Ocean, Freshwater, and Us
Giant Floor Map Facilitation Guide

Ocean Week Canada

CENTRE for OCEAN LITERACY COLLABORATION

INTRODUCTION

Welcome, explorers of all ages and backgrounds, to the engaging world of interactive ocean education on the "Ocean, Freshwater, and Us" Giant Floor Map!

This map focuses on water and marine conservation in Canada, offering unique learning opportunities for everyone — whether you're an educator seeking innovative teaching tools, a student eager to uncover the secrets of aquatic ecosystems in Canada, a private sector professional dedicated to environmental policy, or a business leader looking to integrate sustainability into your operations, this map offers unique learning experiences for everyone.

Dive into a hands-on exploration that reveals the life-sustaining connections between humans, freshwater systems, and the global ocean—all brought to life at your feet. This versatile educational tool is designed for use in classrooms, community events, and corporate sustainability events across Canada. It provides organizations in the private sector with an opportunity to engage their teams in meaningful discussion about marine conservation.

About the "Ocean, Freshwater, and Us" Giant Floor Map

The "Ocean, Freshwater, and Us" Giant Floor Map (GFM) is an interactive educational tool designed to foster a deep understanding of our intricate relationship with water systems, particularly the ocean. The GFM was developed by the Canadian Ocean Literacy Coalition in partnership with the Canadian Geographic Education, renowned cartographer Chris Brackley, Ocean School (a project of the National Film Board of Canada and Dalhousie University), and a multi-partner national design committee. Representatives from Indigenous Leadership Initiative, Water Rangers, Fisheries and Oceans Canada, and Parks Canada contributed their expertise to its creation. Intended for use throughout the UN Ocean Decade (2021-2030), the GFM serves as an effective medium to engage diverse audiences in exploring the connections between humans and aquatic environments.

Key Messages and Their Impact

Five key messages effectively encapsulate the depth and breadth of learning experiences offered by the map, emphasizing both personal and collective responsibilities toward marine conservation:

1. Water shapes us
2. We are connected to the ocean, and the ocean connects us
3. Life on land and life below water depend on a healthy ocean
4. Our actions impact ocean health, our health, and the health of future generations
5. There is only one big global ocean, and we have a responsibility to care for it

These messages aim to inspire action by connecting storytelling behaviours to broader environmental outcomes. By fostering a deep understanding of our interconnectedness with water systems they set the stage for meaningful change at both local and global levels.

Water shapes us

- We have the longest coastline of any country, 50% of which is in the Arctic
- We have a bounty of freshwater, including over 2 million lakes and 8500 named rivers
- Languages, cultures, and identities, across generations, are influenced by our connections to the ocean and local waterways

We are connected to the ocean, and the ocean connects us

- Our community waterways are part of watersheds that flow to the ocean
- Water flows across boundaries, linking us and our communities to each other
- All drains lead to the ocean

Life on land and life below water depend on a healthy ocean

- The ocean creates and supports life on the planet
- A healthy ocean contributes to biodiversity and community well-being
- The ocean regulates climate, and provides clean air, food, jobs, medicines, recreation, transportation, and more

Our actions impact ocean health, our health, and the health of future generations

- Changes in the ocean and global climate are a result of human activities
- Ocean health and biodiversity are threatened as a result of human (in)actions
- These changes are already impacting life in and out of the water and require action

There is only one big global ocean, and we have a responsibility to care for it

- We have an urgent and shared responsibility to protect and restore the ocean and all waters that flow to it
- We, as a country, are working together to protect 30% of land and marine waters by 2030
- We all have a role to play in achieving this goal

Ripple Effect: How Local Actions Create Global Waves

Building on these foundational messages, the concept of a "ripple effect" emerges as a powerful metaphor for understanding how local actions can have far-reaching consequences. Just as a single drop of water can create ripples that extend across an entire pond, individual and community efforts to protect the ocean can generate waves of positive change.

Canada's Commitment to Ocean Conservation

Recognizing the importance of location action, Canada has committed to significant ocean conservation efforts to reflect these values. With ambitious targets for marine protection, Canada aims to conserve 30% of ocean coastal areas by 2030. This commitment aligns with the global efforts to preserve marine biodiversity and mitigate the impacts of climate change. To achieve these goals, Canada is taking a multifaceted approach:

- The government is working to establish new marine protected areas (MPAs), national marine conservation areas (NMCA), as well as Other Effective area-based Conservation Measures (OECM).
- Fostering partnerships with provincial, territorial, and Indigenous governments, as well as local communities, to ensure effective marine planning and conservation.
- Implementing national policies that ensure coastal community access and management of coastal resources.
- Developing need protection standards for MPAs, including restrictions on certain vessel discharges.

By linking educational (and outreach initiatives) like the GFM with concrete protection efforts, Canada demonstrates how local awareness and action can contribute to global ocean conservation.

Photo: Fardou Photography

A Note From the Cartographer, Chris Brackley

The title of the GFM, Ocean, Freshwater, and Us is perfectly descriptive of its content. It is a map that highlights the foundational connections between ourselves and the water that surrounds and sustains us. The massive freshwater flow arrows highlight the reality that while few Canadians live close to the ocean, we are all connected to it by our local and ever-flowing lakes, rivers, and wetlands. And this connection is more than conceptual. What we put into local freshwater systems invariably flows to the ocean affecting delicate marine ecosystems sometimes thousands of kilometres from our homes.

Of course, human impact on the ocean is often more direct and this map also highlights our efforts to protect the ocean through a growing network of protected areas. There are no "one-size-fits-all" solutions to protecting ocean environments, and the different protected areas on this map reflect that reality; some removing certain fishing pressures, some limiting ship traffic and anchoring, some limiting or eliminating resource development, and some doing all of the above. The human impact on water is, of course, determined by us. And the "us" shown on this map is perhaps the most fulsome ever shown on a Giant Floor Map. Not only does it include all villages, towns, and cities (heavily weighted towards the southern parts of the country), but it also shows the ubiquitous presence of Indigenous peoples throughout the entirety of what we now call Canada.

Hopefully, looking at Ocean, Freshwater, and Us through this rich and interconnected cartographic lens will meaningfully inform and inspire Indigenous and non-Indigenous people as we work together to better protect the water around us.

Map Projection and Relative Fraction [1]

The projection is Albers Conical Equal Area. Designed to accurately show areas, this projection ensures that the sizes of regions are proportional to their actual sizes on Earth. Given that Canada is a large country that extends mostly from east to west, this projection effectively represents its area while minimizing distortion.

The Relative Fraction (or this map's scale) is approximately 1:625,000. The Relative Fraction, or the scale of a map, is the ratio that shows the relationship between the distance on the map and the actual distance on the ground.

[1] Geosciences LibreTextes. 2021. 3. Scale and Projections. Accessed June 14, 2024.

Physical Map Data Sets

The data sets featured on the map provide a comprehensive overview of water bodies, marine protected areas, terrain, First Nations, Métis, and Inuit communities, languages, treaties, infrastructure, political boundaries, and more across different regions in Canada. This information offers valuable insights into our relationships with the land, freshwater bodies, and ocean.

1. Water flow - lakes, rivers, watersheds
2. Wetlands
3. Ocean Protected Areas (4 types):
    - Marine Protected Areas (MPAs) under the Oceans Act
    - National Marine Conservation Areas (NMCAs)
    - Other Effective Area-based Conservation Measures (OECMs)
    - Other
4. Terrestrial Protected Areas that are connected to Marine Protected Areas
5. Permanent sea ice
6. Ocean surface labels and sub-surface feature labels
7. Cities and towns (all shown with a dot – only cities/towns of a certain size labelled)
8. Indigenous Treaty Boundaries
9. Indigenous languages
10. Inuit majority towns in the North
11. Inuit Nunangat Regions
12. All First Nations labelled (Canada)
13. Reserves
14. Metis Settlement Lands in Alberta

Explore the Digital Interactive Map

Take your exploration to the next level with the interactive, online version of the map. Available at canadaoceanmap.ca, it allows you to investigate specific regions in detail, uncover fascinating facts about marine ecosystems, and learn about conservation efforts across Canada.

Augmented Reality Content Guide(s)

Discover the immersive world of ocean and freshwater ecosystems in Canada with the Ocean, Freshwater, and Us Giant Floor Map, enhanced by the Augmented Reality (AR) app. This innovative educational tool combines the tangible experience of a physical map with the interactive capabilities of AR. By simply pointing a device at specific locations on the map, users can unlock a wealth of digital content, including 3D models, 360 videos, and informative overlays.

Software version: *OWC App 1.0.8*

Learn about the various approaches and forms of marine protection in Canada.

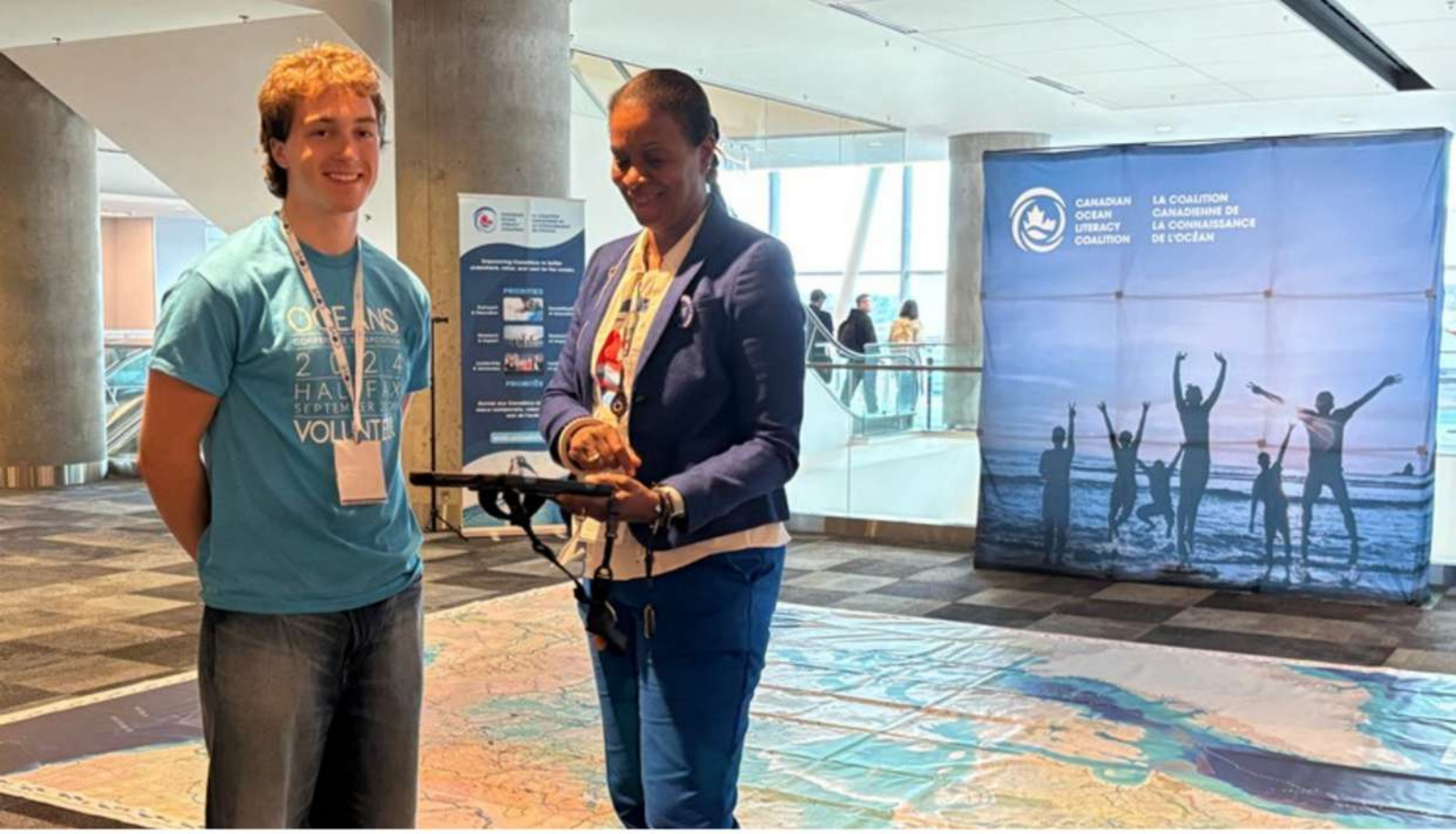
Uncover coastal insights through short 360° videos from across the country, produced by Ocean Week Canada partners.

Explore Canada's first marine protected area, The Gully, and the hydrothermal vents of the Tang.ɢwan – ḥačxʷiqak – Tsig̱is Marine Protected Area.

Download the app

iOS

Android



Guidance for Facilitators

Sparking curiosity on the Giant Floor Map

Your Role As A Guide

As a facilitator, your primary role is to ignite curiosity and foster engagement with the GFM. Remember, you don't need to be a marine or freshwater specialist. Your goal is to help participants make emotional connections to ocean and freshwater resources, inspiring them to take action.

Key Principles

Be a Questioner.

- Encourage exploration through open-ended questions. This approach stimulates critical thinking and allows participants to discover insights on their own.

Spark Curiosity.

- Use the GFM features to pique interest in various topics. Point out unique elements and ask participants what they find interesting.

Encourage Self-Discovery.

- Allow participants to lead their own learning journey. Step back and let them explore freely, offering guidance only when needed.

Foster Connections.

- Help participants relate map elements to their personal experiences.

Facilitation Tips

Begin your session by warmly inviting participants to explore the map freely, setting the tone for openness and curiosity. As they begin their exploration, use guiding questions to spark their interest and encourage deeper observation. Ask open-ended questions like *"What do you notice?"* or *"What interests you most on this map?"* to stimulate their thinking and engagement.

Dip Your Toes

Encourage physical interaction with the map to enhance the learning experience. Invite participants to walk across different areas, point out interesting features, do a river-dance to uncover the direction of water flow, or even sit on specific regions to get a closer look. This hands-on approach can make the learning more tangible and memorable. As the exploration continues, promote peer learning by encouraging participants to share their discoveries with each other, fostering a collaborative learning environment.

For younger participants, you might suggest a treat hunt for specific features. For adults, encourage them to find connections between the map and current environmental issues.

Wade in Purposefully

To make the map exploration more relevant and impactful, help participants relate the map to personal experience. Ask how the features or information on the GFM may connect to their lives or communities. This personal connection can deepen their understanding or interest. Remember to embrace the diverse perspectives by validating different interpretations and observations. Each visitor's unique viewpoint/narrative contributes to a richer learning experience.

Be prepared to adapt your approach for participants with different abilities. For example, provide detailed verbal description for visually impaired participants, or suggest alternative ways to interact with the map for those with mobility challenges.

Deeper Dive to Make Connections

As you guide the exploration, help participants see the links between various map elements, highlighting the interconnections within marine and freshwater systems. This can help build a more comprehensive understanding of the data sets. For instance, you might ask, "How do you think the ocean currents affect the climate in coastal regions?"

Finally, inspire action by concluding the activation with a discussion about actions one might take to continue the learning or to protect water resources in their daily lives. Closing with a call to action (CTA) can transform that experience into a catalyst for positive change. Suggest specific, achievable actions like reducing place use, or participating in a local beach clean up.

More CTA to be found in the Blue Learning Lab, Take Action Zone
oceanweekcan.ca/blue-learning-lab/take-action-zone

Time Management and Group Dynamics

For larger groups, consider dividing participants into smaller teams for more focused exploration. Allocate specific time frames for each section of the map to ensure comprehensive coverage. Be flexible and attentive to the group's energy and interest level, adjusting pace accordingly.

Handling Challenges

If you encounter disengaged participants, try to reconnect them by asking about their interests and relating them to the map. For overly enthusiastic participants who might dominate the discussion, gently encourage input from others to ensure everyone has a chance to contribute.

Cultural Sensitivity

Be mindful of diverse cultural perspectives on water and ocean resources. Encourage participants to share their cultural knowledge or practices related to water conservation. This not only enriches the learning experience but also promotes inclusivity and respect for different worldviews.

Evaluation and Feedback

At the end of the session, invite participants to share what they found most interesting or surprising. Consider having a simple feedback approach. Three options include: 1) thumb up, to the side, down; 2) smiley face, smeh face, frowning face; or 3) create a digital survey and provide access via a QR code linking to an online form for more detailed responses. Use this information to refine and improve future sessions.

Contents

This facilitation guide includes **14 learning activities** (some of which are multi-part*) to be used and/or modified as you see fit to ensure local relevance, cultural appropriateness, and engaging learning experience for participants. Feel free to adapt these activities based on interest, age range, and time constraints.

To make the content accessible and searchable, the activities are organized by themes, allowing for a flexible approach. These themes include:

1. Truth Telling (then Reconciliation) **[3 activities]**
2. Water Expressions **[3 activities*]**
3. Climate Change and Water Systems **[2 activities*]**
4. Species Spotlight **[3 activities]**
5. Freshwater Exploration **[3 activities*]**

We hope these activities, in combination with the Ocean, Freshwater and Us Giant Floor Map, inspire a deeper connection to the waters that sustain us all. By fostering understanding, appreciation, and a sense of responsibility, we believe these experiences can contribute to positive actions for the conservation and protection of ocean and freshwater systems in Canada.

1. TRUTH TELLING (THEN RECONCILIATION)

On-the Map Learning Experiences:

1. The Power of Place
2. Water Acknowledgement
3. Respect the Waters

The Power of Place

ACTIVATION

As we engage in the process of reconciliation, the ceremonial Land Acknowledgment can be extended to outreach education so that we may engage in ocean conversations effectively.

FACILITATOR ACTION

Research the traditional land where the GFM installation will be for the day (week). Hold space to call by name the Nation(s) whose land(s) you are privileged to gather and share knowledge about ocean and freshwater resources in Canada.

Share your expressions of relationship, acknowledging not just the territory but also your connection to that land based on knowledge that has been shared with you.
(Source: GC Treaties and Agreements, 2020)

ELABORATION

You can also use the GFM to identify the Treaties of a given area
(E.g., Williams Treaty 1923 - Northwest Ontario; Peace and Friendship Treaty - New Brunswick, etc).

Some people might not know what a treaty is. This provides a great opportunity to learn!

Treaties are agreements between the Government of Canada, Indigenous groups, and often provinces and territories that define ongoing rights and obligations on all sides. Treaties include historic treaties (noted on the GFM) and modern treaties (e.g., land claim agreements).

MATERIALS REQUIRED:

- Treaty map reference document [native-land.ca]
- Template with prompts to get them started (see next page: water acknowledgement)
- Writing equipment (pens, markers, pencils)

Water Acknowledgment Card

Front of Card:

Title: Water Acknowledgment

Subtitle: Reflect, Connect, and Respect

Instructions: Take a moment to reflect on your relationship with water. How does it impact your life? What feelings or memories does it evoke? Express your gratitude and connection to water through words or art. Use any of the sentence starters on the back of the card to guide your acknowledgment.

Optional: Include event details, date, location, and contact information on the postcard

Back of Card:

My Water Acknowledgement
This template provides a structured framework for creating a personal acknowledgment.
→ framed blank space to the left - sentence starters:

- In my daily life, I can show gratitude for water by...
- I feel connected to water when...
- I pledge to protect the ocean and freshwater by...

Optional (Draw or sketch your personal acknowledgment here)

Share Your Experience:

Share your personal acknowledgment for water on social media using the hashtag #[Choose a hashtag from right] Let's inspire others to reflect on the importance of the ocean and freshwater resources in their lives!

Hashtag suggestions:

- #RespectingWater
- #WaterConnectsUs
- #MyWaterStory
- #OceanAndMe

Hard copy version:

1. The hard copy version of the card can be printed on durable cardstock paper to ensure longevity. It should be compact and portable, making it easy for participants to carry.
2. The front of the card should feature an eye-catching image of water, while the back provides instructions for the activity, space for participants to write or draw their personal acknowledgment, and additional information about sharing their experience and event details.

N.B. A digital version of the card template can be created as a downloadable PDF or image file that participants can access and print at their convenience.

SAMPLE Water Acknowledgment Card

WATER ACKNOWLEDGMENT	REFLECT, CONNECT, AND RESPECT

Instructions: *Take a moment to reflect on your relationship with water. How does it impact your life? What feelings or memories does it evoke? Express your gratitude and connection to water through words or art. Use any of the sentence starters on the back of the card to guide your acknowledgment.*

MY WATER ACKNOWLEDGEMENT	
In my daily life, I can show gratitude for water by... *I feel connected to water when...* *I pledge to protect the ocean and freshwater by...*	*Draw or sketch your personal acknowledgment here*

Respect the Waters

ACTIVATION

Indigenous Peoples (First Nations, Métis, and Inuit) in Canada have a special relationship with water, built on their subsistence ways of life, that extends back thousands of years. They recognize the sacredness of water, the interconnectedness of all life, and the importance of protecting water from pollution, drought, and waste.

FACILITATOR ACTIONS

In a circle or semicircle arrangement, ensure that everyone has a clear line of sight to the facilitator and each other. Encourage participants to sit comfortably and close enough to enable conversation but with enough space for individual reflection.

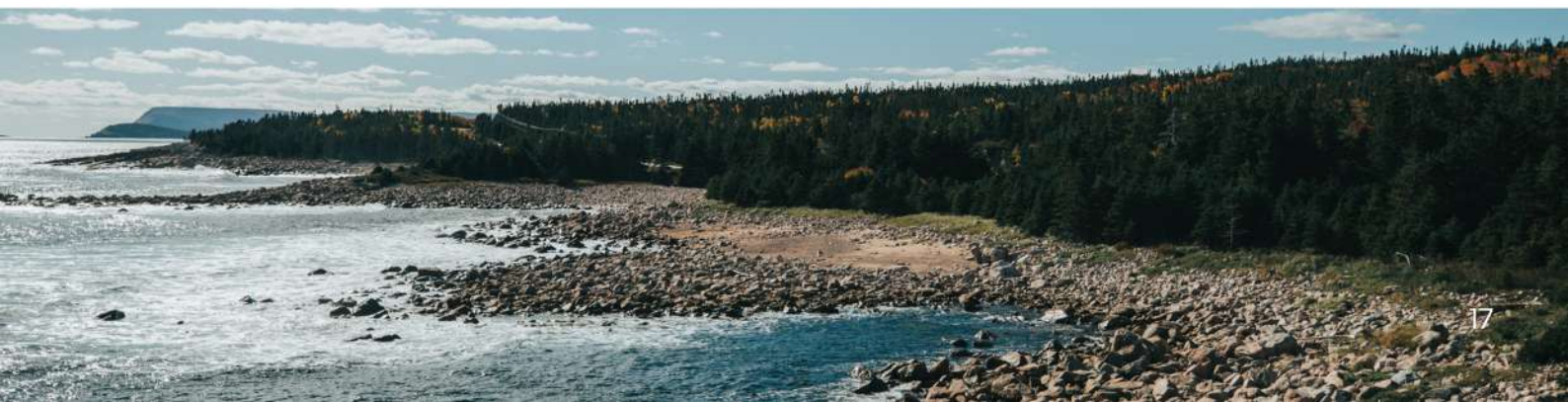
Gauge participant understanding of the diversity of water bodies found in Canada.
Use this reference → Water Body Profiles Journey Diverse Ecosystems - Water Profiles

Present the passage about the importance of water, emphasizing the diversity of water bodies and its significance to Indigenous Peoples and their deep connection to it.

Passage for Sharing:

> *"Water is the most life-sustaining gift on Mother Earth and is the interconnection among all living beings. Water sustains us, flows between us, within us, and replenishes us. Water is the blood of Mother Earth and, as such, cleanses not only herself but all living things. Water comes in many forms and all are needed for the health of Mother Earth and for our health. Water gives us the spiritual teaching that we too flow into the Great Ocean at the end of our life journey."*
>
> *Water shapes the land and gives us the great gifts of rivers, lakes, ice, and [the] ocean. Water is the home of many living things that contribute to the health and well-being of everything not in the water."*
>
> *Source: Assembly of First Nations, Honouring Water [www.afn.ca/honoring-water]*

Explain that the passage reflects Indigenous perspectives on water as the giver of life and the interconnectedness of all living beings.



ELABORATION

Provide opportunities for silent reflection, allowing participants to gather their thoughts and formulate their responses before sharing them with the group.

Group Sharing: Open the floor/map for participants to share their reflections and insights. Some questions to guide the discussion may include:

- What emotions or thoughts does the passage evoke for you?
- How does this perspective on water differ from your cultural or personal understanding?
- How can we incorporate the principles of honouring water into our daily lives and actions?

Invite participants to reflect on the message and its significance, considering how it resonates with their beliefs and values regarding water. Encourage an open and respectful dialogue, allowing everyone to contribute their perspectives and experiences.

2. FRESHWATER EXPLORATION

On-the Map Learning Experiences:

1. H-O-M-E-S is Where the Freshwater Is
2. What Makes the Great Lakes Great?
3. Great Lakes Depth and Volume Visualization (Four Part Mini-Activations)

H-O-M-E-S is Where the Freshwater Is

ACTIVATION

The Great Lakes (and the St. Lawrence River) make up one of the largest surface freshwater ecosystems in the world. Government entities in Canada and the United States have agreed to apply uniform laws throughout this water system to protect it and make it a sustainable resource.

Huron
Ontario
Michigan
Erie
Superior

FACILITATOR ACTIONS

Invite participants to identify the Great Lakes - starting from west to east: Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.

Share list of Fun Fact:

- Together they hold ~20% of all the surface freshwater on the planet and contain about 84% of all the freshwater in North America.
- Only 1% of this is replenished each year by rainfall, snowmelt, and the flow of groundwater.
- There is enough water in Lake Superior alone to cover all of North and South America in 30cm (1 foot) of water!
- Protecting this shared freshwater resource is a balancing act between safeguarding the livelihoods of all those who live and work in the area and keeping the waters clean and the ecosystem healthy.

Engage participants in discussion using the following inquiry questions:

- Who gets to use the water in the Great Lakes basin?
- What can it be used for?
- Who gets to decide?

ELABORATION

Refer to backgrounder, ***What Makes the Great Lakes Great?*** for additional information (pg. 21).

Provide information about the Great Lakes basin, including its ecological importance, the challenges it faces, and the efforts being made to protect and sustain freshwater resources.

As participants walk about the GFM, encourage them to consider the interconnectedness of human activities and the health of the Great Lakes ecosystem.

What Makes the Great Lakes Great?

Introduction

The Great Lakes, consisting of Lake Superior, Michigan, Huron, Erie, and Ontario, are distinguished by several remarkable features that make them "great" beyond their size. These lakes are significant not only for their physical dimensions but also for their environmental, economic, and social impacts.

Physical Characteristics

The Great Lakes are the largest group of freshwater lakes on Earth by total area, and they hold about 21% of the world's surface fresh water.[2][5] Lake Superior stands out as the largest by volume and the deepest, with a maximum depth of 406 meters (1,333 feet).[1] It is larger than the entire state of South Carolina or the country of Scotland, emphasizing its vastness.[20] Lake Michigan, the second largest by volume and third largest by area, is the only one entirely within the U.S. Lake Huron follows as the third largest by volume and second in area, while Lake Erie is the smallest by volume and the shallowest. Despite being the second smallest in volume, Lake Ontario has a much lower elevation than the rest.[20]

Environmental Significance

The Great Lakes region is one of the most ecologically diverse ecosystems, home to over 4,000 species of plants, fish, and wildlife.[10] This biodiversity includes unique habitats like dramatic sand dunes, lush wetlands, and remote islands.[12] The lakes themselves are crucial for drinking water, supporting tens of millions of Canadians and Americans.[17] They also play a vital role in moderating the regional climate through the "lake effect," which can lead to significant snowfall in the winter.[20]

Economic and Social Impact

Economically, the Great Lakes support a regional economy with a GDP of CAD $7.6 trillion ($6 trillion USD), making it the world's third largest economy if considered a separate country.[10] They are essential for trade and shipping, with ports facilitating the movement of goods such as grains, iron ore, and manufactured materials. The lakes also bolster the fishing industry, though commercial fishing has declined due to overfishing and environmental pressures.[19]

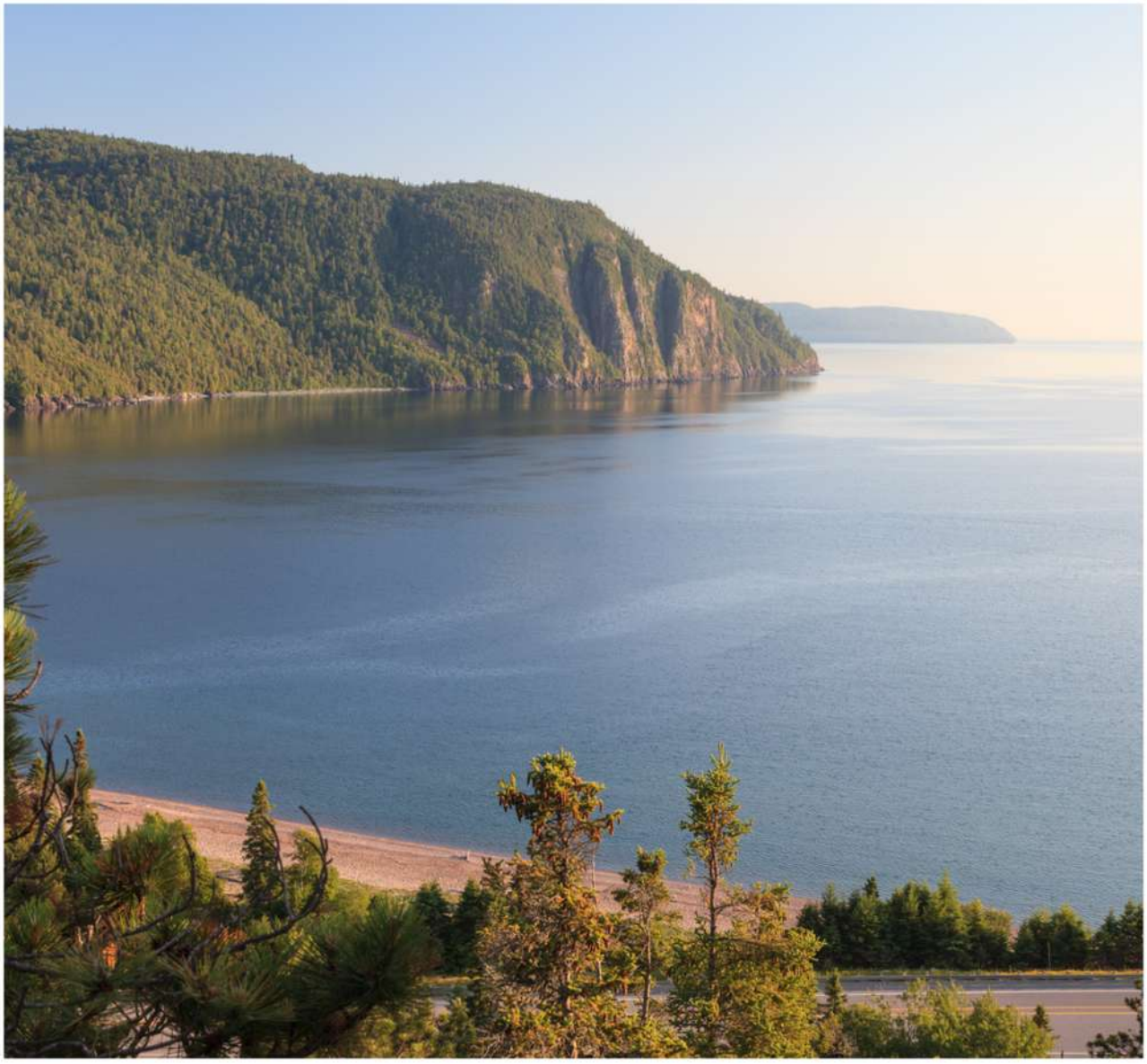
Tourism is another significant benefit, with the Great Lakes offering recreational opportunities like beaches, water sports, boating, and fishing. The region's natural beauty attracts millions of participants annually, contributing to the local economies of lakeside communities.[19]

Challenges and Conservation

Despite their greatness, the Great Lakes face several environmental challenges, including pollution, invasive species, and the impacts of climate change.[7] Efforts to protect and restore the lakes are ongoing, involving governmental and non-governmental organizations. The Great Lakes Water Quality Agreement between Canada and the United States commits both countries to restore and maintain the lakes' ecological integrity.[17]

In summary, the Great Lakes are great not only because of their size but also due to their profound environmental, economic, and social significance. They are a vital natural resource that requires careful management and conservation to ensure their health and sustainability for future generations.

The evidence supporting why the Great Lakes are indeed great will require periodic updates.[1]



[1]Great Lakes Citations at end of document

ACTIVATION - GREAT LAKES TRIVIA CHALLENGE

Given the environmental challenges faced by the Great Lakes, including pollution, invasive species, and the impacts of climate change, here are seven trivia questions that can be posed to children and youth to raise awareness and educate them on these issues.

Printable trivia cards:

QUIZ

What percentage of the world's surface freshwater is held by the Great Lakes?

A. 5%

B. 21%

C. 10%

D. 30%

Correct answer: B

QUIZ

Which invasive species was first discovered in the Great Lakes in 1988 and is known for its ability to filter large amounts of water, affecting native species?

QUIZ

How many kilograms of plastic debris enter the Great Lakes each year?

A. 2,267,962 kilograms

B. 4,535,924 kilograms

C. 9,979,032 kilograms

D. 22,679,619 kilograms

Correct answer: C

QUIZ

What natural phenomenon, caused by fast, strong increases in air pressure, can create large waves on the Great Lakes?

QUIZ

On average, how often does a new invasive species enter the Great Lakes?

A. Every 8 months

B. Once a year

C. Every 28 weeks

D. Every 5 years

Correct answer: A

QUIZ

Which of the following is NOT a source of pollution in the Great Lakes?

QUIZ

What is the largest freshwater island in the world, located in Lake Huron?

A. Manitoulin Island

B. Beaver Island

FUN FACTS - 1

What's a Seiche?

A seiche is a standing wave in an enclosed or partially enclosed body of water, such as lakes, reservoirs, swimming pools, bays, harbours, and seas.[1] The phenomenon requires the body of water to be at least partially bounded, allowing the formation of the standing wave. The term "seiche" was promoted by Swiss hydrologist François-Alphonse Forel in 1890, following his scientific observations of the effect in Lake Geneva. The word originates from the Swiss-French dialect, likely derived from the Latin word "siccus," meaning "dry," referring to the receding of water and drying of the beach.[1]

Seiches can be caused by various factors, including meteorological effects (wind and atmospheric pressure variations), **seismic activity, or tsunamis. These disturbances cause resonances in the body of water, leading to vertical harmonic motion.** The water's impulse travels the basin's length, reflects back, and generates interference, producing standing waves with nodes where no vertical motion occurs. The oscillation frequency depends on the basin's size, depth, contours, and water temperature.[1]

FUN FACTS - 2

Relationship Between Seiches and the Great Lakes

The Great Lakes are particularly susceptible to seiches due to their large size and the fact that they are partially enclosed bodies of water. Seiches in the Great Lakes can be dramatic, with water levels fluctuating significantly in hours, similar to water displaced in a bathtub. These fluctuations can be caused by storms affecting the lakes, sloshing water from one end of a lake's basin to another.[2]

Seiches on the Great Lakes can have various impacts, including sweeping people off piers and beaches, damaging shorelines, sinking ships, causing flooding, and leaving ships high and dry[2]. For example, on **Lake Michigan** in 1956, a seiche suddenly caused the lake to rise 10 feet and sweep anglers off a pier.[2] Another notable event occurred on September 4, 2014, when **Lake Superior** near Sault Ste. Marie, Michigan, experienced water level changes of up to 1.65 meters (65 inches) in just a few hours due to a seiche.[4]

Seiches can also influence lake biology by pulling nutrients from sediments into the nepheloid layer, affecting nutrient dynamics and, potentially, the lake's ecosystem.[2] The factors influencing seiches in the Great Lakes include sustained high winds from one direction and changes in atmospheric (barometric) pressure.[2]

In summary, **seiches are natural phenomena that can significantly impact the Great Lakes, affecting water levels, shoreline structures, and the biological dynamics of these large bodies of water.**

WATCH: What is a "Seiche?"

Great Lakes Depth and Volume Visualization

Introduction

Exploring the Great Lakes: Depth, Volume, and Scale is an interactive, multi-part activity that brings the vastness of the Great Lakes to life. Participants will walk a scaled distance representing Lake Superior's incredible 406-meter depth, use pylons to visualize the distribution of freshwater among the five lakes, and outline areas comparable to Lake Superior's surface using familiar Canadian geographical references.

This hands-on experience transforms abstract numbers into tangible concepts, helping participants grasp the true magnitude of this freshwater system that holds 21% of the world's surface freshwater. The activity concludes with an opportunity to explore the Biinaagami digital platform, offering an Indigenous perspective on the Great Lakes-St. Lawrence Watershed and emphasizing our shared responsibility to protect these waters.

Through physical engagement and digital exploration, participants will gain a deeper appreciation for the scale, importance, and cultural significance of the Great Lakes.

ACTIVATION - MULTI-PART SEQUENCE

1. Depth Visualization

1. Round to the nearest whole number: 41 meters (representing 1/10th of Lake Superior's maximum depth).
    - Do the Math: 406 meters ÷ 10 = 40.6 meters, rounded to 41 meters.
2. Place pylons at 4-meter intervals (10 pylons total, with the last at 40 meters).
3. Participants walk this distance.
4. Extrapolation to other Great Lakes:
    - Lake Michigan: 7 lengths (281 m depth)
    - Lake Huron: 6 lengths (229 m depth)
    - Lake Ontario: 6 lengths (244 m depth)
    - Lake Erie: 2 lengths (64 m depth)

2. Volume Comparison

1. Use 21 pylons to represent the Great Lakes' 21% of the world's surface freshwater.
2. Ask participants to estimate how many pylons represent each Great Lake's volume:
   - Lake Superior: 10 pylons (47.3% of Great Lakes volume)
   - Lake Michigan: 5 pylons (23.2%)
   - Lake Huron: 4 pylons (19.3%)
   - Ontario: 2 pylons (7.3%)
   - Erie: 1 pylon (2.9%)

3. Interactive Estimation

1. Using ropes, ask groups to estimate areas equivalent to Lake Superior's surface area (81,700 km²) in Canadian contexts:
   - New Brunswick (72,908 km²)
   - Nova Scotia (55,284 km²)
   - Combined area of Prince Edward Island (5,660 km²) and Vancouver Island (31,285 km²)
2. Compare these estimates to Lake Superior's actual size on the map.

4. Biinaagami Interactive Guide (Digital Resource)

1. For participants with smart devices, provide a QR code or short URL linking to the Biinaagami interactive guide (https://www.biinaagami.org/map).
2. This digital component will:
   - Offer an Indigenous perspective on the Great Lakes-St. Lawrence Watershed.
   - Highlight the cultural significance of these waters to nearly 150 Nations.
3. Allow users to explore detailed map features, including:
   - Watershed and subwatershed boundaries
   - Indigenous language areas
   - Treaty boundaries
   - Water flow volumes
   - Bathymetry of the Great Lakes
4. Encourage participants to:
   - Locate their home waters and trace connections to the Great Lakes
   - Identify Indigenous territories and languages in their area
   - Explore the interactive 3D mode for a unique perspective on the watershed

This digital enhancement complements the physical activities by providing a broader context and emphasizing the shared responsibility of listening to and protecting these vital waters. It reinforces the message that knowing the waters is the first step towards stewardship, aligning with the Indigenous view of our role as human beings in relation to these water systems.

Biinaagami
OUR SHARED RESPONSIBILITY TO THE GREAT LAKES

KEY TAKEAWAYS

Scale and Volume

The activities directly demonstrate that the Great Lakes contain about 21% of the world's surface freshwater. This is visually represented through the pylon arrangement, making the abstract percentage tangible.

Depth Visualization

By walking the 41-meter line (representing 1/10th of Lake Superior's depth) and extrapolating to the other lakes, participants gain a physical sense of the lakes' immense depths. This hands-on experience makes the abstract numbers more relatable.

Size Comparison

The rope activity, where participants outline areas equivalent to Lake Superior's surface area, provides a concrete understanding of the lake's vast size in relation to familiar Canadian geographical references.

Relative Volumes

The pylon distribution activity for each Great Lake's volume gives participants a clear visual representation of how the water volume is distributed among the five lakes, with Lake Superior containing nearly half of the system's water.

Digital enhancement with Biinaagami platform [www.biinaagami.org]

Our shared responsibility to protect and revitalize the Great Lakes-St. Lawrence Watershed, rooted in Indigenous knowledge and perspectives.

CITATIONS FOR GREAT LAKES SECTION

3. CLIMATE CHANGE AND WATER SYSTEMS

On-the Map Learning Experiences:

1. Land Ice, Sea Ice, Glaciers, oh my!
2. Climate Change Impacts: Changes in Water Availability
   - Background Information
   - Six Part Mini-Activations

Land Ice, Sea Ice, Glaciers — oh my!

INSPIRATION

The Arctic region of the giant floor map provides an ideal opportunity to explore the solid form of seawater that the southern profiles of the map does not provide. This topic makes real the ocean-climate connection for participants as the Arctic region is inaccessible for most who are urban dwellers. The GFM projection depicting sea ice and land ice enables discussions about the frozen zones which are often time out of mind.

ACTIVATION

Fun Facts to share with participants:

- Glaciology and glacial geology are key areas of polar research.
- The ice helps scientists observe evidence of changes in Earth's climate over time.
- Researchers can use the ice core sampling to tell when volcanoes erupted.
- Sea ice rarely forms in the open ocean below a latitude of 60° N; between about 60° and 75° N the occurrence of sea ice is seasonal; and above a latitude of 75° N there is a more or less permanent ice cover.
- Ice is a diminishing resource, therefore data sets of ice cores are digitized to increase availability of this scarce resource.

FACILITATOR ACTION

Begin the session at the southern edge of the giant floor map and gradually walk towards the Arctic region. This movement symbolizes the journey from more familiar, temperate environments to the less accessible Arctic regions, setting the stage for a discussion on the unique characteristics of polar areas.

As you reach the Arctic region on the map, engage the participants with the questions provided:

- **Land Ice:** Ask, "What is land ice, and what forms can it take?" Discuss glaciers and ice caps, explaining their formation and movement over land.
- **Sea Ice:** Then, inquire, "Where would you find sea ice, and what forms can it take?" Explain that sea ice forms when ocean water freezes, and can appear as pack ice, polar ice, or frozen bays.

Comparison Discussion

Facilitate a discussion on how land ice (freshwater, snow) and sea ice (salty, ocean water) are similar and different. Highlight that both are made of frozen water but differ in their locations, type of water, and impacts on global sea levels when they melt (*land ice*[1]*: freshwater, snow, sea ice: salty, ocean water, ice contributes to sea level rise, whereas sea ice does not*).

Fun Facts Integration

Integrate the fun facts into the discussion as you talk about each type of ice. For example, when discussing land ice, mention how ice core sampling can reveal past volcanic eruptions. When talking about sea ice, discuss its seasonal patterns and its role as a diminishing resource.

Personal Connection

Encourage learners to think about how their actions can impact distant environments like the Arctic. Discuss simple actions they can take, such as reducing energy consumption or supporting sustainable practices, that contribute to global conservation efforts.

ELABORATION

Ice Extent and Climate Change Discussion

Facilitator Action

Highlight the areas of the map showing Arctic sea ice extent and discuss seasonal variations and long-term changes observed in ice cover. Link these changes to global climate patterns, such as alterations in sea levels and weather phenomena. Discuss how melting ice impacts not only sea levels but also marine and terrestrial biodiversity.[2]

[A] Impact of Melting Ice on Global Systems
Elaborate on how the melting of ice, particularly land ice, affects global sea levels and climate patterns. Discuss the potential consequences for human populations, especially those in coastal areas.

[B] Deeper Dive into Glaciology and Glacial Geology
Provide a more detailed explanation of how scientists use glaciology and glacial geology to study Earth's past climates. Discuss the tools and methods used, such as drilling for ice cores and analyzing trapped gas bubbles.

Conservation Message

Facilitator Action

Emphasize the importance of preserving cold water environments due to their role in global climate systems and biodiversity. Discuss national / international efforts to monitor and protect these areas.

[1] National Snow and Ice Data Centre. (2024). Parts of the Cryosphere.
[2] Government of Canada. NRCAN.. (2019). Implications of Climate Change for the Arctic Environment.

Climate Change Impacts

Changes in Water Availability

The implications of melting glaciers, reduced snowpack, changing river flows, and shrinking freshwater reservoirs in Canada can have significant impacts on ecosystems, agriculture, and human settlements.

BACKGROUND INFORMATION

Ecosystems

Glaciers and snowpack play a crucial role in maintaining ecosystems by providing a consistent source of freshwater throughout the year. As glaciers melt and snowpack diminishes, there will be reduced water availability during dry periods, leading to changes in habitat conditions for plants, animals, and aquatic species.

- **Loss of habitat:** Melting glaciers and reduced snowpack can lead to the loss of habitat for various species, including those adapted to cold environments, such as Arctic and alpine ecosystems (Sutherland, 2021).
- **Disruption of food chains:** Changes in river flows and water availability can disrupt aquatic ecosystems and impact the availability of food for fish and other aquatic species (Environment and Climate Change Canada, 2019).
- **Increased risk of wildfires:** Reduced snowpack and changing river flows can contribute to drier conditions, increasing the risk of wildfires in forested ecosystems (Canadian Forest Service, 2020).

Agriculture

The availability of water from glaciers, snowpack, and river flows is vital for agriculture in Canada, particularly in regions dependent on irrigation for crop production.

- **Water scarcity:** Shrinking freshwater reservoirs and changing river flows can lead to water scarcity for agricultural irrigation, impacting crop production and livestock farming (Government of Canada, 2021).
- **Altered growing seasons:** Changing snow patterns and temperature shifts can affect the length and timing of growing seasons, potentially disrupting agricultural practices and crop yields (Reid et al., 2019).

Human Settlements

Reduced freshwater availability can have significant implications for human settlements.

- **Water supply challenges:** Shrinking freshwater reservoirs and altered river flows can strain water supplies for human consumption, affecting communities' access to clean drinking water (Kornelsen et al., 2018).
- **Increased risk of flooding:** Melting glaciers and changing river flows can contribute to increased flood risks, threatening human settlements and infrastructure located near rivers and lakes (Natural Resources Canada, 2021).
- **Economic impacts:** Changes in water availability and agriculture can have economic implications, including potential declines in agricultural productivity and impacts on industries dependent on water resources (Canadian Institute for Climate Choices, 2021).

Additional considerations:

Hydroelectric Power Generation

Canada relies heavily on hydroelectric power generation, which is influenced by river flows. Changes in river flows due to reduced snowpack and melting glaciers can impact the reliability and availability of hydropower, potentially affecting energy generation and leading to higher energy costs. This can have broader economic implications and necessitate the exploration of alternative energy sources.

Water Management and Infrastructure

The changing hydrological patterns resulting from glacier melting and reduced snowpack require adjustments to water management strategies and infrastructure. Existing water storage reservoirs may experience reduced inflows, affecting their capacity to meet water demand and manage flood risks. Adapting infrastructure to changing water availability and developing sustainable water management practices will be crucial to ensure the continued provision of water resources to communities and industries.

Research

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Environment and Climate Change Canada. (2019). Climate Change Indicators: Glaciers. Retrieved from https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/climate-change-indicators/glaciers.html

Government of Canada. (2021). Agriculture and Climate Change. Retrieved from https://www.agr.gc.ca/eng/agriculture-and-the-environment/agriculture-and-climate-change/?id=1315915268505

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Natural Resources Canada. (2021). Climate Change and Canada's Rivers. Retrieved from https://www.nrcan.gc.ca/environment/resources/publications/impacts-adaptations/reports/assessments/2011/15117

ACTIVATION - WATER AVAILABILITY IN A CHANGING CLIMATE

Introduction

Using the Giant Floor Map, this multi-learning activity explores the impacts of climate change on water availability across Canada. Throughout the activation, emphasize the **interconnectedness of ocean and freshwater systems**, and how changes in water availability affect ecosystems, agriculture, and human settlements across Canada.

Guidance for Facilitators & Animators

As you prepare to lead *'Water Availability in a Changing Climate,'* we encourage you to:

Research local impacts

- Identify nearby water sources and how they're changing
- Find examples of local ecosystem shifts
- Explore regional agricultural challenges

Understand root causes

- Study how melting glaciers and reduced snowpack affect your area
- Investigate changes in local river flows and freshwater reservoirs

Prepare thought-provoking questions

- How might changing water availability impact our community?
- What industries in our region depend on stable water resources?
- How could our local ecosystems adapt to these changes?

Remember, your role is to guide critical thinking, not to be an expert. Encourage participants to consider both immediate impacts and long-term consequences of changing water availability.

By connecting global trends to local realities, facilitators create a more engaging and impactful learning experience.

1. Glacier and Snowpack Retreat

1. Use different coloured ropes for land ice (glaciers) and sea ice.
2. Gradually remove ropes to show melting over time.
   - Emphasize that land ice melting contributes directly to sea level rise.
   - Explain that sea ice melting doesn't directly raise sea levels but has other significant impacts.
3. Discuss the implications:
   - Land ice melting:
     - Contributes to sea level rise, affecting coastal communities.
     - Reduces year-round freshwater availability for ecosystems and human use.
     - Leads to habitat loss for cold-adapted species in Arctic and alpine ecosystems.
   - Sea ice melting:
     - Doesn't directly raise sea levels but amplifies ocean heating.
     - Disrupts marine ecosystems and food chains.
     - Affects global climate patterns.

By making this distinction, participants can better understand the complex relationship between different types of ice and their varied impacts on sea levels, ecosystems, and climate. This knowledge is crucial for comprehending the broader implications of climate change on water availability and distribution.

2. River Systems

1. Trace major rivers on the map.
2. Participants act as "water droplets," moving along rivers to demonstrate changing flows.
3. Explain how altered flows disrupt aquatic ecosystems and food chains for fish and other aquatic species.

To scaffold the learning for participants regarding coastal regions and climate change impacts, the facilitator can:

a) River Identification:
   - Have participants locate and trace major rivers on the map.
   - Discuss the importance of these rivers for surrounding ecosystems and communities.

b) Food Chain Disruption:
   - Create a simple food chain using participants (e.g., algae, small fish, larger fish).
   - Show how reduced water levels can break links in this chain.

c) Climate Change Connection:
   - Explain the link between melting glaciers, reduced snowpack, and changing river flows.
   - Discuss how these changes contribute to increased flood risks in some areas.

3. Ecosystems at Risk

1. Identify different ecosystem zones on the map (e.g., forests, tundra).
2. Discuss increased wildfire risks in forested areas due to drier conditions.
3. Explain how changing water availability affects habitat conditions for plants and animals.

4. Coastal Regions

- Have participants locate coastal areas on the map.
- Discuss potential impacts of sea level rise and increased flood risks.

To scaffold the learning for participants regarding coastal regions and climate change impacts, the facilitator can:

a) Start with identification:
   - Ask participants to locate major coastal cities on the map.
   - Have them trace the coastlines of different provinces and territories.

b) Introduce sea level rise concepts:
   - Use a measuring tape to show potential sea level rise (e.g., 1 cm on the map could represent 1 metre of sea level rise).
   - Place markers or use rope to indicate areas that could be affected by different levels of sea rise.

5. Major Lakes and Freshwater Reservoirs

1. Identify large lakes and freshwater bodies on the map.
2. Discuss how shrinking freshwater reservoirs affect water supplies for human consumption and agriculture.

6. Urban Centres

1. Locate major cities on the map.
2. Discuss water supply challenges and economic impacts on communities dependent on water resources.

To scaffold the learning for participants regarding coastal regions and climate change impacts, the facilitator can:

a) City Identification:
   - Ask participants to locate major cities in Canada on the map.
   - Discuss the proximity of these cities to water sources like rivers, lakes, or coastal areas.

b) Adaptation Strategies:
   - Encourage participants to suggest water conservation measures for urban areas.
   - Discuss the need for sustainable water management practices and infrastructure adaptations.

c) Interconnected Systems:
   - Demonstrate how changes in water availability can affect urban energy production, particularly hydroelectric power generation.

4. SPECIES SPOTLIGHT

On-the Map Learning Experiences:

1. Measuring Beluga Whales with Everyday Objects
2. Cold Water, What? Corals.
3. Baby Sharks, Doo, Doo, Doo ... & Skates!

Measuring Beluga Whales with Everyday Objects

INSPIRATION

The Department of Fisheries and Oceans 2024 booklet on beluga wheels in the St. Lawrence Seaway. English | French

ACTIVATION

Begin by sharing some background information from the booklet to pique the participants' interest and curiosity:

- Explain that beluga whales are the only whale population that lives permanently in the St. Lawrence Seaway, isolated from other beluga groups since the last ice age.
- Highlight their unique features, such as their white colour, lack of a dorsal fin, and the "melon" on their heads used for echolocation.
- Discuss the importance of the St. Lawrence Seaway as a critical habitat for these whales and the need to protect this endangered species.

Activity: Estimating Sizes*

Gather the participants in an open space or classroom.

- Share the information from the booklet that an **adult beluga whale** can grow up to 5 meters long, while a calf is typically around 1.5 meters at birth.
- Ask participants to look around the room or outdoor area and identify objects that they think might be close to 5 meters and 1.5 meters in length.
- Have them line up the objects end-to-end to create a visual representation of the whale sizes.
  Hint: If you are travelling with the GFM, the borders (length and width) can serve as a reference.
- Once they have arranged the objects, have them measure the lengths using their body measurements, such as arm spans, footsteps, or heights.
- Encourage discussions about how the whale sizes compare to familiar objects or spaces they encounter in their daily lives.

NOTE: While this activity focuses on the beluga whale, any marine animal can be featured on the topic of focus:

1. Orca (Fact Sheet)
2. Right Whale (Fact Sheet)
3. Narwhal (Fact Sheet)

Participants use their creativity and problem-solving skills to visualize the sizes of beluga whales without any additional equipment. By using everyday objects and body measurements, they can better understand the scale and appreciate the whales' dimensions with their surroundings.

FACILITATOR ACTIONS

1. Read aloud excerpts from the booklet that describe the size of adult beluga whales (up to 5 meters long) and calves (around 1.5 meters at birth).
2. Encourage participants to look around the room or outdoor area and identify everyday objects or spaces close to these lengths.
3. Guide the participants in lining up the objects end-to-end or using their body measurements (arm spans, footsteps, heights) to represent the whale sizes visually.
4. Facilitate discussions about how whale sizes compare to familiar objects or spaces in their daily lives, helping them better understand scale.

ELABORATION

To strengthen the learning experience and ensure successful engagement, consider the following additional information and activities:

1. Share more details about beluga whales' unique behaviours and adaptations, such as their social nature, communication through various sounds, and ability to dive deep and use echolocation to find food.
2. Discuss the threats beluga whales face in the St. Lawrence Seaway, such as noise pollution from boats, habitat degradation, and the impact of human activities on their environment.
3. Encourage participants to brainstorm and share ideas on becoming "beluga guardians" by following the guidelines in the booklet, such as maintaining a safe distance from whales, reducing pollution, and promoting conservation efforts.
4. Invite participants to create pledges or drawings representing their commitment to protecting beluga whales and their habitat. These can be displayed or shared with others to raise awareness.

This activity helps participants to visualize the size of beluga whales. It fosters a deeper understanding of their unique characteristics, the importance of their habitat, and the role individuals can play in conservation efforts.

Cold Water, What? Corals.

INSPIRATION

The activity is inspired by the diverse and fascinating world of cold-water corals, focusing on five specific species: **Soft Corals, Black or Thorny Coral, Branching Corals, Sea Pens, and Stony or Cup Corals**. Many of these corals are found at great depths in the Atlantic Ocean Basin. Yes. That's right, there are corals off the coast of Canada. Each species showcases unique adaptations and roles within their ecosystems, highlighting the importance and beauty of cold-water coral habitats.

ACTIVATION

To bring this topic to life, the facilitator will provide background information on cold-water corals, emphasizing their ecological significance, unique characteristics, and the challenges they face. This introduction sets the stage for a deeper exploration of the five selected species, their habitats, and their roles in the marine environment.

- **Soft Corals:** Known for their vibrant colours and flexible, fleshy appearance, soft corals play a crucial role in providing habitat for various small marine organisms.
- **Black or Thorny Coral:** Characterized by their dark colouration and spiky appearance, these corals offer essential habitats for marine life, contributing to the biodiversity of their environments.
- **Branching Corals:** With their intricate, tree-like structures, branching corals create complex colonies that serve as shelter and protection for numerous marine species.
- **Sea Pens**: Resembling old-fashioned quill pens, sea pens are unique among cold-water corals for their feathery structure and significant role in stabilizing seabeds and providing habitats.
- **Stony or Cup Corals:** Featuring hard skeletons that support the colony, these corals come in various shapes and contribute significantly to marine biodiversity.

**These cold-water coral facts can be presented on formatted information cards and laminated for repeat use.*

Source: Department of Fisheries and Oceans. (2023). Bubblegum at the Bottom of the Sea: Atlantic Cold-Water Corals. [Video]. YouTube. https://youtu.be/ooUEN5_dPIU

FACILITATOR ACTION

1. The facilitator stands on the part of the map representing the ocean basin where these corals are found.
2. Show each species card and ask the participants:
   a. *What are these?*
   b. *Where in Canada do you think they would be found?*
3. Explain the ecological importance of each coral species, their role in marine biodiversity, and their specific locations along Canada's coastlines, particularly in areas like the Atlantic where cold-water corals are prevalent.

Alternate engagement approaches:

Species Card Distribution: Hand out species cards to participants, each card depicting one of the five cold-water coral species on one side and a description on the other.

Mapping Activity: On the Giant Floor Map, mark the ocean basins where these corals are found. Invite participants to place their species cards in the corresponding locations, fostering a spatial understanding of cold-water coral distribution.

Interactive Discussion: Engage participants in a discussion about the characteristics, habitats, and ecological roles of each species. Encourage them to share observations and ask questions based on the information on their cards.

Role-Playing Game: Conduct a role-playing activity where participants assume the roles of different marine species interacting with cold-water corals, highlighting the interdependence within these ecosystems.

ELABORATION

To ensure successful engagement and strengthen learning, consider incorporating the following elements:

Conservation Challenges: Discuss the threats facing cold-water corals, such as climate change, ocean acidification, and human activities. Highlight ongoing conservation (MPAs) efforts and how individuals can contribute to protecting these vital ecosystems.

Optional depending on location of set up:

Deep-Sea Exploration: Share stories and footage from deep-sea expeditions that have studied cold-water corals, emphasizing the technological advancements that have made these discoveries possible.

Art Project: Encourage participants to create their own coral models using recyclable materials, fostering creativity while reinforcing the structural diversity of cold-water corals.

Baby Sharks, Doo, Doo, Doo ... & Skates!

INSPIRATION

It is a rare occurrence when children and youth exploring the GFM fail to inquire about sharks. We typically discuss "**Sharks of Atlantic Canada**" facilitated by resources created by the Fisheries and Oceans Canada (e.g., poster, infographic, website, etc.), but recently public engagement highlighted a growing interest on the topic of *mermaid's purses*.[1]

ACTIVATION

Backgrounder: There are two types of reproduction amongst sharks, rays, and the other 'non-bony' fish (known as Chondrichthyes).[2]

1. Viviparity - live young known as pups like mammals such as dolphins, humans
2. Oviparity (Oviparous) - mothers lay undeveloped eggs in specialised cases like birds and reptiles.

Although most sharks and rays give birth to live young or pups, some sharks and skates lay eggs which are surrounded by a tough protective casing. They are typically made of collagen and may have structures like horns or tendrils to help anchor them to the seabed.

The mother deposits eggs encapsulated within a protective case in the marine environment. The embryos develop within these cases until they are ready to hatch. These egg cases can often be seen washed up on beaches and are sometimes referred to as mermaid's purses.

FACILITATOR ACTION

Introduction to Mermaid's Purses

Begin the session by introducing the concept of mermaid's purses. Explain that these are not mythical objects but are actually the egg cases of certain species of sharks and skates. Use illustrations or diagrams to show different types of mermaid's purses.

**Visual Aids will be required*

[1]Eh, Canada Travel. 2023. Mermaid's Purse Found on Topsail Beach Newfoundland.
[2]Marine Madness. (2020). A Beachcomber's Guide to Finding and Identifying Mermaid's Purses.

Giant Floor Map Interaction

Guide participants to the coastal areas on the Giant Floor Map where these species are likely to be found, particularly focusing on the Atlantic coast of Canada.

Discuss how the geographical features and water conditions in these areas contribute to the habitats suitable for the deposition of these egg cases.

Encourage questions and facilitate a discussion about the importance of these creatures in the marine ecosystem, the role of their reproduction in their lifecycle, and the impact of human activities on their survival.

A short list of species of chondrichthyes that lay eggs in egg cases along Canada's coastline, organized by ocean basin:

Ocean Basin	Species Type	Species and Details
Pacific	Skates (Family Rajidae)	Various species including Big Skate (Beringraja binoculata), known for large egg cases with multiple embryos.
	Sharks	Brown Catshark (Apristurus brunneus), typically found at deeper ocean depths, lays egg cases.
Arctic	Skates	Arctic Skate (Amblyraja hyperborea), inhabits cold, deep waters; adapted egg cases for extreme conditions.
Atlantic	Skates	Several species including Thorny Skate (Amblyraja radiata), known for egg cases often found on beaches.
	Sharks	Deepwater Catshark (Apristurus profundorum), found near the continental shelves off Atlantic Canada, lays egg cases.

References

WWF Canada. (n.d.) A comprehensive Guide to Sharks, Skates, Rays and Chimaeras in Atlantic Canada.150+ pages
Fisheries and Oceans Canada. (2018). Skate research.

Scientific Research and Citizen Science

Introduce the concept of citizen science and how ordinary people can contribute to scientific research by reporting sightings of mermaid's purses. Provide examples of how such data has helped in conservation efforts.

Examples: SciStarter: the Shark Trust, The Great Egg Case Hunt, Nature Newfoundland and Labrador, and others.

FACILITATOR ACTION

Conservation Message

Emphasize the importance of respecting and protecting marine life. Suggest ways they can help, such as participating in beach clean-ups, supporting sustainable seafood choices, and spreading awareness about marine conservation.

ELABORATION

Ecological Importance

Elaborate on the ecological role of sharks and skates in marine ecosystems, emphasizing their position in the food chain and their contribution to the health of marine biodiversity.

Conservation Challenges

Discuss the threats these marine species face, such as overfishing, habitat destruction, and pollution. Highlight the importance of mermaid purses in the reproductive cycle of these species and how protecting them can contribute to conservation efforts.

5. WATER EXPRESSIONS

On-the Map Learning Experiences:

1. The Language of Water
2. Water Words
    - Five Part Mini-Activations
3. These Water Feelings

The Language of Water (Part 1)

INSPIRATION

Approximately 71% of Earth's surface is water. Water makes Earth habitable; freshwater sustains life on land. **How do you say water in your language?**

In Part 1, participants will explore how water is named in various languages, fostering an appreciation for the diverse cultural perspectives on this vital resource.

FACILITATOR ACTION

Present a short list of examples of how water is referred to in different languages, such as Anishinaabemowin (Ojibwe), Brazilian Portuguese, Chinese, Czech, Croatian, Danish, Finnish, French, German, Haida, South Qikiqtaaluk, Inuinnaqtun, and Nunatsiavut.

Encourage participants to share how water is referred to in their own language if it's not already listed.

Short list of examples:
a. Anishinaabemowin (Ojibwe): nibi
b. Brazilian Portuguese: água
c. Chinese simplified: 水 [shuǐ]
d. Czech: & Croatian: voda
e. Danish: vand
f. Finish: vesi
g. French: eau
h. German: wasser
i. Haida: Gántl
j. South Qikiqtaaluk: imiq (drinking …)
k. Inuinnaqtun: imarmi (in the …)
l. Nunatsiavut: imak (an expanse of …)

Facilitate a discussion about the significance of language in shaping our understanding and relationship with water. Prompt questions such as:

- How does the diversity of language reflect the cultural importance of water?
- What similarities or differences do you notice in how water is named across different languages?
- How does knowing the names of water in various languages contribute to our appreciation of its importance?

WATER WORDS: MULTI- PART ACTIVATION

Dive into this multi-part exploration of water words! We've created a series of mini-activities with playful headers and engaging questions to spark curiosity and conversation. Our aim is to make learning about language and water fun and memorable for participants.

1. Same or Different?

Surf's Up (Intro):

1. Dive into the chart of water-related words across different languages.
2. Wade through the similarities and differences in how water is described.

Reflection questions:

- What similarities make a splash?
- How do these shared terms reflect our common human experience with water?

Ebb & Flow (Outro):

By exploring these linguistic connections, we gain insights into the universal importance of water and its role in shaping human societies worldwide.

2. Making Connections

Surf's Up (Intro):

1. Navigate the translations of water-related words in different languages.
2. Catch the wave of any notable differences or variations among the translations.

Reflection questions:

- What differences create ripples?
- How might these variations reflect cultural, geographical, or environmental differences among language communities?

Ebb & Flow (Outro):

Recognizing these linguistic differences enriches our understanding of the diverse ways in which water is perceived and valued across different cultures and regions.

3. Root Words

Surf's Up (Intro):

1. Submerge yourself in the translations of water-related words.
2. Unearth any words or concepts related to water that appear in some languages but are absent in others.

Reflection questions:

- Are there any words or concepts related to water that spring up in some languages but not others?
- What might account for these differences in linguistic representation?

Ebb & Flow (Outro):

Exploring these linguistic nuances prompts us to consider the cultural and contextual factors that influence how water is understood and represented in different linguistic communities.

4. Water as Teacher

Surf's Up (Intro):

1. Immerse yourself in the translations of water-related words.
2. Reflect on how language shapes our perceptions and understanding of water.

Reflection questions:

- How do you think language shapes our perceptions and understanding of water?
- How might the words we use influence our relationship with this vital resource?

Ebb & Flow (Outro):

Contemplating the influence of language on our relationship with water invites us to consider the power of words in shaping our attitudes and behaviours towards water conservation and stewardship.

5. Water Across the Ages

Surf's Up (Intro):

1. Reflect on the cultural and historical significance of water in various societies.
2. Consider how language reflects and perpetuates different cultural attitudes, beliefs, and practices related to water conservation and protection.

Reflection questions:

- How does language carry the currents of different cultural attitudes, beliefs, and practices related to water conservation and protection?

Ebb & Flow (Outro):

Wade through the cultural and historical significance of water in various societies. Consider how language reflects and perpetuates different cultural attitudes, beliefs, and practices related to water.

Chart 1. Water Words

Language	Water	Ocean	Watershed	Lake	River	Stream	Pond	Glacier	Sea Ice
Anishinaab emowin	nibi	gichigami		ziibi	ziibi	zaagi'igan			
Brazilian Portuguese	água	oceano	bacia hidrográfica	lago	rio	riacho	lagoa	geleira	gelo
Chinese simplified	海洋 [hǎiyáng]	流域 [liúyù]	湖 [hú]	河 [hé]	溪流 [xīliú]	池塘 [chítáng]	冰川 [bīngchuān]	海冰 [hǎibīng]	海洋 [hǎiyáng]
Czech	voda	oceán	povodí	jezero	řeka	potok	rybník	ledovec	mořský led
Croatian	voda	ocean	sliv	jezero	rijeka	potok	lokva	ledenjak	morski led
Danish	vand	ocean	afvandshed	sø	flod	strøm	dam	gletsjer	havis
Finnish	vesi	valtameri	vesistö	järvi	joki	puro	lampi	jäätikkö	merijää
French	eau	océan	bassin versant	lac	rivière	ruisseau	étang	glacier	glace de mer
Haida	Gántl	hlgayun		ḥlk̲uwaad	k'alawalang	diiga			
German	wasser	ozean	einzugsgebiet	see	fluss	bach	teich	gletscher	meereis
South Qikiqtaaluk	imiq	tariq	asiiq	sirmiq	amaruq	naugak	asiq	malirruq	nipaq
Inuinnaqtun	marmi	tikilisa		niqi	uqalurait	takuk	qamut	nilak	nivi
Nunatsiavut	imak	amuk	natsiata	nepi	sanajanaq	asunak			

ELABORATION

Reflective Discussion: Encourage participants to reflect on the language they use to describe water and its significance in their own lives. Invite them to consider how their cultural background influences their relationship with water.

N.B. If the group completed the Water Acknowledgement activity, you can link it to the personal acknowledgements created.

**Transition to the second part of the task.*

Part 2: Introducing the concept of water feelings.

Explain that we will be discussing the emotional and health benefits of spending time near water.

These Water Feelings (Part 2)

ACTIVATION

In Part 2, participants will explore the emotional and health benefits of being near water, encouraging reflection on personal experiences and connections with aquatic environments.

> *Research shows that being near a body of water makes us calmer and healthier. Spending time near the water, "promotes physical activity and general fitness" reducing the incidence of diabetes and other diseases associated with obesity. But it also slows down our heart rate and reduces stress hormones, boosting our mental health (Global News, 2018).*

Have you ever visited the ocean, a lake, a stream or a river? When you were near the body of water, how did you feel?

(Facilitator: encourage participants to share feelings from their lived experience. Be prepared to backfill the gap if they are not as privileged as you to have visited such a place).

→ Explore Sounds of the Ocean ←

If WIFI connectivity is available, enjoy this award-wining immersive experience that guides you on a mindful underwater odyssey. The experience connects us with the underwater world, through sound, music, visual art, dance, and poetry. You will be guided to a depth of 3000 feet beneath the ocean's surface listening to recordings of ocean life from the deep waters of Monterey Bay Canyon just off the shores of Northern California.

Disclaimer - Trigger Alert
Discussing water's effects on health, wellness, and vitality may stir various emotions and experiences. We aim to provide a safe space for dialogue, though we understand that not all narratives may be positive. While some may find water triggering, our focus is on fostering understanding of its diverse impacts.

Every individual's relationship with water is unique, and we respect differing perspectives and feelings. If you're uncomfortable sharing negative experiences, we fully respect your boundaries. However, we welcome those who feel comfortable sharing, ensuring a judgment-free environment where all voices are valued. We aim to learn from each other and explore water's multifaceted role in shaping our lives and well-being.

FACILITATOR ACTION

Encourage participants to share their feelings and experiences from being near bodies of water, such as ocean basins, lakes, streams, or rivers. Here are some questions to spark discussions:

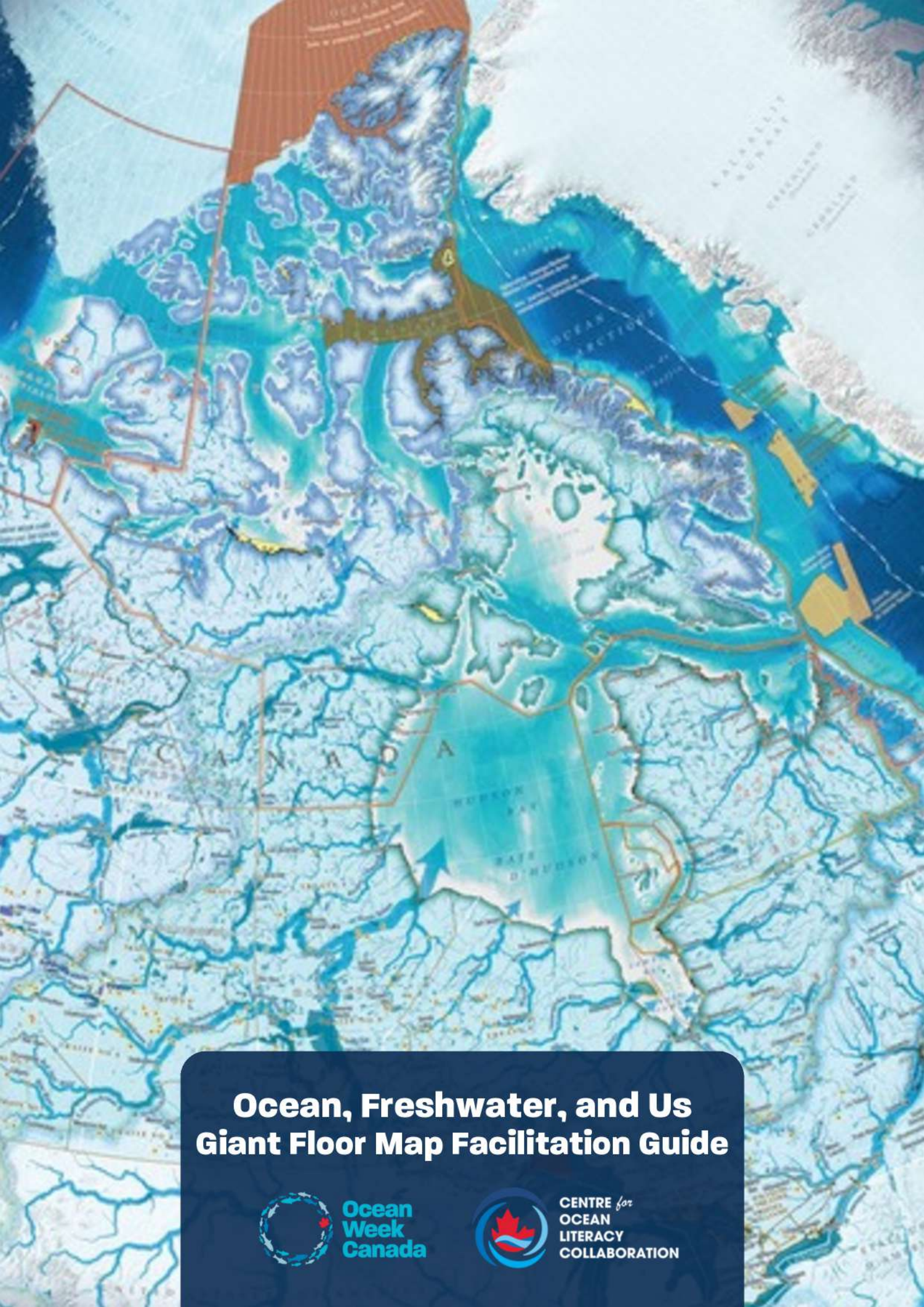
- If water could speak, what emotions do you think it would express?
  (Encourages imaginative thinking and personification.)
- How does being near a water body affect your mood or well-being?
  (Prompts reflection on personal experiences.)
- What role does water play in your life, beyond its practical uses?
  (Invites exploration of deeper connections.)
- What actions can we/you take to ensure future generations have access to clean and healthy ocean/water systems?
  (Encourages thinking about collective responsibility and stewardship.)

Facilitate a supportive environment for sharing, ensuring everyone has a chance to contribute.

ELABORATION

Conclude the session by thanking participants for their contributions and encouraging them to carry forward their mindful reflections and insights into their daily lives. Emphasize the importance of fostering a deeper connection with water to benefit individuals and the planet.

Consider displaying the emotion map as a permanent artifact of the event, creating a digital rendering that enables participants to revisit and reflect on the collective expression of emotions related to ocean and water resources long after the event.



Ocean, Freshwater, and Us
Giant Floor Map Facilitation Guide

Ocean Week Canada

CENTRE for OCEAN LITERACY COLLABORATION