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## Grade 8: Water - Environmental and Social Impacts: Let's make our planet better, one drop at a time!

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### Experience 1: A Look at Global Goals

#### Overview

In this STEM-based, engaging activity, students get an opportunity to embark on a journey in which they will discover how various human developments impact our watersheds and our water and evaluate the quality of drinkable water and the factors that may affect it.

They will start by exploring the UN's and Canada's sustainability goals and their importance, putting emphasis on the goals relating to water quality and the importance of protecting water. This is important so they can see that the world appreciates that we do need to take immediate actions to remedy the situations and make our planet a better place to live. (1 period of 75 minutes)

They will then get to choose specific aspects of various drinking water sources and conduct tests and experiments to evaluate the quality of water from their community's bodies of water. They will compare their findings to Canadian standards. (2 periods of 75 minutes)

Students will then explore how developments and anthropogenic factors can impact Ontario's water quality. This will be accomplished through a case study to understand the impact of Enbridge's line 5 on the Great Lakes which has and will continue to have detrimental effects on all that rely on that fresh source of water. They will then use their findings to build a model of the affected watershed and of the pipeline. (3 periods of 75 minutes)

In the final step, familiarize themselves with the wastewater treatment process. They will then go on to code, using Scratch, an animation that will enable them to simulate a step or more in the process of wastewater treatment, to mimic a situation of an oil spill in Lake Erie or Lake Ontario or to raise awareness about an issue related to the water quality of their choice based on what they would like to emphasize (2 periods of 75 minutes).



[Long Range Plan Grade 8 Model 1; December/January. Big Idea: Water](#)

Overview of learning	In this activity, students will start the journey by exploring the UN's and Canada's sustainability goals and their importance, putting emphasis on the
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<p>experiences – why these activities</p>	<p>goals relating to water quality and the accessibility of drinking water. (1 period of 75 minutes)</p> <p>Big Idea: Water - Environmental and Social Impacts:</p> <p><a href="#">LRP Grade 8 Model 1 - December/January</a></p> <p><a href="#">LRP Grade 8 Model 2 - December/January</a></p>
<p>Prior Knowledge / Prior Skill Set(s)</p>	<p>Background Knowledge and Concepts (Teacher) - Additional teacher concept support</p> <ul style="list-style-type: none"> <li>● Students should have a basic understanding of the main properties of fluids (for example, that oil and water don't mix).</li> <li>● Students should know that they will be exploring important issues studied in the module on hydrographic systems.</li> <li>● Canada shares the Great Lakes with parts of the United States (for example a few years ago the Canadian and American authorities learned to make changes to the Boundary Waters Treaty of 1909, which would have diverted some of the water from the Great Lakes to other parts of the United States or pick it up).</li> <li>● Students need to understand what watersheds are and have an appreciation for their importance.</li> <li>● Students need to remember that access to resources and clean water is an important issue all over the world and is being highlighted by the United Nations.</li> <li>● Students and teachers should have a basic understanding of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (see the Additional Resources section for more information).</li> <li>● Teachers should be familiar with the 1977 Pipeline Treaty (see the Additional Resources section for more information).</li> <li>● Students and teachers should be familiar with the Truth and Reconciliation Commission's Calls to Action (see the Additional Resources section for more information).</li> <li>● Teachers should understand that the treaty partners in Ontario who are affected by the Line 5 and Highway 413 extensions (see Experience 3) are the Mississaugas of New Credit, Six Nations of the Grand River, Chippewas of Georgina Island First Nation, and the Mississaugas of Scugog Island First Nation.</li> </ul>

	<p>Background Knowledge and Skills (Students) – Addressing misconceptions and preconceptions</p> <ul style="list-style-type: none"> <li>• The <b>Engineering Design Process</b> will be applied in this unit. The students should know how to conceive a design fitting established criteria and put to test their critical thinking skills. By going through this process, students will experience firsthand what it takes to create a successful product and what innovation is.</li> <li>• Students will also use their <b>communication and presentation skills</b> to communicate and present their ideas and findings.</li> <li>• Students will use their <b>social skills</b> as they will work in groups to explore various topics.</li> <li>• Students will use and reinforce their <b>research skills</b> as they find answers to their questions and solutions to the presented problems.</li> <li>• Students should also have basic <b>programming skills</b>.</li> </ul>
<p>Strand A - <a href="#">STEM Investigation and Communication Skills</a></p>	<p><b>A1. STEM Investigation and Communication Skills</b>  use a scientific research process, a scientific experimentation process, and an engineering design process to conduct investigations, following appropriate health and safety procedures</p> <p>① <b>A1.1 Scientific Research:</b> Review previous research on local watersheds</p> <p>🗨️🗨️ <b>A1.5 Communication:</b> Communicate their observations and conclusions of their model and explain how this will affect ecosystems, watersheds, and species</p>
<p>Overview / Big Ideas/Fundamental Concepts</p>	<p>Students will be introduced to the UN’s sustainable development goals and will develop their social and presentation skills as they learn about those.</p>
<p>Learning Goals / Success Criteria</p>	<p>There are a few assessment opportunities in these lesson parts:</p> <p><b>Assessment FOR learning</b> - the group work and presentation. The teacher can use the provided presentation on <a href="#">Presentation Skills</a> to go over basic presentation skills and use it to build together with the student success criteria for the students.</p> <p>They can do a similar exercise for social skills.</p>

	<p><b>Ministry of Education Key Points</b></p> <ul style="list-style-type: none"> <li>● <b>STEM Skills and Connections:</b> Perspectives and approaches that provide opportunities for students to investigate and apply concepts and skills from all areas of learning.</li> <li>● <b>Research and Experimentation Processes:</b> Provides students with the scientific literacy skills needed to approach scientific questions that are becoming a part of everyday life.</li> <li>● <b>Engineering Design Process:</b> Provides students with support to plan and build solutions to problems or address needs that connect to the curriculum and the world around them.</li> <li>● <b>Hands-on, Experiential Learning:</b> Includes hands-on, experiential learning opportunities to support classroom activities that encourage curiosity</li> <li>● <b>Coding:</b> Allows students to explore a wide variety of science and technology concepts and contexts through coding, while also learning valuable skills related to the automation and control of systems.</li> </ul>
<p>Learning Experience(s)</p> <p>① <b>A1.1</b></p>	<p><b>A LOOK ON GLOBAL GOALS</b></p> <p>See <a href="#">Appendix A: Student Activity Guide</a> for this activity.</p> <p>The teacher can start by questioning the students and giving them a chance to think and answer. Here are some examples of questions the teacher can ask.</p> <ul style="list-style-type: none"> <li>● What do you think our planet will look like in 30 years? 50 Years?</li> <li>● Are we doing a good job as human civilians to protect our planet for future generations?</li> <li>● What are our leaders doing to ensure our planet is sustainable? What does sustainability mean?</li> </ul> <p>The teacher then introduces keywords such as sustainability, stewardship, and development. Options include</p> <ul style="list-style-type: none"> <li>● Assign 3 students at random and ask each to find the definition and share them in turn to the class.</li> </ul>

<p>  <b>A1.1</b>    <b>A1.5</b> </p>	<ul style="list-style-type: none"> <li>As a class, those keywords should be defined: Sustainability and Stewardship: The curriculum’s definition (<a href="#">p.64 of the curriculum document</a>).</li> </ul> <p>The teacher can then present the UN’s sustainability goals through any of these:</p> <ul style="list-style-type: none"> <li>Video Option 1: this introductory video, entitled <a href="#">UN Sustainable Development Goals – Overview</a> is an animation that summarizes the goals in a visual manner</li> <li>Video Option 2: <a href="#">World’s Largest Lesson</a> Global Goals</li> </ul> <p><b>Group Activity</b> Students explore what the UN's <a href="#">Sustainable Development Goals</a> (SDGs) are and explore the website for resources. Students should also consult <a href="#">The Canadian Indicator Framework for the Sustainable Development Goals</a> to understand the Canadian targets and indicators related to the SDGs.</p> <p>Divide the class into 4 groups and let each group explore one of the following select goals related to water and the environment: 6, 9, 11 and 14.</p> <ul style="list-style-type: none"> <li>Students are to summarize their findings to the class using chart papers.</li> </ul> <p><b>Class presentations:</b> The students are to present, in their own words, their summary. Some of the main points that should be present include the following:</p> <ul style="list-style-type: none"> <li>What are the targets and objectives of this goal?</li> <li>Why this goal matters and the main facts and figures to support their opinions.</li> <li>Some examples showing how it can be achieved around the world and in Ontario.</li> </ul>
<p>Science and Technology Expectations</p>	<p><b>Overall &amp; Specific Expectations from the Science and Technology curriculum</b></p> <p><b>D. Structures and Mechanisms</b> D1.2 assess the impact on individuals, society, and the environment of alternative ways of meeting needs that are currently met by existing systems, taking different points of view into consideration</p> <p><b>E: Earth and Space Systems</b> E1.1 assess the social and environmental impact of the scarcity of freshwater, and propose a plan of action to help address freshwater</p>

	<p>sustainability issues</p> <p>E1.3 assess the impact of scientific discoveries and technological innovations on local and global water systems</p> <p>E2.3 explain how human activity and natural phenomena cause changes in the water table</p>
Science and Technology Vocabulary	<p>Specific vocabulary that will be used and/or covered in this learning experience</p> <p>Engineering Design Process</p> <p>Scientific Process</p> <p>System</p> <p>Sustainability</p> <p>Watershed</p> <p>Development</p> <p>Stewardship</p> <p>Model</p> <p>Simulation</p> <p>Block Coding</p> <p>Infographic</p>
Equipment and Materials	<p><b>Materials needed</b></p> <ul style="list-style-type: none"> <li>● Computer with access to Internet (for the YouTube videos)</li> <li>● Projector</li> <li>● Speakers</li> <li>● Chart papers</li> <li>● Markers</li> </ul>
Timeline and Preparation	<p><b>Preparation time:</b> 20 minutes</p> <p><b>Time for learning experience:</b> 1 period of 75 minutes</p>
Safety Considerations	<p>Refer to these safety resources:</p> <ul style="list-style-type: none"> <li>● <a href="#">Safety in Elementary Science and Technology (STAO)</a></li> <li>● <a href="#">Safe Activity Foundations in Education Document (SAFEdoc) Science and Technology, Grades 1-8 (OCTE)</a></li> <li>● <a href="#">Ontario Curriculum Program Planning – Health and Safety</a></li> </ul>

<p>Opportunities For Assessment</p>	<p><b>Group Activity</b></p> <p>There are assessments <b>FOR</b> learning opportunities in this part.</p> <p>As the students are working in their respective groups to study their SDGs, the teacher can use triangulation to assess their knowledge as they share their ideas and assess their social skills as they interact with others, giving constructive feedback.</p> <p><b>Class Presentation</b></p> <p>Assessment FOR learning - the group work and presentation. The teacher can use the provided presentation (<a href="#">Basic Presentation Skills</a>) and use it to build together with the student success criteria for the students. Students can do a similar exercise for social skills.</p>
<p>Instructional Strategies and Adaptability</p>	<p>21<sup>st</sup> century learning strategies UDL Differentiation <a href="#">Ministry of Education Transferable Skills</a></p> <p>Studying the Sustainable Development Goals highlights an important transferable skill, that of “Global citizenship and Sustainability” as they see the United Nations coming together to create the goals that will make our planet a better place to live.</p> <p>They also see what Canada and Canadians (themselves!) should be doing to respect and achieve those goals.</p>
<p>Additional Supporting Resources</p>	<p><a href="#">UNDRIP</a></p> <p><a href="#">Truth and Reconciliation Commission - Call to Action</a></p> <p><a href="#">1977 Pipeline Treaty</a></p> <p><b>A look on global goals</b> <a href="#">United Nations “Sustainable Development Goals.”</a></p> <p><b>Introduction to sustainability goals and to the activity</b> <b>Overview video:</b> <a href="#">“UN Sustainable Development Goals - Overview.”</a></p>

	<p><b>An alternative video:</b>  <a href="#">“The World’s Largest Lesson   Global Goals.”</a></p> <p><b>The Ontario science curriculum:</b>  <a href="#">The Ontario Curriculum, Grades 1-8: Science and Technology.</a> Toronto: Ministry of Education and Training, 2022 (consult p.64)</p> <p><b>Group activity</b>  Government of Canada, Statistics Canada. <a href="#">“The Canadian Indicator Framework for the Sustainable Development Goals.”</a>  Www150.Statcan.gc.ca, 22 June 2021,</p>
Cross-Curricular Opportunities	<p><b>Literacy:</b>  Many of the activities involve reading news articles, presenting, and communicating in English or French using the proper terms and vocabulary.</p>
Future Opportunities / Next Steps	<p>After these activities, students are encouraged to explore Sustainable Development Goals that were not explored in these lessons and make links with the other Units. They can study how development (highways, suburban expansion) affect elements of our biosphere (for example, their impact on the accessibility of healthy food choices to Canadians).</p>



## **Appendix A: Student Activity Guide**

## A LOOK ON GLOBAL GOALS!

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Together, we can make  
OUR world a better  
place to be!**

Have you heard of the United Nation's sustainable development goals?

What a wonderful initiative put together by the various nations with the objective of making our planet a better and more resilient place!



Source: Image by [Henning Westerkamp](#) from [Pixabay](#)

How does Canada fit in those SDGs? What is our country doing?

All these are questions that you will get to explore through this activity. We will be putting emphasis on specific goals relating to water quality and water protection.

### **Introduction to sustainability goals and to the activity**

Take a moment to think about the following questions – let's discuss them as a class!

What do you think our planet will look like in 30 years? 50 Years?

What are our leaders doing to ensure our planet is sustainable?

Are we doing a good job as responsible civilians to protect our planet for future generations?

What does sustainability even mean?

Do your research to define the following words:

Sustainability: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Stewardship: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Development : \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



# SUSTAINABLE DEVELOPMENT GOALS



Source: Source: <https://www.un.org/en/sustainable-development-goals>

Let's watch together and learn about the UN's Sustainable Development Goals!

### Group activity

In your groups, you will be assigned **ONE** goal to study. You will then **present** what you have learned about this goal to your classmates! You can use the following table as a guide and

write the essential elements on the provided **chart paper** to present and hang in the class!  
Use the following links to begin your research:

*Sustainable development goals | united nations.* (n.d.). Retrieved September 9, 2022, from <https://www.un.org/en/sustainable-development-goals>

*The Canadian Indicator Framework for the Sustainable Development Goals.* (2021, June 22). Retrieved September 9, 2022, from <https://www150.statcan.gc.ca/n1/pub/11-26-0004/112600042021001-eng.htm>

### **UN's Sustainable Development Goals: Summary of my findings!**

**My teammates**

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<b>My notes/brainstorming Plan/ Layout of chart paper</b>

<b>Our assigned SGD goal</b>	
<b>What is the main objective of this goal</b>	
<b>Information to support the need for this goal</b>	
<b>Why does this goal matter</b>	
<b>What is Canada doing about it?</b>	
<b>How does this goal touch on the ongoing</b>	

<b>issue of climate change?</b>	
<b>Other important information</b>	