Grade 2: What is Pollution? Lesson Plan

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Lesson Plan

Estimated Time Needed: 60 minutes

Included Resources: Handout and Lesson Slides

Grade: 2	**Curriculum Area:** Science
Strand: B. Life Systems: Growth and Changes in Animals **E. Earth and Space Systems:** Air and Water in the Environment	**Unit:** Pollution and Human Impact

Curriculum Expectations

Overall Expectations:

A1. STEM Investigation and Communication Skills: use a scientific research process, a scientific experimentation process, and an engineering design process to conduct investigations, following appropriate health and safety procedures.

B1. Relating Science and Technology to Our Changing World: assess ways in which animals have an impact on society and the environment and ways in which human activities have an impact on animals and the places where they live.

E1. Relating Science and Technology to Our Changing World: assess ways in which humans' actions impact the quality of air and water, and create plans to protect these resources.

Specific Expectations:

A1.1. use a scientific research process and associated skills to conduct investigations

A1.2. use a scientific experimentation process and associated skills to conduct investigations

A1.4. follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials

A1.5. communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes

B1.2. assesses the impacts of various human activities on animals and the places where they live and describes practices that can minimize negative impacts.

E1.1 assess the impact of human activities on air and water, taking various perspectives into consideration, including those of First Nations, Métis, and Inuit, and plan a course of action to protect the quality of the air and/or water in the local community.

Content Strand(s) Science concept explanation:

Pollution is... When something that doesn’t belong enters into an environment and brings harm. Pollution can come from nature, but most often, it is made by humans. Types of pollution include:

- Air pollution
- Water pollution

- Land pollution
- Also, Noise. Light & plastic pollution

Today, we will explore air and water pollution and its effect on animals and the places they live.

(See activity follow-up for further explanation of concepts)

Prior Learning:

Students will need to have prior knowledge of the properties of water and air and understand the basic needs of living things, including animals, humans, and vegetation.

Part 2: Lesson Preparation

Safety Considerations:

Food colouring may spill and get onto tables, clothes, and skin. Students will use goggles, gloves, and aprons to protect their eyes, skin, and clothes to prevent this. The teacher should also be aware if there are any food colouring allergies in the class. Put a tablecloth on the table to prevent the food colouring from dying and protect the table. Another safety issue which could occur is that a student could trip on the wire. To prevent students from tripping on the wire, the teacher will place the wire on the other side of the students and stand beside the wire to prevent students from going near it. Also, the mist-maker would be plugged into the closest outlet, and the table would block the wire and outlet. Lastly, to prevent mishaps, the teacher will review all the safety rules and experiment with the students.

Environment Considerations:

Most materials, such as plastic and wood, will be reusable to minimize waste. To minimize paper waste, only one tissue paper and one experiment worksheet will be provided per table. To avoid energy waste, the mist maker will not be plugged into the outlet until the mini mist maker is placed into a smaller, clear container. To avoid waste of water, the water for the smaller clear container will be pre-measured into a larger bottle; also, when cleaning the materials, the sink will be filled up with water, and all the materials from every container will be cleaned at once to avoid the waste of water. For the experiment, we can address that since we are speaking about pollution, reusing materials, and reducing the one-time use of materials. To avoid pollution, the teacher will be using environmentally friendly food dyes instead of harmful chemicals to avoid water pollution when cleaning out the materials.

Consideration for Differentiation:

- Gloves are provided for students with texture sensitivities.
- Answering questions can be provided vocally rather than in writing, or the option to draw out their response can be provided if needed.
- Students who may experience social anxiety due to group work because of fear of uneven participation or performance anxiety due to fear of embarrassing themselves will be reminded that the terrarium experiment is about students connecting with lessons, and the students try their best and work together. Students who experience social anxiety can be instructed to write observational notes for the experiment or can opt out of the experiment and participate in an

alternative experience. The alternative experience will be students watching a video of a factory creating pollution and the students writing observational notes on what they are observing and filling out the worksheet based on what they have observed in the video

- Activity is done in groups to minimize intimidation.

Considerations for EDI and Indigenization:

- Representations of people are from various backgrounds in the worksheet provided
- Content is linked to Indigenous concepts as to how we are to be curators of the land. In addition, caring for our water is a strong Indigenous value. See Autumn Peltier | I am Indigenous: "[Water] hurts every day. … She is sick". We need water, and we need to care for our water.
- In follow-up activity: the sticker design can be done either online on Canva or by drawing if access to technology is not feasible for students.

Part 3: Activity Plan

Materials:

- Printed *My Scientific Investigation* worksheets for each group of students (see resources)
- Clear large plastic container
- White rocks/pebbles
- Miniature white wooden house
- Large White tissue paper
- Fake grass clippings

- Smaller clear container to fit mini mist maker
- Miniature animals (best if white)
- Miniature toy produce
- Water to fill the small clear container
- Food dye
- Mini mist maker
- Experiment worksheet
- Toothpicks
- Googles
- Gloves
- Aprons
- Paper towel

Equipment:

- A table
- Electrical Outlet
- Tablecloth

How will the Materials be Stored, Distributed and Collected Back?

- All the smaller materials will be stored in the larger plastic container. The rocks, grass, animals, houses, and food dye will be stored in separate plastic containers inside the larger container.
- Teacher will pre-make the kits prior to the lesson, and each kit will be placed on a table.

- When the experiment is done, all materials except the mini mist maker and the tissue paper will be placed back in the larger container. The students will throw out the tissue paper, and the mini mist will be left beside the kit. The teacher will leave the kits on the table and collect them during recess so that the teacher can clean them.
- All tables will be arranged to need an electrical outlet, and they will be pushed against the outlet to avoid tripping. Three to four students will be assigned to each table.

Teacher Instructions:

1. Before students enter the classroom, move each table close to an electrical outlet. You can put two tables beside each other to use both electrical outlet sockets.
2. Put tablecloths on the tables.
3. Place one premade kit and an experiment worksheet on each of the tables.
4. Take out the mini mist maker and put it beside the larger container.
5. Set up an experiment kit for yourself so you can show the students step by step.
6. Since all tables are labelled by colour, instruct the students to go to the regular tables they sit at; they will know their tables due to the colours. You can split the students from the remaining tables if there are insufficient outlets and missing tables.
7. Instruct one student from each table to collect goggles, gloves, and aprons for every table member.
8. Instruct students to wear their PPE and explain the safety rules of partaking in an experiment.
9. Instruct the students to remove all materials from the large plastic container.
10. The students can use the rocks, fake grass, miniature houses, miniature animals, and miniature produce to make a mini terrarium in the large plastic container.

11. Instruct the students to make space for their smaller plastic containers.

12. When students are done making the terrarium, they can take the large white tissue paper, scrunch it up, and stretch it out to look like a large cloud.

13. Instruct students to place the tissue paper on the side of the table.

14. When they have finished with the white tissue paper, instruct the students to fill their mini containers with water from the sink and place the mini container in the larger container.

15. Each container will contain three different food dye colours. Instruct the students each dye represents a chemical and the smaller clear plastic container represents a body of water, like a lake, ocean, or river.

16. Instruct the students to squeeze the food dye bottle over the small water container so five drops of dye fall into the water.

17. To mix the dye into the water, instruct the students to use the toothpick to mix the dye and water.

18. Instruct the students to raise their hands when they mix the dye and water.

19. Show all the students the mini mist maker and instruct them that it represents a factory, machine, or boat that produces smoke to work.

20. Ask the students to guess what they think will happen once you put the machine in the water and turn it on. Ask them what they think will happen to the water and the terrarium.

21. Instruct them to write their guess on their *My Scientific Investigation Worksheet* (see resources).

22. When a table mixes the dye and water, go to the table, put the mini mist maker in the water container, and plug it in.

23. Once the mini mist is plugged in, instruct the students to cover the larger container with tissue paper and ask them to watch what happens. Students should be able to observe the mist going to the tissue paper, and it will start to rain inside the large container.

24. After about a minute, you can ask the students to remove the tissue paper so they can observe what else is happening. (They should see mist/smoke coming from the mist maker).

25. Instruct the students to raise their hands when their mist maker stops making mist and go around and unplug and remove the mist machines for the students when they stop making mist.

26. Instruct them what they have noticed happening inside the terrarium and write down their answers on the worksheet.

27. Instruct them why that happened and for them to write down their answers on the worksheet.

28. After they have written their answers, this is the time to explain the effects of pollution and how smoke from factors spreads to the clouds, that rain will be contaminated with the chemicals, and the chemicals will go on the plants, houses, water, animals, and land.

29. Instruct for one student from each table to throw out the tissue paper.

30. Instruct the students to leave the remaining materials in the larger container.

31. Instruct students to remove and throw out gloves if they used them.

32. Instruct students to remove goggles and aprons and place them in a big container.

33. When recess is over, gather all the materials, fill the sink with water, and pour the materials into the sink to wash them.

34. Place the paper towel on the counter and dry the materials.

Part 4: Follow-up and Resources

Questions to Ask Students:

- What happened to the environment?
- How did this affect the animals & the vegetation?
- What would happen if someone was breathing this air or drinking this water for a long time?
- What could have been done to prevent this?
- What are ways that technology could have improved this situation?

Activity Follow-up:

Explain: During & after activity:

Air pollution is when small bits **(particles)** of gasses get stuck in the air. Sometimes it can look like **smog** (*show picture), which makes it hard to see outside. (Ask students what they think will happen if they breathe in this dirty air for a long time.) If we breathe in this bad air for a long time, it can be very bad for our health and can bring cancers & diseases to our heart & lungs. An example of where air pollution can come from is when you see smoke from factories entering into the air.

Water pollution is when waste, chemicals and other bad **particles** cause a body of water to damage the fish and animals that need the water to survive. Water pollution can also disrupt nature's water cycle. Sometimes it can come from natural causes, like volcanoes and animal

waste. But often, it is caused by humans, such as sewage, pesticides, chemicals from factories, and oil spills in oceans (*show picture). If we were to drink this polluted water, it could make us very sick. And for over 1 billion people on our planet, finding clean water isn't always possible. This pollution of water is also very damaging for Indigenous communities, who feel the damage that they see the water. (See video: Autumn Peltier | I am Indigenous).

Discuss as a class ways to prevent or help air & water pollution, such as:

- Reducing waste (especially plastic)
- Planting trees to improve air quality
- Recycling
- Wastewater treatment: building facilities that will properly clean water before it goes back into the environment.
- Conserve water (turning off the tap when it's not needed, shorter showers, etc.)

Elaborate:

- Students can fill out the "Results" and "What Have I learned" sections on their *My Scientific Investigation Worksheet* (see resources)
- As a follow-up activity, have students draw or use Canva to design stickers to help promote change. Their stickers should show either an effect of air and water pollution or something people can do to help stop it.

Evaluate:

- Take anecdotal notes based on student responses to question prompts above.

- Do students illustrate an example of a cause or a solution for air/water pollution in their sticker design?
- Do their *My Scientific Investigation* Worksheets have something filled out that fits for all the parts?
- Take observational notes of the student experiences for assessment purpose according to success criteria.

Resources

My Scientific Investigation Worksheet : created by author of lesson plan

- Students can use this worksheet to fill out during and after the experiment.

Link:

https://www.canva.com/design/DAGIEiDsmC0/oxj7OC9ulWO_N9ecVeunjg/view?utm_content=DAGIEiDsmC0&utm_campaign=designshare&utm_medium=link&utm_source=editor

Autumn Peltier : I am Indigenous YouTube Video:

- 12-year-old Indigenous Activist Autumn Peltier speaks on the significance of water and the need to protect it.

Link: https://www.youtube.com/watch?v=_EodBINYV7A

Relevant Image

Images provided on slide deck: **created by author of lesson plan**

Link:

https://www.canva.com/design/DAF9OKGpkDs/q-rCXo59ZE1Z5yN2tApgHg/edit?utm_content=DAF9OKGpkDs&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

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