

The Story of the Great Lakes

Assessment

AS/OF

Cross-curricular

Civics/Geography, mathematics & other strands in the Gr. 11 Environmental Science U/C course.

Big Ideas

Students will experience issues relating to the water quality of the Great Lakes and St Lawrence River basin, from Lake Nipigon downstream to the mouth of the Atlantic Ocean. They will explore the impacts that local and regional issues can have on the world. This activity aims to simulate the interconnectedness between various human activities (industrial and commercial, agricultural, mining, and personal), and water pollution, both indirect and direct pollution, in order to illustrate that pollution is not always visible. It also introduces students to decision-making processes in order to manage and prevent water pollution at a personal, local and national level. Students propose ways in which people can help prevent and manage pollution now and into the future.

It is also possible to do some simple science tests/observations throughout the story. For example, salinity, turbidity or pH can be measured and the data analyzed (tables, graphs). Students can also record their observations, describing what is happening and the resulting changes.

Specific Expectations

Strand C: Human Health and the Environment

C1.2 evaluate the effectiveness of government initiatives that are intended to reduce the impact of environmental factors on human health (e.g., Ontario Ministry of the Environment smog advisories; provincial laws regulating drinking water; WHMIS regulations on hazardous material)

C2.1 use appropriate terminology related to human health and the environment, including, but not limited to: contaminants, heavy metals, air pollution, and pesticide

C2.2 analyze longitudinal data to determine the impact of various environmental factors that affect human health (e.g., air temperature, atmospheric greenhouse gases, contaminants in drinking water)

C2.3 investigate, through laboratory inquiry or field study, water samples from natural and disturbed environments (e.g., tap water; pond, river, or lake water from disturbed and undisturbed areas; water from an outdoor pool), and analyze the resulting data

<p>Learning Goals Students will:</p> <ul style="list-style-type: none"> • experience the issues relating to the water quality of the Great Lakes and St Lawrence River basin; • explore the impacts that local and regional issues can have on the world; • experience the inter-connectedness between various human activities (industrial and commercial, agricultural, mining, and personal), and water pollution; <p>Success Criteria Students will be successful when they can:</p> <ul style="list-style-type: none"> • propose ways in which people can help prevent and manage pollution now and into the future. 	<p>C3.1 identify the main pollutants and environmental contaminants that can affect human health (e.g., air pollutants such as sulfur dioxide, nitrous oxide, and particulates; noise pollution; heavy metals such as lead and mercury; DDT; PCBs; mould; volatile organic compounds such as acetone and chlorinated solvents)</p> <p>C3.2 describe the effects of a variety of environmental factors on human health (e.g., air pollutants are associated with disorders such as asthma; consumption of fish products from contaminated water may lead to increased levels of heavy metals in the human body; the thinning of the ozone layer may lead to increased incidence of skin cancer; noise pollution may impair hearing)</p>
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Description

Through an interactive story, students will experience the issues relating to the water quality of the Great Lakes and St Lawrence River basin, from Lake Nipigon downstream to the mouth of the Atlantic Ocean. Hence, students will explore the impacts that local and regional issues can have on the world and experience the inter-connectedness between various human activities (industrial and commercial, agricultural, mining, and personal), and water pollution, both indirect and direct, in order to illustrate that pollution is not always visible. Students will be asked to make decisions in order to manage and prevent water pollution at a personal, local and national level.

Materials

A map showing the Great Lakes and St Lawrence River basin.
 One clear container (4 to 5 litre capacity) filled half-way with clear water.
 One film canister or small container (not clear) per student.

Dental floss	green/red food colouring
Litter	baking soda
Vinegar	lemon juice
Salt	muddy water
Water	mushed up chocolate

Dish soap
 Cloudy water and paper

Safety Notes

Keep vinegar and lemon juice away from open cuts- they can sting
 Green and red food colouring can permanently stain clothing.

Introduction

As students look at a map of the Great Lakes and note that they are all connected, teacher will introduce the topic of the importance of the Great Lakes and St Lawrence River basin as a home for many species of animal and plant, and our reliance on the water body. For example, illustrate that this basin is the largest freshwater ecosystem in the world (holding nearly 20% of the world's freshwater), approximately one third (over 30%) of Canada's population and 10% of the U.S. population live in the basin.

Before reading the story of the Great Lakes, ask students whether they would rather work towards not polluting the water or whether they would rather clean/filter it afterwards. Students should be able to also explain the reason(s) they choose the options that they do.

Action

1. Prepare one labelled canister per student. There are 18 possible land uses/characters, therefore you will need to double up on some land uses/characters (e.g. Tourist) to ensure that every student has a role.
 2. Place large clear container, half filled with water, where all the students can see it.
 3. Distribute a canister to each student. Ensure that the canisters are not opened.
 4. Explain to the students that they are each a character in "The Story of the Great Lakes and St Lawrence River" and that when their character is mentioned, to empty the contents of their canister into the large container.
 5. Read the story attached. Emphasize the land uses/characters (in bold) and point to certain locations on the map. While reading the story, ask questions such as:
 - i. How does the water look to you?
 - ii. How do we determine water quality?
 - iii. Do you think the water is safe to drink? swim in? eat fish from? boat on?
 - iv. Is it safe for plants and animals? How do you determine if the water is safe for plants and animals?
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Consolidation/Extension

Discussion questions/activities:

Whole class:

1. What is pollution?
2. Who's polluting the Great Lakes and St Lawrence River basin? Do you think this is a real situation? Do you see pollution in our local river or lake? Is pollution always visible?
3. What did you see happening in the story? What would be a better ending to the story?
4. How did you feel about the changes that were occurring along the stream flow? Did you want to swim, eat fish, boat, or drink the water along the stream flow?
5. How is the pollution on a local scale having an impact on water quality across the world? Use the globe to emphasize that all the water bodies in the world are connected by water currents. As well as mention the water cycle.

Individual/small group (ensure each student has a copy of the story and handout):

1. How does the pollution affect you personally?
 2. My/our ideas about:
 - i. the impacts and significance of each pollutant.
 - ii. removing any of the pollutants to clean up the water. Which pollutants are possible to remove? Why/why not? Who is responsible for cleaning up?
 - iii. the possibility of preventing pollutants in the story. Can any of the pollutants be prevented? How?
 - iv. whether it is easier to prevent pollution or clean up afterwards?
 - v. those problems that could potentially cause water pollution in our area.
 - vi. ways that people in the local area can improve the water quality.
 3. How can each of us prevent pollution and improve the health of the Great Lakes and St Lawrence River basin?
 4. Is there a relationship between the number of people and pollution? Why?
 5. Investigate current strategies and action groups at the local, regional and national (Canada and America) levels that help manage and prevent pollution of the Great Lakes and St Lawrence River basin.
 6. Investigate who uses the water and how pollution may affect the use.
 7. What other challenges is the basin facing, now and in the future? (For example, the impact that invasive species have on the ecosystem.)
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Resources

Environment Canada. *Great Lakes Kids*. Retrieved from
http://www.on.ec.gc.ca/greatlakes/For_Kids-WS4DB7BBAD-1_En.htm