» News and information helping NWT communities make choices to adapt and thrive in a changing climate

Climate Change and NWT Communities

» together we can make a difference

A polar issue: Climate change adaptation at the forefront of International Polar Year conference

Recently, two thousand scientists and representatives of the north gathered for the International Polar Year Conference in Montreal. The theme of the conference was “From Knowledge to Action”, bringing together research, outreach and activities conducted during the past few years in order to identify action.

Climate change adaptation was a big part of the conference. A few highlights from these proceedings were:

» NORTHERN OWNERSHIP

Increasingly, northern representatives are becoming the primary authors of climate change adaptation publications, and community groups are taking a larger role in planning processes for climate adaptation.

» GLOBAL THEMES

Comparisons of adaptation from around the polar world show a few similar themes: that climate change happening at the same time as other social and economic changes and costly threats to infrastructure. Some shared needs across the world include the need for more knowledge-sharing between generations, better ability to manage emergencies, and flexibility in regulation and management of resources.

» COMMUNICATION IS KEY

A number of researchers presented on methods of communication of findings, noting that traditional methods of publishing a paper are not relevant to community members. New ideas include video, audio and websites.

Catch some video highlights of the conference **here** including interviews with leading scientists, political leaders and northern residents.

WESTERN ARCTIC MP DENNIS BEVINGTON SPEAKS AT THE INTERNATIONAL POLAR YEAR CONFERENCE IN MONTREAL, APRIL 2012.

Tough decisions made easier for Alaskan communities

» Similar to NWT, coastal communities in Alaska are faced with multiple threats from climate change. Some communities have made the tough choice to relocate. A new guide walks them through the process, and may be helpful to NWT communities

Four Alaskan communities are already planning relocation and more than 60 are considered to be under threat in the next decade.

Thawing permafrost, storm surges and flooding, and rapid erosion have had large impacts on infrastructure, transportation and quality of life in some coastal Alaskan village. The tough economic and social decision of if and how to relocate communities is a divisive, complicated and costly issue.

A new guide The Alaska Center for Climate Assessment and Policy aims to make the process easier. The guide, **Decision-making for at-risk communities in a changing climate** provides a decision-matrix that helps decision-makers determine what options are available to them using a risk-management approach and find the best one. If the decision to relocate is made, the guide walks them through planning considerations for a new site for the community including costs and timing.

While most NWT communities are not facing as drastic conditions as this, the guide still provides helpful decision-making guides, explores expected future climate change impacts, provides a framework for involving community members in decisions, assessing costs to infrastructure and guidance for sustainable community planning.

Check out the Alaska Centre's website for more adaptation and climate change policy materials.

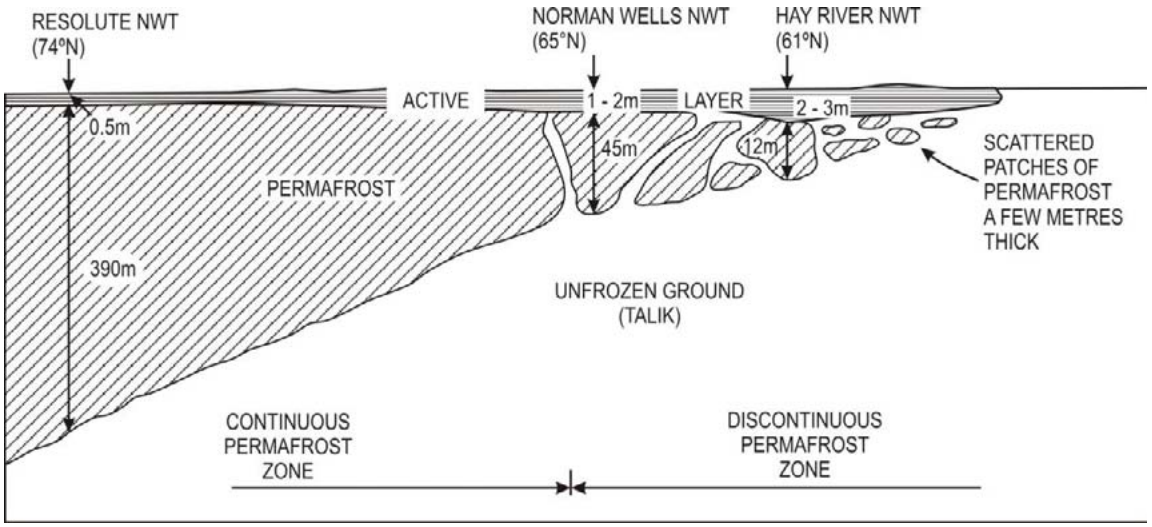
Permafrost 101: What's going on underground?

» WHAT IS PERMAFROST?

Permafrost is ground that remains frozen for longer than two consecutive years. Some permafrost contains significant amounts of ice, while other permafrost does not. The active layer is the part of permafrost that melts in summers.

» WHERE IS PERMAFROST FOUND IN NWT?

Permafrost underlies the majority of NWT communities. The temperature and thickness of permafrost varies across the NWT with climate, vegetation cover and geology.



Rays of hope in Fort Simpson

The largest solar installation in the North can be found in Fort Simpson, NWT.

A new solar photo-voltaic (PV) system in Fort Simpson will provide up to 8.5% of Fort Simpson's minimum power requirements in summer, or power for about 10 houses. This new source of power will offset 15 000L of diesel and 44.5 tonnes of greenhouse gases per year. The system is composed of 258 solar panels which stretch the length of a football field and are 13 feet or one story high.

Because of NWT's long sunny summer days, this system will generate more power than a similarly-sized system located in many other parts of the world, including Paris, London, Tokyo, or Berlin. This project is a collaboration between the Northwest Territories Power Corporation and the Government of the Northwest Territories. Read more about the project here.

Photo Credit: Arctic Energy Alliance

» EACH MINUTE ENOUGH SUNLIGHT REACHES THE EARTH TO HEAT THE ENTIRE WORLD'S ENERGY DEMAND.

Hazard Mapping

What hazards exist in your community that will be impacted by climate change? Hazards could include unstable ground due to permafrost melt, flooding or risk of slumping. Some northern communities have mapped their hazards, such as Clyde River in Nunavut and Pelly and Mayo in Yukon. Check out these maps and think about where these factors are present in your community and what that means for buildings, roads and community activities.

The NWTAC has information to help you get started in hazard mapping in their Hazard Mapping Smart Management Practices guide

PERMAFROST HAZARDS NEAR TSIIGEHTCHIC

» HOW IS PERMAFROST CHANGING?

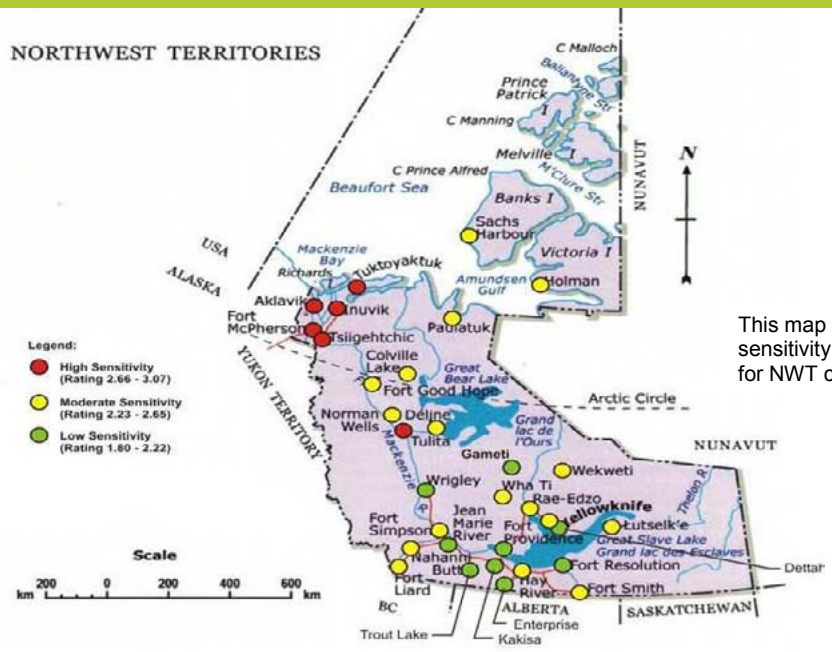
Some areas of NWT are seeing a decline in the depth and distribution of permafrost. Changes to permafrost can be caused by a number of factors, including disturbance from human activities, forest fire, vegetation and drainage changes, as well as the warming climate.

» WHAT ARE THE IMPACTS OF PERMAFROST MELT ON COMMUNITIES?

When permafrost with high amounts of ice thaws, it causes rapid changes to soil stability. This can cause erosion, slumping or landslides. Permafrost can also shift more slowly, which creates less-urgent but still pressing impacts. Permafrost melt has large impacts on any buildings, roads or infrastructure in the area, and can also impact water quality and aquatic life. Determining areas with ice-rich permafrost is important for planning sustainable infrastructure and predicting where change is likely if the permafrost thaws.

» WHAT CAN WE DO?

- Start monitoring ground temperatures and the depth of the active-layer in summer. This can be done in partnership with an academic or government institution.



This map outlines sensitivity to permafrost for NWT communities

- Map areas of permafrost in your community and begin to monitor changes over time
- Use this information to plan future development, placing infrastructure and buildings in less vulnerable areas.
- Share this information with resource managers, planners, proponents of resource development projects and residents.
- Encourage use of good building practices that protect permafrost.

» FOR MORE INFORMATION

See NWTAC's Permafrost project at nwtac.com or contact Sara Brown at sara@nwtac.com

Library corner: The latest in climate change science and adaptation reports

- The 2011 Arctic Report Card sums up the numerous changes we are seeing in the Arctic environment.
- The Pan-Territorial Adaptation Strategy is a collaboration between Yukon, Nunavut and NWT. This document identifies areas of common impacts of the three territories and will guide actions and approaches to adaptation.
- A group of academics has created a list of climate change adaptation priorities in Climate Change Adaptation : a priorities plan for Canada.
- The importance of incorporating traditional knowledge into climate change adaptation is discussed in Weathering Uncertainty: Traditional Knowledge for Climate change Assessment and Adaptation
- The National Roundtable on the Environment and the Economy has released a series of reports on climate change. Their 4th report report "Paying the Price", on the economic impacts of climate change shows that climate change will cost $21 to $43 billion per year in Canada by the 2050s. It also shows the importance of adaptation in reducing these costs.
- Did you know that the average air temperature in the Mackenzie district increased 2.2 degrees over the past 50 years? That's the strongest warming trend in Canada. Find out more at Statistics Canada's Temperature trends in Canada.

the PEMBINA institute

nwtac
NWT Association of Communities

ECOLOGY NORTH

THE AMOUNT OF C02 IN THE ATMOSPHERE IS NOW 3 TIMES HIGHER THAN AT THE START OF THE INDUSTRIAL REVOLUTION.

Scientists say we can curb global warming and its consequences if we take bold, comprehensive action now that adds up to an 80% cut in carbon emissions by 2050 or 2% a year. Let's all do our part!

» News and information helping NWT communities make choices to adapt and thrive in a changing climate

Climate Change and NWT Communities

March 2013

» together we can make a difference

YKDFN developing Climate Change Adaptation Plan

The Yellowknives Dene First Nation (YKDFN) is currently undertaking climate change adaptation planning. They held initial workshops in Dettah and N'Dilo in January to talk about how communities might prepare for the effects of climate change. Climate change could have major implications for community expansion (in this case mainly for Dettah), and requires advance preparation and planning.

A Technical Advisory Committee has been working with a Local Advisory Committee (LAC), made up of community members, to discuss the impacts of climate change being seen on the ground – including changes affecting the land, infrastructure, economy, and people – and what solutions are available. One exercise involved discussion of possible climate-related events in 2050, such as more forceful storms, and the ways YKDFN would like to prepare for such events.

Priorities identified included unpredictable or extreme weather events, drinking water quality, potential forest fire risks, and changing permafrost conditions and the impacts on infrastructure such as roads. The LAC has put together a number of recommendations, including: greater training and education on climate change, integrating climate change considerations across all planning processes (e.g. land use plans, infrastructure contracts, emergency plans), and enhanced monitoring programs.

Photo: Craig Scott

Understanding weather extremes

Weather extremes are of concern to NWT communities.

Climate extremes could involve:

- Unusual weather becoming more common - for example long stretches of hot days in a row in the summer

- New events, like temperatures sometimes rising above zero in winter so that snow and ice melt and re-freeze

Why do extremes matter?

Climate extremes can affect community infrastructure. Roads, buildings, and other infrastructure are built using standards that account for past weather extremes: they may not always withstand the additional stresses of new climate extremes.

For example, more thawing and re-freezing in the spring and fall can cause more damage to roads and runways.

Accounting for extremes

Engineers and other consultants working in communities should factor in changing climate and new extremes when designing community infrastructure. Engineers Canada has a protocol for engineers to follow, so that they can include the best available knowledge about climate extremes in their work (the PIEVC Cimate Change Protocol). www.pievc.ca/e/Part_I_-_PIEVC_Engineering_Protocol_2011.pdf.

Exposure, vulnerability, and risk

The actual impact of extreme weather on communities depends both exposure and vulnerability (including adaptive capacity).

Exposure is how much a community is exposed to climate impacts such as increased flooding or more intense storms. Exposure to climate change effects can be reduced through good planning and community design, for instance avoiding sensitive permafrost areas or floodplains when building new housing.

Vulnerability is about the resources a community has to respond to challenges. Vulnerability to climate change can be reduced by actions like training community staff on how to repair damages or respond to emergencies, having strong social networks, and reducing poverty. This way, the community will be stronger in dealing with changes - the community has more **"adaptive capacity."**

Risk is measured by both the probability of an event occurring (like a climate extreme), and the consequence or impact of that event.

Reducing Risk

Because the consequence or impact depends on vulnerability and adaptive capacity, communities can reduce their risk by increasing their capacity to respond. They can do this in both "hard" and "soft" ways: by engineered infrastructure that is designed to account for climate change, and by improving local knowledge and resources (eg. practicing emergency responses from their emergency plan).

Glossary: The Mackenzie Valley Environmental Impact Review Board has provided translations of a number of key terms. Some of them are relevant to climate change adaptation planning.

Vulnerability

Things that might make it more likely for people, animals or the environment to experience bad change or not take advantage of good change.

Dëne xél huníla náhadhı xa dé ɂedek'erıdı xa dúé lát'ı (Chipewyan)

Yaa'at ch'ıan goonlıı ejuk natr'ıgwahahtsaa gıtr'adhành' kwàh (Fort Macpherson)

T'ahsíı zhágóı́ndíh gotah gúúlı́h ago-dą́ndíh ts'ę́ nágetse íle (Fort Simpson)

Yet'áh gendá gha nágetse híle (Hay River)

Asíı́ yágodí yet'a keríwı gha nátséle (Délıne)

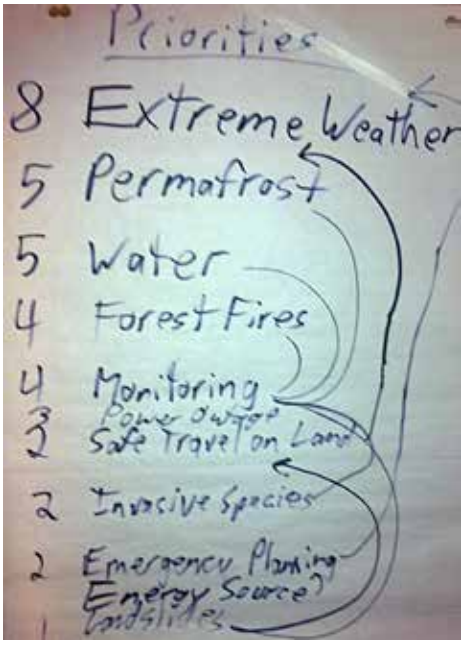
Kuwına dá k'ı́nagúw'e ts'ę́ rats'eséle (Fort Good Hope)

Asìı dezhì t'à wetets'eèdè haàdì (Tlicho)

Source: www.reviewboard.ca/reference_material/aboriginal_language_glossary.php

Continued from page 1, YKDFN climate adaptation plan

The challenges of funding and implementing these recommendations are well recognized, and YKDFN has expressed interest in learning what climate change adaptation work is being done in other NWT communities.



Prioritizing climate change impacts at the Dettah Climate Adaptation meetings: extreme weather ranked the highest.

One of NWTAC's Smart Management Practices

Climate Change Clauses in Contracts

Are you including climate change in your project tenders and proposals? Including climate change and permafrost protection clauses can ensure that your contractors and consultants deliver climate-resilient projects.

Construction contracts can include clauses to minimize on-site permafrost disturbance during construction. Requests for proposals can designate that all work must consider climate change within the infrastructure's designed lifespan.

The NWTAC has information to help you get started in their Climate Change and Site Plans Adaptation Smart Management Practices guide.

Contact Sara Brown, sara@nwtac.com, for more information.

While technologies and practices that reduce greenhouse gas emissions are important, there is ample evidence that, even if global emissions were to cease immediately, climate change-related impacts would be felt for decades to come. With that in mind, the City must assess how it can adapt to climate change. ***Adaptive capacity*** is a community's ability to cope with or adjust to climate change impacts and risks. By building adaptive capacity, communities develop practical means to cope with climatic uncertainties and reduce their vulnerability.

-Iqaluit's General Community Plan www.city.iqaluit.nu.ca/i18n/english/pdf/GeneralPlanOctober2010Eng.pdf

Recent emergency in Norman Wells a strong reminder of need for energy transition

The Town of Norman Wells was under a state of emergency for two days at the end of January, after a power outage caused Imperial Oil's Esso plant to shut down, in turn cutting off the community's natural gas heating supply. The incident foreshadows the challenges ahead. Imperial Oil has announced it will shut off natural gas supply to the town's commercial buildings by June 2013, and shut off gas supply to homes by June 2014.

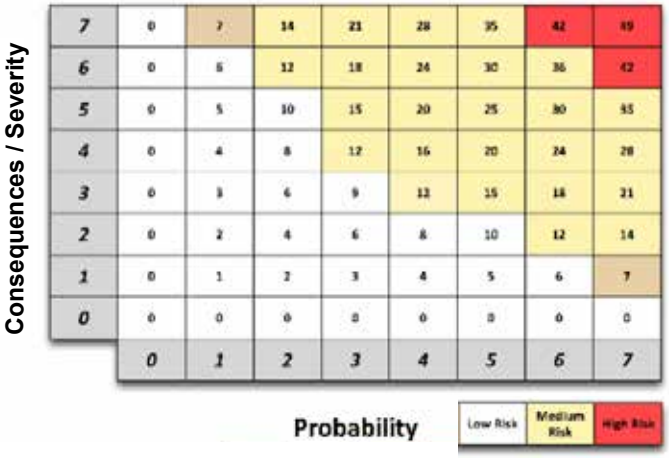
Norman Wells has been investigating alternative fuel sources for the town, especially biomass (wood pellet), propane and fuel oil systems. The Norman Wells Energy Fair in January provided a great opportunity for residents to learn about energy alternatives like biomass, as well as ways to be more energy efficient.

A study by Associated Engineering, completed in June 2012, found that a biomass district energy system would be the least expensive and most sustainable solution. However, the town has been unable to secure capital financing from the territorial government. Norman Wells will be soon be issuing a request for proposals, seeking a private utility company to self-finance a district energy system. Council is also looking at the possibility of providing assistance to individual households to switch boilers.

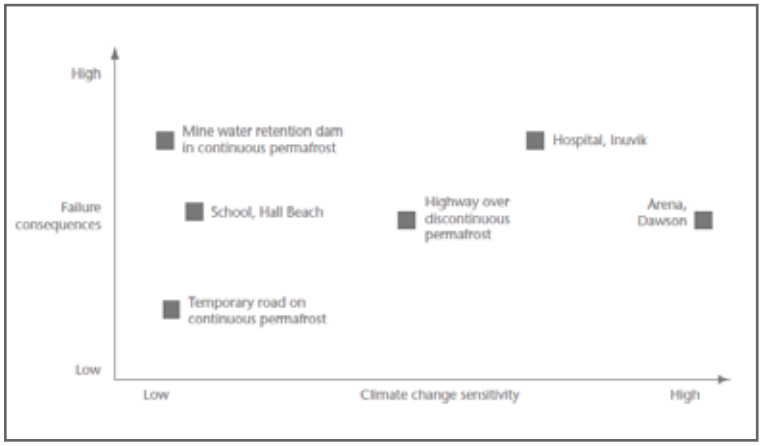
A risk matrix can be used to estimate whether a climate change impact presents a low, medium or high risk to a community and its infrastructure.

For example, a big event like a river flood might do a lot of damage to the landscape but still be low risk, if the community has a good floodplain regulation and no infrastructure located in floodplain areas.

Increasing adaptive capacity can reduce the risk of a climate change impact to a community.



This risk matrix has been adapted from the Engineers Canada Infrastructure Assessment Protocol (page 48).



This risk matrix is from the CSA permafrost Technical Guide (page 67). Adapted from Environment Canada 1998.

Library Corner: CSA guidelines on permafrost

The Canadian Standards Association has a new Technical Guide on designing and building foundations in permafrost conditions with climate change.

The guide can help local make good siting and design decisions about community infrastructure so the infrastructure will continue to function even with changing permafrost conditions in the north.

The guide covers new infrastructure projects, focusing on buildings. The ideas can also be applied to infrastructure such as utilidors, water treatment plants, and tank farms.

The guide:

• Explains how permafrost works, and how it responds to climate change and local changes at the site like ground clearing

• Reviews climate and permafrost trends in northern Canada

• Explains common foundation types in the north

• Provides a "screening process" to make sure that climate change is considered in siting and design of community infrastructure.

The screening tool can also be used in community planning to look at different development options, such as expansion of housing into new areas. It provides a step-by-step process to think about infrastructure and climate change.

The guide is available to local communities through ENR.

nwtac NWT Association of Communities
PEMBINA institute
ECOLOGY NORTH