

Introduction to Water Systems

BC Urban Streams & Watersheds

ENVIRONMENTAL SCIENCE 12



This resource is part of the BC Urban Streams & Watersheds lesson plans, assembled in 2025. Learn more and download additional resources at www.engagewithnbs.ca/for-schools

This material is available to resuse and adapt in your classroom.



Learning Objectives

- To be able to define watershed, and identify the functions, importance, and impact on watersheds.

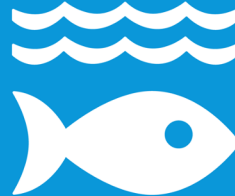
6 CLEAN WATER
AND SANITATION



13 CLIMATE
ACTION



14 LIFE
BELOW WATER



15 LIFE
ON LAND



Demonstration: The World's Water



1 gallon.

This represents all of the water on Earth.



½ cup.

This represents all of Earth's freshwater.



4 tablespoons.

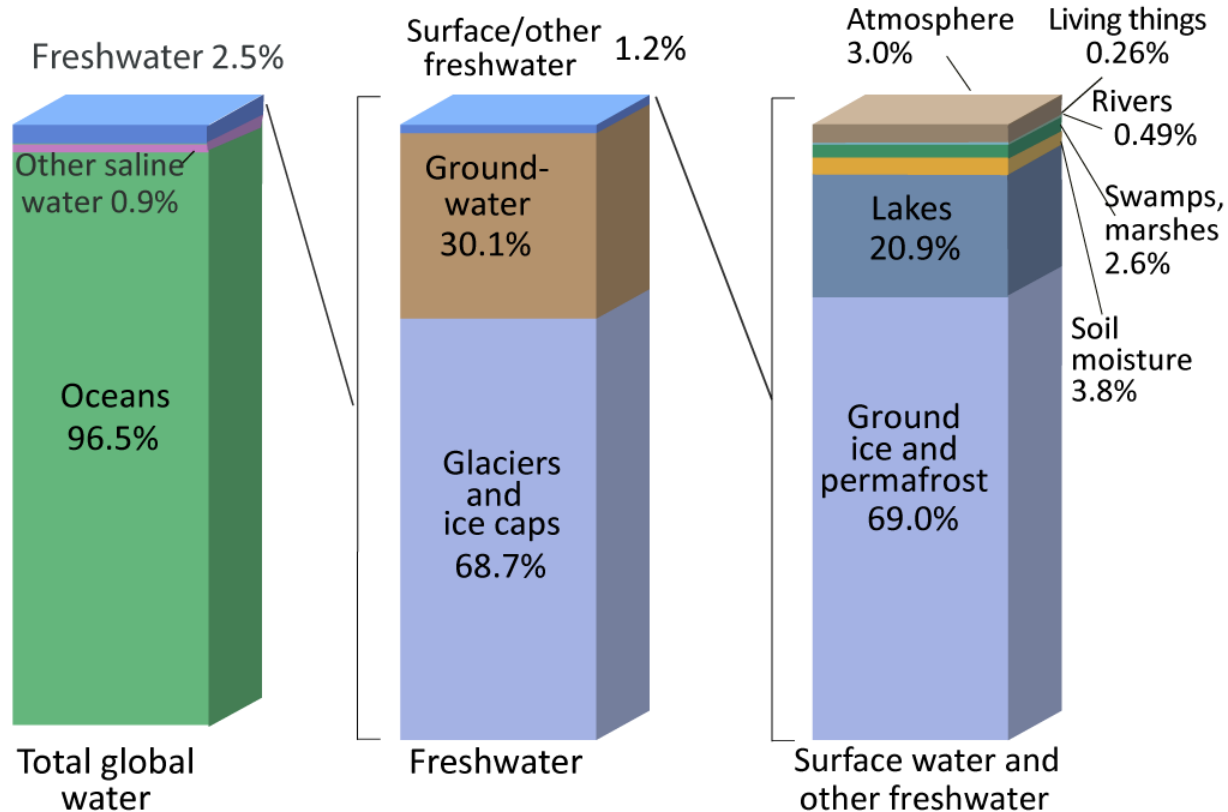
This represents all of Earth's non-frozen freshwater (not in ice caps & glaciers).



1 drop.

This represents all of Earth's available, drinkable non-frozen freshwater.

Where is the World's Water?



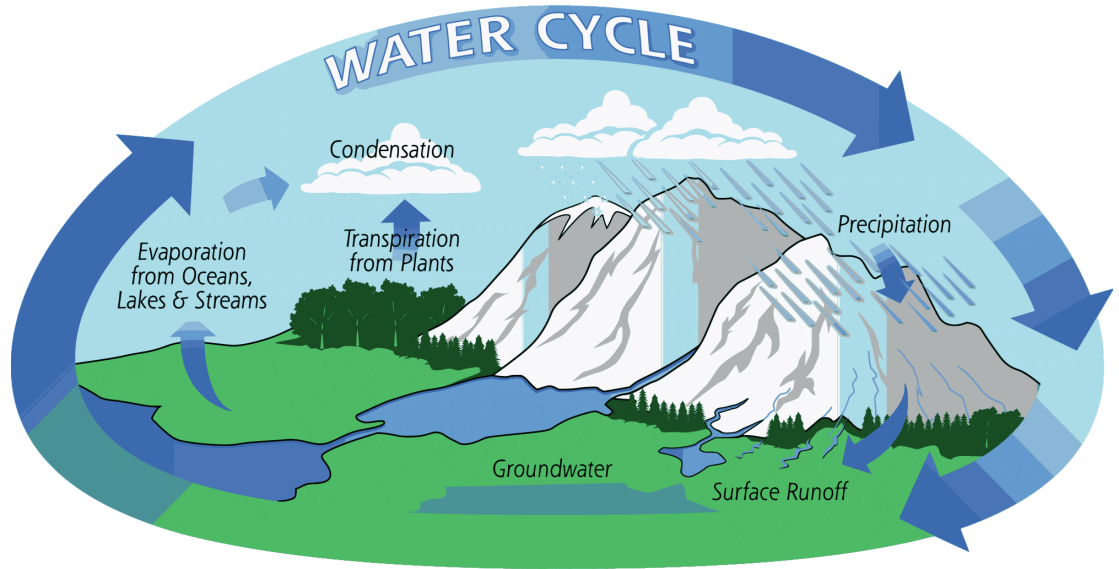
Estimate of global FRESH water distribution and length water remains confined.

LOCATION	TOTAL WATER (%)	FRESH WATER (%)	DURATION
Ice Caps, Glaciers, & Permanent Snow	1.74	68.7	> 1000 years
Groundwater	0.76	30.1	~300 years
Soil Moisture	0.001	0.05	~280 days
Ground Ice & Permafrost	0.022	0.86	
Lakes	0.007	0.26	1-100 years
Atmosphere	0.001	0.04	9-10 days
Wetlands	0.0008	0.03	
Rivers	0.0002	0.006	12-20 days
Humans / Animals / Plants	0.0001	0.003	

Global Water Cycle

There are three basic steps in the global water cycle:

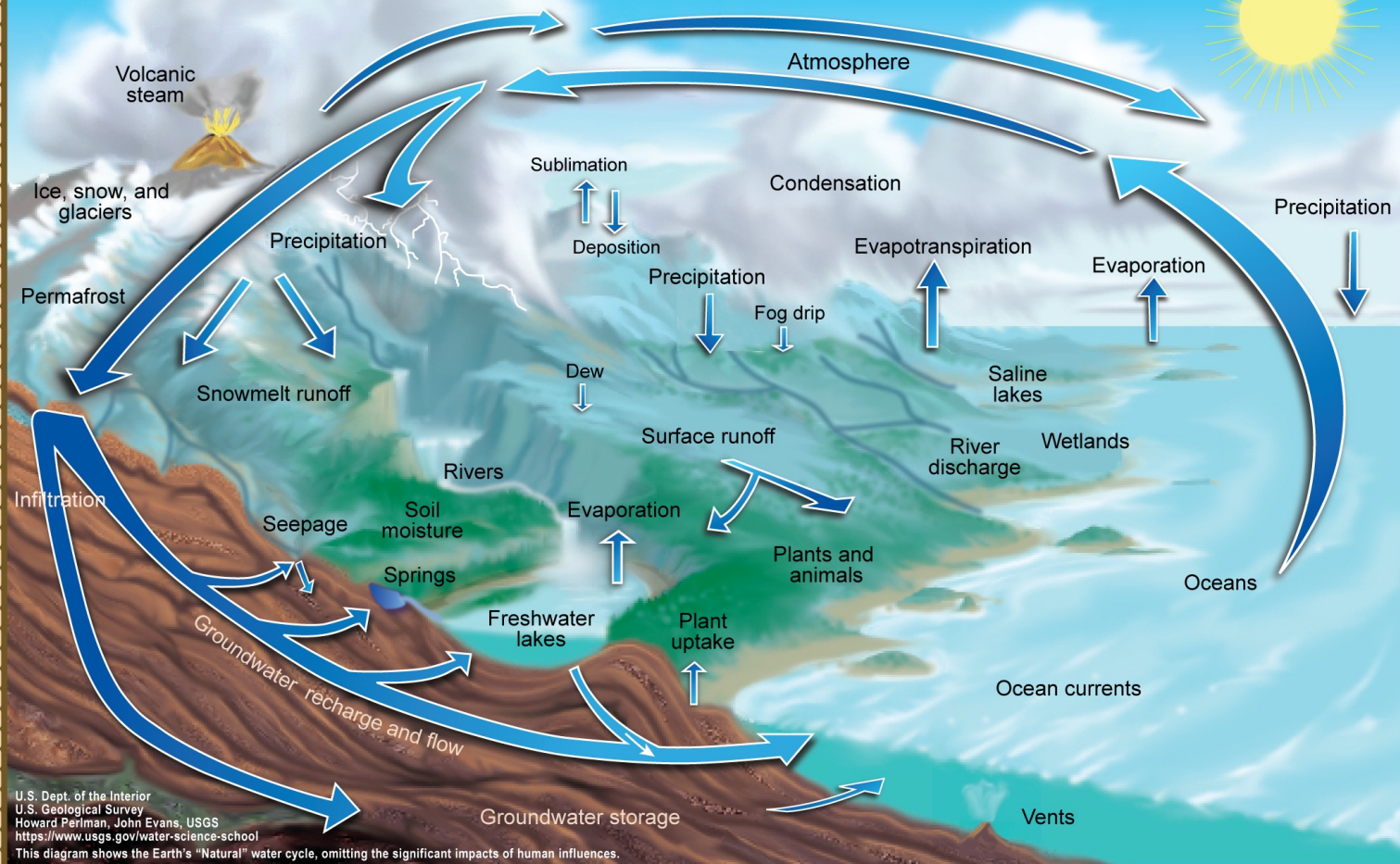
1. water precipitates from the atmosphere,
2. travels on the surface and through groundwater to the oceans, and
3. evaporates or transpires from land or evaporates from the oceans.



The Water Cycle

- **EVAPORATION** The process where liquid water changes into water vapor (gas).
- **PLANT UPTAKE** Water taken from the groundwater flow and soil moisture.
- **TRANSPIRATION** Evaporation of liquid water from plants and trees into the atmosphere.
- **SUBLIMATION** The process where ice and snow (solid) change into water vapor (gas), skipping the liquid phase.
- **CONDENSATION** The process where water vapor (gas) changes into water droplets (liquid).
- **TRANSPORTATION** The movement of solid, liquid and gaseous water through the atmosphere.
- **PRECIPITATION** Water that falls to the earth. Most precipitation falls as rain but includes snow, sleet, drizzle, and hail.
- **DEPOSITION** The process where water vapor (gas) changes into ice (solid), skipping the liquid phase.
- **INFILTRATION** Movement of water into the ground from the surface.
- **PERCOLATION** Movement of water past the soil going deep into the groundwater.
- **RUNOFF** River, lake, and stream transport of water and transport of ice in glaciers.
- **GROUNDWATER** Underground water flow (aquifers).

The Water Cycle



What is a Watershed?

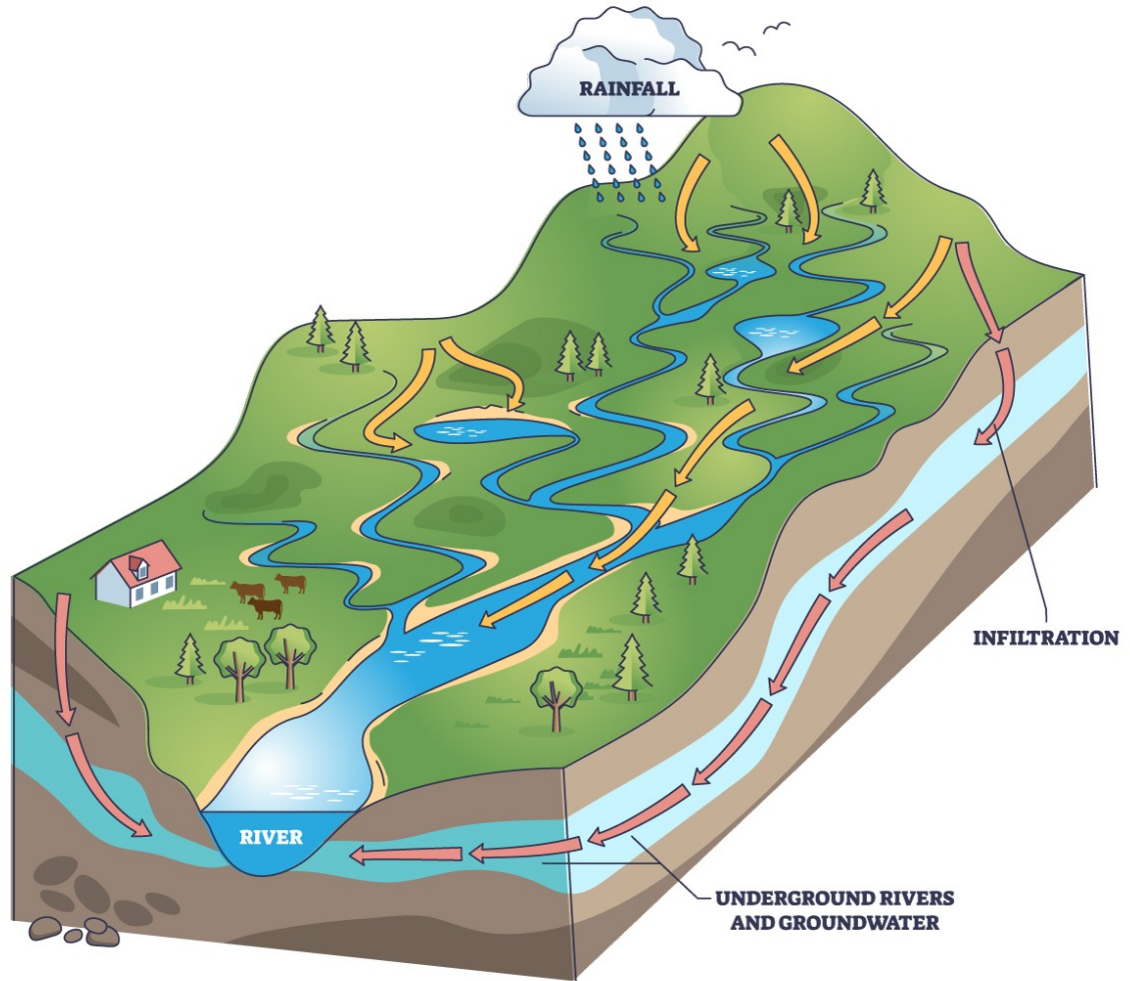
Each of us lives in a watershed, regardless of how far we are from a body of water.

A **watershed** is the area of land that drains rainfall, snowmelt, sediment and dissolved materials to a particular water body, such as a stream, river, lake, reservoir or marine harbour.

The physical characteristics of a watershed – the geology, soil, vegetation and slope, as well as human land uses – influence the quality and quantity of the water that flows through it.

Components of Watersheds

- upland areas such as forests and meadows
- streams and rivers
- lakes
- wetlands
- marine harbours and shorelines
- riparian zones, areas of saturated soils and water-loving vegetation that surround water bodies



What Watershed Are You In?

- Many cities and regions have had their watersheds mapped, with the maps available to the public.



(Map Source: Capital Regional District's *Discover Your Watershed*
<https://www.crd.bc.ca/docs/default-source/es-watersheds-pdf/regional-watershed-maps/watersheds-of-greater-victoria-map-2015.pdf>)

Functions of Watersheds

- Rivers and streams, sometimes called the “arteries of the land,” nourish and connect ecosystems throughout the watershed.
- Wetlands and lakes help to store and filter water, and provide habitat for fish and wildlife.
- Upland forests and meadows provide wildlife habitat, nutrients for aquatic ecosystems, and encourage infiltration of rainwater into the ground.



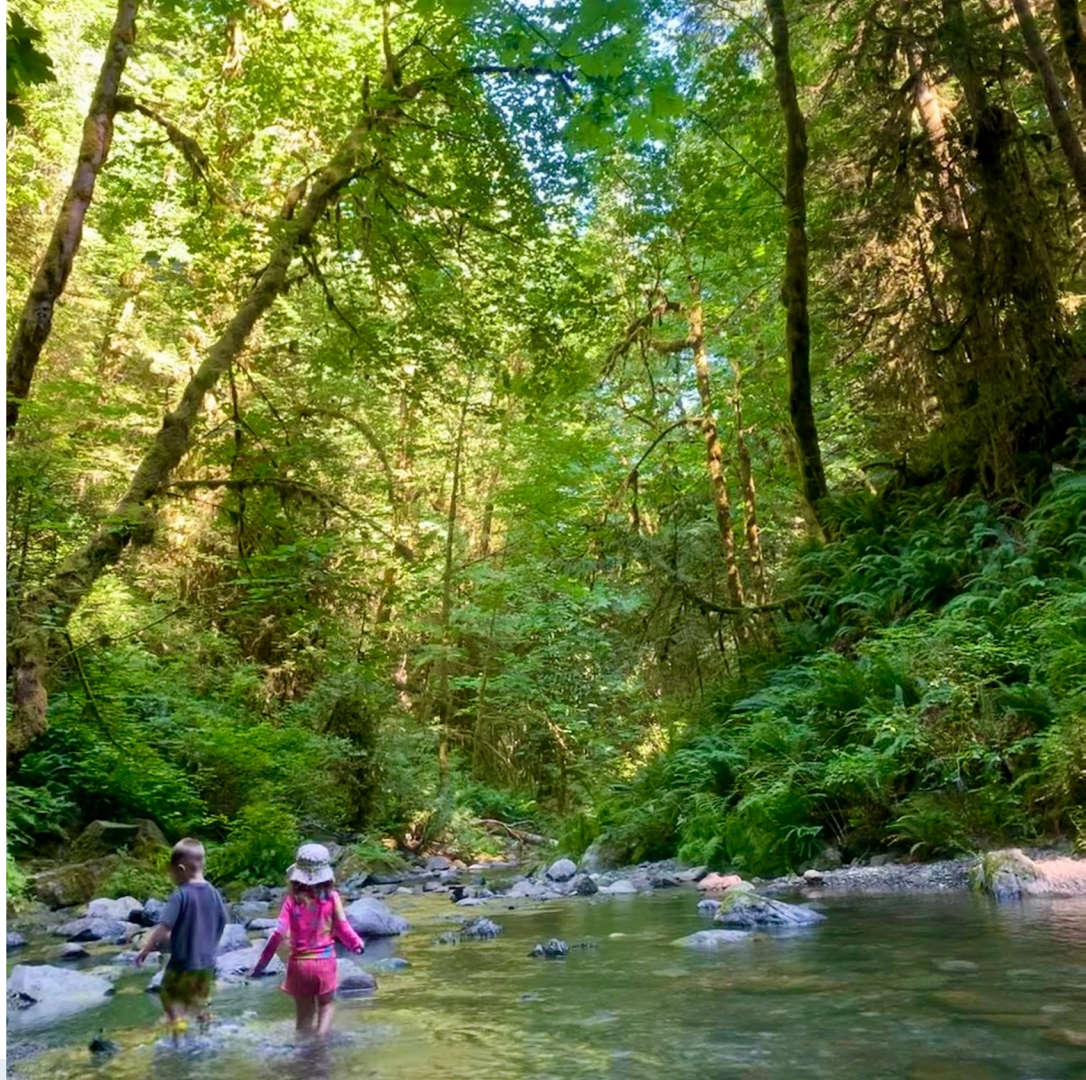
Functions of Watersheds

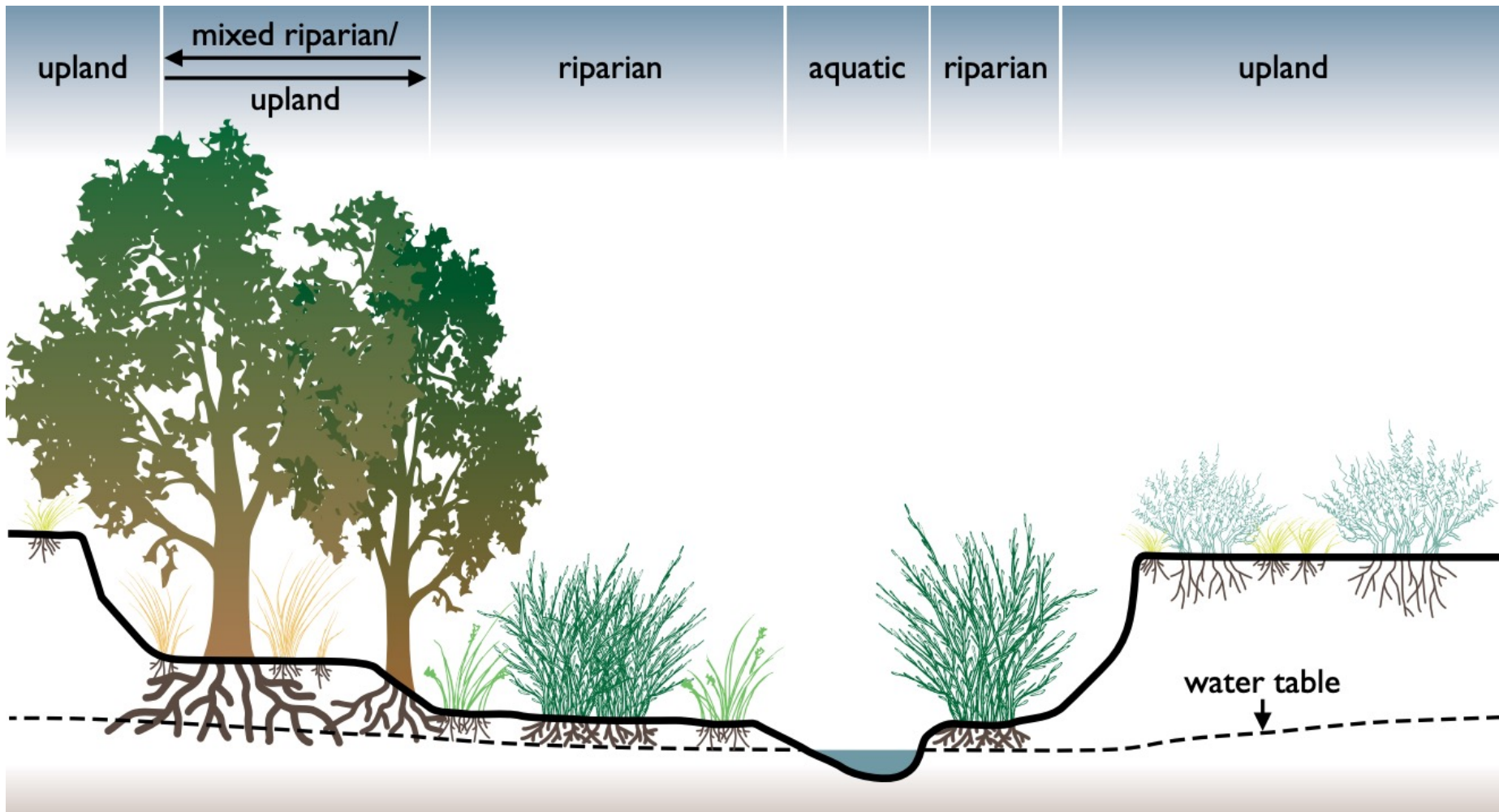
- Watersheds supply us with clean water for drinking and irrigation, from sources such as reservoirs and groundwater.
- Watersheds provide habitat for fish (including the Pacific salmon), birds, mammals, as well as insects and other invertebrates.



Functions of Watersheds

- The various components of watersheds provide people with opportunities for recreation, tourism, education and aesthetic appreciation.





Water Challenges

Increased intensity and frequency of:

- Droughts
- Floods
- Forest fires
- Impacts from activity on land
(such as logging, mining, pollution,
urbanization, and recreation)

Inconsistencies in water availability and
quality protection across BC

- Boil water advisories (turbidity)

DRINKING WATER ADVISORY



The Vancouver Island Health Authority recommends that all water in the Village of Alert Bay be boiled for one minute, or otherwise disinfected, before drinking.



**For further information, contact the local Health Protection office:
250-902-6071**



What does Watershed Security look like?

- Reconciliation in action (collaborative decision-making between Indigenous communities and government)
- Healthy and resilient communities (being prepared for climate change and using nature-based solutions)
- Robust local economies (food security and sustainable agriculture, restoration, monitoring, etc)
- Healthy freshwater for fish and wildlife (such as wild salmon)

BC Watershed Security Coalition

“Our streams, rivers and lakes are the cornerstone of our local economies, food security, and ecosystems — but we have taken them for granted and continue to degrade watersheds in many regions. With low snowpack and a potentially devastating drought approaching, we need our provincial and federal governments working together to strengthen our watershed security, not just for this year, but for the future climate-fueled disasters we know are coming.”

— Coree Tull, chair of the BC Watershed Security Coalition, March 2024



BC
WATERSHED
SECURITY
COALITION



CODE BLUE BC



Watersheds

EXIT CARD:

In your own words, respond to the following:

- *What conclusions can you make about the importance of watersheds?*
- *Which human actions affect the quality of water in our watersheds or urban streams?*
- *Which of the United Nations' Sustainable Development Goals can you connect to watershed security?*
- *What is your connection to your watershed?*



engage with Nature-Based Solutions

communities in local stewardship of lands & waters

Learn more at www.engagewithnbs.ca