

Climate Change – How will it affect us?

Objective: To introduce students to climate change and how it impacts the North.

Introduction: Melting ice and rising temperatures over the past decades suggest that climate change is happening at a noticeable rate in the North. Effects of climate change in the North are more concerning than in other parts of the country due to implications of significant ice melt and permafrost changes. This lesson aims to introduce students to the implications of climate change in Northern communities.

Curriculum Connections:

Unit 1 – 8 c, h

Unit 2 – 1b,f ; 2; 3a-c. d-e

Supplies / Materials:

- Ecology North Climate Change **Resource** Materials (see below)
- Student Journals or notebooks
- Writing utensils

Hook: Show students climate change trends in the North from: http://www.enr.gov.nt.ca/sites/default/files/page_3_nwt-climate-observations_06-13-2015_vf_1_0.pdf. What do they observe?



SCIENCE FOCUS

Lesson Subject

Experiential Science 10

Topic

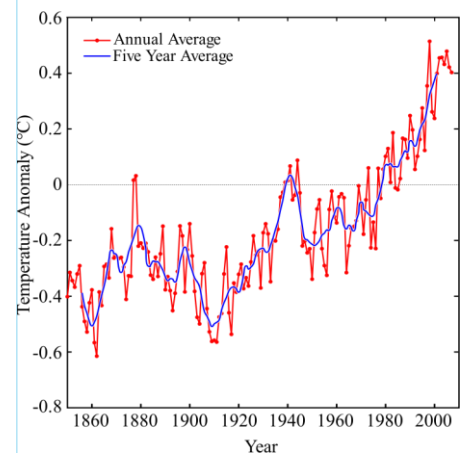
Units 1 and 2

Location

Classroom

Length

50 minutes



Intro Activity: Have students define a number of terms related to weather and climate. Definitions and an introduction to climate change (and its relationship to weather) are found under the **resources** section of this lesson.

Main Activity:

1. Have students reflect how they expect climate to affect the NWT specifically – provide them with a table of key impacts, define applicable terms and let them brainstorm secondary impacts (see below).
2. Have students work in a small group to come up with some recommendations for reducing the impacts of climate change in the North (or specifically your community)

Independent Student Work: Record terms in the science journal/notebook.

Conclusion / Review: Go over the following questions as a class either verbally, on chart paper, or on the board. These can also be used as homework reflection questions.

1. Why does climate change matter?
2. Why is it of particular concern to the North?

Homework: Have students assess nature watch data for evidence of climate change in Canada and make Northern predictions. They can go online; using the link provided below and make some point form comments, questions or conclusions based on the data.

<https://www.naturewatch.ca/plantwatch/view-results/>

Have students find a location in their community to watch for ice formation and ice melt as part of Ice Watch.

<https://www.naturewatch.ca/icewatch/>

Resources:

(Taken from: Integrating Climate Change Measures in Municipal Planning by Ecology North with the help of Pembina Institute).

1. Terminology

- **Weather** is what you see out your window
- **Climate** is the weather of an area over time
- **Climate Change** refers to any significant change in temperature, precipitation, and wind patterns occurring over an extended period of time.
- **Global Warming** is no longer used to refer to climate change, as the climate does not warm in all places at all times.
- **Greenhouse Effect** refers to the trapping of the sun's energy in the earth's atmosphere. Greenhouse gases act like the glass in a greenhouse in doing so.

2. Climate change –what does it mean?

Climate is the average pattern of weather in a given location over a period of time —from months to thousands of years. Climate change refers to any significant change in temperature, precipitation, and wind patterns occurring over an extended period of time.

Climate change is a natural process, but today's climate change is caused mostly by the increasing amounts of carbon dioxide and other greenhouse gases in the atmosphere.¹

The unprecedented rapid global temperature and climate changes in the past century are primarily the result of burning fossil fuels, as well as the rapid increase in deforestation, industrial processes and some harmful agricultural practices.

Greenhouse gases in the atmosphere act like the glass in a greenhouse (hence the name greenhouse effect), allowing heat from the sun in but blocking it from leaving. Some greenhouse effect is essential for human life, but as the amount of carbon dioxide increases in the atmosphere, the changes we are seeing on earth are speeding up — with enormous impacts on the natural environment and people.

It is important to distinguish between weather (what you see out your window today) and climate, which refers to long-term average weather patterns in a given area. The most common measure of climate is temperature. While the daily temperatures that we experience vary across seasons, even a small change in average annual temperatures can have important impacts on ecosystems, on landscape features such as permafrost, and on infrastructure. Other important climate measures are precipitation (rain and snow), wind, humidity and air pressure. Seasonal changes in precipitation — like more snow in the winter — can have big impacts too.

Documented climate change varies across regions but globally includes warmer average annual temperatures, changes in the frequency and intensity of extreme weather events such as heavy rain or snowstorms with high winds, and changes in the amount of precipitation and the type of precipitation, such as rain instead of snow.

4. Climate change in the NWT

Below you will find a table of impacts from the perspective of human use / well-being.

Some key terminology to define/discuss include:

- **Permafrost:** is a permanently frozen layer of subsoil. It consists of soil, gravel, and sand, usually bound together by ice. Permafrost usually remains at or below for at least two years can range from 1 meter to more than 1,000 meters thick.
- **Turbidity:** the cloudiness/haziness of water due to suspended particles. Important to drinking water as disease-causing agents can be bound to particles and turbidity can interfere with chlorination.
- **Erosion:** the movement of rock, soil and other dissolved materials from one place to another by a mechanical process – wind, water or animals
- **Thaw slumps:** a slope failure resulting from thawing of ice-rich permafrost

Primary and secondary impacts relevant to community governments, based on a review of NWT community adaptation plans

KEY IMPACT	SECONDARY IMPACT
Permafrost degradation	Short-term and long-term damage to buildings
	Short-term and long-term damage to transportation infrastructure such as roads (e.g. potholes, sinking, heaving) and airport runways
	Damage to community infrastructure (e.g. water /wastewater lagoons and facilities)
	Ruptured oil tank fuel lines
	Large-scale landscape changes (e.g. increased size and frequency of thaw slumps)
Warmer air temperatures	Transportation disruptions from shorter ice and winter road seasons (e.g. the Fort Providence ice bridge has been reduced by 30 days in the past 40 years) ⁷
	Transportation disruptions through increased risk of landslides on all-season roads
	More difficulty travelling on the land: shorter winter travel season (affecting fur trapping); more dangerous travel on sea ice; more overflow in winter (caused by thinner ice and more snow)
	Decreased heating costs
Rising ocean levels and open water in the Beaufort Sea	Increased shoreline erosion on the Beaufort Sea due to high water levels and less ice cover
Changing weather patterns	More rain on snow events and ice storms
	More extreme weather events
Increased forest fire risk	Greater risk of severe forest fires due to longer, hotter, and drier summer seasons and more lightning strikes

Extensions:

1. Participate in Ice Watch – <https://www.naturewatch.ca/icewatch/>
2. Review the government's strategy to mitigate the effects of GHG:
http://www.enr.gov.nt.ca/sites/default/files/strategies/greenhouse_gas_strategy_final.pdf
3. Peruse the Climate Action Network with/without your class, they are doing exciting things across Canada related to Climate Change!
<http://climateactionnetwork.ca>