

Pollution



Focus: Students will explore the causes and effects of air and water pollution, and suggest personal actions they can take to reduce pollution.

Specific Curriculum Outcomes

Students will be expected to:

- 22.0 explore ways to protect and improve the quality of air and water in the environment [GCO 1/3]

Performance Indicators

Students who achieve these outcomes will be able to:

- plan and carry out actions as a class that may reduce pollution, and explain the importance of pollution control

NOTES:

Attitude Outcome Statements

Encourage students to:

- be sensitive to the needs of other people, other living things, and the local environment [GCO 4]

Cross-Curricular Connections

Social Studies

Students will be expected to:

- demonstrate an understanding of how individuals and groups have contributed to change [2.1.2]
- describe how people's interactions with their environment have changed over time [2.4.2]
- demonstrate an understanding of sustainable development and its importance to our future (local, national, and global) [2.4.3]

Math

It is expected that students will:

- construct and interpret concrete graphs and pictographs to solve problems [2SP2]

English Language Arts

Students will be expected to:

- select, read, and view with understanding a range of literature, information, media, and visual text [GCO 4]
- respond critically to a range of texts, applying their understanding of language, form, and genre [GCO 7]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Science Card 11 • IWB Activity 9 • Science Card 12	• bottle of dirty water • bottle of clean water • students' Science Journals	• Collect a sample of polluted water or mix soil with tap water in a bottle. • Find videos of air and water pollution associated with human activities. (optional) • Gather resources (e.g., books and Websites) related to pollution. • Make arrangements to visit a local water treatment facility, or invite a worker from the facility or an expert on water pollution to visit the class. • Invite an Elder or an Indigenous Knowledge Keeper to discuss how air or water pollution has affected their traditional way of life.	• pollution • polluted

Science Background

- In Canada, Newfoundland and Labrador has the lowest levels of the six most common air pollutants: sulphur oxides, nitrogen oxides, volatile organic compounds, ammonia, carbon monoxide, and particulate matter.

Air Pollutants	Sources
sulphur oxides, nitrogen oxides, and carbon monoxide	- oil and gas industry - transportation industry - other industries (includes mining) - fossil fuel use for heating and electricity production - burning of firewood
volatile organic compounds	- same sources as above for sulphur oxides, nitrogen oxides, and carbon monoxide - paint and solvent use - agriculture - off-road vehicles
ammonia	- agriculture; livestock waste and decomposing plant matter
particulate matter	- burning firewood - construction - dust from roads (paved and unpaved)

- Sources of water pollution include: industrial discharges or spills, untreated sewage, agricultural runoff, leaks in fossil fuel storage tanks or pipelines, storm water overflows, deposition of airborne pollutants (e.g. sulphur oxides dissolving in water to form acid rain), and plant and animal decomposition.
- In Newfoundland and Labrador, boil water advisories are usually issued as a result of contamination of the water supply with Giardia. Giardia is a parasite that enters the water supply by contaminated wildlife using a surface water source, and cannot be killed by other disinfection methods, such as water chlorination.

Possible Misconceptions

- It is unusual for students to have thought about pollution at this age or formed any misconceptions. Many people believe that air pollution or pollution in general is a major contributor to climate change. The reality is that most climate change is due to elevated levels of carbon dioxide in the atmosphere. This greenhouse gas absorbs and retains heat from the sun, raising the temperature on Earth.

ACTIVATE

Water Pollution

Bring in a bottle of dirty water (collect a sample from the environment, or mix soil in with tap water) and a bottle of clean water. Pass the bottles around and ask students which they would like to drink, bath in, or give to



a pet. Introduce the terms “pollution” and “polluted” and add them to the Word Wall. Ask:

- **How are people, animals, and/or plants affected by the pollution?**

When students have finished offering suggestions, lead them to an awareness of how important it is to their lives to have clean water.

CONNECT



What Does Pollution Do?

Share Science Card 11 with the students. In addition, you might watch videos of air and water pollution associated with human activities. Prompt discussion of the implications of pollution on humans and wildlife by asking questions such as:

- **Would you like to use this water? Why?**
- **Would you like to breathe this air? Why?**
- **Do you think water pollution would affect animals and fish? How?**
- **How do you think air pollution affects animals and/or plants?**

Divide the class into small groups. Have each group choose an aspect of pollution that interests them, and then write a specific question to which they can find an answer. Students can record their question in their Science Journals. Provide resources such as books and Websites, and instruct students to search for information related to the question they posed. When research is complete, students can share their research with their classmates by giving a class presentation, or creating a Webpage or poster.



Clean It Up!

Take students on a field trip to a local water treatment facility. Alternatively, have a worker from such a facility or an expert on water pollution visit the class. As a class, brainstorm questions students would like answered. After the trip/visit, discuss with students why using water wisely is important. Review the pictographs students created in *Water at Home* (see page 72) and help them to interpret the graphs to analyze their water consumption at home. Prompt deep thinking by wondering aloud about water use and water pollution. For example, you might say:

- **I wonder why I can't use all the water I want if we clean it up afterward?**
- **I wonder what happens to the stuff that they take out of the water?**
- **I wonder why we sometimes have to boil our water?**

Have the class create a bulletin board presentation summarizing what they learned during their trip/the visit. Revise and add to the unit KWLN chart whenever possible.

What Causes Pollution?

Divide the class into small groups. Direct the groups to brainstorm ways in which water and air might become polluted. Provide materials for students

IWB Activity:

- Students can use
- IWB Activity 9: *Helpful or harmful?* (see the
- Teacher's Website) to
- identify activities that
- are helpful or harmful
- to the environment.



to record their ideas. When the groups have finished brainstorming, come together as a class and invite each group to share their ideas. Create a class list of ideas in a central location.

Have the class vote on which idea is most interesting to them. Write this in a large format and post it in the classroom (e.g. air pollution comes from cars). Then, divide the class into small groups and have the students conduct research to find out if pollution actually happens the way they think it does. Provide resources and time for students to conduct research to check the validity of their ideas. Remind students to keep records of what they find, and that they will be expected to share their information with the rest of the class.

After the groups have shared their findings, return to the statement you posted. Ask students if their idea was completely correct, a bit correct, or not correct at all. Have them explain their choice. Then, invite them to revisit their statement and revise it, based on what they learned.

CONSOLIDATE



Let's Keep It Clean!

Invite an Elder or an Indigenous Knowledge Keeper to discuss how air or water pollution has affected their traditional way of life.

Share Science Card 12 with the class. Discuss the questions on the card as a class. Then, ask students to suggest ways they, as a class, might act to reduce pollution and, therefore, protect our environment. Then, work with the class to create a plan to carry out their idea. For example, students might start a recycling program, reduce the use of paper, or walk to school more often. Students could create a poster campaign to encourage others in the school or community to take action to reduce pollution.

EXPLORE MORE

What If?

Challenge students to draw, build a model, or relate a story in order to communicate their ideas of how their community would be affected if we do not act in ways that protect our water and air. Provide materials, books, and online resources for students to use as needed.

WRAPPING UP THE UNIT



Revisit any remaining questions posted on the I Wonder Wall and have students discuss answers in small groups or with a partner. If there are questions which cannot be answered at the time, these can remain on the I Wonder Wall for students to research independently. Discuss what the students have learned about the three states of water; moisture in the environment, in materials, and in living things; changing air conditions; and ways to protect and improve the quality of air and water in the environment.