Canada Now and in the Future

Lesson Overview
Canada’s huge land area, relatively small population, and abundance of natural resources, have allowed Canadians to enjoy a high standard of living for many years, but these factors alone do not ensure that we will be able to continue to enjoy this lifestyle forever. In fact, at least partly because of our low population, many Canadians have become rather careless with our natural resources and adopted a way of life that has been far from sustainable. Fortunately most Canadians now realize this and are starting to change their practices in order to protect our environment and to make more efficient use of our resources.

This activity is designed to allow the students to examine the issues regarding the use of Canadian natural resources and to introduce students to the wealth of information found in The Canadian Atlas.

Grade Level
Grade 11 (Could be modified for the Grade 9 Atlantic Canada course)

Time Required
2 hours

Curriculum Connection
Nova Scotia, Canadian Geography 11

Link to Canadian National Geography Standards
Essential Elements #4 (Grades 9-12) - Human Systems
• Changes in human settlement pattern over time

Essential Elements #5 (Grades 9-12) - Environment and Society
• Use and sustainability of resources

Geography Skills #4 (Grades 9-12) – Analyzing geographic information
• Use quantitative methods of analysis to interpret geographic information
• Make inferences and draw conclusions from maps and other geographic representations

Geography Skills #5 (Grades 9-12) – Answering geographic questions
• Evaluate the answers to geographic questions

The Canadian Atlas
Students use The Canadian Atlas: Our Nation, Environment, and People starting with the information on pages 8 & 9, “Canada Now”, and from there use the additional sections listed on the page.
• This Water-rich Land (pages 12 & 13)
• Six Natural Regions (pages 16 & 17)
• Pacific and Mountains (pages 20 & 21)
• Central Plains (pages 22 & 23)
• Boreal Shield (pages 24 & 25)
• Mixedwood Plains (pages 26 & 27)
• Atlantic Region (pages 28 & 29)
• Where We Live (pages (40 – 41)
• Canada 2050 (pages 42 – 43)
Main Objective
The three main objectives of the lesson are:

- to make the students aware of the vast array of information in *The Canadian Atlas: Our Nation, Environment, and People*
- to make the students aware of the human impact upon the landscape of Canada
- to make the students aware of what Canadians must be conscious of regarding the sustainable use of resources, if they wish to preserve our land and standard of living for future generations

Learning Outcomes
By the end of the lesson, students will be able to:

- calculate and understand the difference between arithmetic and physiologic population density
- demonstrate an understanding of, and gain an appreciation of the many types of graphics that can be effectively used to convey information
- demonstrate an understanding of the causes and implications of urban sprawl and the need to control it
- demonstrate an understanding of sustainability and the challenges facing Canadians regarding the future use of our resources

The Lesson

<table>
<thead>
<tr>
<th>Teacher Activity</th>
<th>Student Activity</th>
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<tr>
<td><strong>Introduction</strong></td>
<td><strong>Introduction</strong></td>
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<td>• Open with a discussion/demonstration by the teacher of <em>The Canadian Atlas: Our Nation, Environment, and People</em>. Emphasize that this new atlas is a wonderful source of not only accurate and up-to-date maps, but also a large amount of information regarding the present state of Canada and the outlook for the future.</td>
<td>• Students listen to the teacher’s introduction, ask questions and answer questions posed by the teacher during the introduction</td>
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<td><strong>Introduction</strong> (cont’d)</td>
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| • Because this lesson deals with the idea of how Canadians have used, and are using our resources, the concept of sustainability should be introduced.  
• Show the students that the section “Canada Now” on pages 8-9 introduces the students to many of the topics covered in the later pages of the atlas.  
• Review and explain each topic briefly.  
• Finally let the students know that completing the activity will give them both a comprehensive knowledge of several parts of the atlas, as well as basic background information regarding many topics that will be studied more thoroughly during the course. | • |
Lesson Development

- Assign the activity to the students and allow them to begin.
- Provide necessary assistance to the students as they work through the assignment.
- Collect the completed assignments and grade them.

Students complete the assignment, getting assistance from the teacher or peers as necessary.
Students hand in the completed assignment for marking.

Conclusion

- Hand back and review the graded assignments.
- Students participate in the review of the assignment with the teacher

Lesson Extension

Each of these eight topics covered in the assignment could easily become the basis for a significant project by the students. They could be assigned, either individually or in groups, additional research and asked to prepare a presentation for the rest of the class. The presentation might take the form of a PowerPoint, a large poster, or an oral presentation.

The research could be a review of what has happened in the past regarding the population, cities, or the resources of Canada, or it might emphasize the future. If emphasizing the future it is very interesting and useful to get the students to not only suggest what should be done for the future, but to offer suggestions regarding how it will be done and how ordinary citizens such as themselves can make a difference.

Assessment of Student Learning

- Grade the student worksheets
- Administer a formal test on the outcomes and content
Student Activity

As you proceed through this worksheet you will be introduced to several sections of the atlas. Each part of the worksheet deals with key ideas regarding the present state of Canada’s population and natural resources, and the prospects for the next half century.

1. Population

Canada’s relatively low population is often viewed as a positive factor in terms of human impact on the environment. As the population rises though, there will be an increased demand on our resources.

a) What was the population of Canada in 2004, and what is the maximum projected population in 2050? (See pages 8 & 42)

b) Calculate both the absolute change and the percentage change between the 2004 population and the maximum projected 2050 population of Canada.

c) Based upon the present and predicted rates of natural increase, only a small proportion of this growth will be due to the number of births compared to deaths. What will the greatest proportion of population growth be the result of? (See pages 39 & 42)

d) What are several reasons that Canada is such an attractive spot for immigrants?

2. Population Density

One of the reasons many people perceive Canada as a country where environmental sustainability should be possible, is because of its low population density. The usual method of calculating the population density of a country is to divide the population of the country by the area.

a) What was Canada’s population density for 2004? (See page 8)
b) This number can be misunderstood, and thus be misleading, because it gives an average density for all of Canada. Explain the problem with this average figure for Canada.

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c) There is an added problem with using a population density figure calculated in this manner. This type of population density is referred to as the **arithmetic population density** and considers all the land in a country, regardless of the potential of the land to sustain life. A more useful way to calculate the density is referred to as the **physiological population density**. For this calculation, instead of considering all of the land in a country, just the amount of cultivated land is used. Calculate the physiologic population density of Canada in 2004. (See page 8)

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d) Assuming that the Canadian population reaches 45,000,000 by 2050, what will the physiologic population density be?

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e) Examine Table 1 that shows the Physiologic Population Density of selected countries. Compare the 2050 physiologic population density of Canada with the other countries in the table.

Table 1: Physiologic Population Density for Selected Countries, 1994

<table>
<thead>
<tr>
<th>Country</th>
<th>Density</th>
<th>Country</th>
<th>Density</th>
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</thead>
<tbody>
<tr>
<td>Botswana</td>
<td>333.3</td>
<td>U.S.</td>
<td>143.9</td>
</tr>
<tr>
<td>Chad</td>
<td>227.3</td>
<td>Mexico</td>
<td>394.3</td>
</tr>
<tr>
<td>Egypt</td>
<td>2006.1</td>
<td>Argentina</td>
<td>132.7</td>
</tr>
<tr>
<td>Kenya</td>
<td>626.1</td>
<td>Japan</td>
<td>2858.4</td>
</tr>
<tr>
<td>France</td>
<td>301.7</td>
<td>Israel</td>
<td>1382.5</td>
</tr>
<tr>
<td>Iceland</td>
<td>5000.0</td>
<td>Nepal</td>
<td>864.0</td>
</tr>
<tr>
<td>Italy</td>
<td>517.8</td>
<td>Vietnam</td>
<td>1161.6</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1635.9</td>
<td>India</td>
<td>582.6</td>
</tr>
<tr>
<td>UK</td>
<td>993.4</td>
<td>China</td>
<td>1297.2</td>
</tr>
<tr>
<td>Ukraine</td>
<td>146.4</td>
<td>Australia</td>
<td>39.6</td>
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*Source: based upon data in Global Connections: Geography for the 21st Century page 186

What do you notice about Canada’s potential physiologic population density for 2050 compared to the counties listed in the chart?

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f) Based upon Canada’s 2050 physiologic density compared to the others in Table 1, do you believe that the extra 13,000,000 people in Canada needs to be a major cause for concern in terms of food production? Why or why not?

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3. Population, Farming, and Urban Growth

a) Assuming that the population does reach 45,000,000 by 2050, the physiologic density could be noticeably higher than you just calculated. Why might this be the case? (Think about what else besides the population might change between now and 2050.)

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b) The main reason for a different physiologic density than previously calculated would be a change in the amount of farmland. If the amount of farmland changes, do you believe there will be more or less farmland by 2050?

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c) Suggest the main reasons why there might be less farmland by 2050? (See Cities page 8)

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d) One way to counteract the loss of farmland would be through greater productivity of the remaining agricultural land, thus increasing the carrying capacity of the land. What types of changes are predicted for the agricultural industry over the next 50 years that might allow for greater productivity? (See page 42)

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e) People from the more developed countries sometimes do not pay as much attention to the depletion of farmland as people in less developed countries because they assume that they can purchase food from another country in order to make up for any shortages they experience. In order for Canada to be truly sustainable from a food perspective, we have to think in terms of relying upon our own resources and not counting on another country’s. If we hope to truly achieve sustainability in terms of our food supply, what must we be aware of in terms of our farmland?

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f) One of the most common reasons for the reduction in farmland occurring in Canada is urban growth. Canada is among the most urbanized countries in the world, and there is no indication that this will change in the future. What percentage of Canadians presently lives in urban communities? (See page 8)

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As the population of communities increase, the extent of the communities increases as well. In many cases this expansion occurs into land that was previously farmland.

g) Why is it that most large towns and cities are surrounded by farmland?

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h) The donut effect is sometimes referred to when discussing urban growth. What is the donut effect? (See page 41)

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i) Why is the donut effect more noticeable than vertical growth in cities?

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j) Why is this growth at the edges of cities particularly harmful in terms of loss of farmland, as well as energy usage and air pollution?

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As indicated in the Introduction to page 8, the challenge of seeking sustainability embraces two main objectives; preserving resources while creating a buoyant long-lasting economy. This challenge is especially difficult around Canada’s major cities where urban growth and economic expansion usually means the loss of good farmland, a precious resource.

In the case of Toronto, Canada’s largest city, the expansion of the city is especially disconcerting. Toronto is surrounded by much of the very best farmland in all of Canada, and therefore when it is removed from production, it has a much more significant impact than the loss of marginal farmland. Many years ago it was calculated that for every 1000 extra people added to Toronto’s population, 382 acres of farmland was lost. (A.D. Crerar, “The Loss of Farmland in the Growth of the Metropolitan Regions of Canada”, Resources for Tomorrow Conference, Background Papers, Supplementary Volume. Ottawa. 1962.

k) Toronto grows by approximately 85,000 people/year (Stats Canada: Community Profile). Assuming that the Crerar’s 1962 figure still holds true, approximately how many acres of farmland are being lost in the Toronto region annually?

l) Do you believe that this figure of 382 acres/1000 people is accurate today? Why would land use planners be trying to reduce this value?

m) What types of changes would the planners be trying to implement as they attempt to reduce the amount of farmland taken over by the city?

n) What types of urban land uses will replace the lost agricultural land?

o) When the growth of cities takes place at the edge, and it seems to be out of control, it is often referred to as urban sprawl. The Atlas suggests that by 2050, urban sprawl will cease. What is suggested as reasons for the cessation in sprawl? (See page 43)
p) The vast majority of the population growth expected to occur in Canada over the next 50 years will be in cities. How many extra people will likely be living in Toronto, Montreal, Vancouver, and the Edmonton – Calgary corridor by 2050? (See page 43)

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q) From an environmental perspective, it is probably fortunate that this massive population growth is not expected to add substantially to urban sprawl. Where will the growth take place if not on the fringes of the city, and how will it likely be accommodated? (See page 43)

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4. Population, Fresh Water, and Urban Growth

While Canadians have access to one of the greatest supplies of fresh water in the world, they are among the greatest users of water.

a) What percentage of the world’s renewable fresh water is found in Canada, and where do we rank in the world? (See page 13)

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b) Personal consumption of water is a relatively minor part of Canada’s total water consumption. What are the 2 greatest uses of water?

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c) In addition to the pressure on our water supply from our own uses, from where else is there increasing pressure for our water? (See page 12)

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d) What is meant when it says on page 9 that water will be “the oil of the 21st century”?

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As our population increases, the demand for fresh water will also increase. Not only will the extra
13,000,000 people increase the demand for water over the next 50 years, but the urban growth
associated with this population increase will also threaten some of Canada’s most precious
wetlands and fresh water sources. As indicated on page 9, one of the major environmental
challenges Canadians face is the preservation of our wetlands.

One excellent example of land use planning designed to protect environmentally sensitive and
important land, is the case of the Oak Ridge Moraine. (See page 27)

e) What major city is located in close proximity to the Oak Ridge Moraine?

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f) Why is the Oak Ridge Moraine area so important to the residents of the area?

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g) From whom is the pressure coming to convert the natural land to urban types of land use?

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h) The proposed plan allows for what percentage of the land to be converted into urban land use
(intensive development)?

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5. Population Growth and the Pressures on Other Resources

It is not just the number of people that dictate the impact of the population on the environment.
Paul Ehrlich, a respected biologist/demographer has suggested that a baby born in a more
developed country (MDC) such as the United States would use up to 100 times the resources
during its life time, that a baby born in a less developed country (LDC) such as Bangladesh would
use.

a) Explain why this would be the case?

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b) Would the environmental demands of a Canadian baby be more like those of a baby born in the
United States or Bangladesh?

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Both our long life expectancy and high standard of living exert tremendous strain on our natural resources. This section of the activity examines some of the concerns associated with this pressure that we place on our environment, and considers possible solutions.

For hundreds of years the people of Canada have been able to take advantage of our coastal waters and millions of lakes and rivers to provide ourselves with fish. Reports from the early explorers of eastern Canada refer to the unbelievable abundance of fish off the East coast. Unfortunately, unsustainable fishing practices have caused drastic reductions in the availability of fish.

c) Over the 11 year period between 1990 and 2001, there was a huge drop in the amount of fish caught in Canadian waters. How large was this decline? (See page 9)

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d) What are the practices that have resulted in the unsustainable fishing methods? (See pages 21 & 28)

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e) In an attempt to protect our declining cod stocks what did the Canadian government do? (See page 28)

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f) Why did the government believe these two steps would help?

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The decline of the fisheries on both the East and West coasts has resulted in major changes for many people formerly involved in the industry. One change has been the loss of jobs while two other changes have involved significant new approaches to fishing.

g) How have many of the Newfoundland cod fishers counteracted the declining cod stocks and remained in the fishing industry. (See page 28)

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h) Another reaction to declining stocks has been the development of aquaculture or fish farming. What percentage of the value of B.C.’s fishing catches is from farmed salmon? (See page 21)

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i) While many people believe that aquaculture is safe and will grow in importance, others believe there are significant problems with the practice. List the positives and negatives of aquaculture. (See page 21)

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j) Do you believe that aquaculture should become an increasingly important method of creating more food for Canadians? Why?

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With 45% of Canada’s land area covered in forests, it is difficult to imagine concerns regarding the use of our forests, yet they exist. In addition to the concerns of unsustainable forestry practices such as cutting more each year than can be replanted or naturally regenerated, there are other worries as well.

k) One of the main criticisms of the Canadian forestry industry is the practice of clear cutting. What is it about clear-cutting that disturbs many people? (See page 25)

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l) What percentage of Canada’s wildlife depends upon the forest for shelter? (See page 9)

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m) Why is it easier for the government of British Columbia to regulate their forestry industry than the governments of the Atlantic Provinces? (See pages 21 & 29)

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n) One way that governments have tried to deal with the environmental concerns related to forestry is through the creation and management of model forests. How many model forests are there in Canada, and what is the main purpose of the forests? (See page 29)

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Similarly to our other natural resources, Canada’s size also contributes to extensive mineral reserves. It is our energy resources that attract the greatest amount of interest.

o) One reason that our energy resources attract so much attention is because of Canadians’ extremely high use of energy. Where do we rank globally in terms of our energy use? (see page 9)

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p) In what region of the country are the majority of our conventional oil and gas reserves? (See page 23)

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q) The greatest source of unconventional energy reserves is tied up in the tar sands of northern Alberta. Although the oil companies extracting the bitumen from these deposits are proud of their environmental policies, there are some long-term environmental problems associated with their operations. What is one of the major environmental problems associated with the two Fort McMurray oil-sands plants? (See page 23)

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r) Another problem is connected to the reclamation of the land disturbed by the huge tar sands projects. The oil companies have successfully reclaimed the mined land with productive forestlands; however, much of the land was originally wetlands. The ecology of northern Alberta is now starting to show signs of the loss of wetlands. What are the negative aspects of loss of wetlands? (See page 16)

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s) The newest excitement regarding energy resources is related to the oil and gas reserves found offshore in eastern Canada. As with all types of mining, environmental concerns are also evident in offshore mineral development. Examine the map of prime fishing areas on page 28, and locate the four major offshore oil and gas deposits. (Hibernia, Terra Nova, White Rose, and Sable Island) What type of environmental concerns would there be with the offshore energy?

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t) Canadians have a vast appetite for energy and as our population grows our demands will continue to increase. Despite our abundant reserves, we have to be aware of and concerned about our future. There are numerous programs in place to encourage and help Canadians reduce their energy uses, and thus extent the life of our oil and gas reserves. We are also looking to more sustainable types of energy for the future. What five types of energy will become increasingly important in the future? (See page 42)

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u) Based upon what you have read in order to complete this assignment, very briefly list at least 4 things that Canadians are doing as they attempt to use our natural resources in a more sustainable manner.

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v) Suggest four things that you can do to help reduce your impact on the environment.

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