



Fragile Environments

Pages 52–53

Overview

Maps and diagrams on this spread provide a starting point for study, discussion, and debate about our lands, waters, and air. They allow students to explore possible solutions and evaluate existing levels of commitment to the preservation of these natural resources.

A significant portion of Canada’s land is under pressure from urban, industrialized, and mechanized agricultural development. More than 350 species are classified as being at risk in Canada, primarily as a result of the destruction of habitat.

Emissions of sulphur dioxide and nitrogen oxides cause acid precipitation. Although these gases exist naturally, more than 90 percent of the sulphur and nitrogen emissions occurring in eastern North America is generated by human activity. Air pollutants come from electrical production based on fossil fuels, from smelting, and from fuel combustion in vehicles. Once released into the atmosphere, these emissions are converted chemically into pollutants as nitric acid (HNO_3) and sulphuric acid (H_2SO_4). These acids dissolve in water and are carried by prevailing winds to return to Earth in the form of precipitation—rain, fog, and snow.

Greenhouses use glass to keep the heat inside. Similarly, Earth’s atmosphere traps the sun’s heat near the surface. This keeps the Earth warm using what are called greenhouse gases. Without these gases, the sun’s heat would escape, and the average temperature of the Earth would drop from 15° Celsius to -18° Celsius! For centuries, the atmosphere has remained relatively stable. However, as more greenhouse gases are released into the atmosphere through increased industrial and agricultural activity, more heat is trapped. This increased global warming is having biological impacts: species bear their young earlier, or migrate sooner. Physically obvious results of rising average temperatures include the melting of glaciers, rising sea levels, climatic change, and extremes in weather. Canada’s northern areas are experiencing the most dramatic changes.

Knowledge Statements	Activities
<i>After successfully completing the activities in this section, students will be able to:</i>	
<ul style="list-style-type: none">demonstrate basic knowledge about environmental issues	All
<ul style="list-style-type: none">recognize environmental problems created by technology	2, 4, 5, 8, 12, 13, 14
<ul style="list-style-type: none">describe the role of humans in an ecological system	2, 4, 5, 7, 8, 9, 10, 13, 14
<ul style="list-style-type: none">state some relationships among the environment, economy, and society	8, 12, 14
<ul style="list-style-type: none">demonstrate knowledge of methods to manage both finite and renewable resources	9, 10, 11, 14
<ul style="list-style-type: none">discuss the rights and responsibilities of individuals with respect to protecting the environment for future generations	9, 14
<ul style="list-style-type: none">report on the impact of urbanization and urban growth on the natural environment	1, 2, 3, 4, 11, 14
<ul style="list-style-type: none">indicate cause-and-effect relationships	2, 4, 6, 7, 8, 9, 10, 13, 14
<ul style="list-style-type: none">discuss possible solutions to Canadian environmental challenges	9, 12, 13, 14

Geographical and Thinking Skills	Activities
<ul style="list-style-type: none"> develop map-reading skills 	1, 2, 3, 4, 6
<ul style="list-style-type: none"> interpret different types of graphs, charts, models, and diagrams 	4, 5
<ul style="list-style-type: none"> establish relationships between two elements, including cause-and-effect relationships 	2, 4, 6, 7, 8, 9, 10, 13, 14
<ul style="list-style-type: none"> identify and formulate environmental problems 	All
<ul style="list-style-type: none"> propose, discuss, communicate, and apply possible solutions to environmental problems 	12, 13, 14

Opportunities for Co-operative and Group Activity

If desired, and depending upon student experience and comfort with co-operative learning structures, many of the *Using the Atlas* activities and all of the *Atlas and Beyond* activities provide opportunities for various types of co-operative and group work. Some possibilities:

- Think-Pair-Share structures are well suited for activities 4–8.
- Activity 12 provides an opportunity to use either the Creative Controversy or the Corners group structure described on page 20 of this guide.
- A Group Investigation structure could be used for activity 11.

Modifications

Some students will need help interpreting the pie graphs on page 53. Encourage them to examine the pie graphs closely to extract all the information they convey about each province: (1) total amount of greenhouse gas emissions produced; (2) amount of emissions produced by each sector, and (3) proportion of greenhouse gas emissions each province contributes to the Canadian total, as represented by the size (area) of the pie graph itself.

Students may also need assistance with the concept of “per capita.” Although we might expect that the emissions in the Windsor–Québec City corridor would be higher than, for example, Alberta’s, they are actually lower when compared on a per capita basis. Alberta, with approximately 9 percent of the population, produces 29 percent of Canada’s greenhouse gas emissions, primarily from its fossil fuel industries and power generation.

Assessment Suggestions

Assessment Master 1 Research Report Rubric can be used to assess Activity 12. For other assessment opportunities see activities 4, 5, 8, and 11.