



Watersheds: We Are All Connected

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ACTIVITY DESCRIPTION:

The national motto of Canada – *A Mari usque ad Mare*; From Sea to Sea, is certainly a fitting description of this majestic country, defined as much by its oceans as its land. Bounded by three oceans – Atlantic, Pacific, and Arctic, Canada has the longest ocean coastline in the world. In Ontario, most students live so far away from Canada's marine coastlines, it can be hard to understand how their everyday activities can and do impact the world's oceans.

This lesson plan contains three activities for students in grades six through eight. In the first activity, students create a model watershed and discover how activities at one location impact areas downstream. In the second activity, students experiment with cleaning up water contaminated with various pollutants. In the third activity, students explore local initiatives to reduce water pollution entering their watershed.

ACTIVITY 1:**Time Needed:** 1 period**Site Needed:** large outdoor space**Materials Needed:**

- map of Ontario
- large plastic tarp or shower curtain
- watering can
- pollution simulators (cereal, food colouring, soil, salt, cooking oil, grass clippings)

ACTIVITY 2:**Time Needed:** 1 period**Materials Needed:**

- large plastic cup to hold polluted water (1 per group)
- small containers to hold isolated pollutants (4 per group)
- pollutants (small pieces of plastic grocery bag, cooking oil, iron fillings, sand, food colouring)
- pollutant removers (strong magnets, polypropylene cloth (like sock liners), bleach, coffee filters, elastic bands, spoon, tweezers, stir sticks)
- safety goggles

ACTIVITY 3:**Time Needed:** 1 period**Site Needed:** Local neighbourhood**Materials Needed:** clipboard**BACKGROUND:**

Ontario is divided into three large watersheds – the Hudson Bay watershed, the Nelson River watershed, and the Great Lakes watershed (home to ninety percent of Ontario's population). In the Great Lakes watershed, Lake Ontario, being downstream from the other Great Lakes, receives pollution from the entire Great Lakes area. As a result of runoff and other sources of pollution, Lake Ontario's ecology has changed dramatically over the past two hundred years.

Many communities have groups dedicated to helping Canadians understand that storm drains are directly connected to our rivers, lakes, and streams. By preventing pollutants from entering our storm drains, we are protecting and improving water quality and aquatic habitats. Trout Unlimited Canada designed and manages Yellow Fish Road, which paints yellow fish near storm drains to serve as a reminder that anything entering the storm drains flows directly and untreated into the local waterbody. Other municipalities, including Ottawa and Toronto, have sewer grates with fish designs to remind us that anything dumped down the grate ultimately ends up untreated in our rivers and oceans.

TEACHING PROCESS AND CLASS ACTIVITIES:**ACTIVITY 1: SIMULATING A WATERSHED**

- Introduce the concept of a watershed. Using a map, locate the streams and rivers in your watershed, and determine which ocean your watershed drains into.
- Go outside to a large open area. Volunteer students sit on the ground and drape the tarp over themselves to create a watershed. Students use their arms and legs to create peaks and valleys in the watershed. Make sure that all arms and feet are kept under the tarp.
- Using a watering can, sprinkle water onto the centre of the tarp.
- **For discussion:** Where did the water flow? Why is water collecting in some areas and not others? Does the tarp mimic soil or pavement? Why would this matter in a real watershed?
- Brainstorm different types of pollution that may enter a watershed and determine whether they are point source or non-point source.
- Working in small groups, students brainstorm different ways to model point and non-point source pollution on the watershed model (i.e. soil erosion could be modeled by sprinkling soil over the tarp to simulate fields; a pool of oil could simulate a burst oil pipe).
- Students add their pollutant to the tarp watershed. Sprinkle water on the tarp and observe how the water interacts with the pollution.
- **For discussion:** Did the pollution travel upstream or downstream? Is the pollution the same on all sides of the trap? Which type of pollution is more difficult to control – point source or non-point source?

CURRICULUM CONNECTIONS:

Grade 6 – Understanding Life Systems: Biodiversity

- 1.1 analyse a local issue related to biodiversity, propose action that can be taken to preserve biodiversity, and act on the proposal

Grade 7 – Understanding Life Systems: Interactions in the Environment

- 3.8 describe ways in which human activities alter balances and interactions in the environment

Grade 8 – Understanding Earth and Space Systems: Water Systems

- 2.2 investigate how municipalities process water and manage water
- 2.4 use scientific inquiry/research skills to investigate local water issues
- 3.2 demonstrate an understanding of the watershed as a fundamental geographic unit, and explain how it relates to water management and planning

ACTIVITY 2: OPERATION WATERSHED CLEANUP

- Create some “polluted” water for each group to clean. In a large cup filled with water, add some small pieces of plastic garbage bag, cooking oil, iron filings, sand, and food colouring.
- **For discussion:** Have students match the pollutants with what they represent (bags=plastic litter, iron filings=metals from mines, cooking oil=oil spills, soil=erosion, food colouring=microorganisms). How will each pollutant affect the marine ecosystem?
- Explain to the students that their mission is to remove and sort each type of pollution from the water. Show them the available supplies and as a group brainstorm how each might be used: magnets, polypropylene cloth, bleach, coffee filters, elastic bands, spoons, tweezers, stir sticks. Working in groups, students brainstorm a procedure for purifying their water sample.
- Once an experimental plan has teacher approval, students attempt to remove and separate the contaminants.
- **For discussion:** Could these techniques be replicated on a large scale for cleaning a lake or even an ocean? Which steps would work and which would not? Why don't we clean the ocean? Are there any alternatives?
- **For assessment:** Each group creates a report detailing the problem, their experimental method, the result, and how their method compares to a how real water purification plant works. Brainstorm different forms the report could be take: essay, lab report, poster, pamphlet etc.

ACTIVITY 3: MY WATERSHED, MY OCEAN

- Brainstorm different ways pollution can enter the school's watershed. Determine which are point-source and nonpoint-source types of pollution.
- As a class, go for a walk around the school's neighbourhood looking for sources of pollution. Working in groups, students keep track of their observations and determine if the pollution is point source or non-point source.
- Look for indications that conservation groups or government groups are trying to make people aware of how easily pollution can enter the watershed. Make note of any conservation effort.
- **For assessment:** Students create a brochure that could be distributed to the local community describing: 1) what is a watershed, 2) what bodies of water make up their local watershed, 3) different types of pollution students saw entering their local watershed (data obtained from the walk around the area), 4) what impacts this pollution can have on the local watershed and the ocean, and 5) suggest ways for people to prevent water pollution.

For more resources and activities about Ontario's biodiversity, please visit the Biodiversity Education and Awareness website at [https:// biodiversityeducation.ca/](https://biodiversityeducation.ca/).