in the global water cycle. You will also get to know more about your local watersheds, and how to take good care of them so they can continue to take good care of our water (and us!).

As you can see in the image above, the Earth's surface has many different features such as mountains, tributaries, rivers, sub-surface aquifers, riparian ecosystems, marshes, and estuaries. These features are part of the watershed, and they work together to catch, collect, clean, and transport precipitation in the form of snow, rain, mist, and dew.

Indigenous peoples are communities of people that have been living in one geographical area for a very long time, in some cases at least as long as 10,000 years! They are the original humans to have populated an area. Because they have lived and learned for so long in one area, they have valuable knowledge about the ecology and history of local places. Each community is diverse and tied to the geography of the land through their history, language, resources and traditions. Water is sacred to many Indigenous peoples—it is a life giver.

## Life in the Watershed

We all live within watershed systems and depend on them to keep water cycling in our environment.

For certain life forms, like salmonids, water flow and the watershed habitat that supports their food chain is critical to their existence. Salmonids are a type of fish that begin their life in streams and rivers, migrate out to the ocean for a time, and then return to the rivers and streams to reproduce and die. The amazing thing is that the salmonids that die and decompose in the watershed nourish the trees and creatures that, in turn, sustain a healthy watershed system.

### Did You Know?

Water is an unusual substance! Water in our biosphere arrived here from icy asteroids after the Earth formed!

And, stranger still, water is unique.

It is the only natural substance that can exist in all three states of matter—liquid, gas (steam), and solid (ice)—at the temperatures normally found on Earth.

All this water is never sitting still. You may have already learned about the planet's water cycle, and how Earth's water supply is constantly moving from one place to another and from one form to another.

Much of the fresh water travels across the surface of the Earth through watershed systems.

We all live within an interconnected network of watershed systems, including you!



## Activity 1: Watershed Words

### Your Words and Terms

At this point you are probably wondering what some of those words and terms mean. The words and terms we're learning in this session are:

- › Watershed
- › Indigenous knowledge
- › The local Indigenous language word for 'water'
- › Physiography
- › Aquifer
- › Tributary
- › Surface water
- › Ground water
- › River
- › Riparian ecosystem
- › Salmonids
- › Aquatic invertebrates

From this list, your group will learn the meaning of one or two of the watershed words or terms, and share that meaning with the rest of the class, using a quick image and key phrases. Follow the steps below.

### Steps

1. Research the terms: create a bulleted list of key notes defining your word or term.
2. Think about a simple image that demonstrates your word.
3. On a piece of chart paper:
  - » Put your word or term in big letters at the top
  - » Draw your image on the left side of the paper, leaving room on the right.
  - » Write your bullet notes on the right side of the paper.
4. Share with the class!

On the following pages there is a table for you to draw and record what you learn about other groups' words and terms as they share. One side is for the image and one for the bullet notes. Don't forget to label with the word or term itself.

**My word or term:** \_\_\_\_\_

**Image:** \_\_\_\_\_

**Key notes:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



<b>Word/Term:</b>	<b>Notes:</b>
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<b>Word/Term:</b>	<b>Notes:</b>



A visit to your local salmon hatchery is a great way to connect watershed health with the wellbeing of salmon species.

*Photo: Stephanie Cottell*



## Activity 2: Watershed Wiz Quiz

Now for a little game to show what you've learned.

Carefully take your group's chart paper and fold over the top part where you've written the word or term. Tape or pin your paper at the front of the room so everyone can see the image and bullet notes—but not the word or term itself.

Put your notebooks away and let the quiz begin.

When it's your turn, draw a word or term from a container and match it to the correct chart paper. When you get it right (maybe with a little help from your friends), read out the bulleted notes about the word or term you selected.



In your reflection, touch on three or more of the following themes:

- ## Watershed Reflection: *Wading In*

[illegible]



# Session 3

## Mapping Our Watersheds

### Learner's Guide



*Focus on learning and exploring the features of the watersheds in your area. You will be identifying well-known places, like mountain peaks and rivers, and directly connecting them to the concept of watershed systems and your local experiences.*



## Today's Big Question:

### What does our local watershed look like?

#### Introduction

Now that you know a bit more about how watersheds fit into Earth's water cycle, you are going to explore and learn more about the bigger picture of the watersheds where you live! If you have done any hiking, kayaking, river tubing, or other recreational activities in the area, you may be familiar with some of these places already.

Watersheds are fed from high points, such as mountains, and they flow downwards into basins made up of rivers, lakes, marshes, aquifers, and estuaries.

There are many kinds of maps. A physical map is a drawing or image that shows relationships and locations of elements and features of a specific area. Maps can be created to represent features of a specific theme – in our case, the local watershed. In this session, you will use maps to identify features of your watershed.

In this learning project you will explore the important role of watersheds in the global water cycle. You will also get to know more about your local watersheds, and how to take good care of them so they can continue to take good care of our water (and us!).

As you can see in the image above, the Earth's surface has many different features such as mountains, tributaries, rivers, sub-surface aquifers, riparian ecosystems, marshes, and estuaries. These features are part of the watershed, and they work together to catch, collect, clean, and transport precipitation in the form of snow, rain, mist, and dew.

Indigenous peoples of an area have their own place names for features within the watershed. Learning and practicing these names in the local Indigenous language shows respect for their culture and history and helps us understand the Indigenous ecological knowledge of each place.

#### Your Words and Terms

The following terms will help you to understand key watershed features, and to help map your local the watershed.

- |                               |                                       |
|-------------------------------|---------------------------------------|
| › Topographic map             | › Gully                               |
| › Ecosystem maps              | › Valley                              |
| › Elevation                   | › Slope                               |
| › Contour lines and intervals | › Watershed boundary line (or divide) |



## Activity 1: Mapping Our Watersheds

### Part 1

Using the maps and books provided, as well as the internet, research and answer the following questions with your group:

1. Identify all the mountains, hills, and high ground within your region, and include the watershed boundary lines. What are the contour lines and intervals, and what do they mean? Can you find an Indigenous language name for any of the mountains?

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2. Look for the valleys, gullies, streams, and rivers in the area. What is the difference between a valley and a gully? How about a stream and a river? Can you find an Indigenous language name for any of these features?

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3. What are the lakes, marshes, and estuaries in the area? Can you find any Indigenous names for these features?

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4. Find the places where waterways flow through local cities and towns. What spots are most populated? Where are the bridges?

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5. Identify where your school is on the map. Also, explore/identify where you live (generally) on the maps provided.

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## Part 2

Using a map template provided by your teacher and the feature labels provided, label the names of mountains and high ground features, and details like rivers and lakes.

You can shade in the contour lines according to slope and steepness, and collage on the map with magazine images such as forests, mountains, and towns.

Draw in or label (generally) where you live on the map, as well as where your school is.



### Activity 2: Watershed Wiz Quiz

Have someone from your group carefully take your map from the mapping activity above and tape or pin it at the front of the room so everyone can see.

Put your notebooks away and let the quiz begin!

Draw a word or term from a container and match it with a corresponding feature on one of the maps. Explain what it is.

If you are challenged, perhaps you can get a friend to help. When you get it right, you can choose who goes next.

They will draw a word or term from a container and match it to the correct chart paper. When they get it right (maybe with a little help from their friends), they will read out the bulleted notes about the word or term. And then they will get to pick who goes next!



### Activity 3: Watershed Reflection

Write or draw about facts and ideas that stood out for you in today's session about watersheds. Include your thoughts on what you have learned.

In your reflection, touch on three or more of the following themes:

- › The largest watershed system in your area
- › Two smaller watershed systems in the area
- › Mountains in the area and which watershed they belong to
- › Local Indigenous language place names for watershed features
- › Streams in the area and which system they belong to
- › Rivers in the area and the watersheds they are part of
- › A marsh (or bog or fen) near you
- › An estuary in the region

#### **Watershed Reflection:** *Mapping Our Watersheds*

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## Labels for *Mapping Our Watersheds* Session

- › Research Indigenous names as well as common names
- › Consider collaging with magazine pictures to add visuals for a graphic style map

<p style="text-align: center;"><b>River</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>River</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>River</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>
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<p style="text-align: center;"><b>Stream/Creek</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>Stream/Creek</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>Stream/Creek</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p style="text-align: center;"><b>Mountain</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>Mountain</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>Mountain</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p style="text-align: center;"><b>Valley</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>Valley</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>Valley</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p style="text-align: center;"><b>Estuary</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>Estuary</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p style="text-align: center;"><b>Estuary</b></p> <p>Names:</p> <p>_____</p> <p>_____</p> <p>_____</p>

# Session 4

## Watersheds In Distress

### Learner's Guide



*Learn more about practices that are causing serious damage to our watersheds, and threatening the health of our fish populations and drinking water.*





# Today's Big Question: How is our watershed being harmed?

## Introduction

Since before recorded history, people have made use of things on our planet, such as:

- › Wood, earth, and metal for building
- › Plants and other animals for eating
- › Fibres for making clothes

Some people call these Earth's natural resources. Over time, people began not only making things from natural resources for themselves and their own needs, but also making things to trade for other things, and eventually, for money. There seemed to be such an abundance of resources that not many people considered whether we should be more careful about what and how we were doing things.

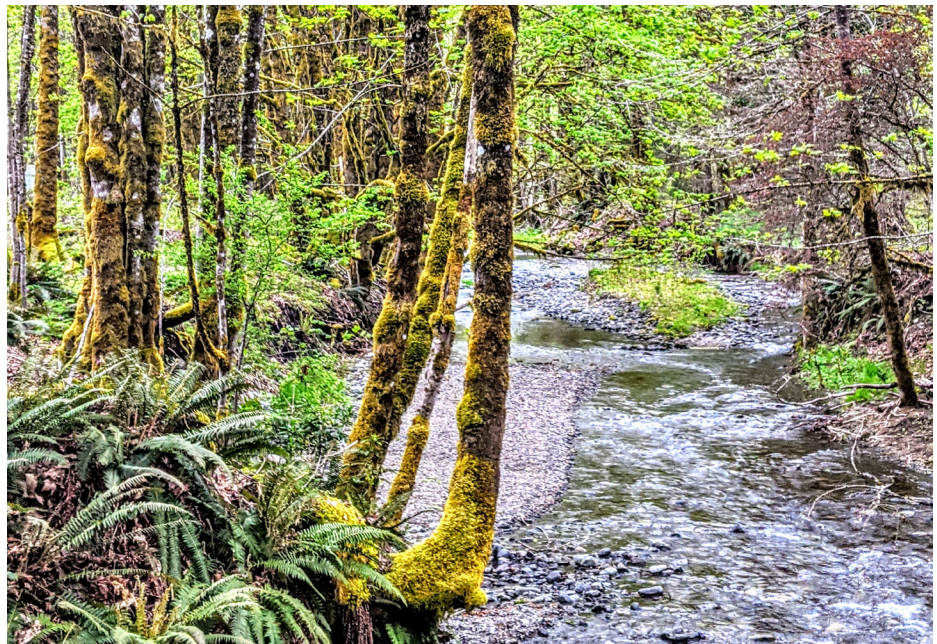
Many Indigenous cultures understand Reciprocity—that we (people) receive from nature to survive and thrive. However, for the Earth to stay healthy and abundant, we also need to take care of, and give back to, nature. Our choices, behaviours, and technologies now cause larger scale ecological damage in shorter periods of time. We are seeing harmful impacts on our planet, including experiencing limits to resources we once thought were endless.

Our watershed is one place where we see these impacts. You may notice that the features and flow of a watershed are quite different, depending on what is happening in the surrounding area. For example, in the higher, more mountainous parts of the watershed, there are fewer houses and towns. These areas are more natural, and watershed features like streams and slopes haven't been altered drastically. However, they could be impacted by activities such as forestry and mining.

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Healthy riparian areas, the strip along freshwater ways, are critical to the wellbeing of all the plants and animals that occupy them.

*Photo: Genevieve Singleton*





## Activity 1: Identifying Impacts on the Watershed

We are going to dive deeper into how our watersheds are being harmed by exploring this session's vocabulary in small groups.

### Your Words and Terms

You will learn more about these human activities and their consequences by exploring the following terms:

- › Deforestation
- › Contaminants
- › Run-off
- › Phosphorus
- › Nitrates
- › Invasive species
- › Reciprocity

In your group, research your vocabulary word(s) and prepare to share what you have learned with the class, using the following method:

#### Steps

1. Research the terms: create a bulleted list of key notes defining your word or term and how it impacts the watershed.
2. Think about a simple image that demonstrates your word.
3. On a piece of chart paper:
  - » Put your word or term in big letters at the top
  - » Draw your image on the left side of the paper, leaving room on the right.
  - » Write your bullets notes on the right side of the paper.
4. Share with the class!

On the following page there is a table for you to draw and record what you learn about other groups' words and terms as they share. One side is for the image and one for the bullet notes. Don't forget to label with the word or term itself.

**My word or term:** \_\_\_\_\_ **Image:** \_\_\_\_\_

**Key notes:** \_\_\_\_\_  
\_\_\_\_\_  
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<b>Word/Term:</b>	<b>Notes:</b>
<b>Word/Term:</b>	<b>Notes:</b>





## Activity 2: Watershed Wiz Quiz

Carefully take your group's chart paper and fold over the top part where you've written the word or term. Tape or pin your paper at the front of the room so everyone can see the image and bullet notes, but not the word or term itself.

Put your notebooks away and let the quiz begin!

When it's your turn, draw a word or term from the container and match it to the correct chart paper. When you get it right (maybe with a little help from your friends), read out the bulleted notes about the word or term you selected.



## Activity 3: Watershed Reflection

Write or draw about facts and ideas that stood out for you in today's session about watersheds. Include your thoughts on what you've learned.

In your reflection, touch on the following themes:

- Threats to our watersheds
- How threats to the watershed impact our drinking water
- How a damaged watershed harms fish species, such as salmon

### **Watershed Reflection:** *Watersheds In Distress*

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## Notes

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Session 5  
**Watershed SOS**  
*Learner's Guide*



*Jump into some action-oriented, solution-based learning  
focused on the protection and restoration of our watersheds.*





# Today's Big Question: How can we protect and restore our watershed?

## Introduction

In the last session, we learned that there are many activities going on that have harmful impacts on this essential biological system. But there is much hope for our watersheds!

Happily, today, we are going to learn many things we can do differently to help protect the watershed, and some actions we can take to restore health to damaged areas.

There are ways we can harvest wood from our forests that will not cause as much harm, especially if we take the time to understand the ecology of each area. In the *Mapping Our Watersheds* session, you learned about natural ecosystem mapping, an assessment tool that helps us understand the unique features and considerations of an ecosystem.

Shown below is an example of an Ecological Character Map of the Koksilah Watershed on Vancouver Island. It shows the different types of forest ecosystems in the area, as well as the soil characteristics and sensitivity. This kind of information mapping can help us make better assessments and decisions about human activities, and reduce impacts on the watershed.

Through generations of Indigenous Ecological Knowledge, the care, protection, and sustainable practices around watersheds allowed many watershed areas to flourish prior to urban sprawl and climate change. All this knowledge contributes to our ecological literacy of our local watershed.

## What other things can we do?

- We can plant gardens in urban areas that help to reduce flooding, and filter contaminants from run-off
- Your class can do "Storm Drain Marking" activities to help prevent contaminants from being released into the watershed
- We can use specific local indigenous plants to help quickly regenerate natural riparian ecosystems that protect waterways and create good fish habitat

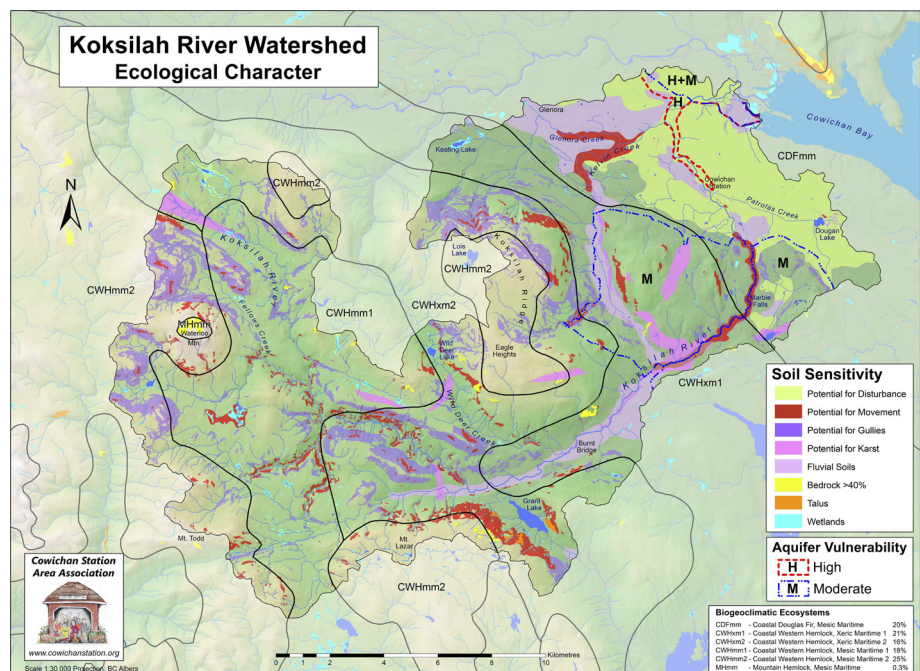


Image courtesy of the Cowichan Station Area Community Association



## Activity 1: Watershed SOS

In our activities today, we will explore the following words and terms.

### Your Words and Terms

- › Ecological literacy
- › Ecological restoration
- › Selective forestry
- › Rain gardens
- › Decontamination
- › Mitigation
- › Local Indigenous words for 'willow' and/or 'red-osier dogwood'

In your group, research your vocabulary word(s) and prepare to share what you have learned with the class, using the following method:

### Steps

1. Research the terms: create a bulleted list of key notes defining your word or term and how it impacts the watershed.
2. Think about a simple image that demonstrates your word.
3. On a piece of chart paper:
  - » Put your word or term in big letters at the top
  - » Draw your image on the left side of the paper, leaving room on the right.
  - » Write your bullets notes on the right side of the paper.
4. Share with the class!

On the following page there is a table for you to draw and record what you learn about other groups' words and terms as they share. One side is for the image and one for the bullet notes. Don't forget to label with the word or term itself.

**My word or term:** \_\_\_\_\_ **Image:** \_\_\_\_\_

**Key notes:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



<b>Word/Term:</b>	<b>Notes:</b>
<b>Word/Term:</b>	<b>Notes:</b>
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<b>Word/Term:</b>	<b>Notes:</b>



## Activity 2: Watershed Reflection

Here you are, learning about your watershed AND doing some incredibly valuable ecological stewardship and restoration while you are at it!

In the next session of this *Best Water Ways* place-based learning project you will participate in an active riparian restoration in your community.

Importantly, you will also create your own unique way of sharing what you are learning and doing. Communicating about your learning helps you to gain a better understanding of the ideas and information covered in the sessions. Your sharing is a powerful way to spread awareness about the health of our watersheds and how people can help preserve and restore them.

This “Watershed Reflection” time is the perfect opportunity for you to think about communicating with others effectively about what you’ve been learning.

The following planning guide has been developed to help you consider, choose, and plan what and how you want to communicate about your riparian restoration experience.

Basically, you are going to choose something about the *Best Water Ways* learning experience that has really stood out for you, and decide how you want to communicate about it. Think of this as an independent mini-project nested within the larger *Best Water Ways* place-based learning series.



Planting native species in a riparian area is a great restoration activity for learning groups.

*Photo: Stephanie Cottell*

# Shout Out and Share! Planning Guide

## Step 1: What

Answer the following exploratory questions. Answering these questions will help you decide *what* you want to communicate about the Riparian Restoration activities.

1. What specific parts of the learning projects are you finding most interesting?

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2. What has surprised you about what you have been learning in this project?

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3. What do you think is the most important information or concept that you've learned?

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4. What do you think it would be like to communicate on one or two specific aspects of the Riparian Restoration activities?

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5. What would it be like to communicate about the activities as a whole?

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Looking back over your answers above, does something jump out at you about what you would like to communicate about this project? Chat with your teacher or classmates if you think it would be helpful to you.

*I would like to communicate about:*

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## Step 2: How

Answer the following exploratory questions. Answering these questions will help you decide *how* you want to communicate about this project.

1. How do you like to communicate—verbally, or through writing? If it's writing, is it creative writing or more technical writing? Do you like to interview experts? Do you like to do visual/graphic communication or a mix of methods?

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2. What do you think would be some effective ways to communicate about this project?

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3. What kinds of resources and tools do you have available to use for this communication? Can you access a camera or video-recorder? Art supplies?

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4. What way of communicating would you most enjoy?

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Looking back over your answers above, what jumps out at you about how you would like to communicate about this project? Chat with your teacher or classmates if you think it would be helpful to you.

*I would like to communicate through:*

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### Step 3: Who

Answer the following exploratory questions. Answering these questions will help you decide *who* to connect with to help with your communication element. Please note you might decide you don't need to connect specifically for this element.

1. How could my communication element benefit from connecting with a mentor?

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2. Who would be helpful to connect with regarding my communication element?

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Looking back over your answers above, does something jump out at you about who you would like to connect with about this project? Chat with your teacher or classmates if you think it would be helpful to you.

*I would like to connect with:*

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## Step 4: Plan

Now that you have a clear idea of *what* you want to share, *how* you want to share it, and *who* to connect with for input and mentorship (if anyone), it's time to plan your process.

### Planning Questions

1. How is timing related to what and how I want to share about the riparian restoration activities?

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2. What kinds of additional equipment or material will I require and when? (Examples: camera, poster paper, materials)

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3. What else do I need to do to prepare ahead for my "Shout Out and Share" element?

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## Step 5: Do

As you are participating in the riparian restoration session activities, you are also going to be working on your “Shout Out and Share!” element. Depending on what you’ve chosen and how you’re going to share, this may mean taking some special notes/writing down questions, making some sketches, or taking some targeted photos.

You will have time after the Riparian Restoration activities to finalize your "Shout Out and Share!" element.

Please consider sharing it with us! Ask your teacher about how your class can share with our community Facebook group.

## Additional Notes

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

# Session 6

## Riparian Restoration Workshop

### Learner's Guide



*Take action! Learners will have an opportunity to learn, and practice, restoration techniques that will help restore a riparian area in your area.*





## Today's Big Question: How do you DO riparian restoration?

### Introduction

Today is very exciting—you are going to go outside and begin to restore your watershed! You are going to discover, and even get to play with, the tools and techniques that restoration professionals and other community members use to help bring a riparian ecosystem back to health.

Don't forget to take some time to compile information for your "Shout Out and Share!" element.

### Your Words and Terms

In your activities today, we will explore the following words and terms.

- › Natural succession riparian species
- › Plant cuttings
- › Live-staking
- › Pruning saw
- › Loppers
- › Hand pruners
- › Planting bar
- › Local Indigenous language place-name for the area you are helping to recover

Students working on their *Best Water Ways* projects in the field.

Photo: Stephanie Cottell







## Activity 1: Fieldwork

Today is all about fieldwork! You will be ‘learning by doing’ all about the terms above. Take some time throughout the session to jot down each word or term and some notes and/or sketches about it.

<b>Natural Succession Riparian Species</b>	<b>Notes:</b>
<b>Plant Cuttings</b>	<b>Notes:</b>
<b>Live-Staking</b>	<b>Notes:</b>
<b>Pruning Saw</b>	<b>Notes:</b>
<b>Loppers</b>	<b>Notes:</b>

<b>Hand Pruners</b>	<b>Notes:</b>
<b>Planting Bar</b>	<b>Notes:</b>
<b>Local Indigenous Language Place- Name for the Area You Are Restoring</b>	<b>Notes:</b>



## Activity 2: Watershed Reflection

Write down notes for your “Shout Out and Share!” communication element here!

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# Learner's Guide

## Glossary

<b>Aquatic Invertebrates</b>	small animals, such as insects, crustaceans, mollusks, and worms that live in water. Most invertebrates are found living in the stream bottom among the rocks and gravel.
<b>Aquifer</b>	underground area that becomes saturated with water within the local watershed.
<b>Contaminants</b>	a polluting or poisonous substance that makes something impure, or alters it from its healthy, natural state.
<b>Contour lines and intervals</b>	a contour line is a line drawn on a topographic map to indicate ground elevation or depression. Contour lines never cross. A contour interval is the vertical distance or difference in elevation between contour lines.
<b>Culverts</b>	a tunnel (with or without a pipe) carrying a waterway (stream or ditch) under a road or railroad.
<b>Decontamination</b>	the process of removing or neutralizing contaminants that have accumulated somewhere.
<b>Deforestation</b>	the action of clearing a wide area of trees.
<b>Dikes</b>	a long wall or embankment built to prevent flooding from the sea or another body of water.
<b>Ditches</b>	a narrow channel dug in the ground, typically used for water drainage alongside a road or the edge of a field.
<b>Ecological restoration</b>	the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.
<b>Ecosystem map</b>	a map that represents ecosystem characteristics and relationships of a given area.
<b>Elevation</b>	distance in height above sea level of a specific location.

<b>Ground water</b>	a watershed flow that has infiltrated the ground, has entered the area below the water table or has been discharged into a stream channel, or springs and seepage water. Groundwater is stored in, and moves slowly through, the layers of soil, sand, and rocks in aquifers.
<b>Gully</b>	a deep and narrow water-worn ravine often with water flowing through as a stream or river.
<b>Hand-pruners</b>	hand-held cutting tool used for pruning and taking cuttings.
<b>Impervious or Impermeable</b>	a surface or substrate that does not allow fluid to pass through.
<b>Indigenous</b>	People, plants, and other biological species originating, occurring naturally, or for a long time (beyond human memory or recorded history) in a specific place.
<b>Indigenous knowledge</b>	refers to the local understandings and philosophies developed by societies with long histories of interaction with their natural surroundings.
<b>Indigenous technology</b>	living-skills, tools, devices, and methods that were developed by local Indigenous cultures based on their Indigenous knowledge systems.
<b>Interconnectedness</b>	the idea that all living and non-living things in the world are connected and affect each other.
<b>Invasive species</b>	a plant, animal, or insect species that is not native to a specific location (an introduced species), and that tends to spread to a degree believed to cause damage to the environment, human economy or human health.
<b>Live-staking</b>	staking a long (2m) cutting of plant material into the soil where it will root and grow.
<b>Loppers</b>	a long-handled cutting tool used for pruning and taking cuttings.
<b>Mitigate</b>	taking action to make something less harmful.
<b>Natural succession species</b>	indigenous species and communities of plants, animals, and insects that occur and evolve over time in an ecosystem.
<b>Nitrates (NO<sub>3</sub>)</b>	a source of Nitrogen (an essential chemical element) for plants. When nitrogen fertilizers are used to enrich soils, excess nitrates are carried by rain, irrigation, and other surface waters through the soil into groundwater. Human and animal wastes can also contribute to nitrate contamination of water.



- Perimeter drain** 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 does allow fluid to pass through.
- Phosphorus (P)** a very reactive chemical element required in small amounts by both plants and animals. Excess phosphorus from fertilizer and other human use (soaps) is carried through the watershed and is very disruptive to the chemical balance of aquatic and riparian ecosystems.
- Physiography** collective physical features such as slope, shape, and elevation of an area.
- Plant cuttings** cuttings of plant material taken from well-established sources.
- Planting bar** a long heavy metal bar used to make deep, narrow holes for planting.
- Pruning saw** a small hand-held saw used for pruning trees, or taking cuttings.
- Rain garden** a garden of native shrubs, perennials, and flowers planted in a small depression, which is generally formed on a natural slope. It is designed to temporarily hold and soak in rainwater run-off that flows from roofs, driveways, patios, or lawns.
- Reciprocity** the concept of mutual exchange and shared benefit within relationships between people, and between people and nature. One way of putting it is “the fair balance of giving and taking in any relationship”.
- Riparian** the land, habitats, and ecosystems that are associated with, adjacent to, and interdependent on bodies of water (streams, rivers, ponds, lakes, and shorelines).
- Salmonids** a family of ray-finned fish which includes salmon, trout, chars, freshwater whitefishes, and graylings, which collectively are known as the salmonids. All salmonids spawn in freshwater, but in many cases, the fish spend most of their lives at sea, returning to the rivers only to reproduce. This lifecycle is described as anadromous. They are predators, feeding on small crustaceans, aquatic insects, and smaller fish.
- Selective forestry** the logging of selected trees in a forest so that growth of other trees and the dynamics of the surrounding natural ecosystems are not affected.

<b>Slope</b>	how steep the land is; how much vertical rise in elevation there is for a certain horizontal distance. Rise over run.
<b>Soil Bioengineering</b>	the use of living plant materials to perform an engineering function such as erosion control, drain-ways, or slope stabilization.
<b>Solubility</b>	the ability for a given substance, the solute, to dissolve in a solvent (water or other fluid).
<b>Storm drains</b>	infrastructure designed to drain excess rain and groundwater from impervious surfaces such as paved streets, car parks, parking lots, footpaths, sidewalks, and roofs.
<b>Surface Run-off</b> (also known as overland flow)	the flow of water that occurs when excess stormwater, meltwater, or other sources flows exceed the capacity of the natural waterways and flow over the land surface. Repeated surface run-off impacts vegetation, and causes flooding and soil and land erosion.
<b>Surface water</b>	any water that collects on the surface of the Earth. This includes oceans, seas, lakes, rivers, or wetlands.
<b>Topographic map</b>	a type of map showing natural and/or physical features of a landscape, including contours and elevation.
<b>Traditional Indigenous language</b>	the language of the Indigenous nation within the local area.
<b>Tributary</b>	a river or stream flowing into a larger river, lake, or water body.
<b>Valley</b>	a stretched-out groove in the land. It has higher ground on three sides and usually has water flowing through the center. Usually V- or U-shaped.
<b>Water table</b>	the upper-most level of an underground area (aquifer) that is saturated (filled) with water.
<b>Watershed</b>	an area of land that catches and collects rain and snow, draining and seeping it through a network of marshes, creeks, streams, and groundwater into a common body of water (such as a river, lake, or ocean).
<b>Watershed boundary</b>	the line that divides the watershed and where water will flow. A raindrop that lands on one side of the boundary will flow into one body of water, and a drop that lands on the other side will flow into a different body of water.