

## **Climate Change**

## Introduction

This story is from Edition #6 of *The Northern Edge*. Edition #5 also has an article on climate change. We developed activities to go with the previous issue in our last *Northern Edge Study Guide*. This section will provide additional activities and ideas for studying climate change.

This story offers an opportunity to encourage learners to learn more about climate change in the Arctic. The online piece has a variety of topics and pictures to help learners understand this complex issue. We have summarized the information for this section in order to make it more readable in print form.

This section presents a list of seven learning activities and the written text for the Climate Change section from *The Northern Edge*. The pages following the written text give instructor notes and handouts for each activity, in the order on the list.

This symbol marks the written text.

This symbol marks instructor notes.



This symbol marks handouts to copy for learners.





Climate Change List of Learning Activities			
Instructor Notes	Handouts	Page #s	
1) Vocabulary	3 handouts	87 to 99	
2) Math Skills	3 handouts	100 to 106	
3) Questions	2 handouts	107 to 111	
4) Comprehension	3 handouts	112 to 119	
5) Writing Skills	3 handouts	120 to 125	
6) Research	3 handouts	126 to 132	
7) Speaking and Discussion	1 handout	133 to 135	



#### Introduction

In October 2007 the Prince of Wales Northern Heritage Centre in Yellowknife, NWT had an exhibit on climate change by the Smithsonian National Museum of Natural History.

The exhibit was called *A Friend Acting Strangely*. We loved the exhibit and contacted the Smithsonian and received permission to use material from their exhibit in our Northern Edge.

You can read all this information on our 6<sup>th</sup> issue of *The Northern Edge*. Below is a condensed version of the information.

#### Measuring Arctic Climate Change

Our planet is getting warmer. Temperatures in most of the Arctic region have also increased. Are these changes unusual or just part of natural variation?

To help answer that question, scientists compare recent changes with records of the past.

Let's take a look at Greenland for example. The first image shows the amount of snow and ice cover on Greenland in 1979. The second image taken in 2002 shows a really dramatic change.



Seasonal melting of the Greenland ice sheet has increased an average of 16 % – an area about the size of Sweden. Scientists use satellites to measure the extent of melting and airborne altimetres to measure the ice cap's thickness. Scientists also use graphs to measure climate change over time.



This is a graph with an **x axis** along the bottom and a **y axis** that runs vertically. The **x axis** on this graph shows the years, from 1900 to the present. The **y axis** shows temperature variations measured in degrees celsius.



Scientists used a thirty year period from 1961 to 1990 to establish what they call normal. That 30 year average is the comparison point and is represented by a horizontal line at zero degrees.

For example, the year 1900 was 0.8°C cooler than the 1961 to 1990 average.



Using graphs like this, scientists have learned that:

- 1. The Arctic has been unusually warm particularly in the last few decades.
- 2. The Arctic has warmed at roughly twice the rate of the rest of the world.
- 3. Arctic temperatures have reached the highest levels in 400 years.
- 4. The Arctic was particularly warm during the 1930s and 1940s as well but the rate of warming has been more rapid in recent decades.

#### Shrinking Ice and Snow

In this section we are going to learn what happens when the climate changes and the ice and snow shrink. To do this we are studying a 3-dimensional drawing that was produced by the Smithsonian Institute.





This drawing has two halves. Each half shows the same piece of land – just flipped so we can see them side by side.

On the right side we will see what happens when the sun falls on snow and ice. On the left side we will see what happens when the snow and ice melt as a result of climate change.

When the sun falls on snow and ice, most of it – up to 85 or 90 % of it – is reflected. Another way of saying this is that only 10-15 % of it is absorbed. When the sun falls on land and water most of it – 80-90 % of it – is absorbed. Another way of saying this is that only 10-20 % of it is reflected.

The light color of snow and ice reflects most of the sun's energy back into space, rather than being absorbed by the dark color of land and open water. That is one reason the Arctic's cold is so extreme – and our planet does not overheat. But with less ice cover, the ocean and the land warm up, causing more ice to melt, further warming the planet.

#### How Much Has Sea Ice Declined?

Satellite data show that Arctic summer sea ice has shrunk 15-20% since 1979. Submarine surveys show a loss in thickness of up to 40% in some areas in the past few decades.

Will this trend continue? It's not clear. But scientists are concerned that the formation of new sea ice won't keep up with the rate of melting.



In this photo we see walruses riding floating ice to travel and feed over long distances. Less ice could seriously reduce their feeding area.



Photo © Bryan and Cherry Alexander Photography

#### How Does Shrinking Ice Affect People?

#### Sámi herders, North Norway

Relying on snowmobiles, herders must wait for the season's first snows before rounding up herds from their summer pastures. Travel is also difficult if the snow cover is thin.

A Sámi legend explains: "We are not reapers, we are not field hands. We are reindeer herders. The reindeer are our bread." But reindeer herding has become more difficult. Lakes, rivers, and bogs freeze much later in autumn, making it harder to collect the herd from its summer



pasture. Migration patterns have also changed. These changes have disrupted the Sámi's traditional herding and slaughtering schedules.

#### **Seal Hunters**

The Inuit hunt seals from the ice. In this photograph we see a seal hunter behind a blind and the seal in the upper right hand corner.



Photo © Bryan and Cherry Alexander Photography

Warmer temperatures could drive seals northward and make hunting riskier and more difficult.

In fact, shrinking sea ice is one of the most worrisome changes in the Arctic. Its loss is already affecting the Arctic environment, wildlife, and cultures. The last four years have seen the most extreme



reductions in sea ice since the beginning of satellite records in the 1970s.

A hunter rescues his dogs that have fallen through the sea ice.



Photo © Bryan and Cherry Alexander Photography

The ice shifts around a lot. There is less of it and it is less stable for hunters whose lives are more and more at risk.

Some hunters won't set foot on it without a global positioning satellite unit to track their whereabouts.

#### Permafrost

An important feature of the Arctic is permafrost. Permafrost is soil or rock that remains below 0°C throughout the year. When the ground



cools enough in winter to produce a frozen layer that lasts throughout the following summer, this frozen soil is called permafrost.

Until recently, permafrost has been solid enough to support houses, highways, pipelines, and airfields. But now thawing ground has become a growing problem throughout the Arctic. Rising temperatures have melted the frozen soil's upper portion, reducing its capacity to bear weight.

An Alaskan homeowner builds a new house to replace the one claimed by melting permafrost. See the air space under the new house, a technique used to help keep the permafrost from melting.





#### Severe Weather

On October 3, 1963, Barrow, Alaska set a new record for severe weather. The most violent storm in memory struck that day.

Both scientists and residents have witnessed more damaging storms in the Arctic since the 1960s — as warming temperatures affect most of the region.

The first two lines of defence against waves are sea ice and permafrost. Both of these have weakened as the Arctic's climate has warmed. So increasingly, Barrow and other coastal communities risk more flooding and erosion when a storm hits. The 2005 Arctic sea ice extent was at a record low.





Three handouts

#### 1-1: Best Meaning

Learners write down their own meaning for the bold word in each sentence and then use a dictionary to find the best meaning for the word. Then they write down the meaning from the dictionary and compare it to their meaning.

#### 1-2: Word Study

Learners study the new words by categorizing them into nouns and adjectives, breaking the words into syllables and finding root words.

#### 1-3: Terms to Know

Learners look up terms on climate change. These terms will help them in the other activities in this section.



#### 1-1: Best Meaning

These 12 groups of sentences are from the text. Write down your own meaning for the bold word and then use a dictionary to find the best meaning for the word. Write down the meaning from the dictionary and compare your meaning to it.

1. Temperatures in most of the Arctic region have also increased. Are these changes unusual or just part of natural **variation**?

Your meaning



2. Let's take a look at Greenland for example. The first image shows the amount of snow and ice cover on Greenland in 1979. The second image taken in 2002 shows a really **dramatic** change.

Your meaning

Dictionary meaning

3. Scientists use **satellites** to measure the extent of melting and airborne **altimetres** to measure the ice cap's thickness.

Your meaning (satellites)

Dictionary meaning (satellites)



Your meaning (altimetres)

Dictionary meaning (altimetres)

4. This is a graph with an x axis along the bottom and a y axis that runs **vertically.** 

Your meaning



5. Scientists used a thirty year period from 1961 to 1990 to establish what they call normal. That 30 year average is the comparison point and is represented by a **horizontal** line at zero degrees.

Your meaning

Dictionary meaning

6. Will this **trend** continue? It's not clear. But scientists are concerned that the formation of new sea ice won't keep up with the rate of melting.

Your meaning



7. A Sámi legend explains: "We are not **reapers**, we are not field hands. We are reindeer herders. The reindeer are our bread."

Your meaning

Dictionary meaning

8. In fact, shrinking sea ice is one of the most **worrisome** changes in the Arctic. Its loss is already affecting the Arctic environment, wildlife, and cultures.

Your meaning



9. An important feature of the Arctic is **permafrost**. Permafrost is soil or rock that remains below 0°C throughout the year.

Your meaning

Dictionary meaning

10. On October 3, 1963, Barrow, Alaska set a new record for **severe** weather. The most violent storm in memory struck that day.

Your meaning



11. So increasingly, Barrow and other coastal communities risk more flooding and **erosion** when a storm hits.

Your meaning





Vocabulary Learning Activity 1

#### 1-2: Word Study

1.	variation	7. trend
2.	dramatic	8. reapers
3.	satellites	9. worrisome
4.	altimetres	10. permafrost
5.	vertically	11. severe
6.	horizontal	12. erosion

- 1. Break each word into syllables.
- 2. What is the root word for the following:

✓ variation	
✓ dramatic	
✓ satellites	
✓ vertically	
✓ horizontal	
✓ reapers	
✓ worrisome	

- 3. Which words can be used as adjectives? Write them in a sentence showing them as an adjective.
- 4. Which words are nouns? Write them in a sentence.



- 5. Which word is an adverb? Describe what an adverb does. Write a sentence for this word.
- 6. Change these words into adverbs.
  - ✓ Dramatic
  - ✓ Horizontal
  - ✓ Worrisome
  - ✓ Severe

What is common about all the adverbs?

7. Write a sentence for **trend** as a noun. Now write a sentence for **trend** as a verb.



#### 1-3: Terms to Know

There are many different terms to know when talking about climate change. Look up the following terms on the Internet. Give a definition for each term. Knowing what these terms are will help you with other activities in this section.

1. carbon cycle

2. CO<sub>2</sub>





7. carbon footprint

8. polar ice cap





Three handouts

#### 2-1: Graph Reading

Graph reading is an important skill for everyday life. Learners use the graph from the text to answer the questions on the handout.

#### 2-2: More Graph Reading

Learners look at the graph on the handout and answer the questions.

#### 2-3: Make Your Own Line Graph

Learners use the data given on temperatures for Yellowknife for the past 50 years and make a graph to show the temperature changes.



Learning Activity 2

#### 2-1: Graph Reading

This is a graph with an **x axis** along the bottom and a **y axis** that runs vertically. The x axis on this graph shows the years, from 1900 to the present. The y axis shows temperature variations measured in degrees celsius.

Scientists used a thirty year period from 1961 to 1990 to establish what they call normal. That 30 year average is the comparison point and is represented by a horizontal line at zero degrees.

For example, the year 1900 was 0.8°C cooler than the 1961 to 1990 average.





Graph reading is an important skill for everyday life. Use the graph on the previous page to answer the questions below.

- 1. What is measured on the x axis? What is the range?
- 2. What is measured on the y axis? What is the range?
- 3. How much warmer is the year 2000 than the average between 1961 and 1990?
- 4. When did the temperature start to increase at a rapid rate?
- 5. What years are approximately normal?
- 6. What kind of trend do you notice in the last 20 years?



- 7. What year does the graph go until? What does the graph tell us about this year?
- 8. What does the graph tell us about these years:

For example: 1920 was 0.6°C cooler than the 1961 to 1990 average.

1945	
1970	
1905	
1930	
1920	



**Learning Activity 2** 

### 2-2: More Graph Reading

Sarah bought a new car in 2001 for \$24,000. The dollar value of her car changed each year as the graph below shows.



- 1. What is measured on the x axis? What is the range?
- 2. What is measured on the y axis? What is the range?
- 3. What does the line graph measure?
- 4. What does it tell us?
- 5. How much has Sarah's car depreciated from 2001 to 2007?



Learning Activity 2

#### 2-3: Make Your Own Line Graph

Line graphs compare two variables. Each variable is plotted along an **axis**. A line graph has a vertical axis and a horizontal axis. So, for example, if you wanted to graph the height of a ball after you have thrown it, you could put time along the horizontal, or x-axis, and height along the vertical, or y-axis.

Some strengths of line graphs include:

- ✓ They are good at showing specific values of data, meaning that given one variable you can easily determine the other.
- ✓ They show trends in data clearly, meaning that they visibly show how one variable affects the other as it increases or decreases.
- They enable the viewer to make predictions about the results of data not yet recorded.

Use the information below about Yellowknife temperatures to make your own line graph. The x axis will be the year and the y axis the temperature. You will have two lines on your graph – one for minimum temperature and one for maximum temperature.

Date and Year	Maximum	Minimum
January 5 <sup>th</sup> , 1955	-18 ° C	- 28 ° C
January 5 <sup>th</sup> , 1960	- 35 ° C	- 40 ° C



January 5 <sup>th</sup> , 1965	- 29 ° C	-38 ° C
January 5 <sup>th</sup> , 1970	- 16 ° C	- 29 ° C
January 5 <sup>th</sup> , 1975	- 31 ° C	- 41 ° C
January 5 <sup>th</sup> , 1980	- 24 ° C	- 27 ° C
January 5 <sup>th</sup> , 1985	- 8 ° C	- 11 ° C
January 5 <sup>th</sup> , 1990	- 27 ° C	- 33 ° C
January 5 <sup>th</sup> , 1995	- 12 ° C	- 35 ° C
January 5 <sup>th</sup> , 2000	- 27 ° C	- 36 ° C
January 5 <sup>th</sup> , 2005	- 8 ° C	- 16 ° C

What does this line graph measure?

What does it tell us?





Two handouts

#### 3-1: Story Questions

Learners answer questions about the text on climate change. The handout asks learners to use a full sentence with correct punctuation.

#### 3-2: Journal Writing

Learners use questions in the handout to guide their journal writing.



**Learning Activity 3** 

#### 3-1: Story Questions

Answer the following questions in one or more sentences. Begin with a capital letter and end with the correct punctuation.

1) How much ice has melted in Greenland from 1979 to 2002?

2) What does the graph on temperature change show scientists?

3) Describe what happens when sun falls on snow and ice? Why is this important?

	The Northern Edge	Climate Change
4)	What might happen to walruses if the se	ea continues to melt?
-)		
5)	What would warmer temperatures do to	o the seal hunt?
6)	What have warming temperatures done this a problem?	to the permafrost? Why is



7) Why are coastal communities at risk from warmer temperatures?

8) How are all these changes to the North going to affect people's way of life?





Questions Learning Activity 3

## 3-2: Journal Writing

Use these questions to guide your journal writing.

- ✓ Have you noticed the climate changing in your community?
  Write about the changes you have noticed.
- ✓ What things do you do in your life to help save the environment?
- ✓ What do you think our world will be like in 50 years?
- ✓ Have Elders noticed any climate changes over their lifetime?





Three handouts

#### 4-1: Comprehending Diagrams

Learners look at the diagram about shrinking ice and snow and write a paragraph about why it is better for the sun to hit snow and ice rather than a surface without snow or ice. They may need to reread the Shrinking Ice and Snow section.

#### 4-2: Using Questions

Ask learners to write down five questions they have about the text. Ask them to share their questions with others. Learners can use these questions for a research project.

#### 4-3: Newspaper Article

Learners read the newspaper article about the polar bears that wandered into Deline in April 2008 and answer the questions on the handout.



#### **4-1:** Comprehending Diagrams

Look at the diagram below. Write a paragraph about why is it better for the sun to hit snow and ice rather than a surface without snow or ice. You may need to reread the section on Shrinking Ice and Snow. Follow the paragraph writing guide on the next page.



113



**Climate Change** 

**Topic Sentence** 

Supporting Sentences (at least 3 sentences)

**Closing Sentence** 



## 4-2: Using Questions

Write down five questions you have about the information on climate change. Share your questions with others in the class. Try to come up with the answers.

1.
 2.
 3.
 4.
 5.





Comprehension Learning Activity 4

## 4-3: Newspaper Article<sup>1</sup>

Read the article below about polar bears wandering into the community of Deline. Answer the questions after the article.

## Wandering polar bears a sign of climate change: expert

Climate change likely played a role in three polar bears wandering hundreds of kilometres south to the Northwest Territories community of Déline, says a Canadian polar bear expert.

Residents in the community of 525, located along the southwest tip of Great Bear Lake, were shocked to get up close to the mother and two cubs when they lumbered into their community Wednesday afternoon — wandering more than 400 kilometres away from their usual habitat on the Beaufort Sea.



Resident Les Baton snapped this picture of the mother polar bear and her cubs in Deline, N.W.T., Wednesday afternoon.

(Photo courtesy Les Baton)

The local RCMP, which started getting calls about the unusual visitors around 3 p.m. MT, said the polar bears appeared thin and hungry. An officer shot and killed the bears out of safety concerns for residents and local dogs.

<sup>&</sup>lt;sup>1</sup> CBC News http://www.cbc.ca/canada/north/story/2008/04/03/deline-bears.html April 3, 2008



It's not the first time that polar bears have travelled south recently: a polar bear made not one, but two trips towards Fort McPherson, N.W.T., last summer.

Andrew Derocher, a University of Alberta biologist who studies polar bears, said the animals have to cope with a dramatic reduction in the amount of sea ice on the Beaufort Sea.

"What we've seen over the last number of years is more increased numbers of incidences of bears that are not being able to maintain contact with the ice through the winter," Derocher told CBC News in an interview Thursday.

"They're having to jump off because the ice breaks up."

#### Some residents concerned

The Déline bears both excited and troubled many residents, about 100 of whom ran outside Wednesday afternoon to take photographs and videos.

"The mother bear looked like it was protecting the cubs, but it's pretty amazing to see," resident Christina Gaudet told CBC News on Wednesday.

"I've lived in Déline all my life, and I've never seen a polar bear; this is the first time."

Const. Jim Craig said RCMP had no choice but to shoot the bears, given they were harassing and threatening dogs nearby. Their proximity to people was also a factor, he added.

"The mother bear, when I shot it was — I'm having a guess here — probably 15, 20 feet





[about 4.6 to six metres] away from me," Craig said.

"There was people everywhere behind me ... out of their trucks, running around behind me, everyone taking pictures and videos. And I'm just concerned for the safety of the people in the community, and for the pets that are tied up outside."

The mother was shot and killed first. However, the sound of Craig's shotgun did not disturb the cubs, as they continued to harass nearby dogs after their mother was shot. They were killed next.

#### Bears likely looking for food since summer

Derocher said he believes the bears that came to Déline probably lost contact with the sea ice last summer, and had been looking for food on the land since then.

Last August, a polar bear wandered south into the hamlet of Fort McPherson, N.W.T., which is 570 kilometres northwest of Déline.

Wildlife officials captured the bear and, with Derocher's help, brought it back to the Arctic Ocean. But several weeks later, it made a second trip south, appearing 100 kilometres north of Fort McPherson.

"When we start to see a pattern like this, it's probably an indication of something changing broadly over an ecosystem," Derocher said.

"We're seeing a lot more bears summering on land in Alaska. We're not seeing a lot of that yet in the Canadian Arctic, on the Beaufort Sea side, but it's certainly an indication that things are changing. The bears are trying to find ways to make a living on land, and of course they're nowhere near as effective as grizzly bears."



Wildlife officers with the territorial government are travelling to Déline on Thursday to examine the carcasses, which are being stored in a local cold storage area.

The officers hope to determine the health, size and age of the bears.

#### Questions

- 1. What do scientists think played a role in the polar bears wandering into Déline? Why?
- 2. Why did they shoot the bears?
- 3. How long do they figure the bears were looking for food?
- 4. Why are bears wandering south, away from sea ice?
- 5. How are polar bear patterns changing in Alaska?
- 6. Why are polar bears struggling on land?
- 7. How does this article make you feel?





Three handouts

#### 5-1: Persuasive Writing

Learners write a persuasive paragraph about climate change. They follow the instructions on the handout.

#### 5-2: Letter to Your MP

Learners write a letter to their MP about climate change. Canada is the third largest producer of green house gasses per capita behind the United States and Australia. First find out who the MP is and then ask learners to write a letter about how they feel about climate change. Helpful hints about writing a letter are on the handout.

#### 5-3: Poetry

Learners write a poem about climate change. They read the poem on the handout and then they write one themselves. Ask them to share their poems with their classmates.



#### 5-1: Persuasive Writing

In persuasive writing, a writer takes a position **for** or **against** an issue and writes to convince the reader to believe or do something. Persuasive writing is often used in advertisements to get the reader to buy a product. It is also used in essays and other types of writing to get the reader to accept a point of view. In order to convince the reader you need more than opinion; you need facts or examples to back your opinion.

Write a persuasive paragraph about climate change. You will have to do a little research on the subject. The Internet will provide you with all the information you need. Ideas for topics are:

- ✓ The changing climate in the Arctic
- ✓ The Kyoto Accord
- ✓ People can make a difference to climate change
- ✓ Climate change affects my community
- ✓ There's no such thing as climate change

#### Follow these steps

- 1. What is the opinion you wish to communicate? For example: *People's actions are causing climate change.*
- 2. What is the action you would like to see taken? For example: *People should walk, ride their bike or take public transportation more.*
- 3. Compose the topic sentence for your paragraph based upon the opinion you want to communicate and the action you would like to see taken.



For example: Climate change is a big concern in our society right now. Canadians should do more to save our earth.

- 4. List some reasons to support your opinion. Your reasons can be facts, statements from experts, incidents, examples and descriptions.
- 5. Organize your reasons, and write them into sentences that flow coherently in a paragraph. You do not have to use all your reasons in your persuasive paragraph. Choose the most convincing ones.
- 6. Conclude your paragraph with a call for action. After you have presented reasons for your opinion, suggest action that the readers can take.

#### Paragraph Checklist

Use the check list below to make sure you have included everything you need for your paragraph.

- \_\_\_\_\_ Did you indent the first word?
- \_\_\_\_\_ Did you use a topic sentence or main idea?
- \_\_\_\_\_ Is each sentence (supporting details) related to the topic sentence?
- \_\_\_\_\_ Is the closing sentence related to the topic sentence?
- \_\_\_\_\_ Is there a capital letter at the beginning and correct punctuation at the end of each sentence?
  - \_\_\_\_\_ Did you correct the spelling?
- \_\_\_\_\_ Did you use the dictionary or thesaurus to find the meaning of words that will improve your vocabulary and spelling?
- \_\_\_\_\_ Did another learner proofread your paragraph?



Learning Activity 5

#### **5-2:** Letter to Your MP

Write a letter about climate change to your Member of Parliament (MP). Writing a letter to your MP can be very effective. MPs are supposed to represent their constituents' views while they are in parliament. So the more they know about what you think the more they can do in parliament.

#### Some ideas of things to write about:

- ✓ Ask what is being done in Canada to reduce greenhouse gasses.
- ✓ Ask what the federal government is doing to tell people what they can do to reduce greenhouse emissions. Canadians are the third leading producer of greenhouse gasses in the world.
- ✓ Ask what is being done in the NWT to reduce greenhouse gasses.
- Tell your MP what you think Canada and the NWT should be doing to reduce greenhouse gasses.
- ✓ Tell your MP what you have learned about climate change in the Arctic. Ask him or her what is being done about the situation.

#### Tips to write your letter.

- ✓ Say why you are writing.
- ✓ Make your request in the first paragraph.



- ✓ Say what you have learned and how you learned it. State your feelings about the issue.
- ✓ Tell the steps you have taken to lessen the impact on the environment.
- ✓ Keep your letter to one page.
- ✓ Be polite and don't use slang.
- ✓ Ask for a reply. You should get one.
- ✓ Ask someone to read your letter before you send it.





Writing Skills Learning Activity 5

5-3: Poetry

Write a poem about climate change. Read the poem below as an example. Your poem must be at least eight lines long. It doesn't have to rhyme, but should express how you feel about climate change.

Climate Change<sup>2</sup> by Francis Duggan

The Worldwide human population has more than quadrupled since I was a boy And these decades of affluence we well may enjoy Yet due to pollution of land and of water and air Signs of climate change are now seen everywhere In the Arctic a part of the World that is very cold The Winters much milder and shorter we're told And with climate change animals and birds becoming rare In the home of the musk oxen and polar bear, The Antarctic Winter now warmer by four or five degrees And the sea ice is thinner on the surrounding seas As polar ice caps melt the sea levels rise to flood coastal lands Worldwide And from changes in Nature nowhere for to hide, The threat of terrorism may cause Worldwide fear But climate change a far greater threat to humanity or so 'twould appear.

<sup>&</sup>lt;sup>2</sup> Source: <u>http://www.dreamagic.com/cgi-</u>

<sup>&</sup>lt;u>bin/PoetryGen.cgi?author=Francis Duggan&html=duggan 54&title=Climate Change&number=540</u> <u>5</u>





Three handouts

#### 6-1: Research Project on Climate Change

Learners develop a research project on climate change. They can choose from three topics and they follow the guide that is on the handout. Review how to reference Internet material before they start their project.

#### 6-2: Your Ecological Footprint

Learners read about ecological footprints and then go on the Internet to calculate their footprint. They answer questions about their footprint and carbon offsetting.

#### 6-3: Polar Bears and Climate Change

The United States has added polar bears to the endangered species list, but Canada has not (as of May 2008). Ask learners to do a report on polar bears. They can use the handout as a guide for writing their report. Have a discussion about how climate change is affecting some animals including polar bears.





## 6-1: Research Project on Climate Change

Research and write a project report on climate change. You can choose one of the topics below. Follow the guide on the next page to help you research and write your report.

#### 1. What is climate change?

- ✓ How does the greenhouse effect work?
- ✓ Why is the earth warming up?
- ✓ Why does an increase of a few degrees make such a change?
- ✓ Where are all greenhouse gasses coming from?
- ✓ How does Canada compare to other countries?

#### 2. What are the impacts of climate change in the north?

- ✓ Why is climate change such a huge issue for the north?
- ✓ How is the land changing?
- ✓ How will climate change affect animals and people in the north?
- ✓ How about the rest of the world?

#### 3. What are some solutions to climate change?

- ✓ What do we need to do?
- ✓ What are some alternative energy sources? Explain how they work.
- ✓ What are some things that ordinary people can do to help?



## **Project Guide**

#### Your project should:

- Be 600 words long, typed and double spaced.
- Have a cover page. Put the title of your report in the middle of the page. On the bottom right side put your name and the date.
- Include at least one page of maps, photos, drawings, or other graphics to illustrate the text of your report.
- Include a reference page at the end. Use at least three references.

#### **Research Plan:**

- Choose a topic that interests you from the above list.
- Use the questions as a guide for your project.
- Use only the facts that you find during your research. Some good websites are:
  - <u>http://www.climatechangenorth.ca/section-</u> <u>BG/B2 Intermediate Outline.html#001</u>
  - o <u>http://www.iisd.org/youth/internetcafe/ccinfo.htm</u>
  - o http://www.davidsuzuki.org/Climate Change/Solutions/
- Do not copy other peoples' words exactly unless you use a quote. This is called plagiarism and it's a serious offence.
- Fill in the attached reference cards as you research.

#### Use the writing process to write your report:

- Brainstorm and organize your ideas.
- Do a mind map with the information.
- Write the first draft.
- Revise talk with other learners and edit for spelling and grammar.
- Rewrite proofread your rough draft for corrections.
- Write or type final copy.



#### References

Make sure you reference all your work. For example if you use a website you should do the following:

"Everything you wanted to know about offsetting but were afraid to ask" by Ron Dembo and Clive Davidson, downloaded from <u>http://www.zerofootprint.net/</u>, May 7, 2008.

- ✓ Title of article in quotation marks
- $\checkmark$  Author (if one is listed)
- ✓ Website address
- ✓ Date you found the article

#### **Reference Card**

Date			
Source	□ Book □ Magazine	□ Encyclopaedia □ Other	□ Website
Author			
Title			
Year			
Address			
Other			
Notes			



#### 6-2: Your Ecological Footprint<sup>3</sup>

Our ecological footprints represent the land and water it takes to provide us with the things we use on a day-to-day basis. In order to live, we consume what nature offers. Every action impacts the planet's ecosystems. This is of little concern as long as human use of resources does not exceed what the earth can renew. But are we taking more?

Today, humanity's ecological footprint is over 23% larger than what the planet can regenerate. In other words, it now takes more than one year and two months for the earth to regenerate what we use in a single year.

You can measure your ecological footprint using calculator tools on the Internet. Ecological footprints enable people to take personal and collective actions in support of a world where humanity lives within the means of one planet.

Answer the questions below about ecological footprints. Use the Internet sites listed to help you.

 What is your ecological footprint? Calculate your ecological footprint using this website: <u>http://www.royalsaskmuseum.ca/gallery/life\_sciences/footprint\_mx\_2</u> <u>005.swf</u> Or you can Google ecological footprint and use a different site.

<sup>&</sup>lt;sup>3</sup> Source: <u>http://www.royalsaskmuseum.ca/gallery/life\_sciences/footprint\_mx\_2005.swf</u>



- 2. What does your ecological footprint mean? How does it compare to others in Canada?
- 3. What does **offsetting** mean? Go to this website for information on offsetting: <u>http://www.zerofootprint.net/</u>
- 4. Air Canada now offers customers an opportunity to offset their travel. Go to their website and calculate how much it would cost you to offset a trip from:
  - a. Yellowknife to Edmonton
  - b. Yellowknife to Toronto
  - c. Yellowknife to Vancouver
- 5. Why does the money from offsetting go towards planting more trees? How do trees help with climate change?



Learning Activity 6

# 6-3: Polar Bears and Climate Change

Climate change is the biggest new extinction threat for polar bears. USA has put polar bears on the endangered species list, although Canada has not yet (as of May 2008). Write a one page report about polar bears and why they may be endangered soon. Answer the following questions in your report:

- ✓ How many polar bears are there today?
- ✓ Where do polar bears live?
- ✓ How many are in Canada?
- ✓ What do polar bears eat?
- ✓ Are polar bears soon to be endangered? Why?
- ✓ How has climate change affected polar bears?
- ✓ What adaptations have polar bears made so far?





One handout

#### 7-1: Interesting Facts (no handout)

Below are some interesting facts that you can use for a discussion on climate change.

- ✓ One tree can absorb the amount of  $C0_2$  released by an average car that's been driven for 6, 400 km.
- $\checkmark$  C0<sub>2</sub> reaches every corner of the globe.
- ✓ Almost half of the C0₂ in our atmosphere will still be here when your grandchildren are born.
- ✓ The ten hottest years ever documented have all occurred since 1990. 1998 was the hottest year on record, followed by 2002, 2003 and 2004.
- ✓ The northern polar ice cap has decreased in thickness by 40% and in extent by 6% over the past 40 years. It is expected to melt completely within 50 years.
- ✓ Reductions in crop yields are anticipated for many regions, especially in later decades as temperatures rise. Recent studies have shown that for rice, the world's most significant grain crop, yields fall by 10% for each degree of warming.
- ✓ The World Health Organization estimates that climate change is already responsible for an estimated 150,000 deaths per year.
- ✓ A study published in *Nature* concluded that climate change could put 25% of all land animals and plants on a path towards extinction over the next 50 years.



 ✓ With Arctic sea ice melting at a rate of up to 9% per decade, Arctic summers could be ice-free by mid-century and polar bears might be driven to extinction within 100 years.

#### 7-2: What Can You Do to Help Climate Change? (no handout)

Learners prepare a two-minute speech on all the things they do to help with climate change.

#### 7-3: Alternative Forms of Energy

Learners research an alternative form of energy and do a fiveminute presentation on it. The handout provides learners with different topics they can choose from and a format for their presentation.





Speaking and Discussion Learning Activity 6

## 7-3: Alternative Forms of Energies

Alternative energies are an "alternative" to the fuels that we use normally. The fuels we use normally are fossil fuels such as petroleum and coal.

Prepare a five–minute presentation on some form of alternative energy. You can pick one of the topics below or choose one of your own.

- 1. Wind power
- 2. Solar power
- 3. Hydrogen power
- 4. Geothermal power

Your presentation should answer these questions:

- ✓ What is the alternative energy? Describe.
- ✓ What are the pros and cons of the alternative energy you chose?
- ✓ How is it being used today?
- ✓ What do you think about this form of energy?
- ✓ Would it work in your community?



## Resources

- English 120 Resource Manual, prepared for the GNWT Department of Education, Culture and Employment by the NWT Literacy Council, 2006.
- English 130 Resource Manual, prepared for the GNWT Department of Education, Culture and Employment by the NWT Literacy Council, 2006.

## Websites

**David Suzuki Foundation** <u>http://www.davidsuzuki.org/</u> This website has a wide range of information and resources on climate change. There are podcasts that students can watch and also a blog that they can participate in.

**Climate Change North** <u>http://www.climatechangenorth.ca/</u> Climate Change North is an educational website created for northerners by northerners. It's about understanding how climate change affects us, and what we can do about it. On the Climate Change North website, you'll find Backgrounders, Lesson Plans, Curriculum Links, Resources, Glossary, and a Student Exchange where students can post their work and see what others have done. Materials cover all subject areas for learners K-12. Developed for Yukon, NWT and Nunavut.

#### Youth Internet Café

<u>http://www.iisd.org/youth/internetcafe/default.htm</u> Learners can join the discussion forum on this website. Youth and young people across Canada participate in this discussion about climate change.