



Northern Community Impacts and Adaptations

So climate change is causing the world to warm up. “What’s the big deal?” you might ask. “How is it going to affect me?”

No one is *exactly* sure how you and your community will be affected because no one knows *exactly* how things will change. But we do know things on the ground have changed during the past few decades. And people’s lives are already being affected.

Folks are getting a pretty good idea of what the future might bring based on the changes that are happening now and based on the information that is being collected across the north and around the world.

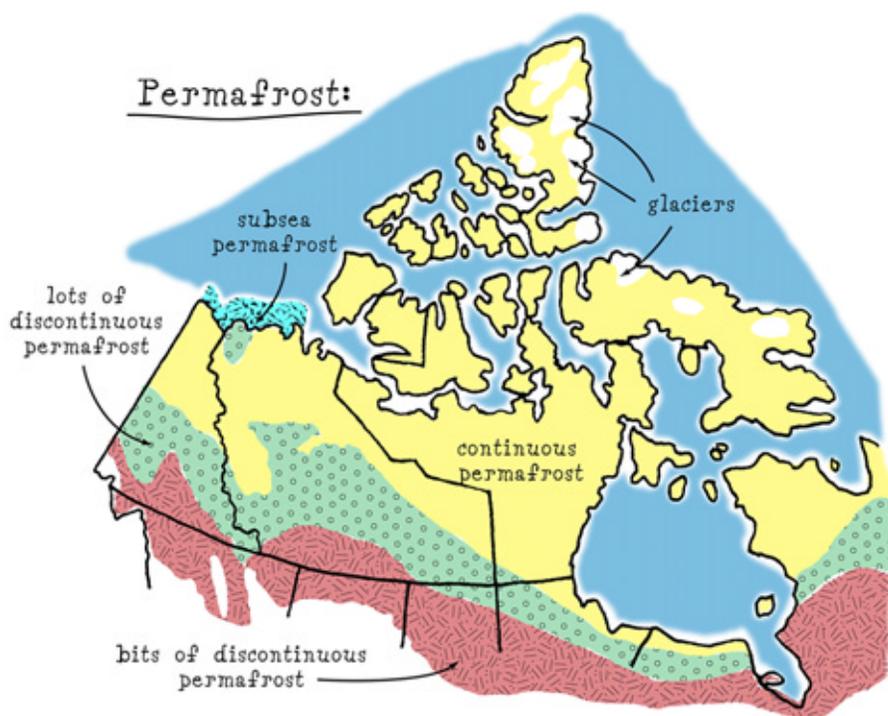
Read on to see how the expected impacts of climate change might affect you, your friends and community.

An Underlying Problem

When many northerners go for a walk or drive, they are cruising over permafrost. This permanently frozen layer of ice in the ground lies under most of Nunavut, Northwest Territories and Yukon. Even where there isn’t solid permafrost, there are often patches of what’s called “discontinuous permafrost.”

As global temperatures increase, some of this frozen ground will start to melt... and things will become topsy-turvy. Roads and airstrips can turn into mini roller coasters. Buildings, water lines, and power poles can all get bent out of shape. It can cost a lot of money to try and straighten things out again.





Over 50% of Canada's land is underlain by permafrost. To stay frozen it needs to maintain a temperature below 0° Celsius all year long.

A lot of Canada's permafrost has an average temperature that is between 0°C and -2°C. By 2080, winter temperatures over the land areas in the Arctic could rise 2.5° to 14°C above current normal temperatures. Summer temperatures are expected to increase by 4° to 7.5°C above what we now usually get. So a lot of permafrost will likely melt.



The speed of change

Hunters, trappers, fishers and berry gatherers use generations of knowledge to survive on the land. For example, this knowledge helps them know where the animals and berries can usually be found. People on the land have learned when to expect rivers and lakes to freeze. They know what kind of weather to prepare for at different times of the year. People understand the connections between all the parts of the environment and the weather.



However, people on the land today are finding it difficult to predict conditions on the land or sea ice or where animals will be. Thinner ice, heavier snow, and melting permafrost are also making travel on the land more difficult and dangerous. New wildlife species are appearing and old ones are changing their behaviour. Salmon are being caught in areas they have never been seen before. Ice is thawing completely in ocean bays, making it difficult for hunters to hunt seals. Caribou are changing their migration routes to deal with different ice or snow conditions and some communities have empty freezers when they should be full of caribou meat.

Although change is normal year to year, the speed of change caused by a warming climate is making it difficult for wildlife and people to adapt. Life on the land is becoming more challenging and uncertain.

“The weather never change that much years ago... it is always cold. Not like today. You can't even tell when the weather is going to change. Years ago we know when the weather is going to change – mild weather it is going to get storm come, we get ready for it even. But today it changes so much... boy we expecting a big storm. Next day, clear as can be. I can't predict weather anymore like we used to years ago.”

Peter Esau, Sachs Harbour, 1999. Quoted in “We can't predict the weather like we used to: Inuvialuit Observations of Climate Change, Sachs Harbour, Western Canadian Arctic.” By Dyanna Jolly et al. in The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change, edited by Igor Krupnik and Dyanna Jolly, 2002.



The Good, the Bad... and the Uncertain

We aren't sure just how hot it will get, or how fast things will change, or how much rain or snow we will get. So it is hard to be specific about the impacts of climate change.

Here is a list of some of the potential changes we *could* experience. Some are already happening or are likely to happen; the risks of others happening is still very uncertain. Some might be positive impacts... and many might not be. You decide!

- **Cheaper heating costs.** Warmer winters will mean heating costs for our homes and businesses should go down a bit.
- **New shipping routes.** As the ice pack in the Northwest Passage melts, ships should be able to travel farther into the north without help from icebreakers. This would create new economic development opportunities – such as more tourism, more export of oil, gas and minerals, and cheaper transportation costs – in some areas. But there are also risks associated with more shipping in the Arctic's fragile ecosystems. A shipping accident in the Arctic waters could have a big impact (*see Backgrounder 7*).
- **Increased safety outdoors.** For people who work and play outside in the winter, warmer temperatures could mean less risk of frostbite and hypothermia. But before you celebrate, remember that warmer temperatures can also cause thin ice that can be dangerous for people travelling on rivers, lakes and sea ice.
- **More farming opportunities.** Longer growing seasons in the north could be good news for someone who wants to farm or garden! However, before you start running out and planting seeds, keep in mind that northern soils do not have a lot of nutrients that crops need to thrive. And there are no guarantees that rain will come at the right time in the growing season.
- **Shorter season for winter roads and ice bridges.** Some northern communities rely on their winter roads to bring in supplies. These roads are built on top of snow and ice. However, as our winters become shorter and milder, our winter roads won't last as long. Melting and slumping can create dangerous conditions which means more time has





to be spent maintaining the roads. It has already become more expensive to maintain winter roads like the one to Rae Lakes in NWT. Also, it is taking longer in the early winter for ice bridges to get thick enough for safe travel.

- **Eroding towns.** Towns along ocean coasts might have to pack up and move farther inland as the land under their feet washes into the ocean. Already Tuktoyaktuk, NWT is seeing more erosion along its shoreline. The community's curling rink was destroyed in the 1980s. The school was closed and torn down in the 1990s, and rebuilt farther inland. Coastal erosion like this is happening more frequently as permafrost melts and sea levels rise. The waves and storms end up washing the melted shoreline away.
- **Cancelled flights.** More storms and fog can mean more cancelled flights between communities and to remote work areas (like mine sites).
- **Impacts on mining.** Many mines in the north rely on permafrost to keep groundwater out of their pits. Also, toxic mining waste might be released into the environment if there is permafrost in the walls of tailings ponds. If the permafrost in the walls melts, the walls wash away. Melting permafrost can also affect the construction of oil and gas wells.
- **Less water for hydropower.** Warmer weather will mean more evaporation of water from our lakes. In some places in the north, like Whitehorse, in the Yukon, electricity is made by hydropower. Hydro dams need water in their reservoirs (the lakes that form upstream of the dam) to make power. If more water is evaporating, then there could be less water to make this power – unless there is a large increase in precipitation to balance what is being lost from evaporation. (Hydro dams can't use all of the water upstream as this would damage fish and wildlife habitat.)
- **Impacts on human health.** Because the north is usually a cold place, we don't have as many types of insects, parasites and diseases as places farther south. As the temperatures warm up, we can expect to see more types of insects, parasites and diseases in the north. People may also suffer more on really hot days. Additionally, a lot of northern people currently eat a lot of healthy country foods (such as berries and wild meat). If climate change affects the availability of the northern plants and animals that people eat, this will likely have a negative impact on people's health, both physical and spiritual.



- **Impacts on traditional cultures.** Many northern people are finding it more difficult to hunt, fish, trap and gather berries. Climate change is making weather and wildlife movements less predictable. The environment is changing. Traditional cultures have always adapted to change, but if future changes are too rapid, it will be difficult for aboriginal cultures to adapt quickly enough. Rich traditions may be lost.



Do these stories sound familiar?

The SnowChange Project collects observations of climate change from indigenous people in the north. Elders in NWT and Nunavut have told the SnowChange project that the weather isn't as cold as it was when they were young. In some areas the elders say there is less snow while in others the snow is melting earlier. Often the elders say the ice isn't as thick as it used to be. Igloos are harder to build and there is a greater risk of going through the ice. Check out www.snowchange.org for more stories like these from Canada and other northern countries.

The Arctic Borderlands Ecological Knowledge Co-op is a community-based monitoring project involving six communities in northern Yukon, NWT and Alaska. People involved in this project have described how it is harder to travel on the land because there is more frost on the trees and willows or there is more overflow on the rivers. They have talked about how the wind on the coast makes it harder to travel in boats. They have told stories about warmer weather in Old Crow Flats that made it harder to get to people's camps and how people couldn't hunt until it was very late in the fall. For more details go to www.taiga.net/coop.



So What Do We Do?

We can do a number of things to help slow climate change (see *Climate Change Solutions Backgrounders 13 to 17*). However, we also know that temperatures will continue to increase for a while even if we all stopped putting any greenhouse gases (GHGs) into the atmosphere today.

So we need to learn how to live with some changes in our climate. We need to adapt.

Some adaptations can be simple. For example, people in Sachs Harbour report using ATVs more often in the spring to go to their camps (they used to only use snowmobiles at that time of year). They also used to use the frozen rivers to get to their camps. However, as these rivers are breaking up earlier, some people are travelling the long way around – along the coastal sea ice – to get to their camps. Everyone in Sachs Harbour is being more careful about going out on the pack ice as it is thinner and breaks up sooner. Changing ways of going out on the land is one way of adapting to climate change.



Tuktoyaktuk is adapting to its eroding shorelines by moving buildings and changing their community plan. By planning ahead for climate change, Tuktoyaktuk is helping to minimize the future impacts of climate change.

Builders and contractors can adapt to climate change by changing the designs of the foundations for their buildings and other projects. These designs need to account for melting permafrost. For example, work on the airport runway in Yellowknife involved digging down 4 metres into the earth – right into the permafrost – and laying down 100 mm of rigid insulation. The insulation is then covered with sand, a special liner, crushed rock and other materials. Then it will all be resurfaced. This should protect the permafrost from melting further.



Climate change isn't the only thing impacting our northern environments and communities. There are also other forces of change at work. For example, the north is affected by pollution and contaminants that travel on the winds from southern Canada and other countries. An increase in mining and oil and gas developments in some northern areas is also bringing changes to the natural world and to northern communities.



If a lot of change happens at once it is harder for our plants, wildlife and people to adapt. To make it easier for the natural world to adapt to climate change impacts, decision makers need to find ways to minimize the impacts of other types of change that they can control. For example, they can protect caribou migration routes and limit disturbance to critical wildlife habitat.

Read On!

All around the world, people are trying to figure out exactly what the impacts of climate change will be. Right now, researchers can predict a range of possible changes in temperature, precipitation and other weather patterns. They do this by using different climate models. But no one is 100% sure exactly how climate change will affect different regions of the world. There are just too many unknowns right now. But we do know stuff is happening!



People are making changes and planning ahead to help reduce the impacts of climate change. Many are also collecting information that will help us figure out what individuals, communities, businesses, and governments need to adapt to. For more details on how some of this information is being collected, check out Backgrounder 5. To find out how other people around the world are being impacted by climate change, read Backgrounder 12.



Key Points

- ★ A warmer climate is going to have a range of impacts. Some of the impacts might be positive, while some will be negative.
- ★ Melting permafrost will create some of the biggest changes. It will affect our roads, buildings and industries.
- ★ People on the land are already noticing changes that are affecting their hunting and trapping lifestyles.
- ★ We need to learn how to prepare for the changes that may be coming, even if we can't be 100% sure of what they will look like.



Want to Know More?

Here are some websites to help you look further into impacts of climate change on northern communities:

- **CKUA Radio Network:** <http://ckua.com/climatechange/singleshow13.html>
– Listen to an online interview with Andy Carpenter, Inuvialuit elder and mayor of Sachs Harbour about how climate change is affecting their way of life.
- **Government of Canada Climate Change (Regional Impacts):**
http://www.climatechange.gc.ca/english/affect/prov_territory/ – Click on northern sections of the map to see what the impacts are in NWT, Yukon and Nunavut.
- **Northern Climate Exchange Knowledge Site (Matrix Maker):**
<http://yukon.taiga.net/matrix/index.html> – Use this amazing matrix to see the impacts of climate change on things like waste management, transportation, and other aspects of community life in the north.
- **Snowchange Project:** <http://www.snowchange.org/> – Current stories of changes being experienced by Arctic communities.
- **Yukon Department of Environment:**
<http://www.environmentyukon.gov.yk.ca/epa/climate.shtml> – Click on ‘Climate Change in the Yukon’ for information about Yukon communities.