



## Climate Change Posters Curriculum

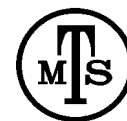


Grade 5 – Teacher's Resource



Natural Resources  
Canada

Ressources naturelles  
Canada



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## **ACKNOWLEDGEMENTS**

Natural Resources Canada – A Teacher’s Resource for the Climate Change Poster Series is intended to supplement the current resources available on this series and is available on the Web site <http://adaptation.nrcan.gc.ca/posters/>.

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## **PREFACE**

Starting in 1999, the Climate Change Action Fund (CCAF) sponsored the development of a series of regional posters on the general science and regional impacts of climate change. Led, or co-led, by Natural Resources Canada (NRCan), the development of these posters was done in close collaboration with provincial and territorial counterparts and stakeholders. NRCan is grateful to its partners who have participated in the development of this curriculum resource. This guide and associated activities is intended to accompany the poster series, with the material found in this guide coming directly from the posters.

## **INTRODUCTION**

The Teacher’s Resource for the Climate Change Poster Series is intended to provide a full range of questions and activity suggestions for the complete set of the 7 Climate Change posters. Teachers may choose to follow the suggested framework and work extensively with the full poster series while some may choose to study and work with only the poster(s) that appear to fit with the region that they live and study in. The overall goals of the resource are to: increase student’s knowledge of climate change, demonstrate the complexity of this environmental phenomenon and improve students’ critical thinking skills while evaluating these complex issues. The Climate Change Poster Series resource enhances several skill areas including critical thinking, evaluation, analysis, application, discussion, questioning, public speaking and reporting.

The Teacher’s Resource has been primarily aligned to meet various curriculum outcomes of Grade 5 science across the country. (See Curriculum Links section for details).

**Natural Resources Canada – Climate Change Posters Curriculum Resource**  
**Provincial Curriculum Outcome Links Grade 5 (4-6)**

Lesson (Grade 4-6)	British Columbia/ Yukon	Alberta	Saskatchewan	Manitoba	Ontario	Quebec/ Nunavut	Atlantic Provinces	Pan-Canadian
<b>Climate Change Poster Activity Worksheets &amp; Scavenger Hunt</b>	<b>Grade 5 Earth &amp; Space Science: Atmosphere &amp; Weather</b>	<b>Grade 5 Topic D: Weather Watch</b> 5-8, 9: 9 - 13	<b>Grade 4 Predicting Weather</b> 1.1, 1.5 2.1, 2.2, 2.3, 2.4 3.1, 3.2, 3.3, 3.4, 3.5	<b>Grade 5 Mathematics</b> SP-IV.2.5 <b>Science</b> 5-4-02 5-4-16 5-4-17 5-4-18 <b>Social Studies</b> 5-S-100 5-S-103 5-S-200 5-S-302 5-S-403 <b>English</b> <b>Language Arts</b> 2.3.5 3.2.5 3.3.2 4.1.2 4.2.5 4.4.2 5.2.1 5.2.2	<b>Grade 5 Earth &amp; Space Systems: Weather</b>	<b>NA</b>	<b>Grade 5 Weather</b> Pan-Canadian	<b>Grade 4 - 6</b> 104, 105-1,2, 106-2, 4, 107-2, 5, 10, 108-1 204-3, 205, 206- 2,3, 207-4 300 – 1, 13, 14, 19, 23 301-2, 13, 14, 19, 20 302-1, 2, 11 303-1 409, 410, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421

*Atlantic Provinces and Pan-Canadian Curricula Numbering: \*STSE: 1\_\_\_, SKILLS: 2\_\_\_, KNOWLEDGE: 3\_\_\_, ATTITUDES: 4\_\_\_.*

\*STSE – Science, Technology, Society and the Environment

## **Manitoba Education Grade 5 Outcomes**

### **Mathematics**

- SP-IV.2.5 makes inferences to generate a conclusion about the data

### **Science**

- 5-4-02 Describe how weather conditions may affect the activities of humans and other animals.
- 5-4-16 Differentiate between weather and climate.
- 5-4-17 Identify factors that influence weather and climate in Manitoba and across Canada, and describe their impacts.
- 5-4-18 Recognize that climates around the world are ever changing, and identify possible explanations.

### **Social Studies**

- 5-S-100 Collaborate with others to establish and carry out group goals and responsibilities
- 5-S-103 Make decisions that reflect care, concern, and responsibility for the environment.
- 5-S-200 Select information from oral, visual, material, print, or electronic sources.  
*Examples: maps, atlases, art, songs, artifacts, narratives, legends, biographies, historical fiction...*
- 5-S-302 Draw conclusions based on research and evidence.
- 5-S-403 Present information and ideas orally, visually, concretely, or electronically.

### **English Language Arts**

- 2.3.5 *Create Original Texts* - create original texts [such as journals, posters combining print and art, dioramas, travelogues] to communicate and demonstrate understanding of forms and techniques
- 3.2.5 *Make Sense of Information* - recognize organizational patterns of oral, visual, and written texts [including main ideas and supporting details, explanation, comparison and contrast, cause and effect, and sequence]; skim, scan, and listen for key words and phrases
- 3.3.2 *Record Information* - record information in own words; cite authors and titles alphabetically and provide publication dates of sources
- 4.1.2 *Choose Forms* - choose forms [such as news stories, interviews, reports, diagrams...] appropriate to a variety of audiences and purposes
- 4.2.5 *Enhance Presentation* - prepare organized compositions, presentations, reports, and inquiry or research projects using pre-established organizers
- 4.4.2 *Effective Oral Communication* – use gestures and facial expression to enhance oral presentations; use and monitor emphasis and appropriate pacing; arrange presentation space to focus audience attention
- 5.2.1 *Cooperate with Others* - distinguish between on-task and off-task ideas and behaviours in cooperative and collaborative groups, and stay on task; identify and solve group productivity issues
- 5.2.2 *Work in Groups* - assume the responsibilities of various group roles; choose roles appropriate for tasks and productivity

## **Natural Resources Canada: 7 Regional Climate Change Posters** **Application to Grade 5 Science Weather Cluster**

In the **Manitoba Grade 5 Science Weather** cluster we learn that daily weather conditions are not the result of random occurrences, but of global systems that can be predicted on a short-term and a seasonal basis. Through observations and measurements, students investigate the properties of air and other aspects of daily weather. Students learn to interpret public weather reports and investigate the usefulness of various ways of predicting the weather. Understanding the meaning of severe weather forecasts and the preparations to ensure personal safety are emphasized. Students recognize the role of technology in increasing scientific understanding of weather while appreciating the limitations in accurately predicting long-term weather trends. They also investigate factors that influence climate in Manitoba and across Canada.

### **Learning Outcomes:**

1. Use appropriate vocabulary related to their investigations of weather.
2. Describe how weather conditions may affect the activities of humans and other animals.
3. Differentiate between weather and climate
4. Identify factors that influence weather and climate in Manitoba and across Canada, and describe their impacts.
5. Recognize that climates around the world are ever changing, and identify possible explanations.

### **The 7 Climate Change posters available are titled:**

1. Degrees of Variation: Climate Change in Nunavut
2. The Tides of Change: Climate Change in Atlantic Canada
3. A Change in the Wind: Climate Change in Quebec
4. Weathering the Changes: Climate Change in Ontario
5. Temperature Rising: Climate Change in Southwestern British Columbia
6. The Winds of Change: Climate Change in the Prairie Provinces
7. Taking the Chill Off: Climate Change in the Yukon & Northwest Territories

*The posters are available from the Geological Survey of Canada:*

1. 601 Booth Street, Ottawa, Ontario K1A 0E8
2. 3303-33<sup>rd</sup> Street NW, Calgary, Alberta T2L 2A7
3. 101-605 Robson Street, Vancouver, B.C. V6B 5J3

*Or by calling:*

1. 1-800-622-6232 (allow 4 – 6 weeks delivery)
2. 1-888-252-4301

*Or order on-line:*

1. [http://climatechange.gc.ca/english/teachers/poster\\_order.asp](http://climatechange.gc.ca/english/teachers/poster_order.asp)

Explore the following website to view the posters, and to get more information on climate change:

1. <http://adaptation.nrcan.gc.ca/posters/>

Ordering the posters, and having them laminated will allow you to use this resource in your classroom many times. Another option is to photocopy the poster into manageable 8.5 x 11" sheets for access in booklet form.

The posters carry much of the necessary information, and capacity to address the Manitoba Grade 5 Cluster, particularly outcomes 5-4-17 and 5-4-18. This is an excellent resource for grade 5 science teachers in Manitoba.

### **Activating Strategies:**

Introduction to the topic of climate change, its potential impacts, and interest in the posters can be facilitated with a variety of activation activities:

1. *Videos: A number of videos to prompt interest in the topic are available: Students view a video on climate change to introduce them to the concept. These videos are listed as S2 resources but also have a possibility with grade 5 students as an introductory activity.*
  - a. What's Up With the Weather? Nova, 2 hours. Original broadcast April 18, 2000. \$19.95 U.S.
  - b. Warnings from the Ice. Nova, 1 hour. Original broadcast April 21, 1998. \$19.95 U.S.
  - c. Chasing El Niño. Nova, 1 hour. Original broadcast Oct. 13, 1998. \$19.95 U.S.
  - d. Einstein Revealed. Nova, 2 hours. Original broadcast Oct. 1, 1996. \$19.95 U.S.
  - e. Planet Earth: The Climate Puzzle. WQED Pittsburgh, PA. Metropolitan Pittsburgh Public Broadcasting, Inc., 1986.
2. *Articles: Students search through newspapers and other sources to identify and collect articles related to climate change, and build a "Climate Change in the News" display. Ongoing research and reports on climate change offer numerous articles to prompt student inquiry. Suggestions include:*
  - a. Suzuki, David. "Let Kyoto take wing: Ottawa signed the accord. Now, let it keep its promise with budget incentives for a green, 21<sup>st</sup> century economy, says environmentalist DAVID SUZUKI." Globe and Mail. 17 Mar 2004. A19.
  - b. Stipp, David. "The Pentagon's Weather Nightmare: The climate could change radically, and fast. That would be the mother of all national security issues." Fortune, 9 Feb 2004. Time, Inc. Vol. 149, i3, p100.
  - c. Jaccard, Marc. "Cool your jets: Let the market fight emissions: Forget about Kyoto. Here's a better way." Globe and Mail. 31 Mar 2004. A19.

Assigned reading for individual students or groups, with the task of reporting main points or the "Climate Change in the News" display may facilitate a discussion on climate change to set the stage for work on the NRC regional posters.

3. *Guest speakers: Students can use active listening skills with a guest speaker(s) on climate change to activate their prior knowledge of the concept.*

### **Acquiring Strategies:**

*Student groups of 3 are ideal to provide enough elbowroom to work on the posters. If desired, two groups of 3 can operate on one poster at a given time.*

1. As a class, students view the layout of the climate change posters, and review and discuss the importance of headings and keywords in their search for information.
2. Students work in small collaborative groups to complete the “*What is Climate Change? Scavenger Hunt*” BLM as an introduction to the climate change posters, and to develop their understanding of what climate change is. Student groups have 10-15 minutes at each poster to locate the required information. They continue to switch posters at the timed intervals, until they have gathered information from all seven posters. As a class, students build and maintain a *word wall* where vocabulary and terminology related to climate change is posted and shared. Time: ~ 70 to 105 minutes
3. Students work through the subsequent blackline masters to obtain further information regarding the causes, and consequences of climate change for each region of Canada, as well as what actions Canadians can take to slow the rate of climate change. Students use headings and keywords on the blackline masters to guide them in locating information on the posters. Students continue to identify climate change vocabulary and terminology found in their studies of the posters that can be discussed with the class, and added to the class word wall.
4. Several strategies for completing the 7 worksheets include:
  - a. Assigned groups study one region at a time, completing the blackline masters for each poster. *Time ~7 hours*
  - b. A jigsaw strategy is used where collaborative groups divide their members so each group member is responsible for a specific poster or posters. Each group member completes the blackline master for their assigned region, and then returns to their home group to share the information obtained. *Time ~4-5 hours*
  - c. Each student is responsible for either the Causes, Consequences, or Action portion of the blackline masters to gather information from all posters. Groups then meet to share the information gathered. *Time: ~4-5 hours*

### **Applying Strategies:**

1. Students write a letter to their family telling them about the causes of climate change and its consequences. They can congratulate their family on the positive actions they are currently taking, and can suggest further changes their family could make to help in slowing the rate of climate change. A class letter could also be written to the principal to encourage changes at the school level as well.
2. Students prepare a presentation of their climate change learning, which addresses what climate change is, the causes, the consequences, and the actions people can take to make a difference to climate change. This could be done individually, or as a collaborative group. (Presentation projects might include: creating a multimedia presentation, class website, climate change brochure, artistic representation through art, drama, or music, a children’s book or game, a news article or letter to the editor.) When presentation projects are complete, students orally and visually share their work with the class, school and/or community.



### **Suggestions for Assessment/Evaluation:**

1. Assessment of climate change poster blackline masters (group or individual).
2. Observation and assessment of collaborative group processes and skills.
3. Assessment of letters, climate change project work and oral presentations.

### **Suggestions for Follow-up Activities/Supplemental Materials:**

#### Web Sites:

1. <http://www.pbs.org/wgbh/nova/teachers> Nova Teachers provides access to the videos listed above, in addition to excellent resources accessible under the following headings:
  - *Program Overview*
  - *Viewing Ideas*
  - *Classroom Activity* (some excellent student handouts included)
  - *Ideas from Teachers*
  - *Related Nova Resources*
  - *Interactive for Students*
2. <http://www.climatechangecanada.org> Temperature Rising. Poster and activities, related links on poster 5, British Columbia.
3. <http://www.weatheroffice.ec.gc.ca> Canadian weather and climate data.
4. [http://climate.weatheroffice.ec.gc.ca/Welcome\\_e.html](http://climate.weatheroffice.ec.gc.ca/Welcome_e.html) National Climate Data and Information Archive.
5. <http://ehp.niehs.nih.gov/topic/climatetop.html> Environmental Health Perspectives Online. Climate change impacts on human health explored.

Order climate change posters on-line at

[http://climatechange.gc.ca/english/teachers/poster\\_order.asp](http://climatechange.gc.ca/english/teachers/poster_order.asp)

6. Climate change posters on-line at <http://adaptation.nrcan.gc.ca/posters/>

#### Articles:

1. "With or without Kyoto, Canada needs a plan." Editorial. Globe & Mail. 4 Dec 2003. A24.
2. Chase, Steven and Tuck, Simon. "Ottawa looks at big outlays for clean gas." Globe & Mail. 13 May 2003. A1.
3. Pearce, Fred. "Kyoto changes may drive deforestation." New Scientist. 22 Mar 2003. Vol 177, i2387, p15(1).
4. "Is Kyoto Dead?" The Economist. 6 Dec 2003. Vol 369, i8353, p73US.
5. "Climate Change's Impacts on Wildlife." National Wildlife. June – July 2002.
6. "Climate Change Impacts on Agriculture." Environment. March 2000. Vol 42, i2, p3.

7. Regush, Nicholas. "Microbes on the March." Canadian Geographic. September/October 2000. p62 – 29.
8. Marchese, John. "Forecast: Hazy." Discover. June 2001. p45 – 51.
9. "Greenhouse Effect, R.I.P." Discover. August 2001. p17 – 18.
10. Zimmer, Carl. "The El Niño Factor." Discover. January 1999. p98 – 106.
11. Hayden, Thomas. "What's Up With the Weather?" Newsweek. 31 Jan 2000.
12. Wood, Chris. "Wild Weather." Macleans. 25 Jan 1999.
13. Nash, Madeleine. "Will We Control the Weather?" Time. 10 Apr 2000. p72 – 74.

For Winnipeg Teachers:

1. Fort Whyte Centre: Weather and Climate Change Lab
  - [http://www.fortwhyte.org/fwSchool\\_Programs.html](http://www.fortwhyte.org/fwSchool_Programs.html)
  - 4 - 5 hour interactive program
  - \$8.00 per student (10 – 75 students)

Videocassette and print material:

1. Kouth, Jude L. *Global Warming and the Greenhouse Effect* [videocassette]. Mississauga, ON: McIntyre Media, 2001.
2. International Institute for Sustainable Development. *Sila Alangotok: Inuit Observations on Climate Change* [videocassette].
3. Drew, David. *Earth in Danger*. Crystal Lake, IL: Rigby Education, 1990

## ***What Is Climate Change? Scavenger Hunt***

Use the climate change posters to find the information needed to complete these sentences. The headings will help direct you to where the information is located on the posters.

### ***Degrees of Variation: Climate Change in Nunavut***

#### ***CLIMATE CHANGE: THE BASICS***

Climate change is a change or variability in the \_\_\_\_\_ of a region.

\_\_\_\_\_ can occur naturally.

The Earth's temperature is regulated by a natural system known as the \_\_\_\_\_.

Name five naturally occurring greenhouse gases. \_\_\_\_\_  
\_\_\_\_\_

Problems can arise when the concentrations of these naturally occurring gases are \_\_\_\_\_.

### ***Taking the Chill Off: Climate Change in the Yukon and Northwest Territories***

#### ***HOW HAS THE CLIMATE CHANGED?***

During the last ice age, \_\_\_\_\_ covered much of Canada and temperatures were much \_\_\_\_\_ than today in the Arctic.

Major shifts in climate, such as those that resulted in past ice ages, are related to changes in the Earth's position relative to the \_\_\_\_\_.

Shorter-term changes in climate can occur after major \_\_\_\_\_.

Changes in the circulation and temperature of the \_\_\_\_\_ can also cause shifts in climate such as El Niño events.

## ***Temperature Rising: Climate Change in Southwestern British Columbia***

### ***IS CLIMATE CHANGING?***

\_\_\_\_\_ is the expected or general pattern of weather for a place or region over extended periods of time.

Scientists are concerned that we are entering a period of unprecedented \_\_\_\_\_ caused by humans.

The greatest differences (in surface air temperature) are predicted to be at high \_\_\_\_\_ and in the \_\_\_\_\_ of continents.

The \_\_\_\_\_ century was the warmest century of the last 1000 years, and the \_\_\_\_\_ was the warmest decade of that century.

## ***The Winds of Change: Climate Change in the Prairie Provinces***

### ***CLIMATES DO CHANGE***

\_\_\_\_\_ and \_\_\_\_\_ trends are part of the Earth's normal climatic cycles.

There have been frequent changes in \_\_\_\_\_, with repeated swings from colder to warmer conditions.

Over the past 140 years, Earth's \_\_\_\_\_ has warmed.

Scientists are concerned that we are entering a period of unprecedented global warming caused by \_\_\_\_\_.

## ***Weathering the Changes: Climate Change in Ontario***

### ***THE CLIMATE SYSTEM – A BALANCING ACT***

The main elements of the climate system include \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

Changes to any of these elements affect the \_\_\_\_\_ of the entire system.

Without this insulation (of greenhouse gases in the atmosphere), Earth would be about \_\_\_\_\_ colder than it is now, making it inhospitable to life.

### ***UPSETTING THE BALANCE***

In Canada, the average temperature has increased by \_\_\_\_\_ since 1948.

This 'enhanced' \_\_\_\_\_ has the potential to warm the planet at a rate never before experienced in human history.

## ***A Change in the Wind: Climate Change in Quebec***

### ***WHAT IS CLIMATE CHANGE?***

Climate change is a change in the 'average weather', affecting these features of weather: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

The enhancement of the greenhouse effect contributes to global warming and may have various \_\_\_\_\_ repercussions.

Myth: A cool \_\_\_\_\_ or colder than average \_\_\_\_\_ means that global warming is not really a problem.

## ***The Tides of Change: Climate Change in Atlantic Canada***

### ***IS CLIMATE CHANGING?***

Recent unusual weather conditions have everyone talking about \_\_\_\_\_.

There is increasingly stronger scientific proof that \_\_\_\_\_ is real.

The temperature increase has not been steady, but since the 1980s warming has \_\_\_\_\_.

\_\_\_\_\_ may experience more temperature change over the next several decades than most regions of the world.

## ***What Is Climate Change? Scavenger Hunt***

### ***Answer Key***

Use the climate change posters to find the information needed to complete these sentences. The headings will help direct you to where the information is located on the posters.

#### ***Degrees of Variation: Climate Change in Nunavut***

##### ***CLIMATE CHANGE: THE BASICS***

Climate change is a change or variability in the 'average weather' of a region.

Climate change can occur naturally.

The Earth's temperature is regulated by a natural system known as the 'greenhouse effect'.

Name five naturally occurring greenhouse gases. water vapour, CO<sub>2</sub>, methane, nitrous oxide, and ozone

Problems can arise when the concentrations of these naturally occurring gases are increased.

#### ***Taking the Chill Off: Climate Change in the Yukon and Northwest Territories***

##### ***HOW HAS THE CLIMATE CHANGED?***

During the last ice age, glaciers covered much of Canada and temperatures were much colder than today in the Arctic.

Major shifts in climate, such as those that resulted in past ice ages, are related to changes in the Earth's position relative to the sun.

Shorter-term changes in climate can occur after major volcanic eruptions.

Changes in the circulation and temperature of the oceans can also cause shifts in climate such as El Niño events.

## ***Temperature Rising: Climate Change in Southwestern British Columbia***

### ***IS CLIMATE CHANGING?***

Climate is the expected or general pattern of weather for a place or region over extended periods of time.

Scientists are concerned that we are entering a period of unprecedented global warming caused by humans.

The greatest differences (in surface air temperature) are predicted to be at high latitudes and in the interior of continents.

The twentieth century was the warmest century of the last 1000 years, and the 1990s was the warmest decade of that century.

## ***The Winds of Change: Climate Change in the Prairie Provinces***

### ***CLIMATES DO CHANGE***

Warming and cooling trends are part of the Earth's normal climatic cycles.

There have been frequent changes in climate, with repeated swings from colder to warmer conditions.

Over the past 140 years, Earth's atmosphere has warmed.

Scientists are concerned that we are entering a period of unprecedented global warming caused by human activity.

## ***Weathering the Changes: Climate Change in Ontario***

### ***THE CLIMATE SYSTEM – A BALANCING ACT***

The main elements of the climate system include the sun, atmosphere, ocean, water, and land.

Changes to any of these elements affect the balance of the entire system.

Without this insulation (of greenhouse gases in the atmosphere), Earth would be about 33°C colder than it is now, making it inhospitable to life.

### ***UPSETTING THE BALANCE***

In Canada, the average temperature has increased by 0.9°C since 1948.

This 'enhanced' greenhouse effect has the potential to warm the planet at a rate never before experienced in human history.

## ***A Change in the Wind: Climate Change in Quebec***

### ***WHAT IS CLIMATE CHANGE?***

Climate change is a change in the 'average weather', affecting these features of weather: temperature, wind patterns, precipitation, and storms.

The enhancement of the greenhouse effect contributes to global warming and may have various environmental repercussions.

Myth: A cool summer or colder than average winter means that global warming is not really a problem.

## ***The Tides of Change: Climate Change in Atlantic Canada***

### ***IS CLIMATE CHANGING?***

Recent unusual weather conditions have everyone talking about climate.

There is increasingly stronger scientific proof that climate change is real.

The temperature increase has not been steady, but since the 1980s warming has accelerated.

Canada may experience more temperature change over the next several decades than most regions of the world.



# Degrees of Variation: Climate Change in Nunavut

## The Causes of Climate Change

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

### Climate Change- The Basics

1. What human factors contribute to climate change?

\_\_\_\_\_

2. What greenhouse gas is most closely connected to human activities?

\_\_\_\_\_

### Did you know?

3. What human activity is a major source of greenhouse gas emissions?

\_\_\_\_\_

4. How much CO<sub>2</sub> is produced for every litre of gas used in your vehicle?

\_\_\_\_\_

### The Challenge

5. What activity is responsible for 53% of the residential emissions of CO<sub>2</sub>?

\_\_\_\_\_

6. How does Canada rank globally for CO<sub>2</sub> emissions?

\_\_\_\_\_

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

## ***Degrees of Variation: Climate Change in Nunavut***

### ***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did you know?**

1. Where do climate models predict the greatest warming will occur?

\_\_\_\_\_

2. If the Greenland Ice Sheet melts, by how much will the global sea level rise?

\_\_\_\_\_

#### **The Current Conditions**

3. By looking at the graph, Frequency of Intense Winter Storms, what can you conclude about these storms in the northern hemisphere?

\_\_\_\_\_

#### **Of Ice and Men**

4. What traditional northern activities depend on sea ice?

\_\_\_\_\_

#### **Life at Sea**

5. What do scientists predict will happen to the range of many marine species as climate changes?

\_\_\_\_\_

6. What animals need strong sea ice to breed, nurse pups and rest?

\_\_\_\_\_

7. How will Inuit hunters be affected as animals change their range in response to climate change?

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8. According to the News North, when it gets too warm, what do the animals do?

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**Glaciers and Sea-Level Rise**

9. What are the impacts of sea level rise?

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**Northern Landscapes**

10. What is found beneath the ground surface in nearly all of Nunavut?

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11. How will people be affected if the permafrost thaws?

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12. How will the food supply of herbivores be affected by climate change?

---

13. How will birds be affected by warming of the Nunavut region?

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**Life on the Land**

14. What aspects of the north will be affected by the climate warming?

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**The Challenge**

15. How might human health be affected by climate change?

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<p><b><u>Connections</u></b></p> <p><i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i></p>	<p><b><u>Reflections</u></b></p> <p><i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i></p>	<p><b><u>Questions</u></b></p> <p>What questions do you still have, or what new questions have been raised?</p>
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**Degrees of Variation: Climate Change in Nunavut**

**Action on Climate Change**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**The Challenge**

1. What do thermosyphons do?

\_\_\_\_\_

2. What does a photovoltaic array do?

\_\_\_\_\_

3. What are five things you can do to help?

\_\_\_\_\_

\_\_\_\_\_

<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>

## ***The Tides of Change: Climate Change in Atlantic Canada***

### ***The Causes of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. Although Canada has only 0.5% of the world's population, it produces 2% of this.

\_\_\_\_\_

#### **The Greenhouse Effect**

2. What are "the big three" greenhouse gases?

\_\_\_\_\_

3. Why does CO<sub>2</sub> have the greatest influence?

\_\_\_\_\_

#### **The Air We Breathe**

4. What are three types of fossil fuels?

\_\_\_\_\_

5. What are fossil fuels used for?

\_\_\_\_\_

6. What does burning fossil fuels do?

\_\_\_\_\_

7. What activity is responsible for 26% of greenhouse gas emissions in Canada?

\_\_\_\_\_

#### **How Do We Measure Up?**

8. Looking at the Annual Greenhouse Gas Emissions per capita data, how many tonnes of CO<sub>2</sub> was each Canadian emitting?

\_\_\_\_\_

9. In Atlantic Canada, what are the four areas contributing most to greenhouse gas emissions?

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<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	What questions do you still have, or what new questions have been raised?

***The Tides of Change: Climate Change in Atlantic Canada***  
***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Did You Know?**

1. What are all species in the marine food web affected by?

\_\_\_\_\_

**Is Climate Changing?**

2. What is happening to most of the world's glaciers?

\_\_\_\_\_

3. Find the Temperature Change maps. What areas of the map show the greatest temperature change?

\_\_\_\_\_

**Freshwater Issues**

4. How could hydro-electricity be affected by climate change?

\_\_\_\_\_

\_\_\_\_\_

**Forests in Peril?**

5. Why might the Gypsy moth threaten Canadian forests if warming continues?

\_\_\_\_\_

**Storm Surges and Coastal Flooding**

6. Why may storm surges cause more frequent and severe flooding?

\_\_\_\_\_



**Down on the Farm:**

7. What is the greatest concern for agriculture in Atlantic Canada?

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8. How would more storms, hail, floods and droughts affect farms?

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9. Make a list of positive and negative consequences for farmers if global warming continues.

**Positive**

**Negative**

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**Rising Sea Level and Vanishing Coasts:**

10. What specific types of coastal areas will be most affected by sea-level rise?

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**Sea Ice and Icebergs:**

11. What will happen to sea ice with global climate change?

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12. What benefits and concerns would there be with less sea ice?

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**Changing Ecosystems**

13. How will climate change affect vegetation zones?

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14. How will wildlife populations handle a changing ecosystem or habitat?

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<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

***The Tides of Change: Climate Change in Atlantic Canada***

***Action on Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Did You Know?**

1. What percent does Canada aim to reduce its emissions by under the Kyoto Protocol?

\_\_\_\_\_

2. What is the fastest, cheapest and surest way to reduce greenhouse gas emissions?

\_\_\_\_\_

**Let's Meet the Challenge:**

3. When we save energy or replace fossil fuels, what do we help to do?

\_\_\_\_\_

4. What are some low-emission ways to travel?

\_\_\_\_\_

5. What are five other types of energy that would reduce greenhouse gas emissions?

\_\_\_\_\_

<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>

***A Change in the Wind: Climate Change in Quebec***  
***The Causes of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Did you know?**

1. What emits over three times its weight in CO<sub>2</sub> every year?

\_\_\_\_\_

2. What greenhouse gases retain 21 times more heat than carbon dioxide?

\_\_\_\_\_

3. One third of greenhouse gas emissions in Quebec are the direct result of what?

\_\_\_\_\_

**Emissions – How Do We Measure Up?**

4. What are the top 3 sources of greenhouse gas emissions in Quebec?

\_\_\_\_\_

**What is Climate Change?**

5. What are three examples of human activity that have enhanced the naturally occurring greenhouse effect?

\_\_\_\_\_

6. Of the three main greenhouse gases, which one has the greatest impact because it is the most abundant?

\_\_\_\_\_

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions.</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	What questions do you still have, or what new questions have been raised?

***A Change in the Wind: Climate Change in Quebec***  
***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Did You Know?**

1. What severe weather phenomenon costs \$10-\$15 million annually in Quebec?

\_\_\_\_\_

2. What Quebec city is frequently hit by severe weather events?

\_\_\_\_\_

3. Which regions are likely to be most affected by a warmer climate?

\_\_\_\_\_

4. What will happen to caribou herds with an increase in temperature?

\_\_\_\_\_

**A Climate in Constant Flux**

5. When have ten of Quebec's warmest years of the century occurred?

\_\_\_\_\_

6. Looking at the global map, what areas are expected to have the greatest temperature change in the next 50 years?

\_\_\_\_\_

7. What do the three graphs show about how the temperature may change by the year 2100?

\_\_\_\_\_

**Our Health**

8. What is the most direct health risk from warming climates?

\_\_\_\_\_

9. Will warming increase or decrease the amount of smog?

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10. What are four indirect impacts of climate change on human health?

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**Extreme Weather – What are the Risks?**

11. What are examples of severe, or extreme weather events that may increase with global warming?

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**Could a Warmer Climate Mean a Shortage of Water?**

12. How might climate change alter snow and rainfall patterns?

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13. What might be the effects of droughts and reduced groundwater, as a result of climate change, on humans?

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14. How are fish affected when groundwater changes due to changes in precipitation?

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**A Dynamic Forest:**

15. What will happen to the tree line in Quebec?

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16. How may precipitation and forest fires be changed with global warming?

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**What about the Far North?**

17. How has the permafrost been affected by the climate warming?

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18. What specific impacts to northern communities will occur if the permafrost melts?

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19. How will tree growth be affected by climate warming?

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**Wildlife Acclimates:**

20. In what ways may animal species be affected?

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**Rising Sea Levels**

21. What are potential impacts resulting from changes in the estuary and gulf?

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**Our Farms**

22. What are the positive and negative effects of climate change on Quebec's agriculture?

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<p><b><u>Connections</u></b> <i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i></p>	<p><b><u>Reflections</u></b> <i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i></p>	<p><b><u>Questions</u></b> <i>What questions do you still have, or what new questions have been raised?</i></p>
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***A Change in the Wind: Climate Change in Quebec***  
***Action on Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

***We Can All Help***

1. What must we do to slow the effects of climate change?

\_\_\_\_\_

2. What are 6 ways we can help?

\_\_\_\_\_

\_\_\_\_\_

***Our Health***

3. What actions can help to improve air quality?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

<b><u><i>What I am already doing...</i></u></b>	<b><u><i>What I can begin to do...</i></u></b>

**Taking the Chill Off: Climate Change in the Yukon & Northwest Territories**

**The Causes of Climate Change**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**What is the Greenhouse Effect?**

1. Name two of the gases that absorb heat energy in the atmosphere.

\_\_\_\_\_

2. What can you conclude about CO<sub>2</sub> concentrations over the last 200 years from studying the graph?

\_\_\_\_\_

3. What happens to the greenhouse effect as concentrations of greenhouse gases increase from burning fossil fuels?

\_\_\_\_\_

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions.</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	What questions do you still have, or what new questions have been raised?

***Taking the Chill Off: Climate Change in the Yukon & Northwest Territories***

***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Permafrost and Climate Change:**

1. What might happen to the permafrost if climate warms?

\_\_\_\_\_

2. What can you conclude is happening from the Summer Thaw Depth graph?

\_\_\_\_\_

3. How will people be affected by thawing permafrost?

\_\_\_\_\_

\_\_\_\_\_

**A Greener North:**

4. What will happen to the treeline with climate change?

\_\_\_\_\_

5. What may happen to insect distribution as climate warms?

\_\_\_\_\_

\_\_\_\_\_

6. What new types of vegetative cover will be found in the Yukon and Northwest Territories as climate warms?

\_\_\_\_\_

**A Tougher Life for Caribou?**

7. What insect might increasingly harass caribou with warmer temperatures?

\_\_\_\_\_

8. What would it become difficult for caribou to give birth and raise their young if climate warms?

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9. How might caribou changes have an impact on the people in the region?

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**Fire and Ice:**

10. How will the risks of forest fires change in the north with expected climate changes?

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11. List three effects of excessive thawing of ice.

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**Impacts of Climate Change in the Beaufort Sea Region**

12. How much erosion could occur in a single year in the Beaufort Sea region?

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13. How may climate warming affect this region?

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14. What is a consequence of climate warming?

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**Sea Ice and Marine Mammals:**

15. What has been happening to the ice concentration in the area over time, comparing the 30-Year Median graph to that of September 1998?

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16. Why do seals suffer when ice melts quicker than usual?

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**Rivers and Lakes**

17. Northern communities rely on ice roads for transportation. How will this change as the climate warms?

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<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	What questions do you still have, or what new questions have been raised?

***Taking the Chill Off: Climate Change in the Yukon & Northwest Territories***

***Action on Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

***Impacts of Climate Change in the Beaufort Sea Region***

1. Examine the air photo taken of Tuktoyaktuk from 1947. The green and black lines show the significant loss of shoreline over the last 50+ years. What has been proposed, and somewhat implemented since 1976?

\_\_\_\_\_

***How Are the N.W.T. and Yukon Responding to Climate Change?***

2. What are some other energy sources to replace diesel fuel generators?

\_\_\_\_\_

\_\_\_\_\_

<b><u><i>What I am already doing...</i></u></b>	<b><u><i>What I can begin to do...</i></u></b>

## ***Weathering the Changes: Climate Change in Ontario***

### ***The Causes of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. How much carbon dioxide is produced by every litre of gasoline used in your car?

\_\_\_\_\_

2. “Jackrabbit” starts use 50% more of what product than if you accelerate gradually?

\_\_\_\_\_

3. What does one third of the carbon dioxide emissions created by human activities come from?

\_\_\_\_\_

#### **The Climate System – A Balancing Act**

4. Which greenhouse gas is made by landfills and wetlands?

\_\_\_\_\_

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	What questions do you still have, or what new questions have been raised?

***Weathering the Changes: Climate Change in Ontario***  
***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Did You Know?**

1. Why may the cold-water fish species such as lake trout disappear from southern Ontario?

\_\_\_\_\_

**Future Climate**

2. What is predicted to happen along with climate change warming in Ontario?

\_\_\_\_\_

3. By looking at the global map, what regions would you conclude may have the most significant changes?

\_\_\_\_\_

**Where We Live**

4. How are storms such as thunderstorms expected to change?

\_\_\_\_\_

5. How would shorter winters affect people?

\_\_\_\_\_

6. What changes do experts predict with climate change?

\_\_\_\_\_

7. How many households in total lost power in the January 1988 ice storm?

\_\_\_\_\_

**Our Health**

8. What climate factors can affect our health?

\_\_\_\_\_



9. Compared to today, how many hot days over 35 degrees Celsius may southern Ontario experience by the middle of the next century?

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10. How will warmer daytime temperatures affect smog?

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11. What causes the “urban heat island effect”?

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**Our Water**

12. What concerns are there when water supplies are warmer?

---

13. How will lower water levels affect shipping?

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14. How will the Great Lakes be affected by climate change?

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**Our Farms**

15. What are the positive and negative consequences of climate warming for farmers in Ontario?

**Positive**

**Negative**

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**Our Forests**

16. What may be some of the effects on forests and forestry with the changes in climate?

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<p><b><u>Connections</u></b> <i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i></p>	<p><b><u>Reflections</u></b> <i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i></p>	<p><b><u>Questions</u></b> <i>What questions do you still have, or what new questions have been raised?</i></p>
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***Weathering the Changes: Climate Change in Ontario***  
***Action on Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Did You Know?**

1. How can you change the frequently used regular light bulbs in your home to save 100 kg of CO<sub>2</sub> per year?

\_\_\_\_\_

2. What should you do with your laundry to save up to 225 kg of CO<sub>2</sub> per year?

\_\_\_\_\_

3. What are the benefits of no-till farming?

\_\_\_\_\_

**Where Do We Go From Here?**

4. What protocol did 160 nations originally negotiate to reduce global greenhouse gases?

\_\_\_\_\_

5. What does this protocol do?

\_\_\_\_\_

6. What is a “walking school bus”?

\_\_\_\_\_

7. What can help reduce greenhouse gas emissions from heating and cooling by shading buildings?

\_\_\_\_\_

<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>

# Temperature Rising: Climate Change in Southwestern British Columbia

## The Causes of Climate Change

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

### Did You Know?

1. How much water does each person use at home every day?

\_\_\_\_\_

2. What is the source of nearly 30% of the greenhouse gas emissions in the lower Fraser Valley?

\_\_\_\_\_

3. What animals are shown as methane producers?

\_\_\_\_\_

### Why is Climate Changing Now?

4. What turning point saw additions of CO<sub>2</sub> to the atmosphere overtake removals?

\_\_\_\_\_

5. What are the causes of the rapid build-up of CO<sub>2</sub> in our atmosphere?

\_\_\_\_\_

### How Do We Measure Up?

6. Out of individual household CO<sub>2</sub> emissions, what % does automobile use put out?

\_\_\_\_\_

7. What activities contribute to 75% of CO<sub>2</sub> emissions that are not individually produced?

\_\_\_\_\_

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	What questions do you still have, or what new questions have been raised?

***Temperature Rising: Climate Change in Southwestern British Columbia***  
***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Is Climate Changing?**

1. How do glaciers behave when climate changes?

\_\_\_\_\_

2. By how much is the global temperature expected to rise above 1980 levels by the year 2100?

\_\_\_\_\_

3. Where does the global map indicate the most significant temperature changes will occur?

\_\_\_\_\_

**The Air We Breathe:**

4. What gets trapped in the Fraser Valley?

\_\_\_\_\_

5. What will happen to the number of “bad air” days as climate warms?

\_\_\_\_\_

**Coastal Floods and Failing Ships**

6. What are the predictions for future winters in coastal British Columbia?

\_\_\_\_\_

7. Are slopes more or less at risk with wetter winters? Explain.

\_\_\_\_\_

**Rising Seas:**

8. As climate warms, what will happen to glaciers?

\_\_\_\_\_

9. What areas are most vulnerable to rising sea levels?

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10. What is the “coastal squeeze”?

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**Salmon in Hot Water:**

11. Why might tuna and mackerel replace salmon stocks in southern B.C.?

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12. How might salmon be affected with warmer waters?

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**Low-Water Blues:**

13. What industry will largely be affected by changes in river flow with climate warming?

---

**Forests in Transition:**

14. What impact will climate warming have on the B.C. forest industry and economy?

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**Down on the Farm**

15. What impacts of warming will have “mixed blessings” for the interior of B.C.?

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16. How will climate warming influence pest impacts on crops?

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<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	What questions do you still have, or what new questions have been raised?

**Temperature Rising: Climate Change in Southwestern British Columbia**

**Action on Climate Change**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Let's Meet the Challenge**

1. What ideas will help reduce greenhouse gas emissions?

<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>

## ***The Winds of Change: Climate Change in the Prairie Provinces***

### ***The Causes of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. What are most forest fires in Canada caused by?

\_\_\_\_\_

2. How much gas does your car burn to produce 2.5 kg of carbon dioxide?

\_\_\_\_\_

#### **Why is the Climate Changing Now?**

3. What specific human activities are responsible for the rapid build-up of CO<sub>2</sub> in our atmosphere?

\_\_\_\_\_

4. What are the “big three” greenhouse gases we’re concerned about?

\_\_\_\_\_

5. Where do these “big three” greenhouse gases come from?

\_\_\_\_\_

\_\_\_\_\_

#### **How are Climates Changing in the Prairies?**

6. What province may have higher risk of drought?

\_\_\_\_\_

7. What problems will higher temperatures with warmer climates create?

\_\_\_\_\_

\_\_\_\_\_



**Melting Glaciers:**

8. What will be affected by shrinking glaciers?

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**Extreme Weather**

9. What are the specific extreme weather events that cause death and destruction on the prairies?

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10. Examine the graph showing costs of weather-related disasters. How do the last 20 years appear different out of the last 70 shown?

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**How Do We Measure Up?**

11. From the graph, which are the three nations that produce the largest amount of CO<sub>2</sub> emissions?

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12. What activity is responsible for the greatest CO<sub>2</sub> output from individual residences?

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13. What activities produce the 75% of greenhouse gases not produced by residences?

---

**Connections**

*What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?*

**Reflections**

*Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"*

**Questions**

*What questions do you still have, or what new questions have been raised?*

***The Winds of Change: Climate Change in the Prairie Provinces***  
***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Did You Know?**

1. Historically what have been the most expensive weather-related disasters?

\_\_\_\_\_

**Climates Do Change**

2. Use graph 3 to tell what has happened to the Earth's average temperature since 1980?

\_\_\_\_\_

3. What is the projected temperature rise for the year 2100?

\_\_\_\_\_

4. What might happen to temperatures south of Greenland and eastward off the Canadian Atlantic coastline?

\_\_\_\_\_

**Life in the North**

5. What animals are vulnerable to changes in sea ice, and why are the females particularly vulnerable?

\_\_\_\_\_

\_\_\_\_\_

6. What is permafrost?

\_\_\_\_\_

7. What will be affected if the permafrost melts with a warming climate?

\_\_\_\_\_

\_\_\_\_\_

**Life in the Prairies:**

8. How might a person living in a prairie city be affected as climate warms?

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9. How might a person living in a farming community be affected as climate warms?

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**Changing Vegetation**

10. What are some potential impacts on forests with the changing climate?

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<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

***The Winds of Change: Climate Change in the Prairie Provinces***  
***Action on Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**How Do We Measure Up?**

1. How can you help to slow the rate of climate change?

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**Let's Meet the Challenge**

2. Why should we not wait to take action on climate change?

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3. Where can we practice energy efficiency in our everyday lives?

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4. What will reducing greenhouse gas emissions now do?

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<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>

# Degrees of Variation: Climate Change in Nunavut

## The Causes of Climate Change

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

### Climate Change- The Basics

1. What human factors contribute to climate change?  
**Enhanced greenhouse effect and atmospheric aerosols, land use change**

2. What greenhouse gas is most closely connected to human activities?  
**CO<sub>2</sub>**

### Did you know?

3. What human activity is a major source of greenhouse gas emissions?  
**Burning garbage**

4. How much CO<sub>2</sub> is produced for every litre of gas used in your vehicle?  
**2.5 kg**

### The Challenge

5. What activity is responsible for 53% of the residential emissions of CO<sub>2</sub>?  
**Transportation**

6. How does Canada rank globally for CO<sub>2</sub> emissions?  
**Second**

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

## ***Degrees of Variation: Climate Change in Nunavut***

### ***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did you know?**

1. Where do climate models predict the greatest warming will occur?  
**Arctic regions**
2. If the Greenland Ice Sheet melts, by how much will the global sea level rise?  
**6-7 metres**

#### **The Current Conditions**

3. By looking at the graph, Frequency of Intense Winter Storms, what can you conclude about these storms in the northern hemisphere?  
**Increasing**

#### **Of Ice and Men**

4. What traditional northern activities depend on sea ice?  
**Travel, hunting, fishing**

#### **Life at Sea**

5. What do scientists predict will happen to the range of many marine species as climate changes?  
**Northward shift**
6. What animals need strong sea ice to breed, nurse pups and rest?  
**Walrus and bearded seals**
7. How will Inuit hunters be affected as animals change their range in response to climate change?  
**Forced to change their hunting regimes**
8. According to the News North, when it gets too warm, what do the animals do?  
**Go to cooler areas**

#### **Glaciers and Sea-Level Rise**

9. What are the impacts of sea level rise?  
**More extreme weather, more erosion, more flooding**

**Northern Landscapes**

- 10. What is found beneath the ground surface in nearly all of Nunavut?  
***Permafrost***
- 11. How will people be affected if the permafrost thaws?  
***Infrastructure suffers greatly: roads, runways, sewage, water supply, underground mines collapse, etc. Open pit mining benefits***
- 12. How will the food supply of herbivores be affected by climate change?  
***Improved with increased plant growth***
- 13. How will birds be affected by warming of the Nunavut region?  
***Positive impacts on northern birds, negative on south***

**Life on the Land**

- 14. What aspects of the north will be affected by the climate warming?  
***Vegetation, wildlife, birds and waterfowl, people***

**The Challenge**

- 15. How might human health be affected by climate change?  
***Food and water quality, infectious diseases***

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

**Degrees of Variation: Climate Change in Nunavut**

**Action on Climate Change**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**The Challenge**

1. What do thermosyphons do?  
**Remove heat from the ground into the air, prevents melting of permafrost by cooling the ground and keeping it frozen**
2. What does a photovoltaic array do?  
**Changes sunlight directly into electricity**
3. What are five things you can do to help?  
**Reduce fuel consumption, wash laundry in cold water, buy energy efficient compact fluorescent lightbulbs, caulk and weatherstrip around doors and windows, talk to municipal councils about recycling programs**

<u>What I am already doing...</u>	<u>What I can begin to do...</u>



## ***The Tides of Change: Climate Change in Atlantic Canada***

### ***The Causes of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. Although Canada has only 0.5% of the world's population, it produces 2% of this.  
**Global CO<sub>2</sub> emissions**

#### **The Greenhouse Effect**

2. What are "the big three" greenhouse gases?  
**Carbon dioxide, methane, nitrous oxide**
3. Why does CO<sub>2</sub> have the greatest influence?  
**Most abundant**

#### **The Air We Breathe**

4. What are three types of fossil fuels?  
**Gasoline, oil, coal**
5. What are fossil fuels used for?  
**Energy**
6. What does burning fossil fuels do?  
**Emits greenhouse gases**
7. What activity is responsible for 26% of greenhouse gas emissions in Canada?  
**Transportation**

#### **How Do We Measure Up?**

8. Looking at the Annual Greenhouse Gas Emissions per capita data, how many tonnes of CO<sub>2</sub> was each Canadian emitting?  
**21.4 tonnes/year**
9. In Atlantic Canada, what are the four areas contributing most to greenhouse gas emissions?  
**Transportation, Residential and commercial buildings, Industrial activity, Electricity generation**

<p><b><u>Connections</u></b> <i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i></p>	<p><b><u>Reflections</u></b> <i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i></p>	<p><b><u>Questions</u></b> <i>What questions do you still have, or what new questions have been raised?</i></p>
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***The Tides of Change: Climate Change in Atlantic Canada***  
***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Did You Know?**

1. What are all species in the marine food web affected by?  
***Changes in water temperature***

**Is Climate Changing?**

2. What is happening to most of the world's glaciers?  
***Shrinking***
3. Find the Temperature Change maps. What areas of the map show the greatest temperature change?  
***The poles – high latitudes and interior of continents***

**Freshwater Issues**

4. How could hydro-electricity be affected by climate change?  
***Increased water flow = more power; reduced water flow with increased evaporation = less power***

**Forests in Peril?**

5. Why might the Gypsy moth threaten Canadian forests if warming continues?  
***Large numbers are a threat to trees, and since the moths die at temperatures below -9°C, warming may not allow enough deaths.***

**Storm Surges and Coastal Flooding**

6. Why may storm surges cause more frequent and severe flooding?  
***Sea level rising – begin to flood areas never before flooded***

**Down on the Farm:**

7. What is the greatest concern for agriculture in Atlantic Canada?  
***Trend toward more extreme weather events***
8. How would more storms, hail, floods and droughts affect farms?  
***Damage crops, livestock, hydropower generation, power lines***

9. Make a list of positive and negative consequences for farmers if global warming continues.

**Positive**

- longer growing season; higher yields
- less loss from winter kill
- fall harvesting easier
- vineyards

**Negative**

- drought; increased irrigation \$
- increased winter insect pests
- more generations of summer pests
- more common pests

**Rising Sea Level and Vanishing Coasts:**

10. What specific types of coastal areas will be most affected by sea-level rise?  
**Salt marshes, lagoons, etc.**

**Sea Ice and Icebergs:**

11. What will happen to sea ice with global climate change?  
**It will become thinner, and less extensive**
12. What benefits and concerns would there be with less sea ice?  
**Shipping season lengthened, ice breakers not necessary, less risk of icebergs hitting oil platform (decrease costs)**  
**Increased coastal erosion, more storm damage to man-made structures**

**Changing Ecosystems**

13. How will climate change affect vegetation zones?  
**Distribution of vegetation zones will change**
14. How will wildlife populations handle a changing ecosystem or habitat?  
**Some will move north, others will stay, some populations will become extinct**

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<p><i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i></p>	<p><i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i></p>	<p><i>What questions do you still have, or what new questions have been raised?</i></p>

## ***The Tides of Change: Climate Change in Atlantic Canada***

### ***Action on Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. What percent does Canada aim to reduce its emissions by under the Kyoto Protocol?  
**6%**
2. What is the fastest, cheapest and surest way to reduce greenhouse gas emissions?  
**Improving energy efficiency**

#### **Let's Meet the Challenge:**

3. When we save energy or replace fossil fuels, what do we help to do?  
**Reduce greenhouse gas emission**
4. What are some low-emission ways to travel?  
**Bicycling, walking, rollerblading, riding buses and trains, carpooling**
5. What are five other types of energy that would reduce greenhouse gas emissions?  
**Solar energy, pedal power, earth energy, community energy, wind energy**

<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>

## ***A Change in the Wind: Climate Change in Quebec***

### ***The Causes of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did you know?**

1. What emits over three times its weight in CO<sub>2</sub> every year?  
***The average car***
2. What greenhouse gases retain 21 times more heat than carbon dioxide?  
***Methane, CH<sub>4</sub>***
3. One-third of greenhouse gas emissions in Quebec are the direct result of what?  
***Human activities***

#### **Emissions – How Do We Measure Up?**

4. What are the top 3 sources of greenhouse gas emissions in Quebec?  
***Transportation 38%, industry 33%, heating 12%***

#### **What is Climate Change?**

5. What are three examples of human activity that have enhanced the naturally occurring greenhouse effect?  
***Use of fossil fuels, agriculture, deforestation***
6. Of the three main greenhouse gases, which one has the greatest impact because it is the most abundant?  
***CO<sub>2</sub>***

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

## ***A Change in the Wind: Climate Change in Quebec***

### ***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. What severe weather phenomenon costs \$10-\$15 million annually in Quebec?  
***Flooding***
2. What Quebec city is frequently hit by severe weather events?  
***Montreal***
3. Which regions are likely to be most affected by a warmer climate?  
***Northern regions***
4. What will happen to caribou herds with an increase in temperature?  
***Herds will decrease***

#### **A Climate in Constant Flux**

5. When have ten of Quebec's warmest years of the century occurred?  
***Since the 1980s***
6. Looking at the global map, what areas are expected to have the greatest temperature change in the next 50 years?  
***Polar/northern regions – high latitudes, interiors of continents***
7. What do the three graphs show about how the temperature may change by the year 2100?  
***Drastically increasing***

#### **Our Health**

8. What is the most direct health risk from warming climates?  
***Heat stress***
9. Will warming increase or decrease the amount of smog?  
***Increase***
10. What are four indirect impacts of climate change on human health?  
***Respiratory disorders, infectious disease, more deaths from extreme weather events, health disorders related to environmental contamination***

### **Extreme Weather – What are the Risks?**

11. What are examples of severe, or extreme weather events that may increase with global warming?

***Flooding, ice storms, winds, rain, hail***

### **Could a Warmer Climate Mean a Shortage of Water?**

12. How might climate change alter snow and rainfall patterns?

***Less frequent, but heavier precipitation***

13. What might be the effects of droughts and reduced groundwater, as a result of climate change on humans?

***Less water for consumption, agriculture, recreation; storm sewers overloaded.***

14. How are fish affected when groundwater changes due to changes in precipitation?

***Groundwater is typically cool/cold, and it cools rivers that it enters. If this is altered, fish habitats will be affected.***

### **A Dynamic Forest:**

15. What will happen to the tree line in Quebec?

***Push farther north***

16. How may precipitation and forest fires be changed with global warming?

***Precipitation – Increase; Forest fires – Decrease***

### **What about the Far North?**

17. How has the permafrost been affected by the climate warming?

***Increased temperature in this layer has led to melting, change in thickness***

18. What specific impacts to northern communities will occur if the permafrost melts?

***Infrastructure – landing strips, roads, erosion in coastal areas, growth rate and density of vegetation***

19. How will tree growth be affected by climate warming?

***Improved in size and shape***

### **Wildlife Acclimates:**

20. In what ways may animal species be affected?

***Reduce population density of lake sturgeon, compromise Atlantic tomcod reproduction, change fish habitats***



**Rising Sea Levels**

21. What are potential impacts resulting from changes in the estuary and gulf?  
***Increased erosion, less riparian habitat, more vulnerable waterfronts, modified distribution of marine species, possibility of accommodating larger ships***

**Our Farms**

22. What are the positive and negative effects of climate change on Quebec's agriculture?  
***Positive – less risk of frost damage, increased yields and longer growing season, grow crops in northern regions***  
***Negative – greater risk of damage caused by ice, lack of adequate protective snow cover and greater damage to low growing plants, milder fall temperatures and less effective cold-hardening of perennials, increased frost sensitivity of plants***

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<p><i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i></p>	<p><i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i></p>	<p><i>What questions do you still have, or what new questions have been raised?</i></p>

**A Change in the Wind: Climate Change in Quebec**  
**Action on Climate Change**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**We Can All Help**

1. What must we do to slow the effects of climate change?  
***Consume less energy***
  
2. What are 6 ways we can help?  
***Reduce energy consumption, plant trees, travel smart, walk, when driving – drive slow, recycle***

**Our Health**

3. What actions can help to improve air quality?  
***Taking public transit, driving environmentally friendly cars, using fewer solvents and products with volatile chemicals***

<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>

# ***Taking the Chill Off: Climate Change in the Yukon & Northwest Territories***

## ***The Causes of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

### **What is the Greenhouse Effect?**

1. Name two of the gases that absorb heat energy in the atmosphere.  
***CO<sub>2</sub> and water vapour***
2. What can you conclude about CO<sub>2</sub> concentrations over the last 200 years from studying the graph?  
***Large increase***
3. What happens to the greenhouse effect as concentrations of greenhouse gases increase from burning fossil fuels?  
***Enhanced***

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

## ***Taking the Chill Off: Climate Change in the Yukon & Northwest Territories***

### ***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Permafrost and Climate Change:**

1. What might happen to the permafrost if climate warms?  
***Melt / become thinner / perhaps disappear***
2. What can you conclude is happening from the Summer Thaw Depth graph?  
***Thaw getting deeper***
3. How will people be affected by thawing permafrost?  
***Unstable ground causes foundations for buildings and infrastructure to become unstable, travel***

#### **A Greener North:**

4. What will happen to the treeline with climate change?  
***It will shift northward***
5. What may happen to insect distribution as climate warms?  
***Migrate northward, having a potentially adverse effect on plants and animals.***
6. What new types of vegetative cover will be found in the Yukon and Northwest Territories as climate warms?  
***Temperate and grassland***

#### **A Tougher Life for Caribou?**

7. What insect might increasingly harass caribou with warmer temperatures?  
***Mosquito***
8. What would it become difficult for caribou to give birth and raise their young if climate warms?  
***Decline due to decreased health, less feeding/nutrition.***
9. How might caribou changes have an impact on the people in the region?  
***They rely on caribou for food, and also for the maintenance of traditional lifestyles. A breakdown of the traditional food supply will force adoption of other dietary sources.***

**Fire and Ice:**

- 10. How will the risks of forest fires change in the north with expected climate changes? **Increase**
  
- 11. List three effects of excessive thawing of ice.  
**Deeper and larger landslides, increased sediment load along riverbanks, which could affect fisheries and destroy spawning beds, landslide dams created, affecting transportation routes.**

**Impacts of Climate Change in the Beaufort Sea Region**

- 12. How much erosion could occur in a single year in the Beaufort Sea region?  
**More than 10 m**
  
- 13. How may climate warming affect this region?  
**Increased thaw of coastal permafrost and slope failure, hazards to navigation and offshore resource development, affect coastal communities.**
  
- 14. What is a consequence of climate warming?  
**Decrease in extent of Arctic sea ice and an increase in the length of the melt season**

**Sea Ice and Marine Mammals:**

- 15. What has been happening to the ice concentration in the area over time, comparing the 30-Year Median graph to that of September 1998?  
**Decreasing**
  
- 16. Why do seals suffer when ice melts quicker than usual?  
**Mothers depend on stable ice for lairs, so that a successful 6-week nursing period can take place. If the ice melts, the seal pups are weaned prematurely, forcing them to fend for themselves at too young an age.**

**Rivers and Lakes**

- 17. Northern communities rely on ice roads for transportation. How will this change as the climate warms?  
**Decrease**

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

***Taking the Chill Off: Climate Change in the Yukon & Northwest Territories***

***Action on Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

***Impacts of Climate Change in the Beaufort Sea Region***

1. Examine the air photo taken of Tuktoyaktuk from 1947. The green and black lines show the significant loss of shoreline over the last 50+ years. What has been proposed, and somewhat implemented since 1976?  
***Shoreline protection measures***

***How Are the N.W.T. and Yukon Responding to Climate Change?***

2. What are some other energy sources to replace diesel fuel generators?  
***Solar panels and walls, photovoltaics, waste heat recovery, wind turbines***

<b><u><i>What I am already doing...</i></u></b>	<b><u><i>What I can begin to do...</i></u></b>

## ***Weathering the Changes: Climate Change in Ontario***

### ***The Causes of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. How much carbon dioxide is produced by every litre of gasoline used in your car?  
**2.5 kg**
2. “Jackrabbit” starts use 50% more of what product than if you accelerate gradually?  
**Fuel**
3. Where does one-third of the carbon dioxide emissions created by human activities come from?  
**Transportation**

#### **The Climate System – A Balancing Act**

4. Which greenhouse gas is made by landfills and wetlands?  
**CH<sub>4</sub> - methane**

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

## ***Weathering the Changes: Climate Change in Ontario***

### ***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. Why may the cold-water fish species such as lake trout disappear from southern Ontario?

***Habitat changes***

#### **Future Climate**

2. What is predicted to happen along with climate change warming in Ontario?

***Increase in the frequency and severity of extreme weather events***

2. By looking at the global map, what regions would you conclude might have the most significant changes?

***Poles***

#### **Where We Live**

3. How are storms such as thunderstorms expected to change?

***Become more severe***

4. How would shorter winters affect people?

***Lower maintenance and snow removal, shorter winter and longer summer recreation season, more freezing rain affects energy, road and airline safety***

5. What changes do experts predict with climate change?

***Fewer extremely cold days, and more extremely hot days, more severe thunderstorms, more frequent freezing rain events***

6. How many households in Ontario and Quebec lost power in the January 1988 ice storm?

***~1 million (100 000 in Ontario, 900 000 in Quebec)***

#### **Our Health**

7. What climate factors can affect our health?

***Temperature, humidity, pressure***

8. Compared to today, how many hot days over 35° C may southern Ontario experience by the middle of the next century?

***46***



9. How will warmer daytime temperatures affect smog?

**Increase it**

10. What causes the “urban heat island effect”?

**Natural vegetation is replaced by surfaces that absorb heat, it makes cities several degrees warmer than nearby rural areas**

**Our Water**

11. What concerns are there when water supplies are warmer?

**Water quality – microbes and algal blooms**

12. How will lower water levels affect shipping?

**Increase costs**

13. How may the Great Lakes be affected by climate change?

**Lower water levels (more than 1 metre), smaller and earlier spring run off**

**Our Farms**

14. What are the positive and negative consequences of climate warming for farmers in Ontario?

**Positive**

- longer growing season
- increased yield of certain crops
- the potential for growing specialty fruits and vegetables

**Negative**

- more irrigation required
- winter crop damage

**Our Forests**

15. What may be some of the effects on forests and forestry with the changes in climate?

**More forest fire damage, increased drought stresses forest, new pest infestations, reduced soil moisture, lower seedling survival**

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<p><i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i></p>	<p><i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i></p>	<p><i>What questions do you still have, or what new questions have been raised?</i></p>

***Weathering the Changes: Climate Change in Ontario***  
***Action on Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Did You Know?**

1. How can you change the frequently used regular light bulbs in your home to save 225 kg of CO<sub>2</sub> per year?  
***Use energy efficient compact fluorescent bulbs instead***
2. What should you do with your laundry to save up to 225 kg of CO<sub>2</sub> per year?  
***Use cold water to wash and rinse your clothes***
3. What are the benefits of no-till farming?  
***Reduce fuel and labour requirements, soil erosion, increase productivity***

**Where Do We Go From Here?**

4. What protocol did 160 nations originally negotiate to reduce global greenhouse gases?  
***Kyoto Protocol***
5. What does this protocol do?  
***Sets targets for reducing greenhouse gas emissions***
6. What is a “walking school bus”?  
***A program for parents walking kids to school***
7. What can help reduce greenhouse gas emissions from heating and cooling by shading buildings?  
***Green roof and vertical garden technologies***

<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>

# **Temperature Rising: Climate Change in Southwestern British Columbia**

## **The Causes of Climate Change**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

### **Did You Know?**

1. How much water does each person use at home every day?  
**Over 300 L**
2. What is the source of nearly 30% of the greenhouse gas emissions in the lower Fraser Valley?  
**Motor vehicle exhaust**
3. What animals are shown as methane producers?  
**sheep and cattle**

### **Why is Climate Changing Now?**

4. What turning point saw additions of CO<sub>2</sub> to the atmosphere overtake removals?  
**Industrial Revolution**
5. What are the causes of the rapid build-up of CO<sub>2</sub> in our atmosphere?  
**Human activities: burning fossil fuels, deforestation, agricultural practices**

### **How Do We Measure Up?**

6. Out of individual household CO<sub>2</sub> emissions, what % does automobile use put out? **45%**
7. What activities contribute to 75% of CO<sub>2</sub> emissions that are not individually produced?  
**Transportation, electricity generation, fossil fuel production, agriculture, community and industrial waste, other industry**

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<p><i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i></p>	<p><i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i></p>	<p><i>What questions do you still have, or what new questions have been raised?</i></p>

## ***Temperature Rising: Climate Change in Southwestern British Columbia***

### ***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Is Climate Changing?**

1. How do glaciers behave when climate changes?  
***Expand when cools/shrink when warms***
2. By how much is the global temperature expected to rise above 1980 levels by the year 2100?  
***~ 4.5 - 5°C***
3. Where does the global map indicate the most significant temperature changes will occur?  
***The poles***

#### **The Air We Breathe:**

4. What gets trapped in the Fraser Valley?  
***Smog***
5. What will happen to the number of “bad air” days as climate warms?  
***Increase***

#### **Coastal Floods and Failing Ships**

6. What are the predictions for future winters in coastal British Columbia?  
***Wetter and stormier, more floods***
7. Are slopes more or less at risk with wetter winters? Explain.  
***More at risk, due to the reduced stability of the slopes***

#### **Rising Seas:**

8. As climate warms, what will happen to glaciers?  
***Melt → increased seawater***
9. What areas are most vulnerable to rising sea levels?  
***Deltas, tidal marshes, low-lying coastal areas***
10. What is the “coastal squeeze”?  
***Loss of coastal land, and “squeeze” on developed cities and their dykes***

**Salmon in Hot Water:**

- 11. Why might tuna and mackerel replace salmon stocks in southern B.C.?  
***They live in warmer waters, while salmon are a cooler water fish.***
  
- 12. How might salmon be affected with warmer waters?  
***Use up energy stores, unable to reach spawning grounds, increase risk of fungal and bacterial infections***

**Low-Water Blues:**

- 13. What industry will largely be affected by changes in river flow with climate warming?  
***Hydroelectric power generation***

**Forests in Transition:**

- 14. What impact will climate warming have on the B.C. forest industry and economy?  
***Improved growth and yield; Loss due to increased fire***

**Down on the Farm**

- 15. What impacts of warming will have “mixed blessings” for the interior of BC?  
***Better growing conditions vs. increased drought***
  
- 16. How will climate warming influence pest impacts on crops?  
***It will increase the impact pests have.***

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

**Temperature Rising: Climate Change in Southwestern British Columbia**  
**Action on Climate Change**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

**Let's Meet the Challenge**

1. What ideas will help reduce greenhouse gas emissions?

***Lifestyle choices, government policies, new technologies, alternative energy sources***

<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>

## ***The Winds of Change: Climate Change in the Prairie Provinces***

### ***The Causes of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. What are most forest fires in Canada caused by?  
***Lightning strikes***
2. How much gas does your car burn to produce 2.5 kg of carbon dioxide?  
***One litre***

#### **Why is the Climate Changing Now?**

3. What specific human activities are responsible for the rapid build-up of CO<sub>2</sub> in our atmosphere?  
***Burning fossil fuels, deforestation, and agricultural practices***
4. What are the “big three” greenhouse gases we’re concerned about?  
***CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O***
5. Where do these “big three” greenhouse gases come from?  
***N<sub>2</sub>O – fertilized soils, CO<sub>2</sub> - burning coal, oil, natural gas, CH<sub>4</sub> – sheep, cattle, landfills, wetlands***

#### **How Are Climates Changing in the Prairies?**

6. What province may have higher risk of drought?  
***Saskatchewan***
7. What problems will higher temperatures with warmer climates create?  
***Increased evaporation and intensify drought conditions***

#### **Melting Glaciers:**

8. What will be affected by shrinking glaciers?  
***Downstream water flows, wildlife habitats, hydroelectric production***

#### **Extreme Weather**

9. What are the specific extreme weather events that cause death and destruction on the prairies?  
***Thunderstorms, tornadoes, hailstorms, heat waves***

10. Examine the graph showing costs of weather-related disasters. How do the last 20 years appear different out of the last 70 shown?

***Much higher costs, and more frequent large costs***

**How Do We Measure Up?**

11. From the graph, which are the three nations that produce the largest amount of CO<sub>2</sub> emissions?

***1 – US, 2 – Canada, 3 - Russia***

12. What activity is responsible for the greatest CO<sub>2</sub> output from individual residences? ***Transportation - 53%***

13. What activities produce the 75% of greenhouse gases not produced by residences?

***Industry, agriculture, transportation, electricity generation, fossil fuel production, waste***

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<p><i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i></p>	<p><i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i></p>	<p><i>What questions do you still have, or what new questions have been raised?</i></p>



## ***The Winds of Change: Climate Change in the Prairie Provinces***

### ***The Consequences of Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

#### **Did You Know?**

1. Historically what have been the most expensive weather-related disasters?  
***Droughts***

#### **Climates Do Change**

2. Use graph 3 to tell what has happened to the Earth's average temperature since 1980?  
***It has risen considerably (~0.6 degrees Celsius)***
3. What is the projected temperature rise for the year 2100?  
***Close to 5°C***
4. What might happen to temperatures south of Greenland and eastward off the Canadian Atlantic coastline?  
***May drop up to 4 – 5 degrees Celsius***

#### **Life in the North**

5. What animals are vulnerable to changes in sea ice, and why are the females particularly vulnerable?  
***Polar bears. Females will have less time on the ice in spring to feed on seals.***
6. What is permafrost?  
***Frozen ground that remains below 0°C all year***
7. What will be affected if the permafrost melts with a warming climate?  
***Infrastructure – buildings, railways, roadways, pipelines, etc.***

#### **Life in the Prairies:**

8. How might a person living in a prairie city be affected as climate warms?  
***More enjoyable temperatures, more severe weather events, decreased air quality, higher air-conditioning costs, lower heating costs, new insects/diseases, increased grocery prices.***

9. How might a person living in a farming community be affected as climate warms?  
**Higher / lower yields, irrigation demands, crop type change, increased losses from severe weather.**

**Changing Vegetation**

10. What are some potential impacts on forests with the changing climate?  
**Decrease in tree growth rate in southern forests, decrease in tree seedling survival, southern forests replaced by parkland and grassland, increase in forest fires, increase in insects, increase in growth rate in northern forests.**

<b><u>Connections</u></b>	<b><u>Reflections</u></b>	<b><u>Questions</u></b>
<i>What connections can you make among what you've learned, your lifestyle, your family, school, community, or other regions?</i>	<i>Reflect on your learning, understandings, and discoveries. "Write about one thing you did not know before starting this activity"</i>	<i>What questions do you still have, or what new questions have been raised?</i>

# ***The Winds of Change: Climate Change in the Prairie Provinces***

## ***Action on Climate Change***

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Group Members: \_\_\_\_\_

### **How Do We Measure Up?**

1. How can you help to slow the rate of climate change?  
***Turn off lights, appliances, TVs and computers when not needed, walk or bike for short trips, take bus or carpool, use energy-efficient lighting.***

### **Let's Meet the Challenge**

2. Why should we not wait to take action on climate change?  
***The longer we wait, the fewer options we may have to deal with climate change.***
3. Where can we practice energy efficiency in our everyday lives?  
***Home, school, transportation habits, workplace***
4. What will reducing greenhouse gas emissions now do?  
***Slow the rate and magnitude of climate change***

<b><u>What I am already doing...</u></b>	<b><u>What I can begin to do...</u></b>