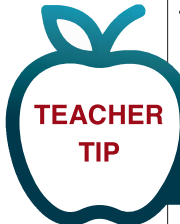


Activity 3.1: Geographical factors – Why are pollutant-releasing facilities where they are?

<p>Summary</p>	<p>Students explore factors that influence companies to set up facilities in certain locations.</p>
<p>What to do</p>	<ol style="list-style-type: none"> 1. Choose one type one type of sector and click on it. <i>What type of distribution pattern can you see? Why might this sector show this pattern?</i> 2. Ask students to brainstorm reasons why a company might choose to place their facilities in a specific location. It is expected that most answers will revolve around the location of natural resources. 3. Open Activity 3.1 in the NPRI Student Dashboard. 4. Once they see the facility distribution on the map, ask students if they want to add any further reasons to the original list, once they see the facility distribution on the map. <div style="background-color: #00728f; color: white; padding: 5px; margin: 10px 0;">  <p>TEACHER TIP You can filter the dots on the map by sector by selecting and deselecting one sector at a time.</p> </div> <ol style="list-style-type: none"> 5. Select the Aluminum sector. Tell the students that bauxite, an abundant ore containing aluminium, is mostly mined around the tropics. There are no bauxite mines in Canada. While only a single facility in Canada produces alumina from bauxite, there are many smelting facilities that transform alumina into aluminum. Since there is no aluminum mining in Canada, what factors might influence where a company chooses to set up an aluminium smelter? Aluminum smelting requires a lot of electricity, which means that settling in a province where electricity rates are lower will reduce their costs. Since Québec has one of the lowest electricity rates in the country, many companies requiring high electricity outputs will benefit from lower costs. Furthermore, setting up along the St-Lawrence River ensures easy access to shipping beyond Canada’s borders. 6. Ask students if they want to add more factors to the list. Examples include electricity cost, access to transportation, governmental regulations, socio-economic factors (some smaller cities will provide incentives for companies to provide employment), geological and hydrological features, physical distance from primary or secondary processing plants. <p>EXTENSION ACTIVITY:</p> <p>Ask students to conduct short research on why the extraction of oil and gas is so dominant in western provinces and nowhere else (i.e., what happened there historically?). If we know that there are oil and gas reserves in the Canadian Territories, why are we not extracting there as well? Students and teachers may be interested in consulting the Government of Canada’s Northern Contaminants Program for up-to-date information on pollution reduction and mitigation.</p>

What You Need	<ul style="list-style-type: none">• Teacher computer with projection screen or a smartboard with access to the Internet to access the NPRI Student Dashboard Activity 3.1• Pollutants in Your Environment - Introduction PPT for Classes – slides 37–38
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Teacher Background

Distribution Patterns

Students will have learned about resource locations in Canada, so it might be helpful to make connections to their prior knowledge that ask them to explain the patterns on the map. For example:


Wastewater facilities:

Wastewater facilities are evident in cities. If a wastewater facility for a community does not show up on the NPRI map, it may be due to the facility not producing enough pollutants to require reporting to the NPRI. This points to one of the limits of the NPRI, which is discussed in Activity 2.3.

Oil and gas pipelines and storage facilities:

Although students may be aware of pollution related to oil and gas extraction, the transportation of these products are also responsible for pollutant releases. The map shows pipeline patterns.

Activity 3.2: Can pollutants released further away affect our water?

<p>Summary</p>	<p>Students consider the implications of pollutants being released further away from their communities. Could they potentially impact our waterbodies? This activity serves as an example of combining a variety of data sources to analyze potential impacts.</p>
<p>What to do</p>	<div data-bbox="240 772 418 999" style="float: left; margin-right: 10px;">  <p>TEACHER TIP</p> </div> <div data-bbox="412 606 1153 810"> <p>Show students the slide entitled Canada Drainage Patterns. <i>The light-coloured areas represent Canada’s waterbodies and the dark coloured areas represent land. What do you notice?</i> Students might be impressed by the interconnectedness of the waterbodies as well as the surprising number of waterbodies covering Canada.</p> </div> <div data-bbox="1177 581 1482 846">  </div> <div data-bbox="412 879 1471 951" style="background-color: #008080; color: white; padding: 5px; text-align: center;"> <p>Click HERE to open the PDF in a separate window to zoom in on the image – zooming in allows an impressive view of the number of waterbodies in Canada.</p> </div> <div data-bbox="412 1031 1153 1371"> <p>Introduce the concept of a water basin by showing students the slides entitled Water movement through a drainage basin and Canada Drainage Basins. A drainage basin is a geographic area where waterbodies like lakes, rivers, streams, groundwater, and precipitation runoff “pool” together to drain into a larger waterbody. Drainage basins can exist at different scales, such as the river drainage basin scale or, in the case of Activity 2.4, at the ocean drainage basin scale. In this activity, an ocean drainage basin is defined as the collection of waterbodies that eventually drain into an ocean.</p> </div> <div data-bbox="1177 1026 1482 1293">  </div> <div data-bbox="412 1413 1471 1478"> <p>In Activity 3.1 in the NPRI Student Dashboard, students will explore NPRI facility data on releases to ocean drainage basins.</p> </div> <div data-bbox="412 1503 1471 1568"> <p><i>So far, we have looked at what is happening in our neighbourhood. What if we zoom out a bit? Could pollutants released further away potential affect our water?</i></p> </div> <div data-bbox="412 1593 1450 1694"> <p><i>The map used in the NPRI Student Dashboard is subdivided by oceanic drainage basin. They are called “Oceanic” drainage basins since they eventually drain into oceans. Can you find our drainage basin on the map?</i></p> </div> <div data-bbox="412 1719 1479 1921"> <p><i>This map’s data has been filtered to only include releases to surface waters. It does not include disposals (e.g., underground injections, tailings ponds with the risk of failure), nor air/land releases. Do you feel that this map accurately captures all sources of water pollution? Justify your answer. It does not consider the complex interactions between air/land releases and eventual water contamination through rain and runoff, as depicted in the Water Movement infographic.</i></p> </div>

<p>What to do cont.</p>	<ol style="list-style-type: none"> 1. <i>Are there pollutant-releasing facilities that you hadn't noticed in the previous activity that might influence our water? Tip: Zoom into the map to see the names of surrounding cities.</i> 2. <i>Could some of the facilities in our community be influencing the water of other towns and cities?</i> 3. <i>What further information would we need to determine the potential spread by water? Water flow direction.</i> 4. <i>If you were in charge of creating environmental protection laws and policies, would you push for international cooperation with other countries? Why or why not? Since waterbodies do not end neatly at the border, pollutant release activities in the United States could definitely affect our water. Therefore, international cooperation should be a priority.</i> <p>EXTENSION ACTIVITY</p> <p>Ask students to draft a law related to Canada's waterbodies and have them justify their law. They could then check to see if such a law already exists.</p> <ol style="list-style-type: none"> 5. <i>What can you infer about air and land pollution based on this exercise? In the same way that contaminated water from far away can affect our waterbodies, so can facilities producing air or land pollution. Furthermore, wind and water currents cause many pollutants to collect in areas, such as microplastics in the Arctic or CFCs (that contribute to ozone depletion) in the Arctic and over Australia.</i>
<p>What You Need</p>	<ul style="list-style-type: none"> • NPRI Student Dashboard Activity 3.2 • Student handout: Activity 3.2 Water Movement Through a Drainage Basin • Student handout: Activity 3.2 Can pollutants released further away affect our water? • Pollutants in Your Environment - Introduction PPT for Classes– slides 39-41

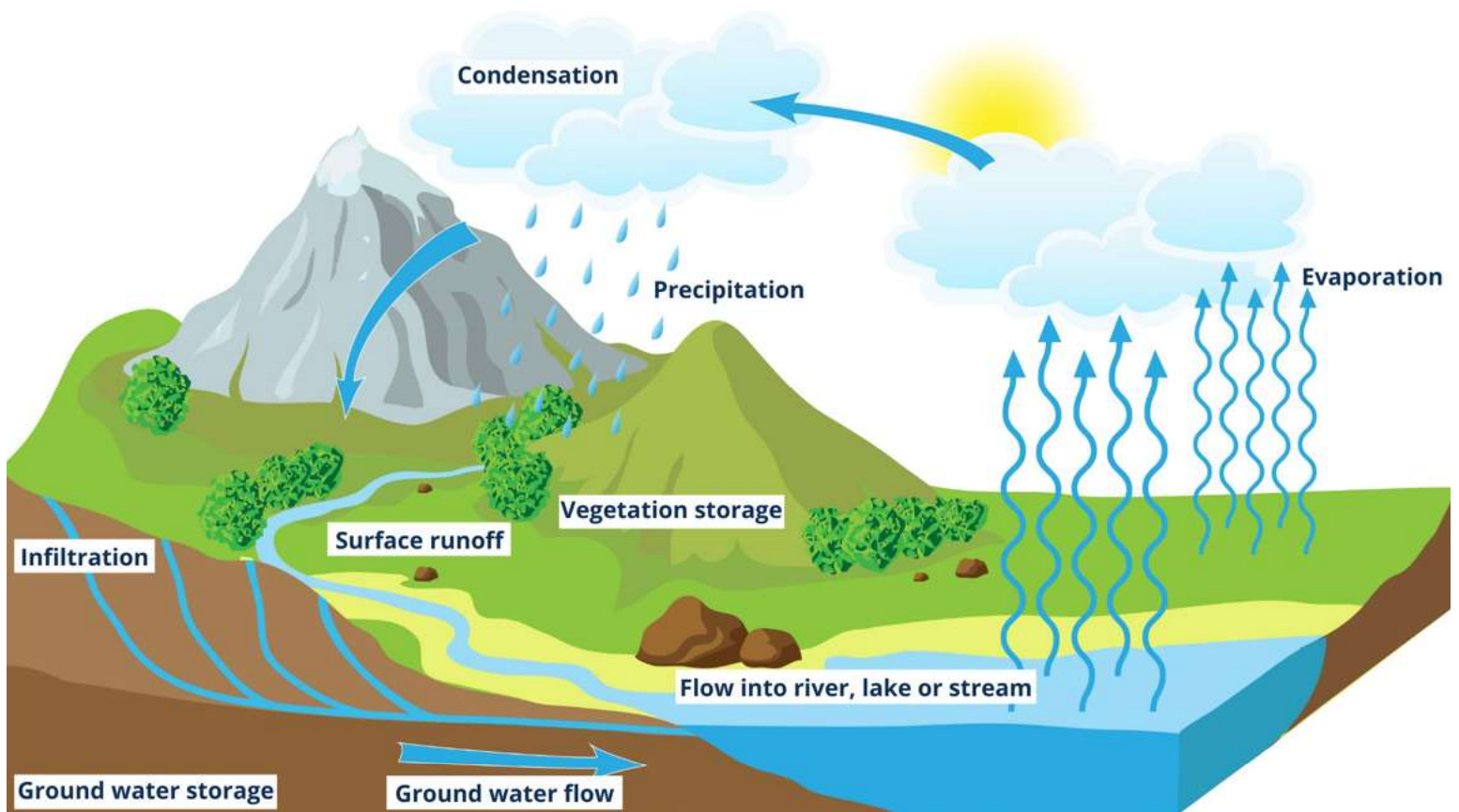
Teacher Background

Please note that in this activity, students are expected to look at the distribution. Students are not required to click on the individual facilities (unless they really want to!).

The NPRI offers a great overview on how water monitoring stations and NPRI data can be used in tandem to determine environmental action plans. See [NPRI Data Integration: Water Quality](#)

Activity 3.2: Water movement through a drainage basin (KEY)

A drainage basin is a geographic area where waterbodies like lakes, rivers, streams, groundwater, and precipitation runoff “pool” together to drain into a larger waterbody, like a major river or an ocean.

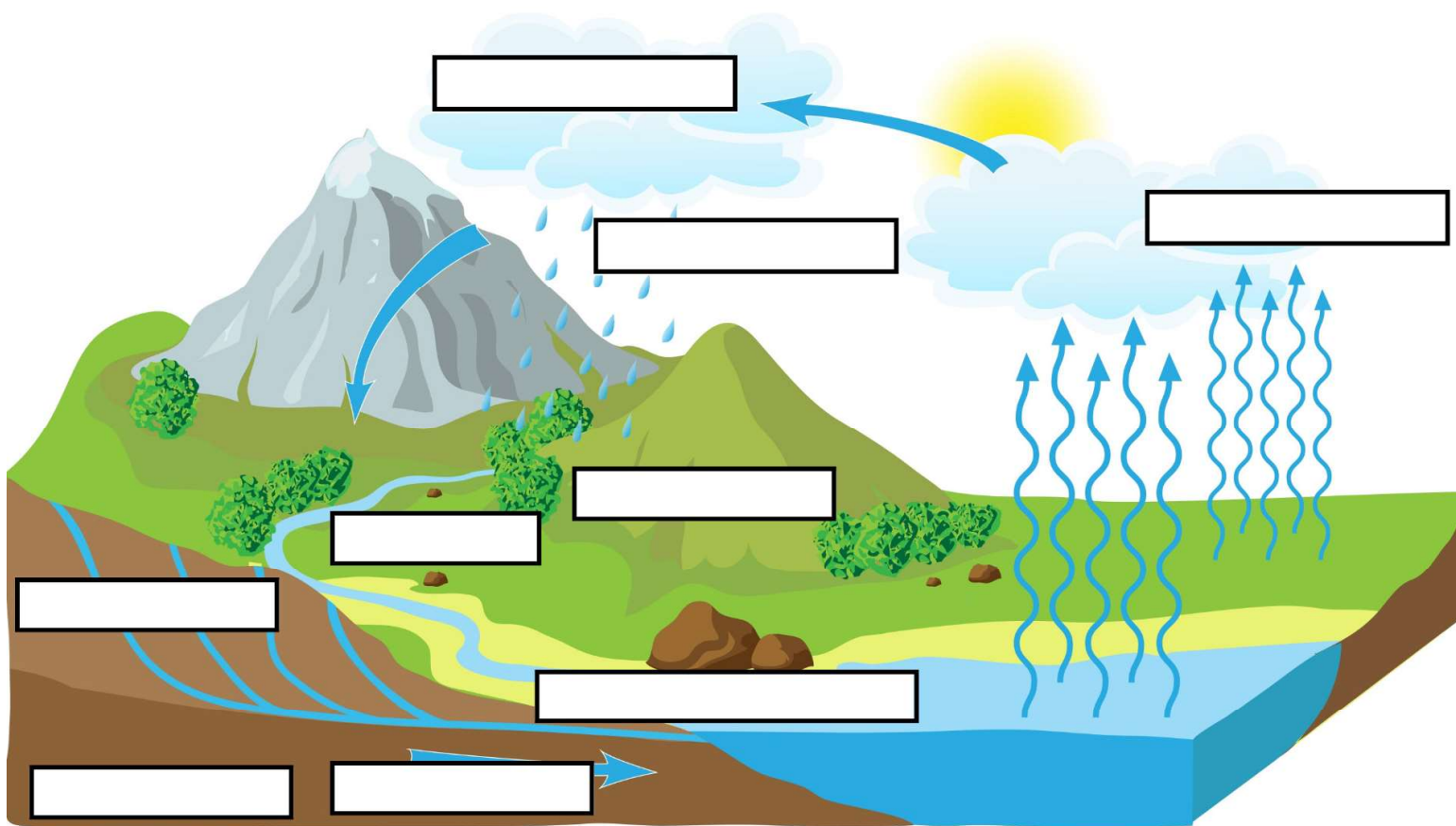


Activity 3.2: Water movement through a drainage basin

Drainage basin definition:

Waterbodies in our community are part of the _____ ocean drainage basin.

See questions on the reverse side.



Activity 3.2: Can pollutants released further away affect our water?

Go to Activity 2.4 in the NPRI Student Dashboard: <https://public.tableau.com/app/profile/ingenium5439/viz/NPRIStudentDashboard/Instructions>.

The map used in the NPRI Student Dashboard is subdivided by oceanic drainage basin. They are called “Oceanic” drainage basins since they eventually drain into oceans. Can you find our drainage basin on the map?

This map’s data has been filtered to only include releases to surface waters. It does not include disposals (e.g., underground injections, tailings ponds with the risk of failure), nor air/land releases. Do you feel that this map accurately captures all sources of water pollution? Justify your answer.

1. Are there pollutant-releasing facilities that you hadn’t noticed in the previous activity that might influence our water? If so, which ones? **Tip:** Zoom into the map to see the names of surrounding cities.

2. Could some of the facilities in our community be influencing the water of other towns and cities? If so, which ones?

3. What further information would we need to determine the potential spread by water?

4. If you oversaw creating environmental protection laws and policies for Canada’s waterbodies, would you push for international cooperation with other countries? Why or why not?

5. What can you infer about air and land pollution based on this exercise?

Activity 3.2: Can pollutants released further away affect our water?

