

Climate Change in Canada

Climate change is an urgent, global concern. The implications of climate change are significant and far reaching, with the potential of impacting future generations throughout the world. Government, non-profit and private organizations are weighing in on the threats and possible solutions to these challenges. Canada's rich and varied terrain and weather is a good model to study the effects of climate change. Students will be introduced to the climate of Canada and the challenges they face with climate change.

Section I

Getting to Know Canada

Pre-Assessment: What do you know about Canada?

Please complete Worksheet 1 before continuing with the readings in Section I.

Canada:

Canada is located on the North American continent and is bordered by the Arctic Ocean to the north, the North Atlantic Ocean on the east, the North Pacific Ocean to the west and the conterminous United States on the south. Including land and water, the total area of Canada is 9,984,670 sq km.

Your teacher will give you a map of Canada. Looking at this map, notice the size of Canada compared to the United States. This is a large country with a variety of features. Due to the size of the country, its features and its location on the Earth, Canada has a varied climate.

Assessment I: Geography of Canada

Section 2- Canada's Climate

By now you have probably been wondering why we are learning about Canada. Canada is an important country and our neighbor to the north (for those of us living in the United States). However, its proximity to the Arctic region means that it is a cold place. You may already know that the Arctic is near the North Pole. You might be surprised to know that the climate of Canada is actually quite varied. Let's take a look at the major regions of Canada and what the climate is like. Use your map to identify these regions.

The Northern Regions:

It is true like you probably imagined that Canada has very cold regions and areas with significant winter snowfall. The areas with the coldest average temperatures are located in northern Ontario, the Northwest Territories, the Nunavut Territory, northern Quebec and Labrador. Temperatures can range from an average of 46°F in the summer to -31°F in the winter!

In this same northern region, there is permafrost. Permafrost exists in regions of the Earth which are so cold, that they are always frozen for as long as two years. It does not get warm enough so that the ground completely defrosts. Living in these areas can be very difficult, due to the extreme cold. Carrying on normal business, transportation, education and medical care are all challenging due to the exceptionally cold weather. In the winter months, the area receives very little sunlight. The lack of sunlight is one of the reasons why it is so cold in the northern regions.

The Pacific Coast:

The Pacific coast of Canada is quite different from the northernmost regions. This region is warmer and due to its location next to the Pacific Ocean has an abundance of rain during the summer and winter months. The Cordillera region is the mountainous part of British Columbia. This

Section 2- Canada's Climate (Cont'd)

range of mountains is part of the vast range that extends all the way down through South America.

The Canadian Rockies (part of the Rocky Mountains of the United States) and the Coast Mountains have an effect on the climate in the area.

Because of these mountains, there are some areas of the Pacific coast of Canada which are in high elevation while others are in low areas. The higher elevation areas are colder than the others and may have snow where the lower elevation areas have rain.

The Boreal Region:

This large region extends from the Yukon to Newfoundland. Although the term Boreal describes the trees which grow there, this region has its own unique climate. The amount of precipitation varies in the area, but is typically moderate to high. In the west, the rate is about 39 inches per year, while the east has about 16 inches. The winter months are long and cold, while the summers are short, warm and rainy. It is no wonder that such large coniferous trees grow there. The conditions are good for their growth.

Canadian Prairies:

The prairie region is located in the southern area of Saskatchewan, Manitoba and Alberta. Summers are warm, but not very wet compared to the Boreal region. Winter months can be very cold. Sometimes this area experiences drought conditions. The prairies are mostly flat, rolling plains. The area usually has just enough rain to support the growth of agriculture.

Temperate Forest:

This southern region of Quebec and Ontario, as well as Prince Edward Island, New Brunswick and Nova Scotia are considered temperate. This means that they are neither extremely cold or hot, but somewhere in the middle. Annual rain and snowfall are fairly high with averages of up to 70 inches.

Section 2- Canada's Climate (Cont'd)

Tundra Forest:

This area is located to the north of the Boreal forest region. This large region extends almost from the westernmost area of Canada to the eastern shores. As you might imagine, northern regions are colder than those to the south. This is no exception. The summers are cool compared to the prairies, but have more precipitation.

Arctic:

Frigid is probably a good way to describe this region. It is the northernmost region of Canada, covers about 5000 miles and is very cold. Only a few animal and plant species can survive in this climate. There is permafrost in the most northern areas of this region and not much snow falls. In fact, only about 12 inches of precipitation fall in this region during one year.

Key Concepts

As you have learned, Canada is not only a very large country, but has a varied climate. Extending from the tundra of the Arctic to the fields of the prairie, Canadian climate is as diverse as the landforms; mountains, plains, many lakes and other bodies of water, permafrost and areas of vegetation. It is truly an interesting country to study.

Unfortunately, there are some outside forces which threaten to disrupt the climate of Canada. What are these forces? What can be done to avoid the effects of those forces on Canada's climate?

Section 3 - Climate Change in Canada

It's true. The climate of Canada is changing. At first glance, this might not seem very important. However, it is a very serious matter. Let's explore the reasons why Canada's climate is changing.

What is climate change?

Climate change is defined as a change in temperature and precipitation over time due to natural forces or human-initiated forces.

This definition suggests that it is normal and natural for the climate in any area of the world to change from time to time. What usually happens is that the changes gradually occur over long periods of time.

Recently, however, scientists have noticed that the climate in some areas of the Earth is changing both rapidly and dramatically.

What is happening in the Canadian Arctic?

We learned that the Arctic region of Canada is very cold, has permafrost and does not receive a lot of precipitation. Because it has almost always been very cold, the Arctic has significant ice. Consider the Arctic Sea. Look at your map of Canada to find this body of water. This sea is so cold that usually ships cannot pass through it, because of the ice. Ice shelves are in the sea. They are very thick platforms of ice attached to the land. Ice shelves are formed by snowfall and freezing melt water. Ice shelves grow from glaciers and floating ice which migrate toward the sea and are added to the existing shelves. Ice shelves can also grow to massive sizes. In Antarctica, the Ross Ice Shelf is about as big as the state of Texas!

In recent years, the average temperature in the Canadian Arctic has increased. Scientists expect that the temperatures in Canada could rise by as much as 5-10 degrees Celsius over the next century. This warming could cause some serious problems for not only Canada, but also the rest of the world.

Section 3 - Climate Change in Canada (Cont'd)

What could happen?

Climate change caused by warming of the Arctic region could affect the wildlife living there.

Large portions of ice shelves are beginning to break off. These large floating pieces of ice could drift into areas where there are lots of shipping boats. If the temperature change continues, then there could be more melting and some of the ice could disappear altogether. Polar bears, walruses, and ringed seals all use these floating pieces of ice to travel, breed and feed. If they lose their ability to do these things, then these species could die and become extinct.

Living under the ice is plankton which is a food source for many life forms in the Arctic. If the ice disappears, then so will much of the plankton. Ringed seals also use the ice for their dens. If the ice melts because of climate change, then they could lose their habitat and many will not survive. Polar bears which prey on these seals could also die in great numbers.

The life forms in the Arctic risk increased numbers of death and possibly extinction if the warming continues.

Why is this happening?

Scientists believe that the warming of the Arctic is caused by an increase in greenhouse gases. This dangerous trend is caused by human beings. Greenhouse gases trap heat in the earth's atmosphere and surface. It is true that it is normal for some greenhouse gases to be in the atmosphere, but due to the way we all live in modern society those gases have greatly increased. The greenhouse gases produced by man's activities come from automobile exhaust, electricity, burning trees, and factory waste.

Thinking ahead:

While you may not live in Canada or worry about what happens to polar bears, global warming can affect everyone. The good news is that we can slow down global warming by changing our behavior.

Name _____

Date _____

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What did you learn?-Assessment II: Complete Worksheet III

Name _____

Date _____

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Climate Change in Canada

Pre-Assessment

Worksheet 1

Answer the following question in the space below.

Using complete sentences describe what you already know about Canada.
How would you describe the climate of Canada?

Climate Change in Canada - Worksheet 2

Using the map provided by your teacher, answer the following questions:

1. Which lakes border the United States and Canada?
2. Which mountain range extends from the United States into Canada?
3. Name the largest islands that are part of Canada.
4. Which body of water is between Canada and Greenland?
5. Circle the correct response:

Ottawa is: a) north of Quebec
 b) south of Toronto
 c) west of Edmonton
 d) east of Calgary

Climate Change in Canada

What did you learn? - Worksheet 3

Using the reading from this lesson, answer the following questions using complete sentences:

1. Which region of Canada is experiencing the most significant evidence of climate change? Describe what is happening in this region of Canada.
2. What seems to be causing the change in climate? Can we do anything to stop it? How could we stop the climate change in Canada?
3. Your classmate believes that what happens in Canada has nothing to do with those of us who live in the United States. Do you agree or disagree? Explain your position.
4. Visit the following website: <http://www.climatecrisis.net/thescience/>
How do you think that climate change could affect your life here in the United States?

If needed, you may use the reverse side of this worksheet for your responses.

Climate Change in Canada Answers

Climate Change in Canada Pre-Assessment - Worksheet 1

Answer the following question in the space below.

Using complete sentences describe what you already know about Canada. How would you describe the climate of Canada?

Students' answers may vary from knowing nothing at all to having considerable knowledge of the country. It is not necessary for the student to know anything about the climate of Canada before completing the lesson; however, it will help teachers to assess the degree to which they need to scaffold the lesson.

Climate Change in Canada - Worksheet 2 Answers

Using the map provided by your teacher, answer the following questions:

1. Which lakes border the United States and Canada?

Lake Superior, Lake Huron, Lake Ontario and Lake Erie

2. Which mountain range extends from the United States into Canada?

The Rocky Mountains extend from the United States into Canada

3. Name the largest islands that are part of Canada.

Students may name Baffin Island, Newfoundland, Victoria Island, Devon Island, Prince of Wales Island, Ellesmere Island, Axel Heiberg Island and others.

4. Which body of water is between Canada and Greenland?

Students may name Baffin Bay or the Labrador Sea (more accurate).

5. Circle the correct response:

Ottawa is: **a) north of Quebec**
 b) south of Toronto
 c) west of Edmonton
 d) east of Calgary [This is the correct response]

Climate Change in Canada

What did you learn? - Worksheet 3 Answers

Using the reading from this lesson, answer the following questions using complete sentences:

1. Which region of Canada is experiencing the most significant evidence of climate change? Describe what is happening in this region of Canada.

Students should understand that in spite of the fact that climate change; global warming, ultimately affects everyone, the Arctic is impacted in a profound way due to the melting of ice, rise in water levels and its negative effects on indigenous species. The domino effect of the demise of one species after the other is profound and could lead to extinction.

2. What seems to be causing the change in climate? Can we do anything to stop it? How could we stop the climate change in Canada?

Students need to know the impact of human activity on the climate; auto emissions, factory output, electricity and other man-made effects of modern society. Yes, we can do something to stop it from progressing; however, we need to fundamentally change how we live and use new technologies which do not have the same negative effects on the environment and climate. Canadians can do their share in this regard; however, what is happening in the rest of the world affects Canada, too. It is not sufficient for Canadians to engage in new practices, but the world as a whole

Climate Change in Canada

What did you learn? - Worksheet 3 Answers (Cont'd)

needs to alter how we use energy, manufacture what we need and use chemicals.

3. Your classmate believes that what happens in Canada has nothing to do with those of us who live in the United States. Do you agree or disagree?

Explain your position.

Students will either agree or disagree with the position and need to support their position with data or substantive information.

Students should be allowed to use outside sources if they choose.

The global impact of increased greenhouse gases should be emphasized.

4. Visit the following website: <http://www.climatecrisis.net/thescience/>

How do you think that climate change could affect your life here in the United States?

Students may report the warnings cited in the website; drought, catastrophic weather events, increase in disease, species migrating and some dying, deaths of humans due to warming, rise in sea levels.

If needed, you may use the reverse side of this worksheet for your responses.