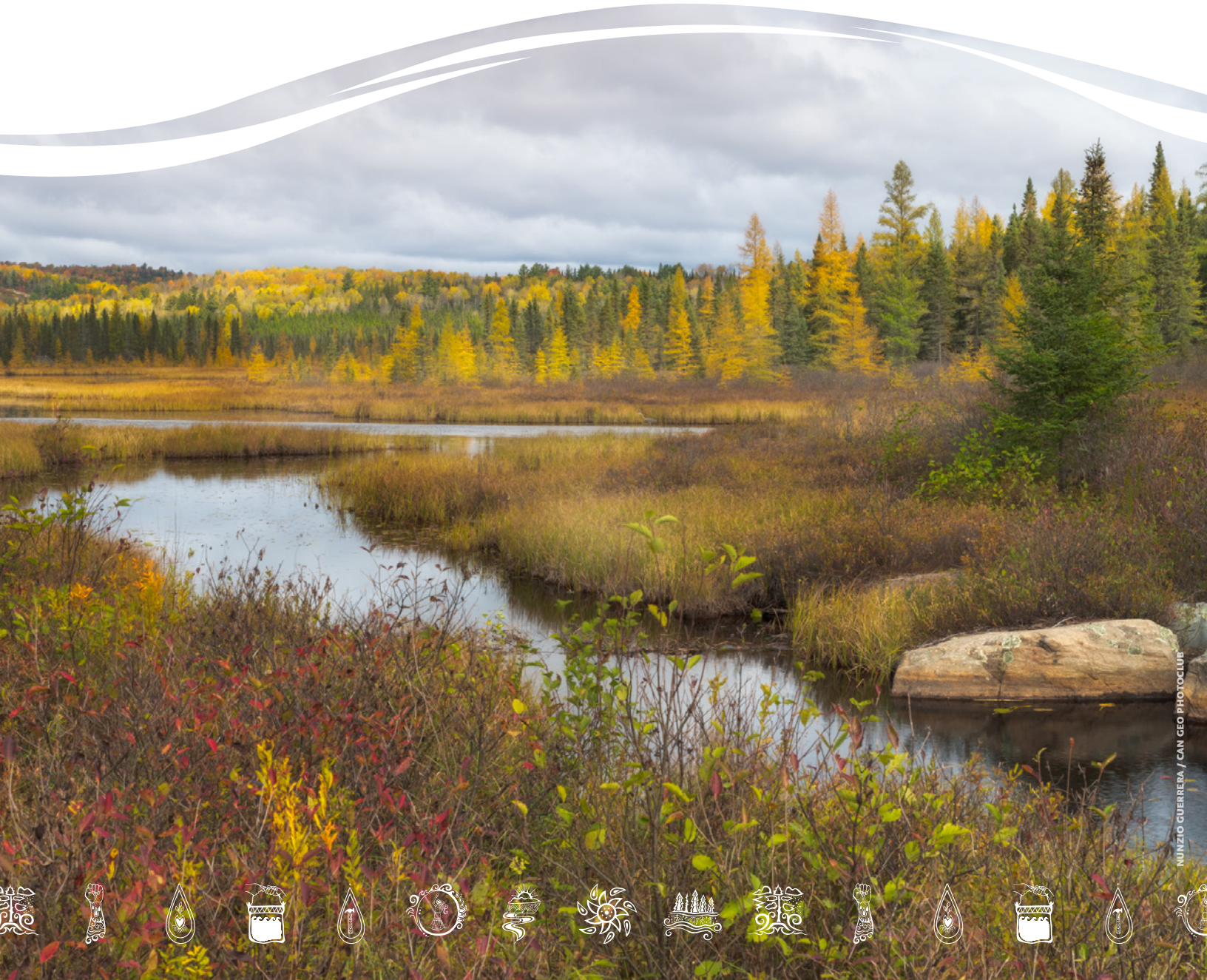
Freshwater: Lifeblood of the Land

GIANT FLOOR MAP

Teacher's guide 2026





AQUA ACTION

CANADIAN Geographic

canadian museum of nature
nature
musée canadien de la nature

Fondation de Gaspé Beaubien Foundation

Environment and Climate Change Canada | Environnement et Changement climatique Canada

Canada Water Agency | Agence de l'eau du Canada

Natural Resources Canada | Ressources naturelles Canada

The Freshwater: Lifeblood of the Land Giant Floor Map was created by Canadian Geographic, in partnership with AquaAction and the Canadian Museum of Nature, as part of The Water Literacy Project, Canada's leading freshwater education initiative. For more information, visit: www.thewaterliteracyproject.org

This document may be freely reproduced for non-commercial and educational purposes without obtaining the permission of the authors, provided that no changes are made to the document and proper attribution is provided. October 2026.



Table of contents

Freshwater: Lifeblood of the Land 1

About this teacher's guide 5

Why water literacy matters 6

Cartographer's message 8

Introduction to the Freshwater Giant Floor Map 24

1 The nature of water: Water is life 29

1.1 Water is life: Relationships and rights 30

1.2 Water is life: Water's role in creation 35

2 The nature of water: Journey of water 39

2.1 Journey of water: Watersheds and drainage basins 40

2.2 Journey of water: Glaciers, ice caps and meltwater 44

2.3 Journey of water: Groundwater and surface water 48

2.4 Journey of water: The water cycle 52

3 Living with water: The water around us 56

3.1 The water around us: Water in our daily life 57

3.2 The water around us: Stormwater versus wastewater 61

4 Living with water: Water at work for us 65

4.1 Water at work for us: How else do we use water? 66

4.2 Water at work for us: How should we allocate water? 71

5 Environmental and climate impacts: Human impacts on water 74

5.1 Human impacts on water: How human activity affects freshwater 75

6 Water inequity 80

6.1 Water inequity: Access to safe water 81

7 Protecting water 85

7.1 Connecting and taking action: Art and stewardship 86

7.2 Connecting and taking action: Pathways to protecting water 90

8 Freshwater careers 99

8.1 Freshwater careers: Working for water 100

8.2 Freshwater careers: From challenge to opportunity 107

8.3 Freshwater careers: Our responsibility for tomorrow 114

Appendix 119



About this teacher's guide

The *Freshwater: Lifeblood of the Land* teacher's guide includes an introductory lesson and **17 lessons across four themes: The nature of water, Living with water, Environmental and climate impacts and Protecting water.** The lessons guide students from exploring freshwater systems and relationships with water to understanding human uses, impacts and inequities and considering pathways to protecting water.

Designed to be used with the Giant Floor Map, the guide encourages hands-on exploration, discussion and learning through the map's features and resources. Lessons connect to the map's data layers, border prompts, **Languages of Water and Working for Water QR codes** and the moveable *Water is everywhere* diagram. The guide also includes activity cards and other supporting resources to help educators facilitate the lessons.



Why water literacy matters

Canada, home to about 20 per cent of the planet's surface freshwater, is a nation of lakes, rivers, wetlands, glaciers and ice. Water sustains all life, shapes our landscapes and communities and supports our economy. For many people, water is also central to cultural and spiritual relationships. Our bodies are two-thirds water; we can't live without it. Yet how much do we really understand about the freshwater that sustains us?

Water challenges affect everyone, often in inequitable ways. Across Canada climate change is exacerbating droughts, floods and forest fires and shrinking glaciers at an alarming rate. Growing anthropogenic pressures on freshwater ecosystems such as changes in land use, industrial pollution and invasive species are contributing to alarming biodiversity loss and decreasing access to clean freshwater. The impacts are being felt disproportionately by communities across the country. As water pressures increase across Canada, the most resilient communities will be those with the clearest understanding of the freshwater ecosystems they depend on. Water literacy matters.

Water literacy is the knowledge, understanding and awareness we need to recognize how water shapes our lives, and how our choices shape water. It means understanding where water comes from, how it moves through watersheds and the water cycle, how it supports ecosystems, communities and economies, and how it connects to our health, culture and future.

Water literacy doesn't require everyone to become a technical expert. It means understanding that water is dynamic and interconnected: what happens upstream can affect what happens downstream, and our choices today can shape the waters we depend on tomorrow. When we understand water, we are better equipped to protect it and find solutions to the challenges facing our communities and our country.


CATHY CURTI / CAN GEO PHOTOCLUB

Young people are uniquely positioned to challenge how we think about and use water, and to imagine new and better possibilities. As educators, you have an extraordinary opportunity to spark their curiosity and help them develop a respectful, caring relationship with water. You may even set them on a career path toward solving water challenges.

I hope our Giant Floor Map and activities inspire you and your students to explore where freshwater is found, why it matters, how it connects us and, most importantly, what you can do for water. Water literacy helps turn knowledge into creativity and stewardship. In Canada and around the world, we need more people who understand water and are inspired to use their unique talents to protect it and help build water-resilient communities.

Have fun with the Giant Floor Map, and whenever possible, get your students outside to see, hear and touch their local waters. Like you, water is an amazing teacher.

In the water spirit,

Meredith Brown
Director of Water and Land Relations
Canadian Geographic



Cartographer's message

Blue land and green water. The colour choices for this Giant Floor Map aren't a mistake. They are meant to grab your attention. Depicting most of Canada in shades of blue reveals a watery truth that lies mostly hidden in the soil. Water is very much present not only where we expect it to be — in lakes and rivers — but also in the ground. The shades of blue throughout the land on this map represent wetlands; the darker the blue, the more wetland areas you would find in that part of Canada. Wetlands are a wonderful cartographic in-between. It's in their name. Wet. Land. Maps, if they show anything, almost always distinguish water from land — but there are these areas in our landscapes that are both land and water. Equally interesting are the areas with virtually no wetlands (orange- and cream-coloured on the map). Who knew that the Prairies — where we grow so much of our food — have so little surface water?

Wetlands are only one of the myriad places that water exists on our planet. As the Earth's Water diagram on the right of this map shows, 96 per cent of Earth's water is in the ocean. This isn't a huge surprise but the fact that more than two-thirds of the world's freshwater is frozen in glaciers and ice caps might be. Perhaps the most mind-boggling surprise is that there is more than 100 times as much water hidden in the ground (groundwater) as there is in the lakes, rivers and wetlands on the surface. Maps are depictions of the surface of our planet — so unfortunately, we couldn't craft a way to show this groundwater on the Giant Floor Map. Though it's worth considering that some percentage of the water we see in lakes and rivers (from a very small amount to well over three-quarters) has percolated up from the ground. Rivers and lakes are not just filled by rain and surface runoff, which goes a long way to explaining why most rivers in Canada always flow, even when it hasn't rained for weeks or months. They are fed by groundwater.

Rivers are showy superstars of the water world. We marvel at their power; we love it when they fall off a high place in magnificent waterfalls. Many First Peoples believe rivers have a spirit — that they are alive — and many people the world over liken them to the veins in an animal or a plant, transmitting nutrients and energy from one part of

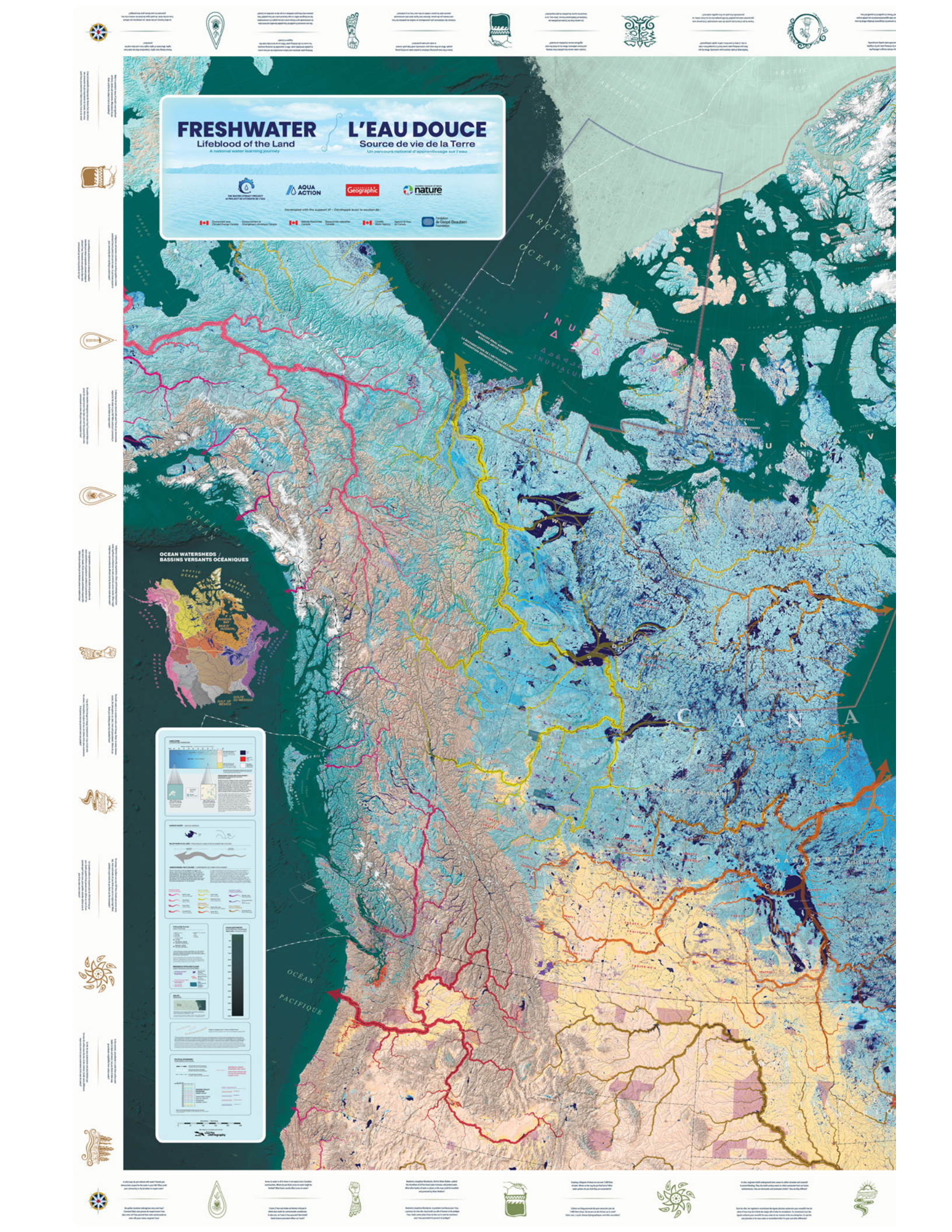


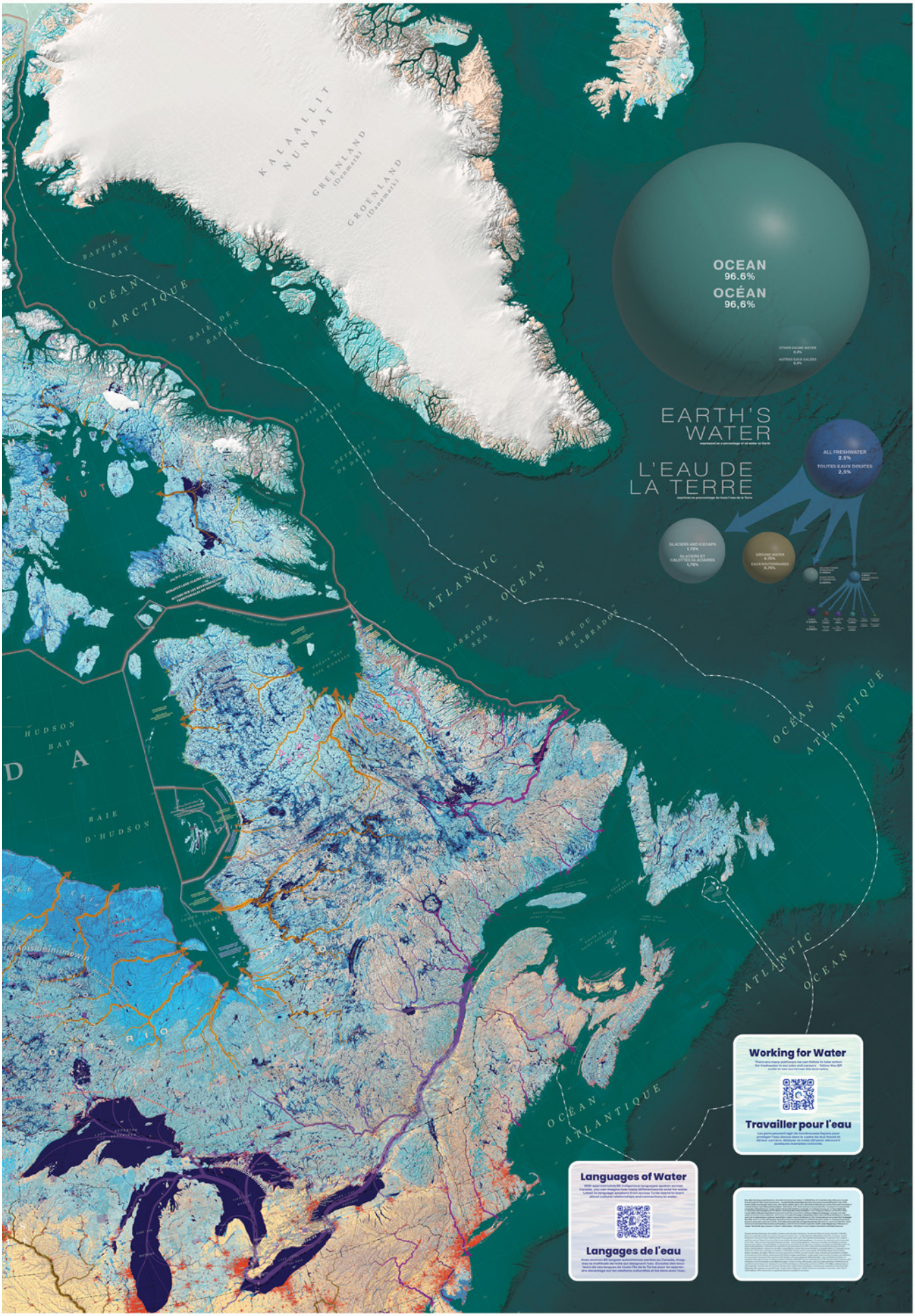
the land to another. Major rivers are highlighted on this map with different colours, denoting where they flow to and which ocean watershed they are a part of. These big bright river lines draw the connections between wherever you and your students live to the ocean, which may be thousands of kilometres from your home.

Like groundwater, rain and snow and atmospheric moisture are also difficult to map, as they exist in three-dimensional space, not on the surface. While you won't see this water on the map, you will find it in the accompanying *Water is everywhere* infographic and movable *Water is everywhere* diagram. It's important to know that any of the water you see on the map from ocean to lake to river to wetland has cycled through the atmosphere, before falling back to Earth to rejoin the collections of water found on the surface and underground.

As the title of this Giant Floor Map says, freshwater is the "lifeblood of the land." It supports and sustains us every day, in ways we too often forget. To give a sense of how different people across Canada interact and know water, there are two QR codes on this map. One leads to a wealth of video stories about how different jobs rely on water, showing the wide range of influence water has on our working lives. The other leads to audio recordings of Indigenous Peoples across Canada sharing the words for water in their languages. Speaking of languages, it's important to note that this is the first Giant Floor Map that includes the presence of Indigenous languages across the country in endonymic form. An endonym is the name a group uses for itself or its language, not one given by outsiders. While many of these names will be new to teachers and students, they represent an important step in decolonizing our understanding of First Peoples.

Chris Brackley
Cartographer


FRESHWATER
Lifeblood of the Land
A national water learning journey
L'EAU DOUCE
Source de vie de la Terre
Un parcours national d'apprentissage sur l'eau
AQUA ACTION
Developed with the support of – Développé avec le soutien de :
OCEAN WATERSHEDS / BASSINS VERSANTS OCÉANIQUES
ARCTIC OCEAN
OCÉAN ARCTIQUE
PACIFIC OCEAN
OCÉAN PACIFIQUE
ATLANTIC OCEAN
OCÉAN ATLANTIQUE
GULF OF MEXICO
GOLFE DU MEXIQUE
BEAUFORT SEA
MER DE BEAUFORT
HUDSON BAY
BAIE D'HUDSON
INUVIALUIT
NUNAVUT
CANADA
MANITOBA
SASKATCHEWAN
ONTARIO
QUÉBEC
UNITED STATES OF AMERICA
ÉTATS-UNIS D'AMÉRIQUE


KALAALLIT NUNAAT
GREENLAND (Denmark)
GROENLAND (Danemark)
ICELAND
ISLANDE
BAFFIN BAY
OCÉAN ARCTIQUE
BAIE DE BAFFIN
DAVIS STRAIT
DÉTROIT DE DAVIS
ATLANTIC OCEAN
LABRADOR SEA
MER DU LABRADOR
OCÉAN ATLANTIQUE
HUDSON BAY
BAIE D'HUDSON
OCEAN 96.6%
OCÉAN 96,6%
OTHER SALINE WATER 0.4%
AUTRES EAUX SALÉES 0.4%
EARTH'S WATER
expressed as a percentage of all water on Earth
L'EAU DE LA TERRE
exprimée en pourcentage de toute l'eau de la Terre
ALL FRESHWATER 2.5%
TOUTES EAUX DOUCES 2,5%
GLACIERS AND ICECAPS 1.72%
GLACIERS ET CALOTTES GLACIAIRES 1,72%
GROUND WATER 0.75%
EAUX SOUTERRAINES 0,75%
Working for Water
Travailler pour l'eau
Languages of Water
Langages de l'eau

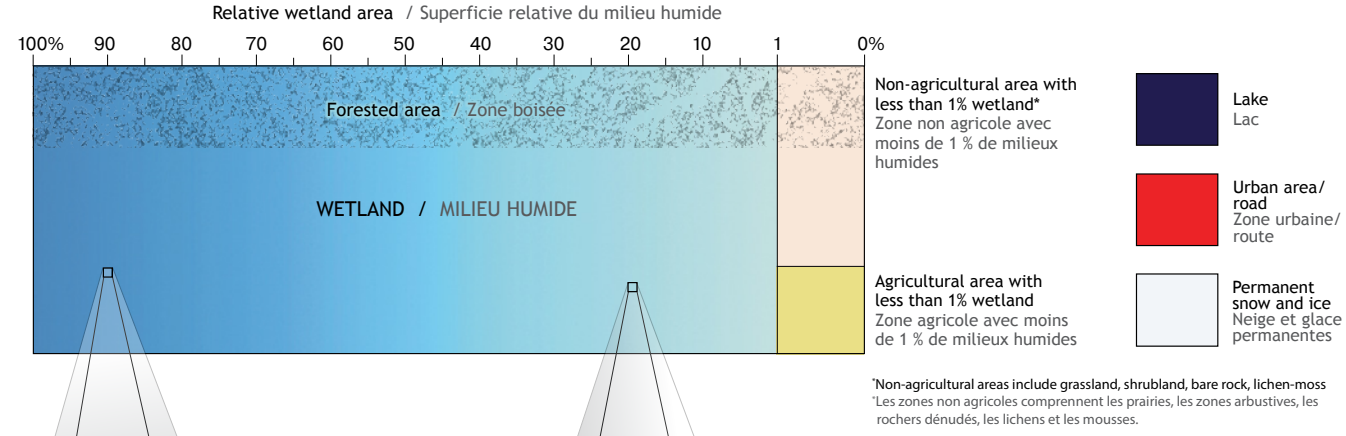
Map overview and resources

Components of the *Freshwater: Lifeblood of the Land* Giant Floor Map

The map legend shows:

- **Land cover:** The relative amount of wetland area across the landscape, as well as areas with less than 1 per cent wetland cover. Yellow represents agricultural areas, pink represents non-agricultural areas, red represents urban areas and roads and white represents permanent snow and ice.
- **Surface freshwater:** Rivers, lakes and other surface freshwater features shown on the map.
- **Freshwater flow:** The direction of water flow in rivers and the larger ocean watershed into which they drain. Colour families show which major body of water the waterways ultimately flow into. Water flow is based on the land area drained by each waterway and does not represent measured flow volume.
- **Populated and Indigenous populated places:** Population numbers and types of urban and Indigenous populated areas.
- **Sea ice:** The location and extent of sea ice on the map.
- **Ocean bathymetry:** The depth and shape of the ocean floor. Darker areas represent deeper water, while lighter areas represent shallower water.
- **Indigenous languages:** Indigenous language names and the regions where they are spoken. The size of each language name indicates the relative number of local native speakers, based on 2016 Census data.
- **Political boundaries:** International and provincial boundaries, historical and modern treaty boundaries and the boundaries of Inuit Nunangat (the land, water and ice of the Inuit in Canada across the four specified regions).

LAND COVER
COUVERTURE TERRESTRE



*Non-agricultural areas include grassland, shrubland, bare rock, lichen-moss
*Les zones non agricoles comprennent les prairies, les zones arbustives, les rochers dénudés, les lichens et les mousses.



90% of this area is covered in wetlands

90 % de cette zone est constituée de milieux humides

20% of this area is covered in wetlands

20 % de cette zone est constituée de milieux humides

UNDERSTANDING THE WETLAND COLOUR GRADIENT / COMPRENDRE LE DÉGRADÉ DE COULEURS DES MILIEUX HUMIDES

Wetlands are present throughout Canada, sometimes dominating the landscape, sometimes existing only as small pockets scattered here and there. On this map, where the land is coloured with a dark wetland blue, it means most of the area is covered in wetlands, with a few lakes and dryer areas. In the real world, it could look something like the 90 per cent pop-out illustration, where most of the area is wetlands and the white part is a dryer area. Where the map is coloured a light wetland blue, it means most of the area is not wetland, but some wetlands do occur. The 20 per cent pop-out illustration shows an example of what it could look like in the real world.

Les milieux humides sont présents partout au Canada; ils dominent parfois le paysage, tandis qu'à d'autres moments, ils ne constituent que de petites poches éparpillées çà et là. Sur cette carte, les zones colorées en bleu foncé (milieux humides) indiquent que la majeure partie de la zone est constituée de milieux humides, avec quelques lacs et des zones plus sèches. Dans la réalité, cela pourrait ressembler à l'illustration à 90 pour cent en exergue, où la majeure partie du territoire est constituée de milieux humides et où la partie blanche correspond à une zone plus sèche. Lorsque la carte est teintée d'un bleu clair représentant les milieux humides, cela signifie que la majeure partie de la zone n'est pas constituée de milieux humides, mais qu'il en existe tout de même quelques-uns. L'illustration à 20 pour cent en exergue montre un exemple de ce à quoi cela pourrait ressembler dans la réalité.

SURFACE WATER / EAUX DE SURFACE

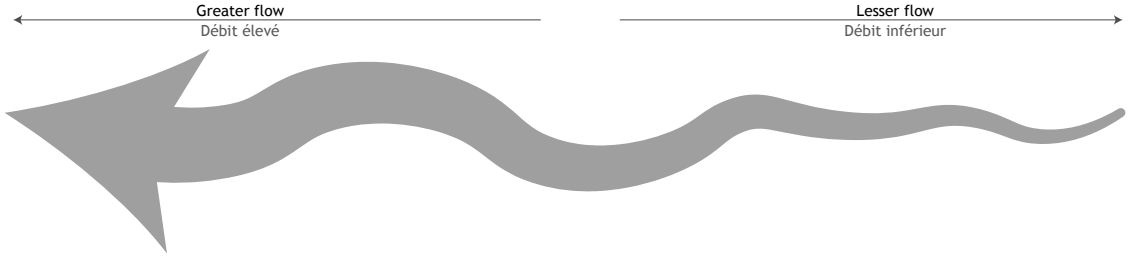


Lake
Lac



River
Fleuve

MAJOR RIVER FLOW LINES / PRINCIPALES LIGNES D'ÉCOULEMENT DES FLEUVES



UNDERSTANDING THE FLOW LINES / COMPRENDRE LES LIGNES D'ÉCOULEMENT

The river flow lines on this map highlight our biggest river systems. Without these colourful lines, it would be difficult to see the routes of these long and winding rivers. Just like the rivers themselves, which generally grow in water volume as they head downstream, the river flow lines get wider as they move towards the sea, symbolizing this increasing volume of water. The colours of the river flow lines represent which ocean, bay or gulf they flow in to, and these colours correspond to the major continental drainage basins on the map above.

Les lignes représentant le cours des fleuves sur cette carte mettent en évidence nos plus grands réseaux hydrographiques. Sans ces lignes colorées, il serait difficile de distinguer le tracé de ces fleuves longs et sinueux. Tout comme les fleuves eux-mêmes, dont le débit augmente généralement à mesure qu'ils descendent vers l'aval, les lignes représentant le cours des fleuves s'élargissent à mesure que ceux-ci se dirigent vers la mer, symbolisant ainsi cette augmentation du débit. Les couleurs des lignes indiquant le cours des fleuves représentent l'océan, la baie ou le golfe dans lesquels ils se jettent, et ces couleurs correspondent aux principaux bassins versants continentaux indiqués sur la carte ci-dessus.

PACIFIC OCEAN
OCÉAN PACIFIQUE



Pacific coast
Côte du Pacifique



Yukon River
Fleuve Yukon



Fraser River
Fleuve Fraser



Columbia River
Fleuve Columbia

ARCTIC OCEAN
OCÉAN ARCTIQUE



Arctic coast
Côte arctique



Mackenzie River
Fleuve Mackenzie

HUDSON BAY
BAIE D'HUDSON



Hudson Bay coast
Côte de la baie d'Hudson



Nelson River
Fleuve Nelson

ATLANTIC OCEAN
OCÉAN ATLANTIQUE



Atlantic coast
Côte Atlantique



St.Lawrence River
Fleuve
Saint-Laurent

GULF OF MEXICO
GOLFE DU MEXIQUE



Mississippi River
Rivière Mississippi

POPULATED PLACES
LIEUX PEUPLÉS

Labelled† / Étiqueté†
- 2000-4999
- 5000-9999
- 10 000-24 999
- >24 999
- PROVINCIAL CAPITAL / CAPITALE PROVINCIALE
- NATIONAL CAPITAL / CAPITALE NATIONALE

Unlabelled† / Non étiquetés†
- >500
- 500-999
- 1000-1999

† In dense urban areas, some places with populations over 2,000 people are shown but not labelled due to the density of labels in these areas. In some remote areas, some places with populations under 2,000 people are labelled to help map-readers orient themselves.

† Dans les zones urbaines denses, certains lieux dont la population est supérieure à 2 000 personnes sont représentés, mais non étiquetés, afin d'éviter l'excès d'étiquettes dans ces zones. Dans certaines régions éloignées, certaines localités comptant moins de 2 000 habitants sont indiquées sur les cartes afin d'aider les utilisateurs de la carte à s'orienter.

INDIGENOUS POPULATED PLACES
LIEUX PEUPLÉS D'AUTOCHTONES

First Nations community
Communauté de Première Nation

Inuit Nunangat regional capital
Capitale régionale de l'Inuit Nunangat

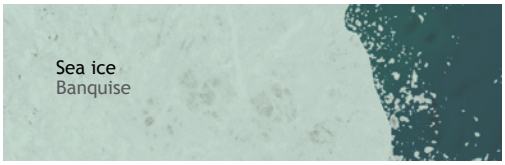
Inuit community
Collectivité inuite

Reserve parcel (Canada)
Parcelle de réserve (Canada)

Reservation parcel (U.S.A.)
Parcelle de réserve (É.U.A.)

Métis Settlement Land
Terres de peuplement des Métis

SEA ICE
BANQUISE

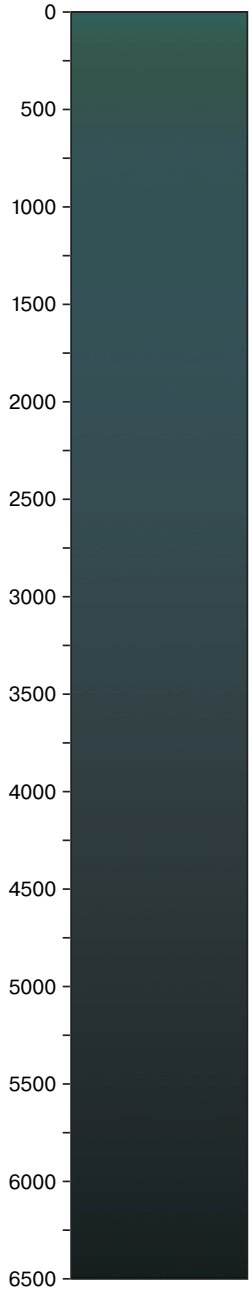


The extent of sea ice shown reflects the smallest recorded ice extent, measured on Sept. 14, 2012.

L'étendue de la banquise indiquée reflète la plus petite étendue de glace enregistrée, telle que mesurée le 14 sept. 2012.

OCEAN BATHYMETRY
BATHYMÉTRIE OCÉANIQUE

depth in metres / profondeur en mètres



Inuktitut

Michif

Anishinaabemowin

Indigenous language spoken or being revitalized today**

Langue autochtone parlée ou en voie de revitalisation aujourd'hui**

**The sizes of Indigenous language labels are roughly equivalent to the number of local speakers based on 2016 census data describing languages most often spoken at home. The labels shown are endonymic (i.e., they are the name of the language *in* the language) and were translated from the original English and French language names listed in the 2016 census. Cree is the one exception, and remains in English and French as there is no known endonym for an undefined dialect of Cree. Some languages not documented in the 2016 census have been added where the language has some living speakers or where there is an active program to revitalize the language in Canada.

** La taille des étiquettes des langues autochtones est à peu près équivalente au nombre de locuteurs locaux, selon les données du recensement de 2016 portant sur les langues les plus souvent utilisées à la maison. Les appellations présentées ici sont endonymes (c'est-à-dire qu'il s'agit du nom de la langue dans cette langue) et elles ont été traduites à partir des noms originaux en anglais et en français figurant dans le recensement de 2016. Le cri constitue la seule exception et continue d'être désigné en anglais et en français, car il n'existe aucun endonyme connu pour un dialecte non défini de la langue crie. Certaines langues qui n'étaient pas répertoriées dans le recensement de 2016 ont été ajoutées lorsqu'il existe des locuteurs vivants de cette langue ou lorsqu'un programme actif de revitalisation de cette langue est en place au Canada.

POLITICAL BOUNDARIES
FRONTIÈRES POLITIQUES

International terrestrial boundary
Frontière terrestre internationale

International marine boundary
Frontière maritime internationale

Provincial/state boundary
Frontière interprovinciale/entre États

HISTORICAL TREATY BOUNDARY (PRE-1975)§

FRONTIÈRE DÉFINIE PAR UN TRAITÉ HISTORIQUE (AVANT 1975)§

1977, 1978, 1985, 1999, 2000, 2011, 2016
1992
1993
1993
1993
1993
1993
1997
1997
1998
2002
2003
2005
2005
2005
2005
2005
2008

MODERN TREATY BOUNDARY (POST-1975)§

FRONTIÈRE FIXÉE PAR UN TRAITÉ MODERNE (APRÈS 1975)§

INUIT NUNANGAT

NUNAVUT

NUNAVIK

NUNATSIAVUT

INUVIALUIT

§Due to scale, the treaty boundaries on these maps may not be exact.

§En raison de l'échelle, les frontières des traités indiquées sur ces cartes peuvent ne pas être exactes.

kilometres / kilomètres

0 50 100 150 200 250



Refer to this image to help students understand the relative volume of ocean water and freshwater expressed as a percentage of all water on Earth.



Refer to this image to help students understand the land area covered by each of North America's ocean watersheds. The colour of each watershed on the inset map is the same as the colour of corresponding flow arrows on the main map. These arrows show the direction of water movement in the watershed and which ocean or sea it flows to.

Base data (hydrology, populated places, international and state boundaries): 1:1,000,000 Atlas of Canada data, Natural Resources Canada; licensed under the Open Government Licence – Canada; **Elevation-based data** (terrestrial and marine): General Bathymetric Chart of the Oceans, British Oceanographic Data Centre, 2023; **Sea ice extent**, Sept 14, 2012: derived from National Snow and Ice Data Center (University of Colorado Boulder) maps; **Watershed boundaries**: "Watersheds, 2010," North American Environmental Atlas, Commission for Environmental Cooperation, Natural Resources Canada, Instituto Nacional de Estadística y Geografía, U.S. Geological Survey, ed. 1.0, Vector digital data [1:10,000,000]; **Inuit Nunangat and First Nations community data, treaty boundaries**: Crown-Indigenous Relations and Northern Affairs Canada; **Métis Settlement Land**: Alberta Environment and Parks, Government of Alberta; **Indigenous languages**: Language most often spoken at home by Census Subdivision, 2016 Census of Canada; **Percentage wetland data**: Global Lakes and Wetlands Database v2, Relative area of all 33 wetland classes combined, HydroSHEDS, Creative Commons Attribution (CC-BY) 4.0 International License, April 2025; **Freshwater flow data**: As the Crow Flies cARTography, derived from land area drained based on GTOPO30 elevation model, U.S. Geological Survey Earth Resources Observation and Science Center, 2018; **Urban areas and roads and agricultural lands**: derived from "Land Cover 2020 30m," North American Environmental Atlas (Landsat and RapidEye), Centre for Environmental Cooperation; **Earth's water diagram**: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources.

Données de base (hydrologie, lieux habités, frontières internationales et étatiques) : Données de l'Atlas du Canada à l'échelle 1:1 000 000, Ressources naturelles Canada, sous la Licence du gouvernement ouvert – Canada; **Données altimétriques** (terrestres et marines) : General Bathymetric Chart of the Oceans (GEBCO), British Oceanographic Data Centre, 2023; **Étendue de la banquise** 14 septembre 2012: établie à partir des cartes du National Snow & Ice Data Center; **Limites des bassins hydrographiques** : Commission de coopération environnementale (CCE). 2010. « Atlas environnemental de l'Amérique du Nord – Bassins hydrographiques ». Ressources naturelles Canada (RNCan), Instituto Nacional de Estadística y Geografía (INEGI), U.S. Geological Survey (USGS). Éd. 1.0, Données numériques vectorielles [1:10 000 000]; Limites des bassins hydrographiques : Commission de coopération environnementale (CCE). 2010. « Atlas environnemental de l'Amérique du Nord – Bassins hydrographiques ». Ressources naturelles Canada (RNCan), Instituto Nacional de Estadística y Geografía (INEGI), U.S. Geological Survey (USGS). Éd. 1.0, Données numériques vectorielles [1:10 000 000]; **Données sur les communautés de l'Inuit Nunangat et des Premières Nations, frontières des traités** : Relations Couronne-Autochtones et Affaires du Nord Canada; **Terres octroyées par une entente aux Métis** : Environnement et Parcs Alberta, gouvernement de l'Alberta; **Langues autochtones** : Langue parlée le plus souvent à la maison, par subdivision de recensement, Recensement du Canada de 2016; **Données sur le pourcentage de milieux humides** : Lakes and Wetlands Database v2, superficie relative des 33 classes de milieux humides combinées, HydroSHEDS, Licence internationale (CC-BY) 4.0 de la Creative Commons selon l'attribution, avril 2025; **Données sur le débit d'eau douce** : As the Crow Flies cARTography, tirées du modèle altimétrique GTOPO30 pour la superficie terrestre drainée, U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS), 2018; **Milieux urbains/routes et terres agricoles** : données tirées de Couverture terrestre, 30 m, 2020 (Landsat et RapidEye), Commission de coopération environnementale; **Diagramme des ressources en eau de la Terre** : chapitre d'Igor Shiklomanov intitulé « Ressources mondiales en eau douce » dans Peter H. Gleick (éditeur), 1993, L'eau en crise : un guide des ressources mondiales en eau douce.

Languages of Water

Freshwater: Lifeblood of the Land represents Indigenous languages spoken today across Canada as one of its layers. These languages are communicated through their endonyms, or the way that the languages name themselves, as opposed to exonyms, or the names that outsiders have given to them. The Languages of Water feature gives that layer a voice. Scanning the **Languages of Water QR code** opens an interactive digital version of the freshwater map, pinned with short video recordings by speakers of Indigenous languages, each saying the word for "water" in their own language and speaking about their relationship to it. Every pin names the speaker, their community and their language group, so a word arrives attached to the people and places in relationship with it. Students can move between the floor map and the digital one, finding the region a speaker comes from and standing on it as they listen. Water has been named on this land for thousands of years, in hundreds of languages, and is still being named today.

Working for Water

"Water work" does not look like one thing. A hydrologist, a treatment plant operator, an Indigenous Guardian, a planner, an electrician wiring a pump station and a community administrator all keep freshwater clean and moving, but all have different skills and career pathways, and none of their days look alike. Artists, business owners, policymakers and civil servants may not handle water infrastructure directly, but all encounter ways to advocate for the well-being of freshwater through their work. As students discover their talents and interests and look to models for future careers, they should know that all of their potential paths will include a relationship to freshwater. Scanning the **Working for Water QR code** opens a hub of short video profiles of people whose work connects to freshwater. The profiles are organized around the same four pathways to action students meet in Lesson 7.2 and use again in Lesson 8.1: science and research, government, non-governmental and not-for-profit organizations and grassroots and community action. Grouping careers this way invites students to consider careers through their potential for different pathways to freshwater action rather than by title or industry. It also makes room for the careers that shape water without announcing themselves as water careers. Not every job is in a field that is "about" water directly. All jobs, however, ultimately depend on our relationship to freshwater, and so hold meaningful opportunities to protect it.

Water is everywhere diagram

The *Freshwater: Lifeblood of the Land* Giant Floor Map features a *Water is everywhere* infographic and an accompanying large-format artistic rendering of the water cycle made of the same material as the map. Created with Anishinaabe artist Patrick Hunter, the movable *Water is everywhere* diagram gathers the stages of the water cycle into a unified whole, held together as a living relationship rather than separated into an image of separate parts. The diagram is movable to better represent how water moves through and connects land, plants, animals and people. Because it can be carried and set down anywhere on the map, students can lay the cycle over a glacier, a boreal wetland, a prairie river or a city and ask what each stage looks like in that place. This modular piece highlights that water is everywhere, not only in the lakes, rivers and wetlands seen on the Giant Floor Map. It reminds students that there is more freshwater in the ground than what we see on the surface.



Border prompts and icons

A map's border usually marks the boundary of what it represents. On *Freshwater: Lifeblood of the Land,* the border is the entryway onto the map and the place where questions and thoughtful interactions begin. Around the edge runs a series of open questions with no single right answers, asking anyone walking on the map what they notice, what they are connected to and how they live in relationship with freshwater. Each prompt features an icon illustrated by Anishinaabe artist Patrick Hunter. The nine icons used throughout the map and lessons are:



ENVIRONMENTAL AND CLIMATE IMPACTS



WATER INEQUITY



WATER IS LIFE



PROTECTING WATER



FRESHWATER CAREERS



WATER AROUND US



JOURNEY OF WATER



WATER AT WORK FOR US



GROUNDWATER

The same icons appear beside the prompts, which are integrated across the lessons. An appendix at the back of this guide gives a guided response to every question on the border.

List of contributors

Canadian Geographic

Chris Brackley, Cartographer
Javier Frutos, Director of Brand and Creative
Cindy LaGarde, Lead Designer
Iza Valle, Designer
Meredith Brown, Director of Water and Land Relations
Jude Gerrard, Director of Indigenous Content and Connections
Bluebird Mustooch, Indigenous Education Fellow
Keegan Hoban, Project Coordinator
Charlene Bearhead, Charter School Pilot

Canadian Geographic Education

John Estabillo, Director of Education
Eric Nadeau, Manager of Education Programs
Fiona Tapp, Education Editor
Anika Guthrie, Curriculum Designer and Lead Writer
Małgosia Halliop, Writer



Introduction to the Freshwater Giant Floor Map

Overview

Maps like the Freshwater Giant Floor Map contain layers of data about the different geographical elements of a particular area, including physical elements and human elements. Maps also use features and symbols to show what information is included, how to read the map and what stories the map tells us. Indigenous knowledge and relationships to water are embedded throughout the Giant Floor Map and its accompanying resources. *Freshwater: Lifeblood of the Land* includes a QR code linking to Languages of Water, a video series of speakers of Indigenous languages sharing how to say "water" in their languages and talking about their relationship to water.

- What are the key elements of a map?
- What layers of data are shown on the Freshwater Giant Floor Map?
- What story is the map telling us about freshwater in Canada?
- How do Indigenous knowledge and perspectives help us understand, value and care for water?

Times required

One 60- to 90-minute period

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

In completing this activity, students will:

- Learn or review the elements of a map
- Become familiar with the different data layers and features of the Freshwater Giant Floor Map
- Learn a word for "water" in some of the Indigenous languages labelled on the map using the Languages of Water feature

Materials and resources

- Freshwater Giant Floor Map
- Devices capable of scanning the Languages of Water QR code
- Languages of Water video series
- **Activity card: What's on the map? Scavenger hunt legend checklist**
- Sticky notes or index cards
- Markers

Lesson implementation

Minds on the map

Begin with students standing around the Freshwater Giant Floor Map. Ask students to consider what stands out to them on this map, what is different from other maps they've seen and what they are curious about. Allow students to explore the map independently, walking around it, sitting on it or even lying on the map to closely observe details. As they explore, ask students to pay attention to all the ways that water is represented on the map.

Before moving on, review basic mapping skills with your class, including:

- Map orientation and cardinal directions
- Scale and how to use a map scale
- Map legends and why they are important
- The map title and how it connects to the purpose of the map
- What elements they have seen before on other maps
- How what is included on a map tells a specific story, which is controlled by the cartographer (mapmaker)

Ask students to locate the title, legend, scale, compass and border on the map. Let students know you will explore the legend together as a class to learn more about the different types of information included on this map. Explain that the map is made up of layers of data, each layer represented in a particular visual way explained by the legend.

Ask students for some examples of what they notice about the different colours, symbols and lettering styles used to represent different layers of data on this map (e.g., blue is used for freshwater, red for urban areas, red words and numbers for treaty lands).

Water and me

If you were making a map of where you live, what water would you include? How would you represent it? What else would you want to feature on your map?

Action

Activity 1: What's on the map? Scavenger hunt

Tell students that they will form small groups and go on a scavenger hunt to find one example of each item represented in the legend (e.g., a lake, a river, a First Nations community, a historical treaty boundary, a provincial boundary). Students in small groups search for and locate their examples on the map and record them on the What's on the map? Scavenger hunt legend checklist. Allow students opportunities to ask questions, and explain any elements of the map that are unclear. Define terms that may be unfamiliar, for example "ocean bathymetry" or "Inuit Nunangat." For more comprehensive context on treaties and treaty boundaries, refer to the maps and materials included in the Indigenous Peoples Atlas of Canada, linked in the additional resources.

When they have completed the scavenger hunt, ask students what they think the purpose of this map is and guide them to start to think about the story it might be telling. Ask students, "What do you notice about the amount of blue on the map and where it is located? What do you notice about other ways water is represented on the map? What do you notice about how water flows on the map?" Explain to students that the map was designed to help people learn about freshwater in Canada, how it moves and changes and how it connects all of Canada.

Have students notice the Earth's Water infographic that shows the percentage of freshwater (2.5 per cent) relative to the total volume of water on Earth, 96.6 per cent of which is salt ocean water. Explain that about 20 per cent of the world's surface freshwater is located in Canada. Discuss the role of freshwater in Canada using the following prompts: Why is freshwater important? What does it mean for Canada that it has such an abundance of freshwater relative to the rest of the world? How would our lives be different if we didn't have access to so much freshwater?

Activity 2: Languages of Water

Explain to students that there was a time that all of the freshwater shown on the map would have been clean drinking water. Since time immemorial, Indigenous Nations, across what is now known as North America, have understood water as a living being; it provides life and can take life. Indigenous cultures experience deep relationships with water, maintain complex knowledge about water and honour the spirit of water through offerings and ceremonies. Indigenous Peoples understand that if the waters are healthy then we, as humans, can also be healthy.

Through colonization and industrialization, pollution has affected many freshwater bodies in Canada, and as a result, many Indigenous communities have experienced longstanding inequities in access to safe drinking water, and some continue to live under long-term drinking water advisories. At the same time, Indigenous individuals and communities across Canada continue to lead efforts to protect water. Let students know you will investigate these issues further as they learn more about freshwater and the state of freshwater.

Have students find your school community on the map. If some students' homes are in a different community, ask them to find their home community as well. Explore the area around these communities on the map. What bodies of water are close by? What is the Indigenous language group closest to your community?

Using the QR code for Languages of Water, listen to/watch the recordings of Indigenous language speakers sharing how to say "water" in their language and talking about their relationship to water. Use the following prompts to discuss what students have heard:

- What is the word for "water" in this speaker's language?
- How does this speaker describe water?
- How does this speaker describe their relationship or their community's relationship to water?

As you listen to Languages of Water recordings, create a chart with the class of the Indigenous languages represented and the word for "water" in each. Have students explore the whole of the map again, this time making note of all of the different Indigenous language families shown on the map. Individually or in small groups, have students create a card with the word for "water" in one of the languages represented in the recordings. Students find the language on the map, place the card on the map with it, and practice saying the word.

Ask: Where does a language area follow a waterway on the map? What does that tell you about how people travelled, traded and lived with water before those borders were drawn? This can be the place students first notice that the Indigenous languages layer does not line up with the political boundaries layer. Language areas follow rivers, coastlines and watersheds; provincial and territorial borders mostly do not.

Extend the activity by inviting Knowledge Carriers from local Indigenous communities to share their connection, knowledge and perspectives on water. Have students prepare questions about the invited guest's specific knowledge, culture, traditional practices and relationship with water. Encourage respectful listening and dialogue.

Conclusion and consolidation

Ask students to reflect on what they have learned so far about the Freshwater Giant Floor Map, freshwater in Canada and Indigenous relationships with water. Before you move on to other lessons, you may wish to have students record, individually or on a class chart, what they already know and what more they would like to know about these subjects.

Modifications

For younger students:
Complete activities as a whole class, including the scavenger hunt. The scavenger hunt can also be simplified into broader categories (e.g. find one example of a freshwater flow arrow, find one example of a political boundary).

Help students understand the breakdown of ocean/freshwater on Earth (as shown in the Earth's Water infographic on the map) through a hands-on demonstration.

- Use 1,000 millilitres (ml) of water to represent the total water on Earth.
- Pour the water into different clear containers to represent the percentages of ocean water and freshwater: ocean water = 965 ml, freshwater = 25 ml.
- Further pour out the 25 mL of water to represent rivers, lakes, groundwater, etc., expressed as a percentage of all water on Earth (e.g., glaciers and ice caps = 17 ml, groundwater = 7.5 ml, surface water = 0.3 ml, can use droppers to break down into surface water bodies).
- Explain to students that out of the 1,000 ml that represents all water on Earth, the 25 ml represents Earth's freshwater. (Salt can be dramatically added to the ocean water to emphasize this point.)

For older students:
- Have students differentiate between physical geography data layers and human geography data layers and mark these on their checklist.
- Discuss the list of data sources (bottom right corner) used to create the map layers. What does this information teach us about how maps are researched and constructed?
- Have students use what they have learned about mapping to create a map of their local community showing water bodies and water sources, including the elements of a map; title, legend, scale, compass and border.

Additional resources

Indigenous Peoples Atlas of Canada (Canadian Geographic Education)
https://cangeoeducation.ca/en/maps/indigenous-peoples-atlas-of-canada/
Downloadable tiled map and teacher's guide.

Indigenous languages across Canada (Canadian Geographic Education)
https://storymaps.arcgis.com/stories/a036c04ff1c6440796721b9c68faba41
Map and other resources with a more detailed breakdown of the geographical distribution of Indigenous languages currently spoken in Canada.

10 amazing world maps created by children (Canadian Geographic)
https://canadiangeographic.ca/articles/10-amazing-world-maps-created-by-children/
Favourite examples of hand-drawn maps from children around the world submitted to the International Cartographic Association contest. Inspiration for maps as visual storytelling.

For younger students:
Map skills for students, ages 4 to 8 (National Geographic)
https://education.nationalgeographic.org/resource/map-skills-for-students/
A collection featuring map activities for younger learners.

1

The nature of water: Water is life

This series begins by exploring our relationship with water. Before students trace where water goes, count how much of it there is, or follow it through a pipe, they are asked a simpler and older question: what is water, and what responsibilities do we have toward the waters around us? For many Indigenous Peoples in Canada, the freshwaters that surround us are living relatives with their own rights and their own voice, cared for through responsibilities passed from one generation to the next. That understanding sits at the centre of this section, and it returns in every section that follows.

The two lessons in this section approach the idea that water is life from different directions. In Lesson 1.1, students consider water as a relative rather than a resource. They explore how water is described in different cultures and traditions, learn about legal recognition of the rights of rivers in Canada and elsewhere and finish by writing one right of water in their own words. In Lesson 1.2, students look at water's role in creation — first by examining the living things that gather where land and water meet on the Giant Floor Map, then by exploring how water appears as a force of creation and transformation in stories, teachings and cultural practices. Together, the two lessons establish the vocabulary of relationship, responsibility and reciprocity that the later lessons on infrastructure, allocation, pollution and protection all rely on.

Additional resources are available on the *Freshwater: Lifeblood of the Land* homepage. Scan the QR code to explore them.

Lessons in this section:

- Lesson 1.1 – Water is life: Relationships and rights
- Lesson 1.2 – Water is life: Water's role in creation

LESSON 1.1

Water is life: Relationships and rights

Overview

Water is not just something we use. Water gives life and connects all living things. Many people and cultures recognize water as living and that it deserves love, gratitude and protection.

- Why is water essential to life?
- What is the role of water in the "circulatory system" of the Earth?
- What does it mean to care for water and treat water as a living relative?
- How can the framework of human rights be applied to water? What kinds of rights would best protect water?



In what ways do you interact with water? How do you demonstrate respect for the water in your life? What could your community or city do better to respect water?

How do you treat people who are related to you and who care for you? How would your relationship to water change if water was part of your family?

Human beings have rights. Corporations that use water have rights. What kind of rights might rivers and lakes need for protection?

Time required

Two 60- to 90-minute periods

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Develop an understanding of the role of water within the living "circulatory system" of Earth
- Consider their relationship with water within the context of family and other relationships of care
- Explore how the framework of rights can be applied to nature and specifically to rivers and lakes

Materials and resources

- Freshwater Giant Floor Map
- Algonquin Water Song recording (linked in additional resources)
- An image or diagram of blood vessels in the human body
- Photos/videos of a nearby water source (optional)
- **Activity card: One right of water**
- Art supplies
- Devices for research (optional)

Lesson implementation

Minds on the map

Have students stand or sit around the Giant Floor Map. Ask students to observe all the places where water appears on the map, both around the land masses and on land. Explore the map legend with students. Ask: Why is so much of the land also coloured in blue? Note that the varying gradations of blue over land areas of the map show the relative wetland area in each location. Darker blue means a greater proportion of wetland area. Paler blue means a lesser proportion of wetland area.

Discuss with students: Why is water essential to life? All living things need water to survive. Water also carries nutrients, regulates temperatures and supports ecosystems.

In Indigenous cultures, water is sacred. It is recognized as a living being and a relative. It is the first medicine that makes all healing possible.

Draw students' attention to this quote: "Water is the life's blood of our mother the Earth. Water is the life's blood of our own bodies" (Grandma Nancy, from the video "Sing the Water Song," which can be found in additional resources). Ask students to consider these two analogies: what do they mean?

Share an image or diagram of blood vessels in the human body. Have students recognize how the rivers on the map have a similar pattern to the veins and arteries in the human circulatory system.

Explore the analogy by creating a chart comparing the role of blood vessels in the human body to the role of rivers in Earth's landscapes:

- Blood vessels carry blood, oxygen and nutrients through the body/Rivers carry water, nutrients and sediments from their source throughout the land.
- Tiny capillaries in the body merge to form larger blood vessels/Small creeks and streams combine to form larger rivers.
- Blockages in the circulatory system can cause illness/Blockages in waterways (dams, pollution) can harm ecosystems.
- The human body needs healthy blood within healthy blood vessels/Earth needs clean water within healthy rivers.

Let students know that it is not only the patterns of rivers that are echoed in the human body. In fact, human blood is itself composed of 90 per cent water. The human body is about 60 per cent water. One way we are connected to water as a living relative is our composition of mostly water. Like a living body, the Earth, too, is close to 70 per cent water.

Ask students to reflect: If Earth is like a living body, how should we care for rivers? What might happen when the Earth's "blood vessels" are unhealthy?

Water and me

Reflect on your own relationship with water:

- How does being near, in or on a body of water (like a river, lake or creek) make you feel?
- Is there a body of water or water source that you've particularly enjoyed spending time with?

Action

Activity 1: Water as a relative

What would it mean to care for water both as a living being and as a relative? Have students consider their relationships with family or other significant people who they care about and who care for them. What are some ways to show care to family or loved ones? What are some ways to thank someone for their care? Students can also consider water bodies and water sources that they already have a relationship with. What has that water meant to their lives?

Have students visit a nearby water source (as a class or individually with family) or have students sit with the water source on the map and/or look at photos/videos of the water source. Ask students to spend a few minutes observing and listening (with their senses and with their intuition or "heart"). Students can ask the water: How do you care for humans? How are you being treated by humans? How would you like to be treated? How can I/we care for you better? As students sit with the water, what observations, feelings or thoughts come up for them? What is the water telling them?

Back in class, have students reflect on their experiences of connecting with the water source. Ask students to act out a conversation with the water (in pairs), write out a conversation with the water or present their interpretation of what water tells them in a letter, spoken word poem or other medium.

Activity 2: The rights of water

How should people demonstrate respect for water? What kinds of rights might lakes and rivers need for protection? Elicit knowledge of universal human rights: a human right is a right that all people are born with just by being human. The United Nations, in its Universal Declaration of Human Rights says, "All human beings are born free and equal in dignity and rights." Human rights can also be explained as rules that everyone should follow in how they treat all other people.

Make a list of human rights, adjusting complexity and completeness to grade level. Some of the most widely accepted human rights around the world include:

- The right to live
- The right to have a home
- The right to be safe from violence
- The right to a fair trial
- The right to an education
- The right to believe and practice any religion
- The right to vote
- The right to peacefully protest against a government

Discuss in small groups or as a class: Water is often invoked as a human right, but if humans have a right to water, who gets to decide how water is used? Instead, if we recognize water as a living relative, this means that water itself would have rights. What are those rights? If you were making a declaration of the rights of water, what rights would you include?

Brainstorm a list with the class. In small groups, students can each choose and represent one right. Groups use the **Activity card: One right of water** to record their work.

Have each group create or find a visual symbol to represent this right. Groups can explain what their image represents and why this right would be important to a body of water. Create a class collage, poster or gallery wall as a declaration of the rights of water.

Conclusion and consolidation

Ask students to share their thoughts on what they learned from the activities. What did they learn about water systems on Earth through the analogy of the human circulatory system? How has their thinking about water changed by considering it both as a relative and a being that has rights? How is caring for water connected to caring for ourselves and other living beings? Encourage students to consider what actions they can take to carry forward these perspectives on water and how to treat it with respect, care and gratitude.

Modifications

For younger students:
Complete the activities as a whole class rather than individually or in small groups. Whether visiting a local waterway in person or reflecting on an image, encourage students to use empathetic imagination to consider how water would like to be treated. Ask students, "If you were water, how would you like to be treated? What would you tell people about how to care for you?"

For older students:
Extend the rights activity by having students research existing rivers around the world that have been granted legal rights (an exploration of one Canadian river's journey to legal personhood is included in the additional resources). What was the process in making these rights legal? What specific rights were granted and how do these compare to those suggested by the class? What challenges or tensions do efforts to grant legal rights to rivers and other bodies of water face? Have students choose a specific lake or river on the map. Would they make any changes or additions to the rights they included in their declaration if they were applying these rights to this specific lake or river?

Additional resources

Share/learn the water song
https://www.singthewatersong.com/songlyrics
Recording of the Algonquin water song, with phonetic lyrics included.

For older students:
I am Mutehekau Shipu: A river's journey to personhood in eastern Quebec (Biinaagami)
https://www.biinaagami.org/i-am-mutehekau-shipu-a-rivers-journey-to-personhood-in-eastern-quebec-2
An article about Mutehekau Shipu, or the Magpie River, which was granted legal personhood and rights. The article also details the nine specific rights granted to the river.

Water is a relative, not a resource (Indigenous Climate Hub)
https://indigenousclimatehub.ca/2026/06/water-is-a-relative-not-a-resource-rethinking-clean-water-in-first-nations-through-the-sovereignty-and-rights-of-water-itself/

The Sacred Relationship (Native Counselling Services of Alberta)
https://www.youtube.com/watch?v=5NxBzyZ-8a4
Documentary film exploring how reconciling the relationship between Indigenous Peoples and the rest of Canada can lead to healthier water. (50-minute video)

LESSON 1.2

Water is life: Water's role in creation

Overview

Water is essential to all life on Earth. It is necessary for human survival. It also creates opportunities for diverse ecosystems to thrive. Because humans have long recognized its vital importance, it appears as an agent of creation and transformation in cultural stories, teachings and practices.

- How is water essential for life and for human survival?
- How does water create opportunities for life to develop and thrive around it?
- What role does water play in creation stories, cultural practices and traditions around the world?



Many cultures believe water is sacred. Where do you see water in your culture's practices, traditions and ceremonies?



Water is a significant part of many creation stories around the world. What role does water play in a creation story that you know? What might that tell us about water?

Time required

Two 60- to 90-minute periods

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

In this lesson, students will:

- Understand why the human body needs water for survival
- Explore the significance to life and ecosystems of the places where land and water meet
- Consider the cultural and spiritual importance of water as an agent of creation and transformation

Materials and resources

- Freshwater Giant Floor Map
- Pylons
- **Activity card: Life where land and water meet**
- **Activity card: My cultural connections to water**

Lesson implementation

Minds on the map

Invite students to walk around the map and explore the rivers, lakes and other waterways on the map. Encourage them to notice where urban areas and Indigenous communities are marked on the map. Students can place pylons on as many marked human settlements as they can see (until they run out of pylons). Ask students, "What do you notice about where most of these cities and communities are located?" (They are often close to water.) What are some reasons so many human settlements are located close to water? Discuss how societies around the world have often formed around rivers and other bodies of water for access to water for drinking, cooking, cleaning, irrigation and travel.

Water and me

Pour yourself a glass of water. Sit or stand in a quiet place and slowly drink the water. Pay attention to the water's taste and temperature and how it feels. Imagine the water flowing down to your stomach and then travelling to all the places it is needed in your body. Notice any changes in how you feel after you drink the water. Finish by taking a moment to be thankful for the water.

Action

Activity 1: Living beings need water

Discuss with students some of the ways our bodies need water to keep us alive and healthy. Before we are born, humans spend nine months being carried in the water of our mother's womb. For this reason, many Indigenous cultures recognize women as "water carriers." This means they have a special spiritual and physical relationship with water through the process of creating life. Water gives life and women also carry life.

Fully grown humans must consume two to three litres of water per day to survive (some of this is contained in food). Water also helps our body to:

- circulate oxygen, nutrients and hormones to where they are needed by keeping our blood fluid and moving
- digest the food we eat through replenishing our saliva, stomach juices and other necessary fluids
- distribute heat and regulate our body temperature by sweating
- cushion our joints and organs, including our brain
- filter waste from our bloodstream and flush it out as urine

Like us, all living beings need water. Many plants and animals, even terrestrial ones, survive and thrive by staying close to water. Invite students to further consider places where land and water meet. Ask students, "How does water create opportunities for life to develop and thrive around it?" In pairs or small groups, students can make a list of plants and animals that live close to water. Each group chooses a plant or animal

and creates a corresponding card using the **Activity card: Life where land and water meet,** including the name of the species, an image, and some ways it uses water for survival. Students locate a place on the map where that plant or animal might live and place the card on the map. Each group briefly explains to the class the various ways this animal or plant connects to water for its survival.

An alternative framing of the activity is to focus on a particular water source in or close to your community. Students make a list of plants and animals that live close to that water source and choose one to present to the class.

Activity 2: Water in creation stories and cultural practices

Because humans have long recognized water as foundational to all life on Earth, it also features in many cultural stories and beliefs about how the Earth and life on Earth began. Around the world, water is connected with creation, healing, cleansing and transformation.

Ask students if they can recall any Indigenous origin or creation stories featuring water. One example is the story of how Turtle Island (or North America) came to be. Several First Nations tell their own versions of this story, in which Turtle Island was formed on Turtle's back after a great flood. A Mohawk telling of this story is included as a video link in the additional resources. Connect with Knowledge Carriers from local Indigenous communities to share other tellings of the story.

Ask students, "Where does water show up in creation stories that you know? What role does water have in your cultural practices, traditions and ceremonies?" First, students can form small groups to share what they already know from their own cultural practices. Next, invite students to expand their knowledge by finding relatives, Elders or community members to ask: How is water important to our culture? Are there important stories or traditions connected to the power of water? What is the role of water in these stories, beliefs and traditions? Students use the sentence starters in the **Activity card: My cultural connections to water** to record applicable answers and observations. Each student can share their learnings with the class. Students can bring in a cultural item or symbol to share (if permitted), tell a cultural story or describe a specific practice, tradition or ceremony associated with water.

Conclusion and consolidation

Review the scientific and cultural lenses through which this lesson looks at water and its role in life and creation. Ask students to reflect on and share their learnings from the activities.

Invite students to give thanks to the waters closest to their home or the water source they visited in the previous lesson. Support students in learning a water song to sing to the water or in finding another way to make a thanksgiving offering.

Modifications

For younger students:
Complete the first activity together as a class instead of breaking into groups. The second activity can be simplified by focusing on one aspect, such as creation stories. Instead of asking students to do individual research, you may wish to invite one or more speakers to share cultural stories or teachings about water with the class.

For older students:
For the first activity, encourage students to look for ecosystem connections with species/cards held by other groups. What are the relationships between various plants and animals in the same location or ecosystem? How do they rely on each other? How do they thrive together?

Add a language arts extension to the second activity by having students write their own creation stories focused on water.

Additional resources

Creation stories featuring water:
Mohawk Story About the Creation of Turtle Island
https://www.youtube.com/watch?v=gE183rBKRpM

The Creation Story of the Maya
https://www.youtube.com/watch?v=Jb5GKmEcJcw&t=7s

The Egyptian Creation Myth
https://www.youtube.com/watch?v=uTy49JIgJZE&list=PL32257ECAC08445A3&index=3

A Hindu creation story
https://www.youtube.com/watch?v=Y9yWwFWpbRo&list=PL32257ECAC08445A3&index=6

Flood myths (Encyclopaedia Britannica)
https://www.britannica.com/topic/flood-myth

Water ceremonies:
Snewíyalh tl'a Stakw — Teachings of the Water, performed by Electra Women's Choir
https://www.youtube.com/watch?v=-dVcP_2W6qQ
Includes the poem "Water Heals," starting at 11:17, written and read by Candice Halls-Howcroft, a Sḵwx̱wú7mesh (Squamish Nation) weaver, storyteller, poet and educator. Also includes a cedar brushing ceremony and Squamish Nation teachings about water, including the connection between humans, water and song.

What are traditional water ceremonies?
https://spiritofthewaters.org/what-are-traditional-water-ceremonies/
Traditional water ceremonies from cultures around the world.

2

The nature of water: Journey of water

Water never stays still, and it never travels alone. It falls, pools, sinks, freezes, flows and rises again, crossing property lines, provincial borders and international boundaries without pausing at any of them. This section follows that journey. It is the most map-dependent part of the series. The flow arrows, the ocean watershed colours, the sea ice and the elevation shading on the Giant Floor Map all become tools students use to answer questions rather than features they simply identify.

Lesson 2.1 establishes the organizing idea that everyone lives in a watershed, and asks students to find and investigate their own. Lesson 2.2 turns to the frozen freshwater held in glaciers, ice caps and snowpack, and to the meltwater that feeds mountain rivers and the communities downstream of them. Lesson 2.3 takes students below the surface to groundwater, which comprises roughly a third of the world's freshwater and is invisible on almost every map. A hands-on model shows how different ground materials drain and store water. Lesson 2.4 draws the four lessons together with the water cycle, so that students can place watersheds, glaciers, groundwater and surface water inside one continuous system.

Additional resources are available on the *Freshwater: Lifeblood of the Land* homepage. Scan the QR code to explore them.

Taken in order, these lessons build a single habit of mind: whatever happens to water in one place will show up somewhere else.

Lessons in this section:

- Lesson 2.1 – Journey of water: Watersheds and drainage basins
- Lesson 2.2 – Journey of water: Glaciers, ice caps and meltwater
- Lesson 2.3 – Journey of water: Groundwater and surface water
- Lesson 2.4 – Journey of water: The water cycle

LESSON 2.1

Journey of water: Watersheds and drainage basins

Overview

Everyone lives in a watershed. All water that falls in a watershed flows toward a larger body of water, usually a large river, lake or an ocean.

- What is a watershed?
- How does water move in a watershed?
- What are the natural boundaries of a watershed?
- How are local watersheds connected to ocean watersheds?



Wherever you are in Canada, freshwater eventually flows through rivers toward an ocean. Where does the water in your community flow?

Which ocean or sea does your water end up in?

Time required

60 minutes

Grades

Best suited for Grades 5 to 8
(modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Understand the roles and functions of a watershed
- Become familiar with Canada's five main ocean watersheds
- Explore the geographic characteristics of their own local watershed

Materials and resources

- Freshwater Giant Floor Map
- String or rope
- **Activity card: Exploring my watershed**
- Metal or plastic trays, clay and paint for making watershed models (optional)

Lesson implementation

Minds on the map

Have students examine the map and legend. Have students follow the arrows of rivers of the same colour to note that these all drain into the same ocean or large body of water. A watershed or drainage basin is an area that flows water (e.g., rain, melting snow) to the same lake, river or other body of water. Smaller watersheds drain into larger watersheds, then into an ocean. Watersheds are separated by ridges of higher land, like the sides of a bathtub where all the water that falls drains in one direction. Examining the map, students will note that there are five main watersheds (ocean watersheds) in Canada: Pacific Ocean, Arctic Ocean, Hudson Bay, Atlantic Ocean and Gulf of Mexico. Each of these watersheds is also divided up into smaller sub-watersheds. Students can picture these as a series of smaller basins or bowls inside the larger bathtub.

Have students examine the map legend. Where does the water in your community flow?

Which ocean or sea does your water end up in? Students can use string to outline the edges of their ocean watershed. What is the overall shape of the watershed? What other communities and bodies of water are you connected to in your watershed? What landforms or areas of elevation create the boundaries of the watershed? Examine the other ocean watersheds on the map and outline their edges. How is their shape and geography similar to or different from the watershed in which you are located?

Water and me

If everything that happens on the land can affect the water in your watershed, what are some ways you could help care for the water where you live?

Action

Activity 1: Investigate your local watershed

On the map, have students locate their closest body of water. Is this a river, lake or smaller tributary? Which is the closest principal river to where you live? Using string, trace the path of the water from the smallest tributary you can find on the map toward a larger river, continuing to follow the path of the water until it reaches the ocean. Note that there is a small chance that your community is in a "closed watershed," which doesn't drain into an ocean, but drains into a lake.

Examining the map, determine the edges of your local watershed. Using string, outline this watershed. What is its overall shape? Is it narrow, wide, etc.? Are there any specific landforms or areas of elevation change that create the boundaries of the watershed? Is the drainage basin steep or shallow?

What is the name of the local watershed that you live in? The name of the watershed may already be familiar to students or it may take a bit of investigation. Most provinces and territories make watershed boundary resources available online.

Examine how watershed boundaries interact with treaty boundaries on the map. How many treaty areas does this watershed cross? Do treaty boundaries and watershed boundaries follow the same lines? Why or why not? How do watershed boundaries interact with other political boundaries on the map (provincial, territorial and international boundaries)?

Students use the sentence starters in the **Activity card: Exploring my watershed** to record their watershed observations.

Continue the discussion with students with the following points: Everyone lives in a watershed. Any land within the watershed (including familiar spots like your backyard, local park or schoolyard) will flow everything into the same body of water (through gutters, streams, rivers, etc.) How can we use land, forests and water in ways that keep the watershed safe for plants, animals and humans?

Conclusion and consolidation

Discuss the activities and their significance with students. Ask students to share what they have learned about watersheds and about the watersheds in which they live. Students can write a letter to their watershed to share what they have learned and name some actions they will take to protect and care for it. Students may wish to express these themes in another creative form such as painting or sculpture, dance or song.

Modifications

For younger students:
Investigate your local watershed as a whole class rather than in smaller groups.

- Encourage students to move around the map to trace the path of the water in their watershed. Ask: If you were a fish, how could you get from where you live to the ocean? Or, if you were paddling in a canoe, how could you reach the ocean? Students can also use cut outs or models of fish or boats and move them through the waterways to the ocean.
- For a hands-on demonstration of how water flows in a watershed, help students create a model of a watershed out of clay. An example of a clay watershed model activity is included in the additional resources. Include a source in the mountains leading to river channels and a wider river mouth. Pour water from the top of the mountains and have students describe where it flows.

For older students:

- Start a discussion with the following prompts: The shape of a watershed determines where water flows, but the flow of water also shapes the watershed. What are some ways water shapes the land around it?

  In small groups, students choose a landscape or landform and research the role of water in its formation. This can be a local or regional landform or another significant landform on the map. How long ago did the landform appear? What was the role of water in its formation?

- Have students investigate their watershed further. Students can determine the original names of places and water bodies in their chosen watershed. To which Indigenous languages do they belong? How do these names connect to and describe the area? What kinds of ecosystems exist in the watershed? What plants and animals rely on this watershed for their survival? What about human communities? Are there any particular threats to the health of this watershed? To extend this activity, ask students in small groups to investigate another watershed on the map. Groups can share and compare what they have learned.

Additional resources

In Your Watershed (National Geographic)
https://education.nationalgeographic.org/resource/in-your-watershed/
Includes instructions for creating a watershed model out of clay.

Watersheds: A Practical Handbook for Healthy Water by Clive Dobson and Gregor Gilpin Beck (Firefly Books, 1999)

Watershed CPR Education Program
https://rivershed.com/watershedcpr/watershed-cpr-education-program/
Watershed education program for all ages focused on the Fraser River.

The Watershed Game (Minnesota Sea Grant)
https://seagrant.umn.edu/watershed-game/classroom-versions
A large-format board game for classroom use with two editions, stream and coast, focused on understanding relationships between water quality and land use.

For older students:
The Watershed Reports
https://watershedreports.ca/
Detailed reports on Canada's watersheds, from the five ocean watersheds to 164 subwatersheds.

Understanding Watersheds (Government of Canada)
https://agriculture.canada.ca/en/environment/resource-management/managing-water-sustainably/understanding-watersheds

LESSON 2.2

Journey of water: Glaciers, ice caps and meltwater

Overview

Glaciers and ice caps store most of the Earth's freshwater. Seasonal meltwater from glaciers, ice caps and snowpack feeds mountain rivers which supply drinking water to many communities in Canada and around the world.

- How do glaciers and ice caps store freshwater and supply drinking water?
- Where are the glaciers and ice caps in Canada found?



Most of Earth's freshwater is stored in glaciers and ice caps. Where are the closest glaciers or ice caps to your community?

Glaciers and ice caps are included in the map legend as "Areas of permanent snow and ice" and are coloured in white on the map. Find your community on the map. Then locate the closest area of permanent snow and ice. In Canada, these areas are found in Western Canada and in the Arctic.

Time required

Two 45-minute periods or one 90-minute period

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Understand the role and significance of glaciers in storing freshwater
- Investigate areas of permanent ice and snow in Canada where glaciers are found
- Understand how mountain glaciers feed rivers systems in parts of Canada

Materials and resources

- Freshwater Giant Floor Map
- Pylons
- String or rope
- **Activity card: Melting glacier observations**
- Two identical small clear containers
- Ice cubes
- Food colouring
- Timer
- Room temperature water
- Devices for further research (optional)

Lesson implementation

Minds on the map

Have students examine the map, paying special attention to the areas marked in white. These are areas of permanent snow and ice that include glaciers, ice caps and ice sheets.

Ask students if they have heard of glaciers before and invite them to share their existing knowledge. Ask students, "What is a glacier? What are some reasons glaciers are important?"

Share with students: **Glaciers** are large masses of permanent ice that move under their own weight, like extremely slow-moving frozen rivers. They are formed when snow builds up and over centuries compresses into ice. **Ice caps** are dome-shaped masses of glacial ice that cover less than 50,000 square kilometres of land area. **Ice sheets** are masses of glacial ice that extend more than 50,000 square kilometres. Ice caps and ice sheets also move, but outward instead of in one direction.

Have students examine the map to locate the glaciated areas in (and next to) Canada. Students can place pylons on all areas of the map where permanent snow and ice are marked. These include the ice sheet covering Greenland, which is one of only two existing ice sheets on Earth. The other (much larger) ice sheet covers almost the entirety of the Antarctic continent.

Ask students to think about the way water is stored in ice cubes. When the ice cube starts to melt in a glass of water, how does it change the temperature and taste of the water? Share with students: Glaciers in all their forms (ice caps, ice sheets, ice fields) are the most important form of freshwater storage on Earth. Glaciers store close to 70 per cent of freshwater worldwide. Glaciers in areas with seasonal periods of warmth release some water in warmer months. This adds cold water to rivers at the hottest time of year. Many parts of the world rely on this **meltwater** from glaciers for drinking water and other daily uses.

Water and me

If a glacier could tell us a story, what do you think it would say about taking care of water?

Action

Activity 1: Explore Canada's glaciers

Have students locate the area of permanent snow and ice closest to your community and explore the area on the map. Where is it located? How far away is it from your community? What other landforms and natural features can be found nearby? What rivers systems or watersheds is it connected to?

Once groups have located their glacier or icefield, have them mark it with a pylon and use string or coloured rope to trace the path meltwater would take from that ice into the rivers it feeds and onward to the ocean watershed it belongs to. Ask students to name the rivers, lakes and communities the string passes. Leave the string in place: by the end of the lesson the map will show several meltwater pathways at once.

Many glaciers in Canada are concentrated into **icefields** (masses of connected glaciers). Meltwater released from glaciers as well as from mountain **snowpacks** feeds into river systems in parts of Canada. There are around 37,000 existing glaciers in Canada. Canada is home to around 20 per cent of the total volume of the world's glaciers.

Students can investigate further: What rivers are fed by the glaciers you are exploring? Which regions and communities rely on these glacier-fed rivers for drinking water? What is the current state of the glaciers in this region?

Have students form groups to choose another area of permanent ice and snow on the map. Using the map as well as other resources, students can investigate this area, starting with the same questions as above.

When groups have finished the second area, have them compare the two directly. How is this glacier region similar to the first, and how is it different? Consider latitude, elevation, distance from the ocean, the size of the ice and the rivers and communities downstream of each. What patterns and trends do students notice?

Activity 2: How do glaciers melt?

Several hours ahead of time, freeze water into ice cubes, adding food colouring to make ice cubes more visible in water.

Add the same amount of ice to each identical clear container. Add about one-quarter cup of room temperature water to the bottom of one container. Label containers so they are easily distinguishable as the ice cubes melt. Distribute **Activity card: Melting glacier observations** to students to track their predictions and results. Ask students to predict: What will happen with each set of ice cubes? Which set of ice cubes will melt faster? Set a timer for several intervals of 10 minutes each. In smaller groups or as a whole class, have students note their observations of how each set of ice cubes is melting. How long does it take for each set of ice cubes to melt? What is the water level in each container at each 10 minute interval?

Explain: As climate change brings warmer temperatures, many glaciers are melting faster than they can be replenished by snow. Warmer temperatures also mean that precipitation is more likely to fall as rain instead of snow. The rate of glacier melt is causing sea levels to rise. As sea levels rise, coastal areas become eroded (worn down by waves and flooding). Glaciers that melt into surrounding water also melt faster because of their contact with the relatively warmer water surface. This means that as sea levels rise, the rate of melting is accelerated. The ice cubes in a container with room-temperature water will melt faster than those without.

To extend the activity, try varying the temperature of the water added. How does the water temperature affect the rate of melting? You can also try placing the containers in a fridge or outside on a winter day. How does the change of temperature affect the results? Discuss how these changes in the environment affect the ice cube "glaciers."

The consequences of climate change on freshwater are discussed further in Lesson 5 Human impacts on water: Environmental and climate impacts

Conclusion and consolidation

Bring students back onto the map with their strings still in place. Ask each group to trace the meltwater from its glacier or icefield through the rivers and watersheds it feeds and to name the communities along the way. Compare the pathways across the class. Which meltwater travels farthest? Which reaches the most people? Which of these pathways would change first if the ice supplying them continued to shrink?

Conclude by discussing the activities and their significance with students. Ask students to share what they have learned about the role of glaciers in storing and supplying freshwater.

Modifications

For younger students:
Activities can be completed together as a class instead of in groups. You may wish to simplify the first activity and place more focus on the hands-on second activity.

For older students:
Invite students to research how prehistoric periods of glaciation shaped landscapes and landmasses. How did past glaciers shape the region you live in?

Additional resources

Glacier ghosts of the Rocky Mountains: What vanishing mountain glaciers mean for river flows, groundwater and the millions who depend on them (Canadian Geographic)
https://canadiangeographic.ca/articles/glacier-ghosts-of-the-rocky-mountains/

Keeping pace with shrinking glaciers in Canada's West (Natural Resources Canada)
https://natural-resources.canada.ca/stories/simply-science/keeping-pace-shrinking-glaciers-canada-s-west
More about Canada's shrinking glaciers.

LESSON 2.3

Journey of water: Groundwater and surface water

Overview

Visible water in bodies like lakes, rivers and glaciers is the water we see and connect to. However, nearly one third of the freshwater on Earth exists away from our eyes in the form of groundwater.

- What is groundwater and why is it important?
- How does groundwater differ from surface water?



In the summer, groundwater is cooler than surface water (water in lakes and rivers). Can you think of other ways groundwater might differ from surface water?

Time required

Two 45-minute periods or one 90-minute period

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Understand the role of groundwater and aquifers in storing and supplying freshwater
- Explore how groundwater moves through different substrates through a hands-on activity
- Consider the relationship between surface water and groundwater

Materials and resources

- Freshwater Giant Floor Map
- **Activity card: Groundwater facts**
- **Activity card: Modelling groundwater**
- Identical transparent plastic or glass containers
- Soil, clay, sand, gravel
- Food colouring
- Pumps from hand soap
- Timer

Lesson implementation

Minds on the map

Have students gather around the map. One at a time, call out each type of freshwater visible on the map: a lake, then a river, then a wetland, then an area of permanent snow and ice. Have every student move to an example of it. Once students have registered how much of Canada is visible water and where each kind of water is concentrated, turn the lesson to the water they cannot see.

Explain: When we think of water sources in the landscape, we usually think of the water above ground (**surface water**). Surface water includes permanent lakes, rivers and wetlands but also seasonal bodies of water and human-made bodies of water like artificial lakes or ponds. Surface water is the water we see, but it only makes up 0.03 per cent of the world's freshwater supply.

Ask students to consider: What water in the landscape isn't visible and doesn't show up on the map?

If students are standing on the map, another way to put the question is: If we could lift this map up and look underneath it, what would we find beneath the land? Students are standing on the answer. **Groundwater** lies beneath most of the landscapes and communities they are standing on right now, including the parts of the map with no blue on them at all.

Draw out existing knowledge of groundwater with the following prompts: Have you ever seen a spring bubbling up from the ground? Have you ever had the opportunity to drink water straight from an underground spring? Where is that water coming from? If your community is one that uses well water, whether from private or municipal wells, where does that water come from? Do you live in the country? If so, chances are high that you drink and bathe in groundwater.

Share the **Activity card: Groundwater facts** with students and discuss the basics of how groundwater works. Check that students understand that aquifers are not pockets of water underground, but instead areas where the ground holds a significant amount of water within the pores of soil, rocks and other materials, as well as around them.

Have students find examples on the map of places where groundwater and surface water feed each other. Ask groups to locate a river, a lake and a wetland, and to consider which is likely to be fed by groundwater and where a spring might emerge. Wetlands are the clearest case, as many of them are places where the water table meets the surface.

Let students know that while groundwater is found everywhere, it can be hard to measure and access, and it is often used at a rate faster than it is recharged from the surface.

Water and me

Walk slowly across the map and imagine the groundwater beneath each landscape and community you pass. Stop somewhere you think a great deal of water is stored underground, then somewhere where there may be very little. If you are not on the map, take a few moments to close your eyes and imagine the water that you can't see but is everywhere beneath the ground, even beneath buildings and roads. Consider: What are some ways you can show your care and thanks to the water hidden under your feet?

Action

Activity 1: How does the ground drain and store water?

Have students form small groups. Gather different materials — sand, gravel, soil, clay. Pour each material into a separate transparent container, with a mix in the last container. If needed, more than one group can work with the same type of material. Students use the **Activity card: Modelling groundwater** to record observations.

Students pour the same quantity of water (with a drop of food colouring to make the water more visible) into each container. Ask students to predict: Which material will allow water to drain the fastest from the top to the bottom of the container? Which material will make the water drain most slowly?

Have students time the water flow with a timer or other device. How fast does it drain from the surface to the bottom of each container? Groups can compare timing. Which material is the most porous?

Have students examine the containers from the side and measure from the top of the container to the top of the saturated area. This is the depth of their water table.

Students can experiment with using a pump from a soap refill container to try pumping water from each container to the surface.

Drip a few drops of a different colour of food colouring at the surface of each container. What happens to the food colouring as it moves through the soil and other materials? Does it seep through below the water table? Does it get filtered out by the other materials?

Contaminants aboveground or at the surface can seep down and contaminate groundwater. Have students consider what types of contaminants may seep into groundwater from human activity (chemical leaks, fertilizer runoff, cattle manure, gasoline, oil, road salts). What impacts does contaminated groundwater have on freshwater? How might this impact other living things in the watershed?

Before or after the demonstration, connect the model to a real place. Have each group choose a location on the Giant Floor Map and ask what the container model tells them about water moving beneath that landscape. A group standing on the Prairies, on the Canadian Shield, in a river delta and in a mountain range should not give the same answer.

To conclude the activity, return to the map to scale the container experiment back up to the size of the country. Ask groups to identify places where human activity could affect groundwater. Examples include large agricultural regions, cities and their industrial areas, mining and resource development and major transportation corridors. Have them mark two or three with pylons and explain what they would want to know about the ground beneath each one.

Conclusion and consolidation

Discuss the activities and their significance with students. Ask students to share what they have learned about groundwater. What is one thing they wish more people knew or understood about groundwater? What might people do differently if they considered groundwater in all their decisions and actions? Invite students to consider how they will include groundwater in their own relationship with water. Encourage students to explore these questions through creative writing, art or movement.

Modifications

For younger students:
Activities can be completed together as a class instead of in groups. Early in the lesson, invite students to draw or paint a familiar landscape or setting like their home or school and include the groundwater under the landscape. What do they imagine groundwater looks like underground?

After the lesson, ask students to check how they represented the water underground against what they have learned. What changes could they make to their picture to make it more accurate?

For older students:
Have students investigate where the closest aquifers and/or springs might be found in your community. Why does groundwater come up to the surface in some locations instead of others? Students can also research threats and challenges to groundwater in their community or another region of Canada. How can groundwater be protected?

Additional resources

The Incredible Adventures of H2O and his Friends (Groundwater Project)
https://gw-project.org/videos/the-incredible-adventures-of-h2o-his-friends/
A video set in sub-Saharan Africa that shows the process of accessing groundwater by drilling a well.

Groundwater guide (Canadian Geographic)
https://canadiangeographic.ca/articles/groundwater-guide/
Tips on protecting groundwater and keeping it safe from contamination and overuse.

First global map of hidden groundwater versus Canada's supply (Canadian Geographic)
https://canadiangeographic.ca/articles/first-global-map-of-hidden-groundwater-vs-canadas-supply/

LESSON 2.4

Journey of water: The water cycle

Overview

The Earth's water is in constant motion and change. Water circulates between oceans, atmosphere, ice, lakes, rivers and groundwater.

- How does water change and move around the Earth?
- What journey might one drop of water have taken?



The Earth's water is in constant motion and change. Water circulates between oceans, atmosphere, ice, lakes, rivers and groundwater. Where might your drinking water have travelled from?

Time required

One 60- to 90-minute period

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Become familiar with the water cycle and its stages
- Get to know one stage of the water cycle and share their learning in a creative or kinetic form

Materials and resources

- Freshwater Giant Floor Map
- Movable *Water is everywhere* diagram
- Pylons
- **Activity card: Stages of the water cycle**

Lesson implementation

Minds on the map

Gather students on and around the Giant Floor Map. If students have completed other lessons on the Journey of water, review what they have already learned about where freshwater is found and how it moves around the Earth. Prompt students to note the two main states in which water appears on the map: as liquid water and as frozen water (ice and snow).

Ask students, "What other forms can water take on Earth and in Earth's atmosphere? What makes water change state?" Have students list as many forms of water in their environment as they can think of: surface water, groundwater, glaciers, fog, clouds, rain, snow, hail, condensation, dew, ice, etc. With the class, group the examples into the three phases of water: solid, liquid and vapour (or gas). Students may find some examples harder to classify than others. Explain to students that the water on Earth is continually changing and moving between these three phases through a series of processes known as the water cycle.

Have students locate liquid water and frozen water on the map. Ask everyone to stand beside liquid water (a river, a lake, an ocean) and then to move and place a pylon on an area of permanent snow and ice. Both states are visible on this map at the same time, which is the observation the rest of the lesson rests on.

Water and me

Water has been travelling around our planet for millions of years. Today it might be in a cloud, tomorrow in a river and one day it could be the water you drink. How does knowing that water is always on a journey change the way you think about it?

Action

Activity 1: Exploring the water cycle

Introduce the activity by asking students what they already know about the water cycle. Draw students' attention to the Water is everywhere infographic on the map and the movable *Water is everywhere* diagram. What do students notice in the diagram? What do they understand about what the diagram represents? Why might this diagram be represented in a form that can be moved around the map?

Explain that all the water currently on Earth is (more or less) all the water that has ever existed on the planet. The water you drink today is the same water that was around when the dinosaurs were on Earth. It's the same water that your ancestors drank, washed in and travelled through on boats and canoes. Water as a living being is in an endless process of transformation. The same droplets of water are recycled in a continuous loop, moving from one storage area to another: surface water, ice and snowpacks, groundwater, plants, the atmosphere, even the bodies of humans and other living things. How does this happen?

Have students form small groups. Each group will represent one stage in the water cycle. If possible, have at least two groups assigned to each stage in the water cycle, so that students can see each process represented in more than one way. Distribute the **Activity card: Stages of the water cycle** to each group. Each card outlines one of the four main stages of the water cycle:

1. Evaporation and transpiration (together known as evapotranspiration)
2. Condensation
3. Precipitation
4. Collection, infiltration and surface runoff.

Position the role stations directly on the Giant Floor Map, so that the map becomes the model of the water cycle:

- Evaporation and transpiration belong at an ocean, a large lake or a forested region
- Condensation above those regions
- Precipitation over a mountain range or a coastal region
- Collection, infiltration and surface runoff at a river system or a low area

Each group then stands in a place where its stage of the cycle actually happens.

At their role station, each group can decide on a creative way that they will share this stage in the cycle with the rest of the class. Encourage students to find a creative or kinetic way to communicate the process they have researched.

Once each station has prepared, have students form home groups with one member from each stage and walk one possible journey of a drop of water across Canada, stopping at each station in turn and having that member explain what happens to the drop there. Groups can choose different starting points, such as the Pacific coast, Hudson Bay, a Prairie field, the Arctic, so that the class sees several journeys rather than just one.

Conclusion and consolidation

Once students have shared with the class, review the water cycle again. Then use the map to ask how the water cycle differs across Canada. Compare the Arctic, the Prairies, the Great Lakes region and the West Coast. Invite students to place the movable *Water is everywhere* diagram on these regions of the map and consider what each stage of the water cycle looks like in that region.

Where do they think the most precipitation falls, and where does very little? Where is water locked up as ice for much of the year? Where does water move quickly through the cycle, and where is it stored for a long time? The cycle is the same everywhere, but its speed and its proportions are in constant change.

Ask students, "What is one new or interesting thing you have learned about the water cycle?" Students can individually reflect on the water cycle by describing it in the form of a story or representing it in a visual or performance-based medium. You may also wish to have students consider how water in the human body is part of the water cycle. What journey has the water they drink already taken before it enters their body?

Modifications

For younger students:
The stages of the water cycle can be simplified for younger students by grouping them into two main processes: water moving up into the atmosphere and water coming down.

For older students:
Students can research smaller processes in the cycle, such as sublimation (ice turning directly into vapour).

Students can also investigate the various ways human activity disrupts or threatens the water cycle and how the water cycle is altered in urban areas.

Additional resources

For younger students:
Water Cycle for Children: The Worldwide Adventures of Droppy – The Long Trip (Groundwater Project)
https://gw-project.org/videos/the-worldwide-adventures-of-droppy-the-long-trip/

Books for younger students:
Water Is Water: A Book About the Water Cycle by Miranda Paul, illustrated by Jason Chin (2015)

The Water Cycle (Learn About: Water) by Sonia Black (2022)

Two Little Raindrops: An Exciting Story Inspired by Nature: An Earth Science Educational Adventure by Adele Lamothe, illustrated by Steven Tu (2023)

Infographics and diagrams:
The Water Cycle Diagrams (U.S. Geological Survey, Water Science School)
https://www.usgs.gov/water-science-school/water-cycle-diagrams
Three versions of the same diagram — *The Water Cycle, The Natural Water Cycle* and *The Water Cycle for Kids* — each available as a poster, letter-sized handout and fill-in-the-blank worksheet in more than 70 languages, including French. All versions are public domain.

Water cycle (U.S. Geological Survey, Water Science School)
https://www.usgs.gov/special-topics/water-science-school/science/water-cycle
The accompanying explainer describes how energy from the sun and the force of gravity drive the continual movement of water.

Infographic: Understanding atmospheric rivers (Canadian Geographic)
https://canadiangeographic.ca/articles/infographic-understanding-atmospheric-rivers/

3

Living with water: The water around us

Most students in Canada access freshwater through a tap, and most have never had reason to ask what happens on either side of it. This section makes the invisible system visible. It connects the lakes, rivers and aquifers students located in the Journey of water lessons to the water that comes out of a fountain at school and then follows that water back out again through drains, treatment plants and outfalls.

In Lesson 3.1, students trace their own community's water from its source to the tap and back to the environment, mapping the route on the Giant Floor Map and taking stock of the visible and invisible ways they use water in a day. In Lesson 3.2, they distinguish the two paths that used water takes — wastewater, which is treated before it returns to a waterway, and stormwater, which in most places is not — and consider what that difference means for anything they wash, spill or drop on a street.

These lessons are the pivot point of the series. Up to here, water has been a natural system; from here on, it is also a built one, managed by people who make choices that can be examined and questioned.

Additional resources are available on the *Freshwater: Lifeblood of the Land* homepage. Scan the QR code to explore them.

Lessons in this section:

- Lesson 3.1 – The water around us: Water in our daily life
- Lesson 3.2 – The water around us: Stormwater versus wastewater

LESSON 3.1

The water around us: Water in our daily life

Overview

Freshwater plays an essential role in life across Canada, including in our homes and communities. We use water in visible and invisible ways. Understanding where our water comes from and where it goes helps us care for it.

- What are all of the ways we use water in our daily lives?
- Where does our local water come from? Where does it go when we're done using it?



On average, Canadians use over 200 litres of water per person every day. How much water do you think you use on a typical day? What activities in your house do you think use the most water?



Find the body of water closest to your community. Where do you think your drinking water comes from? Is it pumped from a lake or river, or does it come from a well or aquifer underground?

Time required

One 60- to 90-minute period

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Recognize how water is part of their everyday lives
- Understand where their daily water comes from and where it goes after they use it

Materials and resources

- Giant Floor Map
- **Activity card: My source to tap journey**
- Sticky notes or index cards
- Markers
- Devices for further research (optional)

Lesson implementation

Minds on the map

Have students stand around the border of the map. Each student's ticket onto the map is naming one thing they did yesterday that used water, with no repeats allowed. Ask students, "What were all the times you interacted with water?" Student examples will likely include direct uses of water such as drinking, brushing teeth, washing hands, showering, flushing the toilet, preparing food, washing dishes, doing laundry, giving water to pets and watering plants.

As each student offers an idea, they step onto the map. Once everyone is on, give them a few minutes to explore before the lesson begins.

Ask students to also think about indirect ways water might have been used in other aspects of their day. Some examples of indirect water use: growing food, growing cotton to make clothing, manufacturing electronics like smartphones, cooling data centres. Explain to students that both direct and indirect uses of water usually require clean water free from contamination or pollution.

Ask students if they know where the water in their homes and community comes from? Before students answer, have them find their own community on the map and look at what surrounds it. Which lakes, rivers, or watersheds are nearby? Which of them are large enough to supply a community? Students can often narrow down their own drinking water source from the map before anyone tells them the answer.

Ask students, "How is your drinking water made safe to drink and use?" Have students share their current understanding about their water source and how their water is made safe to drink. Let them know that you will be learning more about where their daily water comes from and where it goes after each use. If your school or any students' homes are in a community where access to clean drinking water has been inconsistent or subject to boil water advisories, let students know that this issue will be discussed further in later lessons.

Water and me

Imagine you turn on the tap tomorrow morning and no water comes out. What would you miss first? What would be the hardest aspect? How would your day change?
If you live somewhere that is under a boil water advisory, or do not have access to clean drinking water, consider how your life would change if you could turn on your tap and have clean safe water.

Action

Activity 1: From the source to the tap

Find out the source of your local water on the map (at the school and perhaps in students' homes if it is different). Does your local water come from a lake or river through a municipal treatment facility? Does it come from groundwater via household or municipal wells? Direct student attention to your local watershed on the map. If you have not yet identified your local watershed, you can do so now. Find other bodies of water (lakes/rivers) that impact or are connected to your local water source.

Explain to students: Drinking water often comes from lakes and rivers. Sometimes it comes from groundwater. It is cleaned at treatment plants, then travels through pipes to homes.

See if you can connect with the local water treatment plant to do a tour or get a presentation. Many treatment plants also make information available online about the stages of their treatment process. If your community or some homes in it use private wells, discuss the process of how wells are used to get groundwater safely to your tap (including safe well installation and water testing). A video showing how groundwater is accessed by drilling wells is included in the additional resources.

Share **Activity card: My source to tap journey** and have students record their learning about the water source and treatment system connected to their home.

Then have students act out the journey of their local drinking water from source to tap directly on the map. Assign students to stages in the process: lake, river, treatment plant, pipe, house tap, drain (or groundwater, well, pipe, tap, drain). Each group can create a card or image connected to their role. In small groups, each role will stand somewhere on the map relevant to their role. Print out an image of a water droplet and pass it through the system from group to group to demonstrate the movement of water.

Explain to students: Acting out source-to-tap will differ across locations nationally. We can stand at a lake or a river, but not all water infrastructure aligns with built-up areas on the map. How do different communities connect to water sources? How is the process different for a community on the Prairies, a large city on the Great Lakes, a northern community relying on trucked or seasonal supply or a coastal town? Each has a place water comes from, a way to treat it, and a place where it goes after it is used.

Conclusion and consolidation

Ask students to reflect on what they have learned about the journey of their water from source to tap. How did the process they learned about compare with their initial understanding? Are there places in the journey water takes from the source to your tap where it may get contaminated or polluted? What would happen if you couldn't get clean safe water to your tap? How would (or does) that impact your daily life? Let students know that they will learn more about what happens to water once it goes down their drain in the next lesson.

Finally, the class can bring the reflection back onto the map. Have students locate the treatment plant serving their community, or the nearest one they can identify, and mark it. Then ask groups to find two other communities in different settings, such as a large city, a small northern community, a coastal town and a Prairie farming community. Then ask them to consider where each is likely to get its water and how far that water may have to travel. The journey from source to tap looks different for each.

Modifications

For younger students:
Keep the activity focused on the source-to-tap journey as a whole.

For older students:

- Research treatment processes and compare different sourcing and treatment pathways used in different municipalities. Consider the following questions: What is the process for ensuring tap water is safe to drink? Why did this municipality choose this water source and treatment method? How is the safety of local drinking water connected to watershed health? What activities might pollute the water source? What is the cost to municipalities of water treatment?
- Science extension: Measure household water use for one day.
- Language extension: Have students write a response to the prompt "A day without water" using a form of their choice (fiction, skit, poem, reflective paragraph).

Additional resources

The Incredible Adventures of H2O and his Friends (Groundwater Project)
https://gw-project.org/videos/the-incredible-adventures-of-h2o-his-friends/
A video set in sub-Saharan Africa that shows the process of accessing groundwater by drilling a well.

Make a water filter (National Geographic)
https://kids.nationalgeographic.com/books/article/water-wonders
Step-by-step instructions for making a water filter, simplified for younger learners.

DIY Filter Science Project
https://www.youtube.com/watch?v=A0vrwHNsz9g
Video tutorial showing how to make a water filter for middle school or high school students.

A Day in the Life — Your Virtual Water Footprint
https://waterportal.ca/a-day-in-the-life-your-virtual-water-footprint/
Video on water use in daily life and resources for calculating a water footprint.

Potable water use in Canada (Statistics Canada)
https://www150.statcan.gc.ca/n1/daily-quotidien/190611/g-b001-eng.htm
Infographic on potable water use in Canada.

Books:
Enough Water?: A Guide to What We Have and How We Use It by Steve Conrad (Firefly Books, 2016)
Includes infographics; aimed at ages nine to 12.

Your Water Footprint: The Shocking Facts About How Much Water We Use to Make Everyday Products by Stephen Leahy (Firefly Books, 2015)
For all ages.

Canadian Geographic articles:
University of Alberta researcher developing simpler way to test water quality
https://canadiangeographic.ca/articles/university-of-alberta-researcher-developing-simpler-way-to-test-water-quality/

Half of Canadians consider water most important resource: study
https://canadiangeographic.ca/articles/half-of-canadians-consider-water-most-important-resource-study/
Includes discussion of water waste and water conservation.

The Canadian innovation that pulls drinking water out of thin air
https://canadiangeographic.ca/articles/the-canadian-innovation-that-pulls-drinking-water-out-of-thin-air/

LESSON 3.2

The water around us: Stormwater versus wastewater

Overview

Humans have learned how to treat polluted water to protect human health. Wastewater and stormwater have two different pathways before they return to nature. Polluted or contaminated stormwater can harm waterways, animals and other living things.

- What happens to wastewater after it goes down the drain?
- What happens to surface runoff in cities after it goes into storm sewers?
- What are the similarities and differences between wastewater and stormwater?
- How is polluted water treated to protect human health?



In cities, engineers build underground storm sewers to collect rainwater and snowmelt to prevent flooding. They also build sanitary sewers to collect wastewater from our homes and businesses. How are stormwater and wastewater similar? How are they different?

Humans have learned how to treat polluted water to protect human health. Do you have a wastewater treatment facility in your community? We have learned a great deal from nature: can you think of ways nature purifies water?

Time required

One 60-minute period

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Learn the difference between stormwater and wastewater
- Become familiar with some ways polluted or contaminated water can be treated to clean it

Materials and resources

- Freshwater Giant Floor Map
- **Activity card: Sanitary sewer collection in urban areas information sheet**
- Two clear containers or bins
- Water
- Small items to represent pollution (dirt, leaves, a drop of food colouring, small bits of paper, etc.)
- Coffee filter
- Spoon or stick
- Devices for further research (optional)

Lesson implementation

Minds on the map

Review with students what they have learned about where their water comes from and how it gets to their tap or household source. Ask students, "What happens to the water after it goes down the drain? What about water and waste from the toilet after it is flushed?" Have students share their current understanding of what happens to the water in their household and other daily locations after it is used.

Make further connections to daily life by asking, "What about when it rains in our school yard or roads? What might the water pick up along the way? Where would that water go in our community?" Guide students toward understanding that rainwater runoff can pick up dirt, garbage, bacteria and chemicals (such as paint, weed/insect killer, etc.) when it meets the ground, especially in urban areas. Check that students understand that in natural landscapes, rain and snow is mostly absorbed and naturally filtered by the soil and through plants. Although pollution from stormwater runoff is a bigger problem in urban areas, surface runoff can also pick up chemicals and contaminants from roadways or farmland. Have students try to identify where the runoff from rain/snow in their school yard ends up, using what they know about the flow of water on the Giant Floor Map.

Explain to students that dirty water from drains and toilets is called **wastewater** and dirty water from surface runoff on roads and other paved surfaces is called **stormwater.**

Discuss sites in your area where waters might become polluted or contaminated: households and businesses, industrial sites, large farms, paved areas. If students have already visited or learned about their local water treatment plant, elicit existing knowledge of how dirty water is cleaned. Explain that some homes don't send their dirty water to a big treatment plant. Instead, they clean it right in their yard using a septic system. The soil helps filter the water before it goes back into the ground.

On the map, have students identify the broader settings where wastewater and stormwater concerns concentrate: dense urban areas, agricultural regions, industrial and port areas, mining and resource development and major transportation corridors. Have groups mark two or three on the map and name the waterway that would receive the runoff from each.

Water and me

Water connects our homes, our communities and nature. What does this mean to you?
If water could tell the story of its journey though your community, what do you think it would say?

Action

Activity 1: The two paths of polluted water

Use this hands-on activity to help students see and experience the difference between wastewater (treated) and stormwater (often untreated).

1. Tell students, "We're going to follow two different kinds of water and see what happens to them."
   Label containers: Container 1: Wastewater; Container 2: Stormwater

2. **Create "Dirty/Polluted Water" together.**
   Have students add pollutants to both containers. Talk about what the pollutants might represent (dirt and leaves are obvious, but you could also add bits of paper or plastic to represent plastic or other waste). Ask students, "Where might these pollutants come from in real life?" (Streets, shoes, garbage, cars, etc.)

3. **Demonstrate the two journeys of water**
   - **Wastewater path (gets treated)**
     Slowly pour the water in the wastewater container through a coffee filter into a larger clear bin/container. Explain, "In real life, most wastewater goes to a treatment plant where it is cleaned before going into nature (rivers, groundwater, streams). Ask, "What happened to the dirt? Is the water cleaner now?"
   - **Stormwater path (often not treated)**
     Pour stormwater water directly into the other bin/container (no filtering). Explain, "Stormwater often flows straight into rivers and lakes without being cleaned."
     Ask, "What do you notice about this water? Where would this pollution go?"

4. Make a simple comparison chart of the two pathways of contaminated water.
   - **Wastewater:** Enters **sanitary sewer** and travels to treatment plant or enters household septic system/ Cleaned before release/Comes from homes and businesses
   - **Stormwater:** Enters **storm sewer** designed to prevent flooding/Often goes directly to the environment/ Often untreated/Comes from rain or snow
   - After modelling both pathways, return to the map. Ask each group to choose one of the locations marked earlier and trace where the water from each pathway would end up: which river, lake, watershed or groundwater system receives it, and what lies downstream of that point.
   - The distinction between stormwater and wastewater is central to future learning about pollution, environmental impacts and water stewardship.

5. Ask, "Which type of water might be more dangerous for lakes and animals? Why?"

Conclusion and consolidation

Ask students to reflect on what they have learned about how dirty water is treated and the differences between wastewater and stormwater. Discuss some actions that individuals and communities can take to prevent stormwater pollution (eg., reducing pollution, eliminating use of pesticides, sweeping streets, using permeable paving surfaces whenever possible.)

Then use the map to ask where different solutions fit. Have groups choose contrasting places, like a dense city, a suburban neighbourhood, an agricultural region or a northern community, and consider which stormwater approaches would work in each. Permeable surfaces, rain gardens, retention ponds, wetland restoration and separated sewer systems are not equally practical everywhere, and the reasons are geographic. Space, soil, slope, rainfall, frost and how much of the ground is already paved all determine stormwater management approaches.

Modifications

For younger students:
Focus on the hands-on activity and helping students understand the main differences between wastewater and stormwater.

For older students:
With students, dig deeper into comparing wastewater treatment methods. When are septic systems used? How do they work? How do they compare to centralized municipal sewage treatment plants? What are the challenges and environmental impacts of each method? Encourage students to further research stormwater management practices and share what they have learned. What are other ways urban areas can prevent and mitigate the impacts of runoff and stormwater pollution?

Additional resources

For older students:

Killer tire chemical threatening Canadian salmon (Canadian Geographic)
https://canadiangeographic.ca/articles/killer-tire-chemical-threatening-canadian-salmon/

Sanitary sewer collection in urban areas (Biinaagami)
https://www.biinaagami.org/sanitary-sewer-collection-in-urban-areas

4

Living with water: Water at work for us

Drinking water is only part of the freshwater story. Freshwater helps grow food, generate electricity, cool industrial processes, move goods, extract minerals and is embedded in nearly every manufactured object a student handles in a day. This section zooms out from personal use to the economy, and then asks a challenging question: when there is not enough water to meet demand, who decides who gets it?

Lesson 4.1 surfaces the hidden water in familiar objects and industries, and has students locate those uses on the Giant Floor Map. Lesson 4.2 turns the class into a decision-making body. Working from sector cards and a community scenario, groups must allocate a limited water supply among competing needs, such as a municipality, a farm, an industry, an energy producer, an ecosystem and a First Nation exercising treaty and inherent rights. They then defend the choice they made and account for who bears its cost.

There is no answer key for the allocation challenge. Students develop a working understanding of trade-offs, standing and the difference between technical questions and political ones.

Additional resources are available on the *Freshwater: Lifeblood of the Land* homepage. Scan the QR code to explore them.

Lessons in this section:

- Lesson 4.1 –Water at work for us: How else do we use water?
- Lesson 4.2 – Water at work for us: How should we allocate water?

LESSON 4.1

Water at work for us: How else do we use water?

Overview

People, animals, plants and communities depend on water every day. We use water for growing food, making energy, transportation, cleaning and creating products. People rely on water in many different ways and have a responsibility to care for it.

- How does water help people every day?
- Where do we use water that we might not notice?
- What sectors in Canada use the most water?



Growing a kilogram of wheat can use over 1,000 litres of water. Where on the map do you find farms? What water systems do you think they are connected to?

Hydroelectricity requires huge amounts of flowing water to generate power by moving water through turbines. Where on the map do you think significant hydropower might be located?

Time required

One 60-minute period

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Learn about the many sectors in Canada that rely on freshwater
- Understand that some sectors use more water than others

Materials and resources

- Freshwater Giant Floor Map
- Small clear containers
- Blue beads
- **Activity card: Water sector icons**

Lesson implementation

Minds on the map

Gather students around the Giant Floor Map. Start by introducing four common items and using a four-corners vote (explained below) to get students thinking about how much water is used to produce or grow them. Hold up or post images of these four items in four corners of the room:

- Apple
- Hamburger
- Cotton clothing
- Paper

Ask students, "Which item do you think needs the most water to make?" Students vote by moving to the four corners of the room. Ask students to briefly explain their reasoning, then discuss the four items as a class. Explain that both hamburgers and cotton clothing use a lot of water to produce. Lesser amounts of water are used to process paper and grow apples.

Before continuing, point to each image and ask students to step somewhere on the map where they think each item might be grown or produced. Also ask students to guess: Which of these four items isn't produced in Canada? Briefly discuss the examples in relation to the map and help students think about why each industry is connected to specific locations or types of locations:

- In Canada, major apple-growing areas are Nova Scotia (the Annapolis Valley), New Brunswick (Saint John River valley), Quebec (near the US border), southwestern Ontario and British Columbia (the Okanagan Valley).
- Pulp and paper mills are usually built on rivers with access to large forested areas to harvest the wood pulp. Today, major locations for pulp and paper production in Canada are Ontario and Quebec, but British Columbia, New Brunswick, Manitoba and Alberta also have pulp and paper operations.
- Cattle need access to large areas of grassland, so almost half of Canadian beef production originates in Alberta, with about 85 per cent of all Canadian beef farms found in the four Western provinces.
- Canada's winters are too cold for growing cotton, so of the four items, cotton is the only one not produced in Canada.

To give students a visual sense of how much water is used to produce each item, use clear containers and blue beads to represent relative water use. Have students physically pour or count water tokens (beads) into containers in the following quantities:

- Apple, 1 tablespoon
- Paper, 5 tablespoons
- Cotton T-shirt, 8 tablespoons
- Hamburger, 15 tablespoons

This creates a dramatic visual and shows how some products we use require much more water than others.

Water and me

Think about everything you've already used today — from the food you ate to the clothes you wore, the lights in the classroom, your notebook or the devices you've used. Which of these needed water before reaching you? Now imagine there wasn't enough water. Which things would change first? Which would you choose to protect? Why?

Action

Activity 1: What uses the most water?

Build on the examples in the minds on the map activity by eliciting knowledge of ways humans use water to meet needs and wants on top of physical survival. You may have touched on some of these when introducing the source-to-tap local-water journey in a previous lesson. Ask students, "Apart from drinking water and cleaning with it, how else do we use water in our society? What are some non-direct ways we rely on water?"

Major ways water is used in Canada include:

- Agriculture (to grow things: crops, irrigation, livestock, food processing)
- Industry (to make things: manufacturing, mining, energy production, cooling systems, processing goods)
- Hydroelectricity (to power things: electricity powered by the force of water)
- Transportation (to move things: travel routes, shipping corridors)

Divide students into groups, one sector each, and give each group an appropriate quantity of icons from the **Activity card: Water sector icons**, representing their sectors:

- Home icons (highly populated areas and big cities)
- Farm icons (Saskatchewan, Alberta, Manitoba, Central Ontario)
- Factory icons (Central Ontario, Quebec)
- Hydroelectric symbols (Quebec, Manitoba, British Columbia, Labrador)
- Natural ecosystems (wetlands, river systems, lakes and forests across the country)

Groups read their sector, decide where in Canada that activity is concentrated, and place their icons on the map. When every group has placed, read the resulting pattern together as a class: which sectors cluster, which are spread across the country and which sit closest to large bodies of water.

Prompt students thinking by asking, "Which of these icons use the most water?"

Create a visual representation with students of relative ratios of water consumption for each category. For older students, you may wish to note that some sectors, like the power sector in Canada, withdraw large quantities of freshwater, but much of the water they use is returned to the same source or recirculated. The agricultural sector currently consumes the most water because that water is incorporated into plants and animals and not returned to its original source. Note that the growing number of data centres in Canada will likely increase the industrial use of clean water, as data centres use vast amounts of water for cooling.

For an elementary classroom demonstration, the goal is not perfect scientific precision, but a clear visual comparison that helps students understand:

- Agriculture uses the largest share of freshwater
- Industry also uses a significant amount
- Homes use less than students often expect
- Ecosystems require water too, even though humans do not always "count" it

Have students add beads, stones or blocks to clear containers to visually demonstrate which sectors use the most water. A simple and effective classroom ratio would be:

CATEGORY	SUGGESTED RATIO	EXAMPLE CONTAINER SIZE
Farming	7 parts	Largest container
Industry	4 parts	Medium-large container
Homes	2 parts	Medium container
Ecosystems	3 parts	Medium-large container

Conclusion and consolidation

Ask students to reflect on what they have learned in this lesson about how water is used to grow, make, power and move things in Canada. Ask students, "What is one new or interesting thing you learned? What surprised you about how water is used?"

Then look at the map as a whole, with the icons still in place. Ask: what patterns do you notice in where water-intensive activities happen in Canada? Where are they concentrated, and what is beside them? Does access to freshwater appear to influence where these activities are located, or do other factors like climate, soil, transportation, population or resources matter more? Have students point to evidence on the map for their answer.

Modifications

For younger students:
Keep the focus on the hands-on activities that will help students understand relative use of water for each sector.

For older students:
Have students research further on how water is used in each of the sectors in this lesson. Each group can create a poster or infographic (including drawings and/or collage) to show the ways water is used in their sector. Have each group present their poster and discuss what they learned about water use in their sector. You may wish to have one additional group research and present their findings on residential water use.

Additional resources

Potable water use in Canada (Statistics Canada)
https://www150.statcan.gc.ca/n1/daily-quotidien/190611/g-b001-eng.htm
Infographic on potable water use in Canada.

AI data centres use vast amounts of water. But gauging how much is a murky business (CBC)
https://www.cbc.ca/news/ai-data-centre-canada-water-use-9.6939684
CBC article.

LESSON 4.2

Water at work for us: How should we allocate water?

Overview

- Who needs water in a community?
- How can we protect water while still using it?

Time required

Two 45-minute periods or one 90-minute period

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Learn about the specific needs and challenges of several sectors that rely on freshwater
- Become aware of conflicting priorities for water use in communities
- Understand the challenges and tensions involved in making decisions about water allocation

Materials and resources

- Freshwater Giant Floor Map
- **Activity card: Sector cards**
- **Activity card: Community water allocation challenge scenarios**
- Art/poster supplies

Lesson implementation

Minds on the map

Let students know that in this lesson they will consider the different sectors that rely on water in Canada and consider how to make decisions about how to share water fairly. Divide the class into five groups and give each member of the group their own sector card.

Each group gets familiar with their sector card and locates where this sector most commonly exists on the map. Before starting the main activity, have each group share with the class some of the information on their card.

Water and me

Think about all of the ways water is used in your community — for homes, businesses, farms, factories, transportation and whatever else comes to your mind. Which of these uses of water are most important to you? Why?

Action

Activity 1: Community water allocation challenge

Put students into new groups so that each group has at least one member representing each of the five sectors, each student bringing with them a card with information about their sector. Depending on the size of the class, have each group consider two to three of the scenarios on the **Activity card: Community water allocation challenge scenarios**.

Before groups discuss their scenario, have them locate its setting on the Giant Floor Map and investigate it. What water systems are nearby? What communities, and which of those are Indigenous communities? What land use is shown? Which watershed is it in, and what lies downstream? Groups should gather this evidence before they begin arguing for their sector, so that the discussion rests on the place and not only on the sector's position.

Students discuss the scenario and related questions within their group, then present their scenarios to the class, opening up the questions and discussion to the whole class. You may wish to have students choose only one of their scenarios to present to the class.

Along with the questions specific to each scenario, each group should also consider the following:

- Who gets water first?
- How much water goes where?
- How do we protect ecosystems too?

To conclude the activity, have each group mark its scenario location. Ask:

- Where were the conflicts hardest to resolve, and what did those places have in common?
- What geographic factors shaped the decisions — climate, the size of the watershed, distance from other water, the number of communities involved?
- Did the same priorities work everywhere, or did the answer change with the place?

Conclusion and consolidation

Ask students to reflect on what they learned from the activity. As a class, brainstorm what students (and their families and communities) can do to use water in wise ways: conserve water, reduce pollution, protect wetlands, clean shorelines, reuse, reduce waste, consume less, waste less food, etc. Discuss what students can do as individuals versus what might require community cooperation, government regulations or other collective solutions. Have students create posters to share in the school and community to persuade others to use water wisely.

To close the lesson, ask students to reflect on the following prompts:

- One thing I learned about water is...
- One way water helps our community is...
- One way I can care for water is...

Modifications

For younger students:
Complete the activities as a whole class, first reading through the category cards with students, then choosing a few of the simpler scenarios to discuss as a class.

For older students:
Older students can further discuss or reflect on the following questions:

- Is water a human right, a resource or both?
- Who should make water decisions?
- Should ecosystems have guaranteed water?
- How do upstream actions affect downstream communities?
- What would "fair" sharing of water look like?

Additional resources

There's a cost to using artificial intelligence: the water you drink (Canadian Geographic)
https://canadiangeographic.ca/articles/theres-a-cost-to-your-chatgpt-query-the-water-you-drink/

Data Centers and Water Consumption (Environmental and Energy Study Institute)
https://www.eesi.org/articles/view/data-centers-and-water-consumption

5

Environmental and climate impacts: Human impacts on water

Every waterway on the Giant Floor Map has a history. Some of those histories include a mill, a mine, a dam, a diversion, a spill, an invasive species, a warming trend, or a shoreline rebuilt in concrete. This section asks students to read a waterway as a document and to look at a river or lake and ask what has happened to it, who was affected, and what is being done now.

In Activity 1 of Lesson 5, students assess the health of a waterway near them using observable indicators, building the habit of looking closely at water they pass every day. In Activity 2, they research and retell the story of a specific Canadian waterway, following it from what it was, through what changed, to where it stands today. Lake Athabasca and the Athabasca oilsands are offered as a worked example, and students are invited to make connections to the freshwater they know and live with.

Lessons in this section:
Lesson 5 — Human impacts on water: How human activity affects freshwater

LESSON 5

Human impacts on water: How human activity affects freshwater

Overview

Human settlement and industry in Canada have changed freshwater sources, affecting water quality, water quantity, ecosystems and living things. Many of the waterways in Canada have their own specific histories of change and challenge, which fit into broader environmental and climate impacts to freshwater across Canada.

- What are some ways human settlement and industry have changed freshwater in Canada?
- How do human activities affect freshwater, living things and ecosystems?
- What regions are most affected by pollution?
- What regions are most affected by flooding or by drought?



Canada's water sources face pollution from industry and human settlement. Where do you think the most significant sources of pollution are located?

For centuries, people have drained wetlands to create farmland and buildable land for cities. Where on the map can you find abundant wetlands? Where are they missing?

Can you think of ways climate change disrupts the water cycle? What regions in Canada will be most affected by melting glaciers?

In Canada, many of our freshwater fish populations are in trouble. Fish are sensitive to pollution, changes in water temperature and changing water flows. If you were a fish, where on the map would you like to live?



Can you think of ways climate change is affecting the groundwater we rely on for drinking water and for irrigating food crops? Think about both water quality and quantity.

Time required

Two 60-minute periods

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

In this lesson, students will:

- Develop an understanding of how human activities change and impact freshwater
- Consider the health of a particular waterway using direct observation
- Understand how the current health of a waterway connects to how that waterway has been used over time

Materials and resources

- Freshwater Giant Floor Map
- **Activity card: Water observation worksheet**
- **Activity card: Story of the waterway worksheet**
- Clear containers with lids for water sampling
- Tools to allow worksheets to be completed on-site (clipboards, pens)
- Water quality testing kits (optional)
- Art/poster supplies (optional)
- Devices for remove waterway research (optional)

Lesson implementation

Minds on the map

Gather students around the map. Let them know that your focus today will be on how the freshwater on the map has been and is still being changed by humans. Ask students, based on what they have learned in previous lessons and already know, about some of the ways human activity has changed waterways or had negative impacts on water. Explore the map with students asking them to make some guesses about locations that might have the most human impacts, for example places on the map where cities are clustered. Generate a list with the class of some ways that human settlement and industry might impact water. Ask students questions such as: How might factories or other industries affect water? How might cities affect water? How might damming rivers to generate hydropower affect water? How might transporting goods on large container ships affect water?

To frame the investigation in the next activity in the context of examples of environmental and climate impact, discuss the border questions and answers related to pollution, wetlands, climate change and freshwater fish. With students, generate a list of some other ways freshwater bodies have been changed by humans across Canada. These could include changes such as dams and canals, rerouted rivers and paved-over rivers and creeks in urban areas. Prompt students with examples in your community or region and guide them to identify

Water and me

Considering some of the things you've learned about water and its importance, what do you wish everyone understood about taking care of water?

Action

Activity 1: Exploring waterway health

Pay a visit to a local river, lake, creek or wetland with the class. Let students know that you will be investigating the waterway to consider how healthy it is and how it might have been impacted by human activity, now or in the past. First, find a safe location near the water, watching out for hazards such as litter, poison ivy or bank erosion. In small groups, have students make visual observations of the water and its surroundings. If it's possible to do so safely, supervise students in groups to collect water into clear plastic containers for closer observation.

For classes that cannot make the visit, run the observation on the map instead. Have groups choose a waterway on the Giant Floor Map and use photographs, satellite imagery and local sources to complete the same **Activity card: Water observation worksheet** at a distance.

Ask questions such as:

- What is the colour of the water? Is it clear or murky? Does it contain any visible litter?
- How would you describe the surrounding area? (quiet, busy, urban, rural, forested, etc.)
- What plants and trees can you identify near the water? What other living things can you observe in, on or near the water? (fish, insects, birds, mammals, etc.)
- What do you notice about how humans are interacting with the water?

Have students use the **Activity card: Water observation worksheet** to record what they notice about the waterway and its surroundings and about the water itself.

Activity 2: The story of the waterway

Place the observations your class has made in a broader context by researching the history of the waterway or wetland you visited. This may involve investigating print and online resources, visiting a local museum or historic site or inviting local historians, naturalists, Elders or community members to speak to the class about the history of the waterway. Have students individually or in groups consider the following prompts:

- Who were the original Indigenous caretakers of this land and waterway?
- Is this waterway connected to any traditional stories?
- What changes, if any, have humans made to the waterway and its surroundings since colonization? What has been the impact of these changes on the water and the ecosystems around it?
- What personal memories do people in the community have of this waterway and any changes? (For example, changes to fish populations, swimming access, etc. These might include students' own memories.)
- How is the waterway responding to broader challenges? (e.g., climate change, pollution)
- What concerns does the local community have about the health of the waterway? How are these concerns being addressed?
- Or, if the waterway is considered healthy, how has its health been protected? Which people, communities or organizations currently care for the waterway?

Prompts can be divided into related topics and assigned to (or chosen by) groups or individuals for further research. You may choose to have students consider all the questions in the **Activity card: Story of the waterway worksheet** or have each group or individual consider only the questions relevant to a specific topic. Have students present what they have learned to the class as a poster, infographic or other media text. Students may also choose to share the story of the waterway in another creative form, such as a poem, song or dramatized narrative.

Conclusion and consolidation

Discuss with students what they have learned in this activity. Zoom out to contextualize changes in the waterway you have studied within larger environmental and climate impacts on freshwater in Canada. How does your waterway connect to freshwater issues around the country? Ask students to reflect on human-caused impacts on freshwater. What patterns do they see? What issues do they think are most important to address or solve?

Make the zoom out literal by returning to the Giant Floor Map. Have each group mark the waterway it studied and place beside it one card naming the main pressure on that water (industry, agriculture, urban development, resource extraction, a dam or diversion, invasive species or climate change). Read the resulting pattern as a class: where do the same pressures repeat, and which parts of the country carry which pressures? One waterway's story becomes a national picture when all of them are on the map at once.

Modifications

For younger students: Complete the **Activity card: Water observation worksheet** as a whole class.

Simplify the second activity into broader topics using these prompts: "What happened here in the past?" "What is happening here now?" "What might need to happen in the future for the water to be healthy (or stay healthy)?" Guide the class through finding and grouping facts and stories about how the waterway/wetland came to be as it is today. The worksheet questions can be simplified and answered together as a class.

For older students: Expand the water sampling activity by having students use water quality testing kits designed for classroom use to test the water for factors such as bacteria, chloride, dissolved oxygen, nitrate, pH, phosphate and temperature. For the **Activity card: Story of the waterway worksheet**, you may wish instead to have students conduct individual interviews with family and community members of experiences with the waterway, observations of changes and challenges and suggestions for how to protect the waterway. Compile these as posters and display them in the classroom. As a class, discuss patterns in the stories and proposed actions. What have students learned?

Additional resources

How is pollution in the St. Lawrence measured? | Ask a Scientist (Environment and Climate Change Canada)
https://www.youtube.com/watch?v=iiQl3YuQ7iA
An example of how pollution is measured in a major Canadian river.

Environmental Sciences | How To Collect Water Samples (Lakeland College Canada)
https://www.youtube.com/watch?v=tiiwWYDrVT0

The Watershed Game (Minnesota Sea Grant)
https://seagrant.umn.edu/watershed-game/classroom-versions
A large-format board game for classroom use with two editions, stream and coast, focused on understanding relationships between water quality and land use.

For older students:
Embodied listening for freshwater fish futures
https://www.greendreamer.com/podcast/zoe-todd-fish-philosophy
Podcast interview with Dr. Zoe Todd examining the relationship between fish well-being and Indigenous sovereignty in Canada, including discussion of how fish might experience changes to waterways and water quality.

National Lake Blitz (Living Lakes Canada)
https://livinglakescanada.ca/project/national-lake-blitz/
Information on getting involved with a national lake-monitoring program.

Great expectations for the Great Lakes (Canadian Geographic)
https://canadiangeographic.ca/articles/great-expectations-for-the-great-lakes/
The State of the Great Lakes 2025 Report gives an overall assessment of the health of the Great Lakes, including some positive trends.

How swimming returned to downtown Ottawa (Canadian Geographic)
https://canadiangeographic.ca/articles/how-swimming-returned-to-downtown-ottawa/
How two Ottawa waterways once considered too polluted for swimming were cleaned up and opened to the public.

6

Water inequity

Water connects everyone, but it does not reach everyone equally. In a country holding a fifth of the world's freshwater, many First Nations communities have lived under drinking water advisories for years and, in some cases, for decades. This section examines this disparity directly, and confronts the fact that this situation is not a natural shortage, but the result of decisions about funding, jurisdiction, infrastructure and whose needs were prioritized.

The lesson approaches inequity through two activities. Activity 1: Downstream effects

uses the flow arrows on the Giant Floor Map to demonstrate that the consequences of a decision about water do not stay where the decision was made, namely that communities downstream inherit them. Activity 2: Boil water advisories then brings students to the specifics of what an advisory is, how long some have lasted, what daily life is like under one and what it takes to lift one.

Additional resources are available on the *Freshwater: Lifeblood of the Land* homepage. Scan the QR code to explore them.

Lessons in this section:

- Lesson 6 – Water inequity: Access to safe water

LESSON 6

Water inequity: Access to safe water

Overview

Water connects all living things and communities. Decisions about water typically do not affect everyone equally. In Canada, First Nations communities often face greater challenges accessing clean, safe water than others.

- How does water connect places and communities in different parts of Canada?
- What are possible effects on connected communities from decisions and behaviours related to water?
- What are some barriers to clean water access in Canada? How do these barriers disproportionately impact Indigenous and marginalized communities?



Drinking water advisories exist where communities do not have access to potable (drinkable) water. Who is responsible for ensuring everyone has access to safe drinking water? What can we do to help make this happen in Canada?

Access to water in all its forms is not equal across Canadian communities. Where do you think access to water might be limited? What factors would affect access to water?

Time required

One 60-minute period

Grades

Best suited for Grades 5 to 8
(modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Learn about possible downstream effects of decisions made about water
- Understand that taking care of water means treating all water as connected
- Understand that not all communities have equal access to safe drinking water.
- Explore how decisions about land and water affect people differently.

Materials and resources

- Freshwater Giant Floor Map
- **Activity card: Sources of pollution**

Lesson implementation

Minds on the map

Have students locate Lake Athabasca in northern Alberta, and the surrounding First Nations communities — Mikisew Cree First Nation and Athabasca Chipewyan First Nation on the map. Using a map for reference, mark off the Athabasca oilsands so students can see the proximity. Explain that since the 1970s these communities have been "downstream" from the oilsands industry and the impacts on Lake Athabasca have been harmful to all living things and the way of life of the Nations who live there. The water has been contaminated. They can no longer swim in the water, they can no longer eat the fish that come from that water and wildlife can't survive around the lake the way they used to. The impacts of industry affect the entire watershed.

Introduce the term **environmental racism**. Pollution or environmental problems may affect some communities more than others. In Canada, Indigenous communities have often experienced more drinking water advisories and environmental impacts than many other communities. Several other marginalized communities have faced similar issues, such as historic Black communities in Atlantic Canada. When certain groups face more environmental risks because of historical or social inequalities, this is called **environmental racism**. This can include lack of safe water, location of landfills and other environmental hazards.

Water and me

Imagine you could send one message to leaders in Canada about clean water. What would you say and why?

Action

Activity 1: Downstream effects

With the class, select a major river in your watershed on the map. Note the areas and communities the river travels through. Divide students into small groups and assign or let them choose a specific location along the river. Introduce the following prompts: How is the water used at this location? What are some activities that happen in or near the water? Which of these activities can have negative effects on the water (litter, pesticide runoff, industrial pollution)?

Using the prompts on the **Activity card: Sources of pollution**, have students at each location create cards or tokens to represent a source of pollution that might enter the river here. Students can stand on the map at their location. Students closest to the headwaters of the river start by passing their tokens to the next location, explaining what each token represents. Have the group at the next location name some effects this pollutant might have on their community, then add their own tokens and pass all tokens on to the next group. Each group passes their tokens on to the next group until the group closest to the ocean is left holding the tokens. What effects might this accumulation have on the water as it flows to the ocean? What effects might it have on animals, plants and humans throughout the watershed?

Explain that while decisions about water are currently made within specific locations or regions, their consequences are felt by all living beings in the watershed. While treatment facilities along the way clean some pollutants out of the water, not all pollutants can be removed. Ask students, "What could be done differently at your map location to keep water clean and safe for all living things along the river? What decisions might we make differently if we considered the watershed as a whole? What would we do differently if we treated water as a living relative?"

Activity 2: Boil water advisories

Many communities across Canada have experienced long-term boil water advisories. A boil water advisory is a warning that tells people their tap water may not be safe to use.

You can find which First Nations communities in Canada are currently under boil water advisories here: https://www.sac-isc.gc.ca/eng/1614387410146/1614387435325

Locate and mark the current boil water advisories on the map. Have students consider the following questions: what patterns do you notice? Where do you see many advisories? Where do you see a few advisories? What needs to be done to solve the problem of lack of access to clean drinking water? Who needs to be involved in solving the problem?

Conclusion and consolidation

Water connects all people, places and living things. The choices we make about water can affect communities far away and for many years. Clean, safe water is something everyone needs to live. Protecting water is a shared responsibility.

In 2012, Canada recognized the United Nations declaration on the human right to safe drinking water, but has not yet legislated the right to water. Discuss with students: What does it mean to say that water is a human right? What is the role of governments and laws in ensuring everyone has access to clean water? What difference might it make to water equity in Canada if the human right to water was enshrined in Canadian law?

Have students share a one-sentence response beginning with: "Access to clean water is important because..."

Modifications

For younger students:
Activity 1: Downstream effects can be completed as a class from start to finish without breaking into smaller groups. The "Access to clean water is important because..." message can also be completed as a class.

For older students:
Encourage students to investigate specific Canadian examples (i.e. Grassy Narrows, Neskantaga First Nation, Elsipogtog First Nation) and consider who is impacted and what the specific impacts are on each community.

Have students pursue further research on attempts to legislate the human right to water in Canada. Some relevant links are included in the additional resources. Students can report on the specifics and current status of proposed legislation.

Additional resources

When it comes to stream health, land use and protection matter (Canadian Geographic)
https://canadiangeographic.ca/articles/when-it-comes-to-stream-health-land-use-and-protection-matter/

Lifeblood: Fort Chipewyan's relationship to water (Canadian Geographic)
https://canadiangeographic.ca/articles/lifeblood-fort-chipewyans-relationship-to-water/

Human Rights to Water and Sanitation (United Nations)
https://www.unwater.org/water-facts/human-rights-water-and-sanitation
UN-Water facts page explaining the right to water and sanitation, with resources for further reading.

Canada must strengthen efforts to guarantee right to water and sanitation for Indigenous Peoples: UN expert (United Nations)
https://www.ohchr.org/en/press-releases/2024/04/canada-must-strengthen-efforts-guarantee-right-water-and-sanitation

Drinking water and wastewater legislation (Government of Canada)
https://isc.gc.ca/eng/1697555066364/1697555089256
Information on Bill C-37, the proposed First Nations Clean Water Act, introduced in the House of Commons in June 2026.

7

Protecting water

Protection begins in connection: people defend what they love and notice, and the work of drawing attention to water through art, ceremony, story and public voice is part of the work of protecting it.

Lesson 7.1 explores art as a form of stewardship and activism, from Water Walk songs to public installations, and has students create work that expresses their own relationship to a waterway. Lesson 7.2 extends this perspective to protection as a whole. It introduces four pathways to action:

1. Science and research
2. Government
3. Non-governmental and not-for-profit organizations
4. Grassroots and community action.

There is a short case study for each, alongside its central focus on Indigenous water protectors, Water Walkers and the writing of a class water declaration.

Protecting water is not one kind of work done by one kind of person. It is many kinds of work, done at different scales and speeds, and there is a place in it for every set of interests and strengths, starting in the classroom.

Additional resources are available on the *Freshwater: Lifeblood of the Land* homepage. Scan the QR code to explore them.

Lessons in this section:

- Lesson 7.1 — Connecting and taking action: Art and stewardship
- Lesson 7.2 — Connecting and taking action: Pathways to protecting water

LESSON 7.1

Connecting and taking action: Art and stewardship

Overview

Water is a connector. It connects all living things. It connects people and places across distances. Many people across Canada share a deep connection to water and a desire to protect it. Art can be used to explore connections to water and to promote and protect water.

- How does water connect different parts of Canada?
- What are other ways water can be described as a connector?
- How can art be used to explore relationships to water?
- How can art be used to promote and protect water?



What stands out for you most as a way that water connects different parts of Canada? Where are the most significant locations for these connections?



Water is essential to many of Canada's most significant art forms, stories and ceremonies. What places do you think could be the subject of art or storytelling?

Time required

One 60- to 90-minute period

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Understand some ways water connects different parts of Canada
- Explore other ways water can be described as a connector
- Explore how art can be used to demonstrate relationships to water
- Explore how art can be used to promote and protect water

Materials and resources

- Freshwater Giant Floor Map
- **Activity card: Water protection banners**
- Other examples of Canadian art depicting water, connections to water and water activism
- Art supplies of various kinds

Lesson implementation

Minds on the map

Gather the class around the Freshwater Giant Floor map. Have students examine the map as a whole. Ask students, "What are some of the ways water connects different parts of Canada? Where are these connections most visible on the map?"

Draw students' attention to the wide geographical span of some of the major watersheds and waterways on the map. For example, the Hudson Bay watershed connects places as far apart as southern Alberta, the Arctic, northern Ontario and northern Quebec. Major rivers such as the Mackenzie and its tributaries and the St. Lawrence (in connection to the Great Lakes) span multiple regions of Canada. Water crosses political boundaries both within Canada and between Canada and the United States. Across Canada, people and places are connected over great distances by shared water.

Ask students, "Other than geographically, what are some ways people and places across Canada are connected by water? What do you think it means to say that water is a connector?" In pairs or small groups, students brainstorm ways that water is a connector. Encourage them to consider what they have learned in previous lessons or already know about water. Have each group share their ideas with the class, and compile them into a list. Answers might include:

- All living things are connected by their need for water
- The water cycle connects all water on Earth over distances and even through time
- People and animals use water as a connector to get from one place to another
- Water connects communities through the downstream effects of contamination or pollution
- Water connects people through fun activities that take place on or in water, such as boating, swimming, fishing and even skating,
- Water connects people through activism about water access and water equity
- Water has spiritual meaning in many cultures and traditions around the world and helps connect people to the sacred

Next, ask students to reflect on their own personal connection to water using the Water and me reflection questions. Encourage students again to draw on what has been explored in previous freshwater lessons as well as personal experiences of all kinds.

Have each student write a few lines or sketch an image or symbol of a significant personal connection to water or a water-related issue. Students choose a location and place their connection piece on the map.

Water and me

- What are some of the most important ways you connect to water?
- What personal experiences with water have been most meaningful to you?

Action

Activity 1: Art as activism

If you have completed the earlier lesson on water's role in creation, have students briefly recapitulate what they already explored and learned about water's role in creation stories, ceremonies and cultural traditions. Let students know that, along with its role in stories and ceremonies, water has also been an important subject for visual art in Canada.

Introduce students to a few examples of work by Indigenous and non-Indigenous artists in Canada with a focus on water and relationships to water. As a class or in small groups, have students examine and discuss the various ways these artists express their connection to water. Some diverse examples of water-focused art by Canadian artists can be found in the additional resources.

Explain that while many artists express a deep connection to water, other artists go one step further by speaking up for water and drawing attention to the ways we can protect water. Ask students if they have seen art that specifically speaks out about taking care of water.

Some students may already be familiar with the now-iconic "Water is Life" banners created by Christi Belcourt and Isaac Murdoch. Share the Water Protection Banners page with students, which includes several examples of Belcourt and Murdoch's banner images. The Additional resources section includes a link to more banner images. They are available for download for non-commercial use. Choose a few of the banners and discuss their visual elements. Ask, "Why do you think the artists made these choices about images, layout and colours? What overall effect do these choices create? How does this image and message make you feel? What kinds of actions might this banner inspire you to take?"

Let students know that they too can be an artist on behalf of water. Have students return to the connection piece they placed on the map in the opening activity. This can be the starting point for their art piece. Some students may want to reflect on the questions again and find another connection point instead. Let students know that they can include a brief written message in their art as Belcourt and Murdoch did, or they can choose to simply let the visuals do the talking.

Once students have created their artworks, share them in a class gallery or in a display area in the school. You may wish to add a gallery tour, with each student presenting their artwork to the class and sharing their intentions and message.

Conclusion and consolidation

Ask students to reflect on what they have learned about water as a connector and how art can be used to explore relationships with and concerns about water. Ask them if there are any other aspects of water as a connector that they would like to add to the list compiled at the start of the lesson. Discuss the idea of environmental stewardship, as used in the title of this lesson, which means human responsibility and care for the Earth and other living things. What have students learned about how art can be a form of stewardship?

As a class, discuss common themes in the art and messages shared by students. Ask students to consider, individually or in pairs: Which artworks and messages in the gallery did you particularly connect with? What elements of art might make people connect more deeply to water or want to protect water? What other creative forms could be used to promote and protect water?

Modifications

For younger students:
Complete the minds on the map activity together as a class and help students compile some examples of personal connections to water to place on the map.

For older students:
Invite students to add a written artist's statement explaining their artwork and its message about water or have students interview each other in pairs about their art pieces, asking questions about inspiration, visual elements, message and meaning and use these to write artist profiles for each other. Students can also explore other examples of art as water activism in the additional resources or online.

Additional resources

The Shape of Water: 11 Canadian Works (Art Canada Institute)
https://www.aci-iac.ca/wp-content/uploads/2022/07/Art-Canada-Institute-Newsletter_The-Shape-of-Water_11-Canadian-Works.pdf
Eleven diverse examples of water-focused visual art by Canadian artists from the early 1900s to the 2010s.

More Isaac Murdoch and Christi Belcourt banners for download (Onaman Collective)
https://onamancollective.com/murdoch-belcourt-banner-downloads/

Making Waves: 9 Artists on the Politics of Water (Art Canada Institute)
https://www.aci-iac.ca/wp-content/uploads/2023/03/Art-Canada-Institute-Newsletter_Making-Waves_9-Artists-on-the-Politics-of-Water.pdf
Nine Canadian works that explore the politics of water.

Virtual Water Gallery (Global Water Futures)
https://www.virtualwatergallery.ca/
Twelve artists paired with teams of Global Water Futures scientists to explore water challenges in various Canadian ecoregions and river basins.

Keep It in the Ground!
https://canadianart.ca/features/keep-it-in-the-ground/
More on Christi Belcourt and Isaac Murdoch's activist art on behalf of water.

5 Canadian artists addressing Canada's increasingly threatened landscapes (Canadian Geographic)
https://canadiangeographic.ca/articles/5-canadian-artists-addressing-canadas-increasingly-threatened-landscapes/
Five Canadian artists incorporating environmental activism into their work.

Celebrated Canadian Photographer Ed Burtynsky's Watermark Project
https://www.edwardburtynsky.com/projects/photographs/water

LESSON 7.2

Connecting and taking action: Pathways to protecting water

Overview

Water is powerful, and it is also vulnerable. There are many people and organizations working across Canada to protect water. Indigenous community organizations, Elders and Knowledge Carriers have upheld their responsibilities to protect water since time immemorial, and now the waters need everyone to do their part.

There are many pathways to protecting water. Scientists, governments, organizations and communities each protect water in different ways, and each depends on the others.

- Why does water need protection?
- What can individuals and communities do to protect water?
- What are some ways Indigenous community organizations, Elders and Knowledge Carriers are working to protect water?
- What are the different pathways people take to protect water, and how do they depend on each other?
- Which pathway to action best fits your own interests, strengths and situation?



Nookomis Josephine Mandamin, the first Water Walker, walked the shorelines of all five Great Lakes to honour and protect water. What other bodies of water or places on the map could be travelled and protected by Water Walkers?

Treaties are a foundational framework for sharing the land and water. What aspects of treaty relations are most significant to protecting water for future generations? How do treaty areas and water connect where you live?



Indigenous community organizations, Elders and Knowledge Carriers have made significant contributions to water protection across Canada. Where might Indigenous communities be impacted most by decisions made about water?

Time required

Three 60-minute periods

Grades

Best suited for Grades 5 to 8 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Understand that individuals and communities are working across Canada to protect water
- Know that Indigenous community organizations, Elders and Knowledge Carriers have led efforts to protect water
- Research organizations and individuals who are water protectors and Water Walkers
- Identify four pathways to protecting water: science and research, government, non-governmental and not-for-profit organizations and grassroots and community action
- Analyze a case study of water protection and explain what its pathway makes possible and what it cannot accomplish alone
- Connect their own interests, strengths and situation to a pathway for protecting water

Materials and resources

- Freshwater Giant Floor Map
- Rope or string
- Device to play a video about Josephine Mandamin's Water Walk, or a copy of Joanne Robertson's book *The Water Walker*
- **Activity card: Indigenous water protectors profile**
- **Activity card: Pathways to action case studies**
- **Activity card: My water protection pathway**
- Devices for further research

Background for teacher: Four pathways to protecting water

Students often leave a lesson on water protection believing that caring for water is mostly a matter of personal virtue, such as when we encourage people to use less, pick up litter or encourage others to do the same. Those things matter, but they are a small part of how water actually gets protected. Water is protected by people doing four broadly different kinds of work, at different scales and different speeds, and each kind of work depends on the others.

Framing protection this way gives every student somewhere to begin their freshwater protection journey. A student drawn to science, one drawn to rules and fairness, one who wants to build an organization and one who wants to speak out can all move along different paths that all lead to healthier freshwater. It also gives students a realistic picture of how change happens. Research finds problems and proves what is causing them, the government sets limits and funds work and change, organizations build what is missing on the ground and communities create the attention and the pressure that make the other three move.

The four pathways are not tidy categories, and it is worth saying so to students. Indigenous-led water protection runs through all four as well: Indigenous scientists and Guardians, Indigenous governments exercising their own water laws, Indigenous-led organizations and community Water Walks and ceremonies. The most effective work often combines all pathways. In one of the activities in this lesson, students will explore the four pathways by examining and presenting a case study on one of the pathways, then tracing a water problem across all four pathways together as a class.

1. Science and research: Finding out what is actually happening

Someone has to determine what is wrong with a body of water, what is causing it and whether a proposed solution will work. Research operates on long timescales and produces evidence that can settle arguments which opinion alone cannot. It rarely changes anything by itself — but without it, the other three pathways don't have all of the information they need to take action.

This pathway provides reliable evidence that can help us understand water issues and make informed decisions. However, research alone does not lead to change. It is most effective when combined with other actions.

2. Government: Setting the rules and paying for the work

Governments can do things no individual or organization can: make rules that apply to everyone, enforce rules and provide funding at a scale beyond what non-profit organizations can. In Canada, responsibility for freshwater is divided among federal, provincial and territorial, municipal and Indigenous governments, which is part of why coordinated action has historically been difficult.

3. Non-governmental and not-for-profit organizations: Building what is missing

There is a gap between what governments deliver and what communities can do on their own. Non-governmental organizations and not-for-profits are built to work in those gaps by running training programs, restoring habitat, monitoring water quality, providing legal support or delivering services where no one else will. They provide education, making people aware of impacts to water and helping people and decision makers understand the implications of ignoring the mistreatment of water. They often work closely with grassroots and community organizers. They can start faster than a government and last longer than a focused campaign.

This pathway offers speed, focus and the ability to build something specific that nobody else is building. It is limited by the fact that organizations must raise funds for their work, and they cannot make or enforce rules, and so they too work best in collaboration with the other pathways.

4. Grassroots and community action: Changing what people notice and value

The fourth pathway requires no budget, no authority and no institution. It is what people do when they decide that something matters and act on it publicly by walking, singing, speaking, organizing, refusing and teaching their children. It works by changing what a society pays attention to. That change is what eventually moves the other three pathways.

What this pathway offers is that it is available to anyone, immediately, including students. It creates the attention and moral pressure that research findings and policy proposals cannot create for themselves. It too must work with the other pathways, as individuals and community groups alone cannot certify an operator, fund

a treatment plant or enact a regulation. Community and grassroots organizers often form strong connections with non-governmental or non-profit organizations in mobilizing people to care about water.

How the pathways work together

The clearest way to show students how the pathways connect is to trace one problem (choosing one of the four case studies) across all four. Algal blooms are a good example: research at the Experimental Lakes Area identified phosphorus as the cause, governments in Canada and the United States wrote limits and treaty targets in response, organizations and conservation authorities have worked to reduce agricultural runoff that regulation did not reach and community groups and lakeside residents have kept the issue in front of the public for 50 years. Drinking water advisories work the same way: research and monitoring identify the problem, government funding pays for upgraded water treatment facilities, organizations like Water First build local capacity to operate treatment facilities and it is sustained public pressure (much of it from Indigenous youth and Water Walkers) that makes the issue impossible for governments to ignore.

These four pathways return in lessons 8.1 to 8.3. There, students meet them again not as ways of protecting water but as ways of working — the modes through which people act on water through their careers. If you are teaching the career lessons, tell students here that they will see these four categories again and that they will be asked where they might stand in them.

Lesson implementation

Minds on the map

As a review of prior learning and to introduce the lesson, start by asking, "What are some of the ways water is powerful? What are some of the ways it is vulnerable (able to be harmed)? Why does water need protection?"

Focus on the Great Lakes on the map. Take a few minutes to explore the Great Lakes and St. Lawrence River watershed. Have students rope off the Great Lakes and St. Lawrence watershed with coloured rope or string as they explore it, so that the scale of the largest freshwater system in the world is marked out physically on the map. Elicit existing knowledge of the Great Lakes from the map and from student experience. How large are the Great Lakes compared to other geographic elements on the map? What is their significance to freshwater? Explain to students that the Great Lakes is the largest freshwater ecosystem in the world, containing one fifth of the world's freshwater. Discuss some of the threats faced by the Great Lakes: pollution, habitat degradation, invasive species, climate change. Ask students to think about how they might go about protecting the Great Lakes.

Leave the rope in place for the rest of the lesson, and the water protectors, organizations and pathways students go on to research can be placed inside it and beyond it.

Share with students that one Anishinaabe Grandmother, Biidaasige-ba (Josephine Mandamin) was so concerned about what was happening to water that she dreamt about a new type of ceremony that would help people to respect and protect water. She became the first Water Walker, and walked over 25,000 kilometres around the Great Lakes, praying for and connecting with freshwater in Canada and the United States. To introduce students to Josephine's journey and its extent, share a video of Josephine explaining why she walked, read Joanne Robertson's book *The Water Walker* with the class, or play a video of Joanne Robertson reading her

book. Links to videos are included in the additional resources. Josephine's story is also outlined in one of the case studies in Activity 2.

Before moving into the activities, guide students to understand that protecting water is not one kind of work done by one kind of person. Ask, "Who do you think actually protects water?" Collect answers, then introduce the four pathways to action — science and research, government, non-governmental and not-for-profit organizations and grassroots and community action — with one sentence for each. Ask students to predict which pathway Josephine Mandamin was using, and whether her walk could have accomplished what it did on its own.

Water and me

Think of a waterway that you are connected to that needs help and protection. How might you bring people's awareness to it? How could you show people how important it is?

Action

Activity 1: Research Indigenous water protectors

Explain to students that Indigenous Peoples have cared for and honoured the waters on Turtle Island since time immemorial. Indigenous communities in Canada have also faced and continue to face unequal access to safe drinking water. For these reasons, Indigenous individuals and communities across Canada have been at the forefront of efforts to protect and care for water.

Share a couple of examples of individuals (Autumn Peltier) and community/group projects that are protecting water. An interview with Autumn Peltier and a series of Indigenous Water Guardian videos are included in the additional resources.

In small groups, have students research other examples of communities and organizations that are protecting water and use the **Activity card: Indigenous water protectors profile** to record their findings. Some suggested examples are included in the additional resources. Groups can share back with the class what they learned about each organization/community.

Activity 2: Pathways to action

Explain to students that the water protectors they researched in Activity 1 are part of a much larger effort, and that people protect water in four broadly different ways. Introduce the four pathways using the **Activity card: Pathways to action case studies**:

- Science and research — the Experimental Lakes Area and the phosphorus experiments
- Government — the Canada Water Agency
- Non-governmental and not-for-profit organizations — Water First
- Grassroots and community action — the Water Walkers

Divide the class into four groups and give each group one case study card. Groups read their case study and prepare to teach it to the rest of the class, answering:

- What was the problem?
- What did these people actually do?
- What changed as a result?
- What can this pathway do that the others cannot?
- What can it not do on its own?

Have each group present, then place their card on the Giant Floor Map at the location their case study concerns — northwestern Ontario for the Experimental Lakes Area, Winnipeg and the eight priority waterbodies for the Canada Water Agency, the communities Water First partners with and the shorelines of the Great Lakes for the Water Walkers. Seeing all four on the map at once makes the point that protection is happening everywhere and in different forms.

Close the activity by tracing one problem across all four pathways together as a class. Algal blooms or long-term drinking water advisories both work well. Ask students what would have been missing if any one of the four had not been there.

Finally, ask each student to identify which pathway most appeals to them and why. Emphasize that all four are open to them now, not only in adulthood; students can collect data, write to decision makers, volunteer with organizations and organize in their own communities.

Activity 3: Water declaration

After completing Activities 1 and 2, students should have an understanding of what other groups/organizations are doing to protect water and why their work is important.

Watch this video made by the Grand Council Treaty 3 for World Water Day: https://gct3.ca/nibi-declaration-and-video-for-world-water-day and share the declaration they wrote.

Invite students to notice:

- What values are repeated?
- How does the declaration describe water?
- What responsibilities do people have toward water? Who is included in caring for water?
- Why is it important to think about future generations?

Work together as a class to develop a class declaration that expresses their shared relationship with water and their collective responsibilities for protecting it. Rather than creating a list of rules, students will create a statement of values, commitments and hopes that can guide their actions throughout the school year. Suggested prompts for brainstorming include: “Water is...”, “We believe,” “We promise to...” and “We hope future generations...”

Encourage the class to consider actions they can take on a daily basis at school and in the community.

Conclusion and consolidation

Ask students to reflect on what they have learned in this lesson. What connections can they make between what they learned in this lesson and the themes they explored in Lesson 7.1 — Connecting and taking action: Art and stewardship?

What connections can students make between their learning in this lesson and what they observed in past lessons about how watershed boundaries interact with treaty boundaries as well as how environmental impacts are passed from one community to another through shared waterways? If something happens to water in one part of the watershed, could it affect communities in another treaty area? What might this mean for rights, responsibilities and decisions about protecting water?

Students can reflect on their own relationship to protecting water by completing the statements in the **Activity card: My water protection pathway**.

Modifications

For younger students:
Complete Activity 1 together as a class, focusing on the initial examples provided. Look at a few of the suggested organizations together, answering the questions as a class.

Read the four case study cards aloud as a class rather than assigning them to groups, and use a simpler sorting frame, such as people who find things out, people who make the rules, people who build and teach and people who speak up.

For older students:
Presentations about communities and organizations protecting water can take a more structured form, including a written component for assessment. To extend the activity, students can put together written case studies of several organizations, discussing common elements and differences in the work they do.

For older students:
After examining the four case studies, have students research a fifth case study of their own choosing and identify which pathway it belongs to, or argue for a pathway the four categories do not capture. For example, Indigenous governments exercising their own water laws, the courts and industry-led change. Students can also examine how the pathways can conflict through negative examples, such as research that governments decline to act on, regulations that communities regard as inadequate or organizations filling a gap that a government is obliged to fill.

Additional resources

Pathways to action — science and research
IISD Experimental Lakes Area
https://www.iisd.org/ela/

Algal blooms research and the phosphorus story (IISD Experimental Lakes Area)
https://www.iisd.org/ela/researchers/our-research/algal-blooms/

Lake 227, fertilized every year since 1968 (IISD Experimental Lakes Area)
https://www.iisd.org/ela/lakes/lake-227/

Pathways to action — government
Canada Water Agency
https://www.canada.ca/en/canada-water-agency.html

Freshwater Action Plan and the eight priority waterbodies (Canada Water Agency)
https://www.canada.ca/en/canada-water-agency/freshwater-action-plan/freshwater-action-plan-overview.html

Pathways to action — non-governmental and not-for-profit organizations
Water First Education and Training
https://waterfirst.ngo/

Water First Drinking Water Internship
https://waterfirst.ngo/our-work/drinking-water-internship/

Pathways to action — grassroots and community action
Nibi Walk
https://www.nibiwalk.org/

Mother Earth Water Walk
https://www.motherearthwaterwalk.com/

Indigenous water protection resources
Water protection and youth activism with Autumn Peltier (Canadian Geographic)
https://canadiangeographic.ca/articles/water-protection-and-youth-activism-with-autumn-peltier/

Indigenous Water Guardian videos
https://canadaoceanmap.ca/video-gallery/#vid=.water-guardians

More Indigenous-led water protection efforts
Decolonizing Water
https://decolonizingwater.ca/

Native Women's Association of Canada — Water Carriers
https://nwac.ca/academics-policy/policy-development/environment/water-carriers/

Our Living Waters — Indigenous Water Partnership
https://ourlivingwaters.ca/indigenous_water_partnership/

Seal River Watershed Alliance
https://www.sealriverwatershed.ca/

Learning from Lake Sturgeon
https://learningfromlakesturgeon.ca/

Junior Water Walkers
https://sites.google.com/tbcschools.ca/juniorwaterwalkers/home

Water declaration
Nibi Declaration Toolkit
https://decolonizingwater.sites.olt.ubc.ca/files/2020/05/Nibi-Declaration-Toolkit-1.pdf

Other water declarations
Great Lakes Commons — Charter Declaration
https://www.greatlakescommons.org/charter-declaration

Great Lakes Commons — First Principles
https://www.greatlakescommons.org/first-principles

Further reading — books for younger students

We Are Water Protectors by Carole Lindstrom, illustrated by Michaela Goade (2020)

Nibi's Water Song by Sunshine Tenasco (2019)

Further reading — articles for older students

Water Protectors: Indigenous-Led Initiatives Safeguarding Canada's Waterways in a Changing Climate (Indigenous Climate Hub)
https://indigenousclimatehub.ca/2024/06/water-protectors-indigenous-led-initiatives-safeguarding-canadas-waterways-in-a-changing-climate/

Inside the ambitious Indigenous-led plan to protect northwestern Ontario's breathing lands (Canadian Geographic)
https://canadiangeographic.ca/articles/inside-the-ambitious-indigenous-led-plan-to-protect-northwestern-ontarios-breathing-lands/

How four Manitoba First Nations are protecting one of the world's largest remaining wild watersheds (Canadian Geographic)
https://canadiangeographic.ca/articles/how-four-manitoba-first-nations-are-protecting-one-of-the-worlds-remaining-wild-watersheds/

"It's at the very core of everything": The significance of Canada's wild rivers (Canadian Geographic)
https://canadiangeographic.ca/articles/its-at-the-very-core-of-everything-the-significance-of-canadas-wild-rivers/

A prayer not a protest (Canadian Geographic)
https://canadiangeographic.ca/articles/a-prayer-not-a-protest/
Métis Elder Marjorie Beaucage and her Water Walk along the Saskatchewan River.

8

Freshwater careers

The final three lessons in this protecting water theme asks students to place themselves in the story. Having learned how water moves, how it is used, how it has been harmed and how it is defended, they now consider the working lives that intersect with it. This includes education, possible career paths connected to freshwater and also ones that do not look like water jobs at all but which still hold powerful opportunities to act.

Lesson 8.1 introduces freshwater careers through the Working for Water video profiles, from hydrologists and water system operators to Guardians, planners and skilled tradespeople, and has students assemble the team a real freshwater challenge would require. Lesson 8.2 shifts from working within an organization to starting something: students identify a freshwater problem, design a responsible enterprise around it and test their idea against a set of questions that includes the most important one, including whether an enterprise is the right pathway at all, or whether the problem calls for research, a public rule, an existing organization or community-led action instead. Lesson 8.3 closes the series by extending responsibility beyond water-focused work entirely, asking how any career carries obligations toward freshwater and inviting each student to map a career pathway of their own. Across all three lessons, students revisit the four pathways to action introduced in Lesson 7.2 and use them to place any career — including careers that have nothing obviously to do with water — inside the work of protecting it.

The three final lessons can be used together as a culminating sequence or drawn on individually. Used in order, they move students from admiring the people who do this work to imagining themselves among them.

Additional resources are available on the *Freshwater: Lifeblood of the Land* homepage. Scan the QR code to explore them.

Lessons in this section:

- Lesson 8.1 — Freshwater careers: Working for water
- Lesson 8.2 — Freshwater careers: From challenge to opportunity
- Lesson 8.3 — Freshwater careers: Our responsibility for tomorrow

LESSON 8.1

Freshwater careers: Working for water

Overview

Some professionals work directly with freshwater as scientists, engineers, water-system operators, Guardians, planners, skilled tradespeople or conservation professionals. Others influence freshwater through the decisions they make in other fields. *Freshwater: Lifeblood of the Land* includes a QR code linking to Working for Water, a careers landing page featuring short video profiles of professionals whose work connects to freshwater. Students use these profiles to investigate career pathways, workplace responsibilities, transferable skills and the ways professionals collaborate to address complex freshwater issues.

- What career opportunities and pathways are connected to freshwater?
- What knowledge, skills, experiences and personal qualities are needed in freshwater-related work?
- How do professionals from different fields collaborate to address freshwater challenges?



Indigenous and western scientists are working together to better understand how to protect and care for water. Do you know anyone in your community who is working to protect water?

Engineers, water researchers and conservationists contribute to economic growth and stability through their work for water. What features of Canada's land and water do you predict will hold future opportunities?

Governments pass and enforce the laws that can protect water or make it vulnerable. What significant places and bodies of water would benefit most from more protection?



Some of the most promising initiatives to protect water are led by young people. What are three ways your community could help youth connect to water and water protection?



Geoscientists study freshwater that makes its way into the ground and back to the surface. They want to know how much we have, where we can find it and how it moves. Why is it important to understand groundwater?

Time required
Two 60- to 90-minute periods

Grades
Best suited for Grades 7 to 10 (modifications provided for younger and older students)

Learning objectives
By completing this activity, students will:

- Explore a range of careers and educational pathways connected directly or indirectly to freshwater
- Identify the transferable skills, technical knowledge, personal qualities and experiences used in different professions
- Explain how professionals from different fields collaborate to address freshwater challenges
- Connect freshwater careers to environmental, social, cultural, economic and technological issues examined elsewhere in the lesson series

Materials and resources
- Freshwater Giant Floor Map
- Devices capable of scanning the Working for Water QR code
- Headphones, if available
- Working for Water video profiles
- **Activity card: Career profile organizer**
- **Activity card: Freshwater challenges**
- **Activity card: Freshwater career team worksheet**
- Sticky notes or index cards
- Markers and yarn
- Optional: devices for additional career and pathway research

Background for teacher

The three career lessons can be used independently or as a career-focused culmination of the Freshwater Giant Floor Map lesson series.

Preview the Working for Water landing page and video profiles before the lesson. Select or recommend profiles that reflect a range of career sectors, educational and training pathways, technical and transferable skills, regions and working environments, identities and lived experiences, community-based and professional knowledge.

Avoid presenting the lesson as a recruitment exercise for a limited set of environmental careers. Its broader purpose is to help students recognize how freshwater intersects with many forms of work and how professional responsibility can be exercised across sectors.

Where profiles feature Indigenous Guardians, Elders, Knowledge Carriers or community-led stewardship, describe each role according to the Nation, community, organization and protocols represented. Do not treat these roles as interchangeable career titles or reduce community authority and cultural responsibility to conventional employment categories.

Connecting careers to the four pathways to action

Lesson 7.2 introduced four pathways to protecting water. The same four categories describe how people act on water through their working lives, and saying so directly gives students a way to place any career, including careers with no obvious connection to water, inside the work of protecting it.

Each pathway is defined by where a person's leverage comes from:

- **Science and research:** scientists, Knowledge Carriers, technicians, monitoring staff, Guardians, engineers doing assessment work and data analysts act by changing what is known.
- **Government:** elected leaders, policymakers, regulators, municipal water and public works staff, planners, public health staff, law enforcement and teachers in publicly funded schools act through government bodies. They change what is required, what is permitted, what gets paid for and what gets taught.
- **Organizations and enterprises:** staff of not-for-profit organizations act through organizations built to protect water. So do employees of companies, industries, utilities and consultancies whose organizations were built for something else entirely. Both change water outcomes by changing what a business or an organization does, including what it buys, builds, discharges, measures, discloses and treats as acceptable.
- **Grassroots and community:** entrepreneurs can start businesses that support water or integrate water protection into their plans; individuals can ask questions of their employers, their governments, or their communities and act from where they stand without needing institutional authority first; communities can engage in science and research by monitoring their local waterways and sharing results with public, government and business.

One difference from Lesson 7.2 is worth naming for students. There, the third pathway is illustrated by an organization whose purpose is protecting water. In this lesson it widens to include any organization, because most students will spend their working lives in organizations that are not explicitly about water at all, but still offer significant opportunities for freshwater action. A purchasing manager at a food processing plant, a site supervisor deciding where runoff goes or a fleet manager choosing a wash facility affects freshwater more than many people whose job titles contain the word water.

Lesson implementation

Minds on the map

Begin by letting students explore the map freely for a few minutes. Then ask each student to stand somewhere that interests them — a city, a coastline, a river, a farming region, an area of ice — and to name one kind of work that would be done with or near water in that place. Collect answers from around the map before moving to the following questions:

- What kinds of work can we connect to different places on the map and features of the land and water?
- Which of these careers are responsible for understanding, supplying, using, managing or protecting water?
- Which of these careers might affect freshwater without describing themselves as water careers?

Record students' initial ideas. Encourage them to think beyond environmental science and include careers in skilled trades, infrastructure, health, planning, law, business, technology, communications, education, government and community leadership.

Invite students to revisit freshwater systems, communities or activities that they have encountered on the map. Draw brief connections to other lesson topics:

- Who helps communities understand watersheds, groundwater or glacier-fed rivers?
- Who designs and operates drinking-water, wastewater and stormwater systems?
- Who makes decisions about water use in agriculture, industry, energy or urban development?
- Who responds when human activity damages a water system?
- Who helps interpret water rights, treaties, laws or public responsibilities?
- Who brings communities and professions together to protect connected waterways?

Throughout the lesson, encourage students to make these connections by asking:

- What relationship with freshwater is most relevant to this career?
- What information from *The Freshwater: Lifeblood of the Land* Giant Floor Map and the other lessons could help someone in this career?
- What responsibilities would this professional carry when making decisions about freshwater?

Water and me

Think about your own community and all the people who you know. Which jobs in your community are connected to water (understanding it, protecting it, managing it)? Who do you know whose job is related to water? What would you like to ask them about their job?

Action

Activity 1: Working for Water career profile

Direct students to the Working for Water QR code. Explain that the landing page introduces professionals whose careers connect to these questions.

Ask students to consider as they watch:

- What does the professional do?
- What pathway brought the person into the field?
- What skills and personal qualities does the work require?
- What responsibilities does the person carry toward water and communities?

Place students in pairs or small groups. Have each group scan the QR code and select or be assigned one Working for Water video profile.

Students complete the **Activity card: Career profile organizer.**

Ask each group to locate a place on the map where this kind of work might occur. The place may be the location shown in the video or another region in which the profession would be relevant.

Groups briefly introduce their profession, explain their map placement and identify the strongest connection to another lesson topic.

During the presentations, invite students to note recurring employability and transferable skills, such as communication, collaboration, critical thinking, problem solving, data analysis, technical competence, creativity, adaptability, leadership, cultural awareness and ethical decision making.

Ask:

- Which skills appear in several different careers?
- Which skills could you begin developing now?
- How might the same profession involve different responsibilities in different regions or communities?

Then connect the profiles back to Lesson 7.2. Ask:

- Which of the four pathways to action does this professional mainly work through — science and research, government, organizations or grassroots and community action?
- Does the work use a second pathway as well?
- What can this professional do that someone on another pathway could not?

Students will often disagree about where a profession belongs, particularly for roles that sit inside a government body but produce evidence, or roles inside an organization that depend on personal initiative. The disagreement is productive: it shows that the categories describe how a person acts, not what their employer is called.

Activity 2: Building a freshwater team

Provide each group with one scenario from the **Activity card: Freshwater challenges**.

Ask each group to locate a possible setting for its challenge on the Freshwater Giant Floor Map.

Students identify three or four professionals or community roles that should be involved. At least one must come from the Working for Water video profiles.

Groups prepare a concise plan using the **Activity card: Freshwater career team worksheet**.

Groups present their plan from the relevant location on the map.

After each presentation, ask:

- Why does this challenge require more than one profession?
- Which transferable skills would team members need to work together effectively?
- Whose knowledge, rights or experience must be included?
- What could happen if the team considered only economic, technical or environmental concerns (instead of considering all of these factors together)?
- How might this situation create new or changing career opportunities?

Conclusion and consolidation

Conclude by explaining that a career pathway is rarely a single fixed route. People may enter freshwater work through university, college, apprenticeship, technical training, public service, entrepreneurship, community leadership, land-based learning or experience gained across several occupations.

Ask students to reflect on what they have learned about freshwater careers so far. In the next freshwater career lesson, students will consider how to apply freshwater responsibility to any career. They will also complete personal reflections on their own potential freshwater career pathway.

Add that a career pathway and a pathway to action are two different things. The first is how a person gets into the work. The second is how they act once they are in it. A student may change their career pathway several times over a working life and still carry the same pathway to action throughout.

Modifications

For younger students:

- To simplify the activities in this lesson
- Preview a selection of Working for Water videos and assign each group a profile or work through several selected profiles together as a class.
- Work through all or some of the **Activity card: Freshwater challenges** together as a class.
- Partially complete the **Activity card: Career profile organizer** with headings, prompts and key vocabulary.
- Allow students to respond through a combination of notes, audio recording, discussion or visual representation.
- Provide examples of transferable skills and pathway options for students to select and explain.

For older students:

- Opportunities for further inquiry:
- Have students compare two professionals with different pathways who contribute to the same freshwater issue.
- Ask students to investigate current education, apprenticeship, certification or training requirements for a selected career.
- Have students identify relevant secondary-school courses, experiential learning, cooperative education, Specialist High Skills Major (SHSM) opportunities, volunteer work or community programs.
- Ask students to conduct an informational interview with a professional whose work affects freshwater.

Additional resources

Marine Month in Canada (Canadian Geographic Education)
https://cangeoeducation.ca/en/marine-month/

A free educational program introducing students in Grades 5 to 12 to careers connected to water, including engineering, environmental science, technology, logistics, tourism and the skilled trades.

Work for Water
https://www.workforwater.org/

Explore careers in the water sector and learn about different roles and career pathways.

World Oceans Day: Building a more sustainable ocean future — one worker at a time (Canadian Geographic)
https://canadiangeographic.ca/articles/world-oceans-day-building-a-more-sustainable-ocean-future-one-worker-at-a-time/

Part three of Canada's Ocean Supercluster, a six-part series. Explores careers in Canada's emerging blue economy and initiatives encouraging young people and Indigenous Peoples to pursue careers in marine- and water-related fields.

Younger students:
My Water Superhero (The Water Literacy Project)
https://thewaterliteracyproject.org/en/action-packs/k6/action-pack-4

An action pack for younger students that explores careers in freshwater through a creative activity in which students invent a water-protecting superhero and consider the real-life careers connected to that role.

LESSON 8.2

Freshwater careers: From challenge to opportunity

Overview

Entrepreneurs identify needs or problems and bring together ideas, skills, people and resources to respond to them through business. Freshwater challenges can also create opportunities for entrepreneurs to develop new products, services, technologies, organizations and ways of working. Freshwater entrepreneurship must consider more than whether a product or service can be sold; it must also consider how the products and services we provide affect the health of freshwater for future generations.

- How can freshwater challenges create opportunities for entrepreneurship?
- How do entrepreneurs turn a problem or unmet need into a product, service or other solution?
- What makes a freshwater enterprise useful, viable and responsible?
- How can entrepreneurship contribute to freshwater health without treating water simply as a commodity?

Time required

Two 60- to 90-minute periods

Grades

Best suited for Grades 7 to 10 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Recognize entrepreneurship as one possible pathway for responding to freshwater challenges
- Identify freshwater problems, needs or opportunities that could be addressed through a product, service, organization or new way of working
- Consider the environmental, social, cultural, technical and economic factors that influence whether a freshwater enterprise is responsible and viable
- Explain how an entrepreneurial response could contribute to freshwater health and community well-being

Materials and resources

- Freshwater Giant Floor Map
- **Activity card: Freshwater challenges** from Lesson 8.1
- **Activity card: Freshwater enterprise plan**
- Sticky notes or index cards
- Markers and yarn
- Optional: devices for additional research

Background for teacher

This lesson extends the career exploration in Lesson 8.1 by introducing entrepreneurship as another pathway through which people can work with and for freshwater. Entrepreneurship can include establishing a conventional business, but it can also involve creating a social enterprise, cooperative, community initiative, independent service, new technology or other organization designed to meet an identified need.

The emphasis of the lesson should remain on problem solving rather than simply on making or selling a product. Encourage students to begin with a freshwater need or challenge and then determine what type of business response would be appropriate.

Throughout the lesson, encourage students to consider the difference between creating economic value from an idea and treating freshwater itself primarily as something to be bought, sold or exploited. Students have encountered freshwater throughout the lesson series as a source of life, part of connected ecosystems and watersheds, a human necessity and a focus of rights and responsibilities. Their entrepreneurial ideas should carry these understandings forward.

Where an idea would connect with Indigenous communities, students should recognize that consultation, rights, jurisdiction, community knowledge and relationships to water cannot be reduced to a market or customer consideration. The central question is not simply whether an idea could work, but whether it should work, for whom and under what conditions.

Lesson implementation

Minds on the map

Gather students around the Freshwater Giant Floor Map. Revisit some of the freshwater challenges explored throughout the lesson series. Ask students to identify places where people might encounter problems or changing needs connected to:

- Drinking water and water treatment
- Wastewater and stormwater
- Flooding and drought
- Agricultural or industrial water use
- Pollution and water quality
- Groundwater
- Habitat and ecosystem health
- Climate change
- Monitoring and scientific information
- Public education and communication
- Access to safe and reliable freshwater

Place sticky notes on several locations where students identify a freshwater need or challenge.

Explain that challenges such as these require scientists, engineers, operators, tradespeople, Guardians, planners, policymakers, educators and many other professionals. They can also create opportunities for entrepreneurs.
Ask students what they think an entrepreneur does. Develop a working definition with the class. An entrepreneur identifies an opportunity or unmet need and organizes people, ideas, skills and resources to develop a response.

Ask students to consider some everyday examples. A person might notice that something takes too much time, wastes resources, costs too much, causes harm or is difficult for people to access. An entrepreneurial response begins by asking:

- What is the problem or unmet need?
- Who experiences it?
- What might make the situation better?
- What could we create or do differently?
- Return to the freshwater challenges marked on the map. Ask:

Which of these challenges might create an opportunity for a new product, service, technology, organization or way of working?

Water and me

Think about the water you use in your own daily life and community. Is there anything about the way water is accessed, used, monitored, protected or cared for that you think could work better?

If you could invent one product, service or new way of doing something to help water or the people who depend on it, what would you create?

Action

Activity 1: Finding a freshwater opportunity

Place students in pairs or small groups.

Give each group a scenario from the **Activity card: Freshwater challenges** from Lesson 8.1 or allow groups to identify another freshwater challenge from the Giant Floor Map or the broader lesson series.

Ask groups to locate a place on the map where their challenge could occur. Students should first investigate the problem rather than immediately proposing a solution.

Have groups discuss:

- What exactly is happening?
- Who or what is affected by the problem?
- What do the people, communities, ecosystems or water systems involved need?
- What currently happens in response to this problem?

- What appears to be missing, difficult, inefficient, inaccessible, damaging or expensive?
- Who would need to be involved in developing a better response?

Ask students to write a one-sentence opportunity statement:
People/communities/water systems need a better way to _____ because _____.

Groups then brainstorm as many possible responses as they can. Encourage a wide range of ideas rather than asking students to settle immediately on the first solution proposed.

Possible types of responses might include:
- A physical product or piece of equipment
- A digital tool or technology
- A monitoring or testing service
- A repair, maintenance or skilled-trades service
- An education or communication service
- A conservation or restoration service
- A design or planning service
- A community-based organization
- A cooperative or social enterprise
- A new way of delivering an existing service

Ask groups to select one idea to develop further.

Before moving to Activity 2, have each group test its idea with five questions:
1. Does it respond to a real freshwater need?

2. Who would use, pay for, support or benefit from it?

3. Could it unintentionally create another freshwater or community problem?

4. What would make this idea meaningfully different or better than what already exists?

5. Is an enterprise the right pathway for this problem? If a research answer, a public rule, sustained public funding, an existing organization or community-led action would work better, say which and why. Identifying the right pathway is a strong finding, not a failure to complete the task.

Activity 2: Build a freshwater enterprise

Provide each group with the **Activity card: Freshwater enterprise plan**.

Explain that an idea alone is not yet an enterprise. Entrepreneurs must determine how an idea could actually work. This means thinking about users, skills, partners, costs, resources, impacts and responsibilities.

Groups develop a concise plan for their enterprise.

As students work, circulate and encourage them to make connections to the Working for Water profiles explored in Lesson 8.1. Ask:

- What professional skills would be needed to develop this idea?
- Which parts of the work could members of your team do themselves?
- Which professionals, tradespeople, organizations, communities or Knowledge Carriers would you need to work with?
- What would the enterprise need in order to operate?
- Who would use or benefit from the product or service?
- Who might pay for or support it?
- How would you know whether it was actually helping?

Students should also identify possible consequences of their enterprise. Ask them to consider:

- Could the idea reduce water use, pollution, waste or environmental damage?
- Could making or operating the product or service itself require significant water, energy, materials or land?
- Could some people benefit while others experience costs or risks?
- Whose rights, knowledge, authority or experience would need to be included?
- What would the enterprise need to do to remain accountable to freshwater and affected communities?

Groups prepare a short pitch explaining their enterprise. The goal of the pitch is not simply to persuade an audience to buy the idea. Students must demonstrate that they understand the freshwater problem and can explain why their response would be useful, workable and responsible.

Groups present from the location on the Giant Floor Map where they have situated their enterprise.

Each pitch should answer:

- What freshwater problem or opportunity have you identified?
- What is your product, service, organization or solution?
- Who would use or benefit from it?
- What skills, people and resources would you need?
- How could the enterprise sustain itself?
- How would it contribute to freshwater health or community well-being?
- What is one possible risk or unintended consequence?
- How would you remain accountable to freshwater and affected communities?

After each presentation, invite classmates to respond as potential users, community members, partners or freshwater professionals rather than only as potential customers.

They can ask:

- What evidence would convince you that this idea is needed?
- What might make the idea difficult to put into practice?
- Who else should be involved?
- What might the group need to change?
- How could the idea have a greater positive impact on freshwater?

Conclusion and consolidation

Return to the question: What makes a freshwater enterprise successful?

Students may initially identify factors such as customers, funding, useful products, good ideas or profit. Expand the discussion to include effectiveness, trust, collaboration, environmental impact, community benefit, responsibility and long-term sustainability.

Ask students to consider how entrepreneurship differs from some of the career pathways examined in Lesson 8.1. Entrepreneurs may need knowledge from several different fields and may create their own role rather than applying for an existing job. At the same time, entrepreneurs rarely work alone. Their ideas depend on the expertise, labour, knowledge, support and trust of other people and communities.

Conclude by asking students to complete the statement:
A freshwater challenge can become an entrepreneurial opportunity when...

Then add a second statement:
A freshwater opportunity should only be pursued if...

Use students' responses to lead into the next career lesson, which asks how responsibility for freshwater can become part of any career or form of work.

Modifications

For younger students:

- Complete the first activity together using one familiar freshwater problem before asking groups to develop their own ideas.
- Provide students with a small selection of clearly defined freshwater challenges and possible categories of solutions.
- Simplify the **Activity card: Freshwater enterprise plan** to four questions: What is the problem? What is our idea? Who will it help? How will it help water?
- Allow groups to represent their idea through a drawing, model, poster or short oral presentation.
- Focus assessment on identifying a genuine need and explaining how the idea would help rather than on financial or operational details.

For older students:

- Ask students to research whether products, services, businesses, organizations or technologies already address the problem they have identified. How would their proposed response differ?
- Have students identify potential start-up and operating costs, sources of revenue or financial support, customers or users, partners, competitors and barriers to implementation.
- Ask groups to identify measurable indicators that could determine whether their enterprise produces the environmental or community outcomes it promises.
- Extend the pitch into a more formal entrepreneurial proposal or business model.
- Invite local entrepreneurs, water professionals, economic-development organizations, community leaders or social-enterprise representatives to provide feedback on student proposals.
- Have students investigate an entrepreneur or enterprise whose work connects to freshwater and examine both the opportunity it identified and the environmental and social responsibilities associated with its work.

Additional resources

Farming a changing sea (Canadian Geographic)
https://canadiangeographic.ca/articles/farming-a-changing-sea/
Working toward sustainable aquaculture entrepreneurship in Atlantic Canada.

Kelp: the sustainable superfood coming soon to a plate near you (Canadian Geographic)
https://canadiangeographic.ca/articles/kelp-the-sustainable-superfood-coming-soon-to-a-plate-near-you/
Sustainable commercial kelp farming on Canada's East and West coasts.

The Canadian innovation that pulls water out of thin air (Canadian Geographic)
https://canadiangeographic.ca/articles/the-canadian-innovation-that-pulls-drinking-water-out-of-thin-air/

University of Alberta researcher developing simpler way to test water quality (Canadian Geographic)
https://canadiangeographic.ca/articles/university-of-alberta-researcher-developing-simpler-way-to-test-water-quality/

The puzzle of plastic: turning to science to solve our recycling dilemma (Canadian Geographic)
https://canadiangeographic.ca/articles/the-puzzle-of-plastic/
An environmental entrepreneurship case study reflecting on the role of business in responding to environmental challenges.

LESSON 8.3

Freshwater careers: Our responsibility for tomorrow

Overview

Freshwater is an inseparable part of communities, ecosystems, cultures, public health and economic activity. In this lesson, students consider not only whether they might pursue a water-focused career, but also how any career can carry responsibilities toward freshwater. Students connect their interests, strengths, values and developing skills to possible future pathways and identify how they could contribute to freshwater health through their work and decisions.

- How can people make freshwater responsibility part of almost any career?
- How can workplace decisions contribute to or undermine freshwater health?
- How might our interests, strengths, values and goals connect to a freshwater future?

Time required

Two 45-60 minute periods

Grades

Best suited for Grades 7 to 10 (modifications provided for younger and older students)

Learning objectives

By completing this activity, students will:

- Recognize that responsibility for freshwater can be part of almost any career
- Evaluate how workplace decisions can contribute to or undermine freshwater health
- Connect their own interests, strengths, values and goals to possible career pathways and freshwater responsibilities

Materials and resources

- **Activity card: My freshwater pathway**
- Optional: devices for additional career and pathway research

Lesson implementation

Minds on the map

Return with students to the Freshwater Giant Floor Map. From the first career lesson, review places on the map and features of the land and water that students connected to different kinds of work. Review students' initial answers to the question:

- Which of these careers might affect freshwater without describing themselves as water careers?

Expand the discussion of freshwater responsibility as part of any career with the following prompts:

- What are some questions people in any career can ask when they consider how their job affects freshwater health?
- What are examples of decisions that can support freshwater health in any career?
- What are examples of decisions that can harm freshwater in any career?
- What are some long-term consequences people in any career should consider to support a healthy freshwater future?

Water and me

What's one job you've imagined yourself doing in the future? How could you help protect water in this job, even if it's not directly connected to water?

Action

Activity 1: Freshwater responsibility in any career

Explain that freshwater career responsibility extends beyond jobs centred directly on water. Ask each student to select a career or field that interests them. It may come from Working for Water or from another area they are considering.

This activity can be implemented on the map. In pairs, students name a career that interests them, then walk the map to find two different places where that career would exist, and explain what makes each place different for someone doing that work. A civil engineer, a teacher, a lawyer and a truck driver all exist in a Prairie farming town and in a coastal city, but not in the same relationship to water.

Students complete the statement:
A person working in _____ could contribute to freshwater health by _____.

They then identify:

- One workplace decision that could support freshwater health
- One workplace practice that could harm freshwater
- One skill or value that would help the person act responsibly

Invite several students to share their examples.

Reinforce connections to the other lessons. A professional might influence:

- How water moves through a developed landscape
- How drinking water or wastewater is managed
- How water is allocated among competing needs
- How pollution and climate impacts are reduced
- How water rights and responsibilities are respected
- How communities collaborate across a watershed
- How writing or art is used to promote or protect water

As another option, turn these into a short map challenge. Ask each student to choose one statement, find a place on the Giant Floor Map where it would matter especially, and explain why that place. Students place a marker as they answer, so that the class finishes with the whole list distributed across the country.

Then return to the four pathways to action from Lesson 7.2 and ask each student to place the career they chose on one of them: science and research, government, non-governmental and not-for-profit organizations and grassroots and community action. Most students will find that their career sits mainly on one pathway and touches at least one other.

Ask:

- Which pathway does the career you chose mainly act through?
- What does that pathway let you do that the others do not?
- What could you not do from there, and who would you need to work with?
- Does the career you chose have a pathway available to it that people in that field rarely use?

The last question is the one worth lingering on. Most careers carry more freshwater leverage than the people in them realize, and it usually sits on the organization pathway. The decisions an employer makes about what it buys, builds, discharges and measures are made by employees, and they are more often changed by someone asking a question at the right moment than by a new regulation.

Ask:

What changes when freshwater responsibility becomes part of professional identity rather than an optional environmental activity?

Activity 2: My freshwater pathway

Ask students to select a location, community, watershed or body of water on the map that interests them.

Students complete the **Activity card: My freshwater pathway**.

Invite students to place their reflections near their chosen map locations or discuss them with a partner.

Once all the reflections are placed, walk the map together as a class. Ask students to look for patterns rather than reading every reflection. Where are the reflections concentrated, and why there? Which careers appear more than once? Which freshwater issues drew the most students? Are there large parts of the map with nothing on them, and what would it mean to work for water in those places?

Conclusion and consolidation

Conclude the three career-focused lessons by inviting students to reflect on or discuss the following statement: Freshwater responsibility does not depend on choosing a specifically environmental career. It can be expressed through the standards people follow, the questions they ask, the people they include and the long-term consequences they consider in their work.

Encourage students to examine both opportunity and responsibility. A profession may contribute to freshwater health, but it may also participate in decisions that increase water use, pollution, habitat loss, inequity or climate risk.

The central career-learning question is not only, "What work could I do?" It is also, "How could I carry out that work responsibly?"

Close the pathways thread as well. Ask students which of the four pathways to action they can already imagine themselves using, and remind them that all four are open to them now rather than only in adulthood: they can gather evidence, write to decision makers, work with organizations and act on their own initiative. The career comes later; the pathway is available immediately.

As a class, complete the statement:

- In our future, we can work for water by...
- If you can, complete this statement standing on the map, with all the reflections in place. Ask the class what the map now shows: how many different places, careers and ways of contributing to freshwater health are represented, and how much of the country the class has covered between them. This is the last time students will stand on the map in this series, and the pattern they have made on it is the series' closing image.

Modifications

For younger students:

- Complete the first activity together as a class, working through several examples, or guide the class through two to three examples, then have students work through two to three more as paired shares.
- Simplify the **Activity card: My freshwater pathway** activity by focusing broadly on interests, skills and connections to issues that students may want to address in the future. Work through the activity as a class with examples from students or ask students to discuss it in pairs or small groups.

For older students:

- Ask students to investigate current education, apprenticeship, certification or training requirements for a selected career.
- Have students identify relevant secondary-school courses, experiential learning, cooperative education, Specialist High Skills Major (SHSM) opportunities, volunteer work or community programs.
- Ask students to conduct an informational interview with a professional in a field of interest. For this interview, encourage students to look beyond jobs centred directly on water to make broader connections to freshwater responsibility in any career. Students can ask, "How can this career contribute to freshwater health? How can this career work for water?"

Additional resources

AquaHacking Challenge (AquaAction)
https://aquaaction.org/en/our-programs/aquahacking-challenge

A program that supports young innovators in developing solutions to freshwater challenges.

Making swimmable cities in the Great Lakes watershed (Canadian Geographic)
https://canadiangeographic.ca/articles/making-swimmable-cities-in-the-great-lakes-watershed/

Explores how individuals, community groups and governments are working together to reconnect people with urban waterways and encourage shared responsibility for protecting them.

Ocean Bridge Diaries: Vanessa Fladmark (Canadian Geographic)
https://canadiangeographic.ca/articles/ocean-bridge-diaries-vanessa-fladmark/

A first-person account of a young Indigenous participant in Ocean Wise's Ocean Bridge program and her experience taking action to protect the ocean.



Appendix

Border prompt questions and teacher notes

The nature of water



Water is life

In what ways do you interact with water? How do you demonstrate respect for the water in your life? What could your community or city do better to respect water?

TEACHER NOTE:
Water use is discussed in greater detail in **The water around us**: Water in our daily life and **Water at work for us**: How else do we use water? Students consider how they can demonstrate respect for water in **Water is life**: Relationships and rights.

Human beings have rights. Corporations that use water have rights. What kinds of rights might rivers and lakes need for protection?

TEACHER NOTE:
Water is life: Relationships and rights explores how the framework of rights can be applied to water. In this lesson, students create a declaration of the rights of water.

How do you treat people who are related to you and who care for you? How would your relationship to water change if water was part of your family?

TEACHER NOTE:
In **Water is life:** Relationships and rights, students consider their relationship with water within the context of family and other relationships of care.

Many cultures believe water is sacred. Where do you see water in your culture's practices, traditions and ceremonies?

TEACHER NOTE:
Water is life: Water's role in creation explores the cultural and spiritual importance of water as well as its significance to life and ecosystems. In this lesson, students consider the role of water in their own cultural practices, traditions and ceremonies.

Water is a significant part of many creation stories around the world. What role does water play in a creation story you know? What might that tell us about water?

TEACHER NOTE:
In Water is life: Water's role in creation students explore the role of water in creation stories.



Journey of water

The Earth's water is in constant motion and change. Water circulates between oceans, the atmosphere, ice, lakes, rivers and groundwater. Where do you think your drinking water has travelled from?

TEACHER NOTE:

Journey of water: The water cycle explores the journey of water through the stages of the water cycle.

Discuss the question with students with reference to the information provided in the lesson and activity. Have students imagine possible paths their drinking water might have taken through the stages of the water cycle to reach their water source (for example, starting in the ocean, rising as water vapour to form clouds, travelling over land, then falling as precipitation into a local body of water or into the ground around them, where it seeped down into groundwater.)

The final leg of the journey, to their tap or local drinking water source, is discussed in **The water around us**: Water in our daily life.

Wherever you are in Canada, freshwater eventually flows through rivers toward an ocean. Where does the water in your community flow?

TEACHER NOTE:

The Giant Floor Map uses a different colour to represent each of Canada's five ocean watersheds (see map legend). Find your community on the map. Follow the flow lines of the water in your community as they join a major river and then flow into the ocean.

Journey of water: Watersheds and drainage basins discusses Canada's five ocean watersheds and explores the roles and functions of a watershed.

Most of Earth's freshwater is stored in glaciers and ice caps. Where are the closest glaciers or ice caps to your community?

TEACHER NOTE:

Glaciers and ice caps are included in the map legend as "Areas of permanent snow and ice" and are coloured in white on the map. Find your community on the map. Then locate the closest area of permanent snow and ice. In Canada, these areas are found in Western Canada and in the Arctic.

Journey of water: Glaciers, ice caps and meltwater explores the role and significance of glaciers in storing freshwater.



Groundwater

In the summer, groundwater is cooler than surface water (water in lakes and rivers). Can you think of other ways groundwater might differ from surface water?

TEACHER NOTE:

Groundwater is naturally filtered through soil and rock and, unlike surface water, generally does not need to be purified to remove harmful bacteria, viruses and pollutants. This is why people will drink or collect water directly from a trusted spring. (Groundwater is still vulnerable to contamination, however, and well water must be regularly tested.)

Groundwater dissolves minerals from the rocks and soil it comes into contact with. This gives it a taste that many people enjoy.

Journey of water: Groundwater and surface water explores the role of groundwater in storing and supplying freshwater.

Living with water



Water around us

On average, Canadians use over 200 litres of water per person every day. How much water do you think you use on a typical day? What activities in your home do you think use the most water?

TEACHER NOTE:

Some resources for calculating water usage are listed at the end of **The water around us**: Water in our daily life.

In the average North American household, flushing the toilet uses the largest percentage of household water (24 per cent), followed closely by showering (20 per cent) and running faucets (19 per cent).

Find the body of water closest to your community. Where do you think your drinking water comes from? Is it pumped from a lake or river, or does it come from a well or aquifer underground?

TEACHER NOTE:

The water around us: Water in our daily life discusses household and municipal drinking water sources and drinking water treatment.



In cities, engineers build underground storm sewers to collect rainwater and snowmelt to prevent flooding. They also build sanitary sewers to collect wastewater from our homes and businesses. How are stormwater and wastewater similar? How are they different?

TEACHER NOTE:

Stormwater and wastewater are two kinds of polluted water. Dirty water from drains and toilets is called wastewater, and dirty water from surface runoff on roads and other paved surfaces is called stormwater. **The water around us**: Stormwater versus wastewater discusses the differences between stormwater and wastewater and their two different pathways before they return to nature.

Humans have learned how to treat polluted water to protect human health. Do you have a wastewater treatment facility in your community? We have learned a great deal from nature: can you think of ways nature purifies water?

TEACHER NOTE:

The water around us: Water in our daily life and **The water around us**: Stormwater versus wastewater discuss how polluted water is treated to protect human health.

Nature purifies water through:

- Physically filtering it through soil and rock to remove large contaminant particles (like a strainer)
- Neutralizing contaminants through chemical reactions with minerals in the soil
- Breaking down harmful bacteria and other matter through microbes and microorganisms in the soil.

Humans have learned from these natural processes how to effectively treat water.

Water at work for us

Growing a kilogram of wheat can use over 1,000 litres of water. Where on the map do you find farms? What water systems do you think they are connected to?

TEACHER NOTE:

Agricultural land is coloured yellow on the map. In Canada, the highest concentration of farms can be found in the Prairie provinces of Alberta, Saskatchewan and Manitoba. Other regions of farmland include southwestern Ontario and parts of the Maritimes.

Farmland in the Prairie provinces relies on runoff from heavy precipitation and melting glaciers in the Rocky Mountains, which flows east through major rivers in Alberta, Saskatchewan and Manitoba toward Hudson Bay.

Water at work for us: How else do we use water? explores the many sectors in Canada that rely on freshwater.

Hydroelectricity requires huge amounts of water to generate power by moving water through turbines. Where on the map do you think significant hydropower might be located?

TEACHER NOTE:

Hydropower is typically generated by damming big rivers in order to move water from high elevation to lower elevation to create potential energy. Quebec provides more than half of Canada's hydroelectricity. Significant hydropower is also found in British Columbia, Manitoba, Ontario and Newfoundland and Labrador.

Water at work for us: How should we allocate water? explores the many sectors in Canada that rely on freshwater.

Environmental and climate impacts



Environmental and climate impacts

Canada's water sources face pollution from industry and human settlement. Where do you think the most significant sources of pollution are located?

TEACHER NOTE:

Many freshwater bodies in Canada have been subjected to industrial, municipal and agricultural pollution:

- The Great Lakes suffered greatly from water pollution until government efforts to clean them started in the 1970s. The high population and extensive development in the area continue to put a strain on water quality in some of the Great Lakes.
- The Alberta oilsands have caused significant water contamination in the Athabasca River watershed and the larger Arctic watershed through acid rain (rain contaminated with chemicals), leaks and oil spills.
- Other waterways, like the St. John River in New Brunswick, have faced significant pollution from dumping of industrial waste.
- Stormwater, overflow sewage and runoff are ongoing sources of pollution, especially in densely populated urban areas.

Human impacts on water: How human activity affects freshwater discusses human-caused impacts to water.

For centuries, people have drained wetlands to create farmland and buildable land for cities. Where on the map can you find abundant wetlands? Where are they missing?

TEACHER NOTE:

Wetlands are one of the most important ecosystems on Earth (they store groundwater, provide habitat, naturally filter water and prevent flooding), but also one of the most endangered.

Relative wetland area is shown through varying gradations of blue over land areas of the map. Darker blue means a greater proportion of wetlands. Paler blue means a lesser proportion of wetlands. The map legend also notes the colours used for two types of areas with less than 1 per cent wetlands.

In Canada, abundant wetlands extend from the Northwest Territories to the north of Alberta east of the Rockies around the south shoreline of Hudson Bay to Quebec and Labrador.

The areas with the fewest wetlands are found along the West Coast, in the Northern Arctic and in heavily populated or farmed areas in southern Canada (e.g., southern Alberta, southern Ontario).

Human impacts on water: How human activity affects freshwater discusses human-caused impacts to water.

Can you think of ways climate change disrupts the water cycle? What regions in Canada will be most affected by melting glaciers?

TEACHER NOTE:

Climate change disrupts the water cycle by intensifying it, leading to more extreme weather patterns. Rising temperatures increase evaporation, which in turn leads to increases in precipitation. This will mean an increase in both droughts and floods in different regions.

Climate change also causes faster melting of glaciers. In Canada, Western Canada and the Arctic will be most affected by melting glaciers. Glaciers in Alberta and B.C. are already melting faster than ice can accumulate.

Human impacts on water: How human activity affects freshwater discusses human-caused impacts to water.

In Canada, many of our freshwater fish populations are decreasing. Fish are sensitive to pollution and to changes in water temperature and water flows. If you were a fish, where on the map would you like to live?

TEACHER NOTE:

Some of the best places to be a freshwater fish are free-flowing (undammed) rivers with limited industrial exposure and cool temperatures.

In Canada, the Ontario Northern Boreal region between Lake Superior and James Bay includes thousands of lakes, five intact large rivers and the largest wetlands in North America. It has the highest natural fish biodiversity in Canada.

Human impacts on water: How human activity affects freshwater discusses human-caused impacts to water.



Groundwater

Can you think of ways climate change is affecting the groundwater we rely on for drinking water and for irrigating food crops? Think about both water quality and quantity.

TEACHER NOTE:

Climate change results in more extreme weather patterns and changes in precipitation, which will be felt differently in different areas. Some possible impacts to groundwater are:

- Warming groundwater temperatures that degrade the quality of drinking water
- Increasing evaporation from soil and surface water, reducing groundwater storage
- In dry areas, reduced rain, which also means less water seeping into the ground to recharge aquifers
- In wet areas, increased risk of groundwater flooding
- Heavy rains leading to floods that collect pollutants and contaminate groundwater
- Hotter temperatures and other impacts leading to higher demand for water, which means groundwater is withdrawn faster than it can recharge (this also has impacts on the recharge of surface water)
- Saltwater intrusion into freshwater in coastal areas.

Human impacts on water: How human activity affects freshwater discusses human-caused impacts to water.



Water inequity

Drinking water advisories exist where communities do not have access to potable (drinkable) water. Who is responsible for ensuring everyone has access to safe drinking water? What can we do to help make this happen in Canada?

TEACHER NOTE:

Protecting water is a shared responsibility. In Canada, all levels of government share responsibility for making sure our drinking water is safe.

Connect these questions to the **Water inequity**: Access to safe water lesson. Guide a discussion about the problem of lack of access to clean drinking water, who is responsible for solving it and how it might be solved.



Treaties are a foundational framework for sharing the land and water. What aspects of treaty relations are most significant to protecting water for future generations? How do treaty areas and water connect where you live?

TEACHER NOTE:

Explore the connections between treaty boundaries and waterways on the map, in your local watershed as well as across Canada. Questions of relationships between waterways and treaty boundaries are introduced as students investigate their local watershed in **Journey of water**: Watersheds and drainage basins. In **Protecting water**: Connecting and taking action, relationships between treaty relations and waterways are reintroduced, this time framed through the lens of rights, responsibilities and decisions about protecting water.



Access to water in all its forms is not equal across Canadian communities. Where do you think access to water might be limited? What factors would affect access to water?

Connect these questions to the Water inequity lesson, discussing the examples in the lesson. In Canada, Indigenous communities and other marginalized communities have faced disproportionate environmental impacts and issues related to clean water access.

Protecting water



Connecting and taking action

Water connects all living things. What stands out to you most as a way that water connects different parts of Canada? What are the most significant locations for this connection?

TEACHER NOTE:

Water in Canada connects regions, communities and ecosystems across distance and political boundaries. The Hudson Bay watershed connects southern Alberta, the Arctic and northern Ontario and Quebec.

Many rivers in Canada also cross great distances as well as several provincial or territorial borders. The Mackenzie River basin connects five different Canadian provinces and territories. The St. Lawrence River connects the Great Lakes with the Atlantic Ocean.

Connecting and taking action: Art and stewardship explores how water connects people and places across distance, how people across Canada share a connection to water and how art can be used to explore these connections and to promote and protect water.



Nookomis Josephine Mandamin, the first Water Walker, walked the shorelines of all five Great Lakes to honour and protect water. What other bodies of water or places on the map could be travelled and protected by Water Walkers?

TEACHER NOTE:

Connecting and taking action: Pathways to protecting water discusses Josephine-ba Mandamin, the first Water Walker. Connect the question to the lesson content and students' knowledge and experiences of other rivers and lakes in Canada that might require protection.



Indigenous community organizations, Elders and Knowledge Carriers have made significant contributions to water protection across Canada. Where might Indigenous communities be affected most by decisions made about water?

TEACHER NOTE:

Connecting and taking action: Pathways to protecting water discusses Indigenous individuals, communities and organizations working to protect water. Make connections between this lesson and the Water inequity lesson, which talks about the downstream effects of the Athabasca oilsands and other highly polluted areas, in which contaminated water has had significant negative impacts on Indigenous communities.



Water is essential to many of Canada's most significant art forms, stories and ceremonies. What places do you think could be the subject of art or storytelling?

TEACHER NOTE:

Connecting and taking action: Art and stewardship explores how artists in Canada have expressed relationships to water through art and used art to promote and protect water. Connect the question to the lesson content and to students' own experiences of and relationships with bodies of water across Canada.



Careers

Indigenous and western scientists are working together to better understand how to protect and care for water. Do you know anyone in your community who is working to protect water?

TEACHER NOTE:

Connecting and taking action: Pathways to protecting water discusses Indigenous individuals, communities and organizations working to protect water. **Freshwater careers:** Working for water explores how career professionals from different fields collaborate to address freshwater challenges, while **Freshwater careers:** From challenge to opportunity and **Freshwater careers:** Our responsibility for tomorrow look at how freshwater health can be addressed through entrepreneurship and by understanding that freshwater responsibility can be part of almost any career. Connect the question to lesson content and to students' own experiences of people in your community working to protect freshwater through diverse channels and approaches.

Engineers, water researchers and conservationists contribute to economic growth and stability through their work for water. What features of Canada's land and water do you predict will hold future opportunities?

TEACHER NOTE:

This question can be tied into the activities in **Freshwater careers:** From challenge to opportunity as well as the two other lessons focused on freshwater careers and freshwater responsibility. Students can also draw on learning about freshwater challenges and opportunities in other lessons as well as their own observations of the map and prior knowledge of Canada's geography. Encourage students to brainstorm as many possible answers as they can.

Governments pass and enforce the laws that can protect water or make it vulnerable. What significant places and bodies of water would benefit most from more protection?

TEACHER NOTE:

Discuss the question with students, tying it into prior knowledge as well as what they have learned about vulnerable places and bodies of water in already completed lessons. **Connecting and taking action:** Pathways to protecting water and the three career-focused lessons that make up the final section **Freshwater careers** offer further background on the role of government as one of the four pathways to water protection.



Some of the most promising initiatives to protect water are led by young people. What are three ways your community could help youth connect to water and water protection? [Protecting water icon]

TEACHER NOTE:

Tie this question to learnings from the **Connecting and taking action:** Pathways to protecting water lesson and the three career lessons, particularly those related to entrepreneurship and freshwater responsibility. Discuss the question with students and help them brainstorm ways to connect youth in your community to water and water protection.



Groundwater

Geoscientists study freshwater that makes its way into the ground and back to the surface. They want to know how much we have, where we can find it and how it moves. Why is it important to understand groundwater?

TEACHER NOTE:

Journey of water: Groundwater and surface water explores the significance of groundwater in Earth's freshwater resources. Although groundwater is hidden from view, it is one of the most important sources of freshwater on Earth. About half of the world's population relies on groundwater for drinking water, and it accounts for 40 per cent of the world's irrigation water used to grow food and other crops. Understanding groundwater, where and how to find it, how to measure it and how to keep it free from contamination is critical to keeping the Earth's freshwater supply safe for humans and other living things.