



Preparing for the weather of the future in the north. What is happening and why? Are there opportunities for communities? Transferring knowledge and building a team.

(3 Oct. 2016)

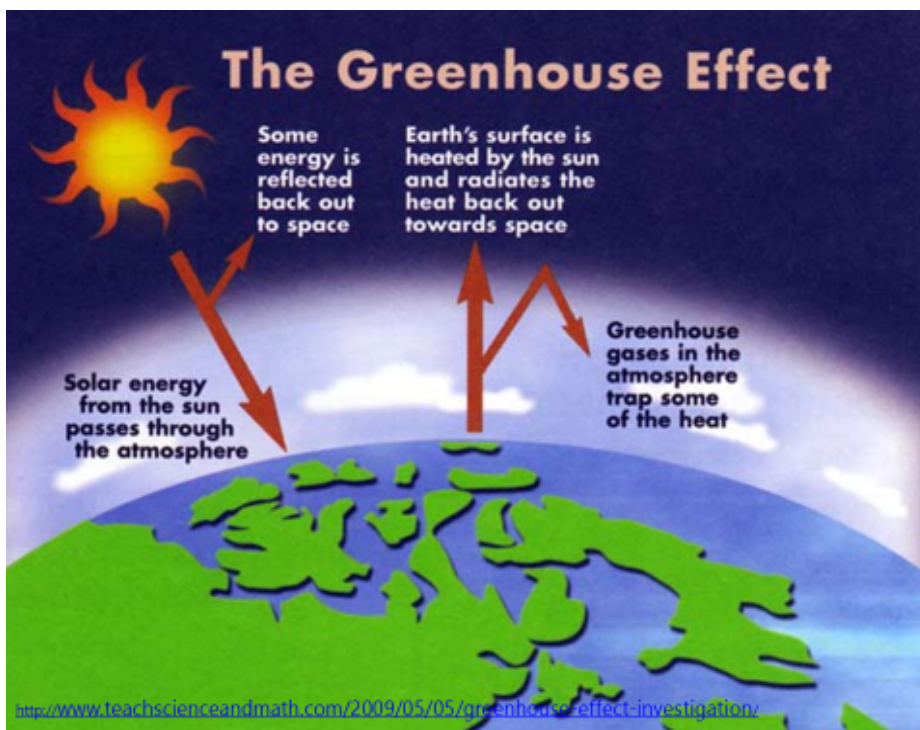
What will the weather be like when today's young people become Elders? What will changes in climate mean for First Nations in the north ... for communities, for wildlife and plants ... for travelling on the land? How can First Nations prepare? How might Northern First Nations include knowledge of climate change in planning their future? Will there be economic opportunities as Ontario acts to limit climate change?

Those are some of the questions scientists in the School of the Environment at Laurentian University in Sudbury are hoping to work with First Nations in the north to answer. Our vision is to build a climate change team with First Nations across the north. We have already teamed up with the Ontario FN Technical Services Corporation to assist communities identify opportunities as Ontario reduces pollution from using energy.

What could be done through teamwork and collaboration?

- 1) Increase people's understanding of why and how weather is changing in the north and around the world
- 2) Study how changes in climate have affected the north in the past and what could happen in the future
- 3) Recommend how at least eight communities in the north could prepare for future weather
- 4) Promote energy planning, especially in communities where it isn't already happening
- 5) Assist in identifying economic opportunities for First Nations in Ontario's proposals for cutting climate warming gasses with a "cap and trade" program

Why is the weather changing?



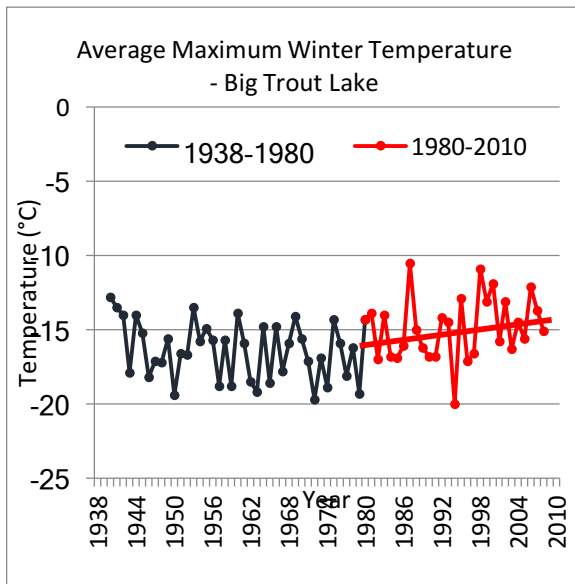
Weather is changing because of invisible gas pollution in the atmosphere. Carbon dioxide gas is released when coal, oil, diesel or gasoline is burned to generate electrical energy or to power vehicles. This causes the "Greenhouse Effect".

Energy from the Sun warms the Earth which stays cool by radiating heat into space. Carbon dioxide and other "greenhouse gases" trap some of that heat like the glass of a greenhouse. With more carbon dioxide in the atmosphere, more heat is trapped.

Warming increases evaporation from oceans and lakes, adding more water vapour to the atmosphere. Water vapour is also a greenhouse gas, so evaporation increases warming.

How much has climate changed in the north?

Temperature has increased in all seasons in the north since 1980, especially in winter (December, January and February). Records from the weather station in Big Trout Lake show the changes in winter very clearly.



The black zig zag line connects the average of the highest temperatures for each day of the winters from 1938 to 1980.

Before 1980 winters were becoming slightly colder.

The red line shows that since 1980 the average of the highest temperature for each day of the winter has increased by $1\frac{1}{2}^{\circ}\text{C}$

Weather records confirm what people in communities are saying – winters in the north are warmer than they used to be.

Big Trout Lake: Average of the highest daily winter temperatures from 1938 to 1980 in black and 1981 to 2010 in red (information from Environment Canada). The straight red line shows warming in winter of 1.5°C between 1981 and 2010. This followed cooling of 1.6°C in winters from 1938 to 1980

Effects of warming in the north

People in the north are noticing -

- the winter road season becoming shorter
- permafrost in the far north is melting
- flooding in communities when heavy rain in late winter or early spring falls on frozen ground
- thinner ice and greater danger of breaking through on traditional winter travel routes
- lower water levels and greater danger of hitting rocks in streams and rivers along summer travel routes
- more severe rainstorms in summer between longer dry periods
- heat waves that cause heat stress in elderly people and young children
- changes in the migration patterns of geese and caribou
- some birds, insects and fish are moving north
- rising concern about more frequent wildfires if forest and bush become dry during warmer summers

Building a network to learn how changing climate is changing the north

In Tribal Councils and First Nations that support the idea, we hope to work with a climate change project participant chosen by each First Nation community and Tribal Council. We are able to pay for part of the time of a person in each community and Tribal Council until 31 March, 2018. We are developing training workshops and will organize meetings with the intention of creating a network of climate change specialists, actively discussing the results of changing climate across the north and playing an important role in their communities.

We are also developing an Ojibway, Cree and English website to interest youth as well as inform community members. We know its reach may be limited by bandwidth. We hope for access to community radio and TV. Our aim is to increase knowledge and awareness of climate change, including among young people in schools.



Unfortunately, we don't have time or resources to include all the communities north of the Great Lakes in the climate change study. However, all the farthest north First Nations, whose communities are on the map, are being invited to participate along with their Tribal Councils. We will do our best to involve other communities.

Reports will be prepared for each community, with their climate story based on knowledge of the past from Elders and community members, combined with scientific analysis of past weather records and events. Science-based estimates of future weather will be included, as well as discussion of possible risks from future weather for a community's well-being and for local land and wildlife.

Community reports will belong to the First Nation and will only be made public with their permission. They will be "living documents" that will need to be updated as years pass. The community reports will be summarized in an overview report covering the entire north that will be made available to the public.

Preparing for the weather of the future

Information about risks likely to be caused by future weather will be considered in identifying actions First Nations might take to adapt or prepare for the future. This is part 3) of the work listed on page 1. Communities will be engaged in discussions about those risks and ways of reducing them.

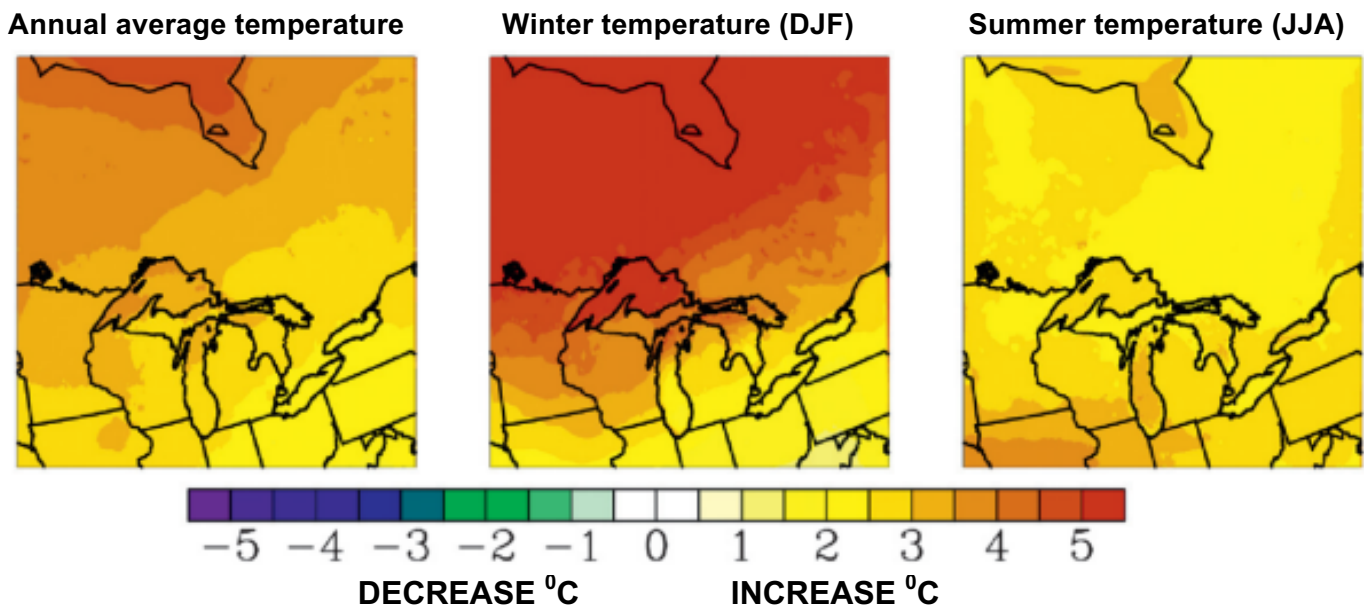
Preparing for the future means taking actions such as improving surface drainage in communities to prevent flooding of homes during severe rainstorms; being sure that land for expansion of communities is high enough that it will not be submerged by lake and river flooding; ensuring that Health Centre staff are familiar with newly appearing diseases like Lyme Disease carried by deer ticks; equipping a building with air conditioning to deal with summer heat stress in elderly people and very young children; being ready to quickly evacuate people with breathing problems if smoke from wildfires reaches a community; considering ways of protecting communities from the flames of wildfires; and making people aware of the likelihood of thinner ice than in the past when travelling in winter, and lower water levels when travelling in the summer.

How much higher might temperatures be in 2050?

It is possible for scientists to estimate the temperatures of the future by taking all we know about how the Earth's climate works and how it is reacting to increasing pollution, then putting those theories and that knowledge into powerful computers. These three maps of the likely temperature in Ontario in 2050 were created at the University of Toronto. The colours show the increase in average temperature for the whole year, and for winter and summer. The deeper the red colour on the maps, the higher the temperature will be.

Projections of climate for 2050 show the average temperature in winter north of the Great Lakes to be at least 5°C warmer than it was in 1990. If scientists are correct, that means in the next 35 years it will become warmer, more rapidly, than it has in the last 35 years. So, in the lifetime of a person born in 1980, the winter temperature could rise as much as it has since the end of the last Ice Age in Ontario, about 9,000 years ago.

Temperatures in 2050 compared with 1990



Projected changes in annual, winter and summer average temperatures in the 2050s compared with 1979 – 2001. (Research published by Jonathan Gula and Richard Peltier, University of Toronto)

Peat is a natural carbon store in the north

Plants are made with carbon taken from carbon dioxide “greenhouse” gas in the air. When plants die back in the lowlands and wetlands of the north, their remains become black soil or peat. Wet conditions and cold weather mean that vegetation, including moss, doesn't completely turn back into gas or dissolve and disappear after it has died. Instead it is buried under new vegetation, slowly building up a one or two metre layer of peat, keeping carbon in the ground. By storing carbon taken from the atmosphere, peatlands are “carbon sinks” and peat is a “carbon store”. Storage of carbon in peat makes the Earth a little cooler than it would have been. If climate becomes warmer, more plants and peat will rot and the Earth could lose some of this carbon store.

Energy planning, reducing costs and reducing air pollution

Countries and communities are looking for ways to reduce carbon dioxide pollution. Many are using Nature's energy in the sun, wind, water, and in rocks underground, to avoid burning expensive oil and polluting the atmosphere. Planning energy systems for the future in northern communities is already happening. We and our partner, the OFNTSC, will be available to help First Nations engaged in energy planning and looking for opportunities, some of which may come from Ontario's “Cap and Trade” system to cut greenhouse gasses.