

NUNATSIAVUT
kavamanga Government

MEMORIAL
UNIVERSITY

NAIN Research Centre
Kaujicapvinga

Pan-Territorial
Permafrost Workshop
November 2013

Planning Sustainable Nunatsiavut Communities from the Ground Up

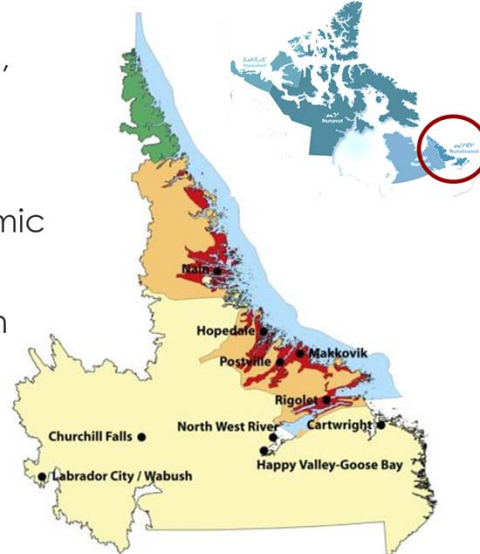
Trevor Bell, Christine Goldhar, Tom Sheldon
and the DISC team (Rudy Riedlsperger, Caitlyn
Baikie, Shane Belbin, Scott Hatcher)

In addition to being a prof at MUN, I am research champion for the NG and am principal research partner on several projects that they lead. These are research projects that address priority issues for the government and region. In my talk today I want to focus on one of those projects – the Sustainable Communities Initiative. But first I want to tell you a bit more about Nunatsiavut and the context and approach for this project.

Nunatsiavut is the homeland of Labrador Inuit



- Recent Inuit governance, political transition
- NG formed in 2005
- Rapid social and economic transformation
- Rapid community growth and expansion
- Infrastructure deficit



The Nunatsiavut Government formed in 2005 after a successful vote by Labrador Inuit to accept a Land Claims Agreement that had been negotiated by the Labrador Inuit Association and the provincial and federal governments for over 30 years.

The government has authority over health, education, culture and language, resource development, community matters etc.

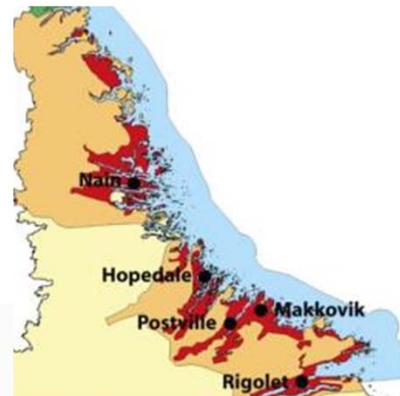
Inuit self-governance is very recent in the region.

Nunatsiavut is in a period of political transition while it continues to experience rapid social and economic transformation as the southernmost Inuit region in Canada.

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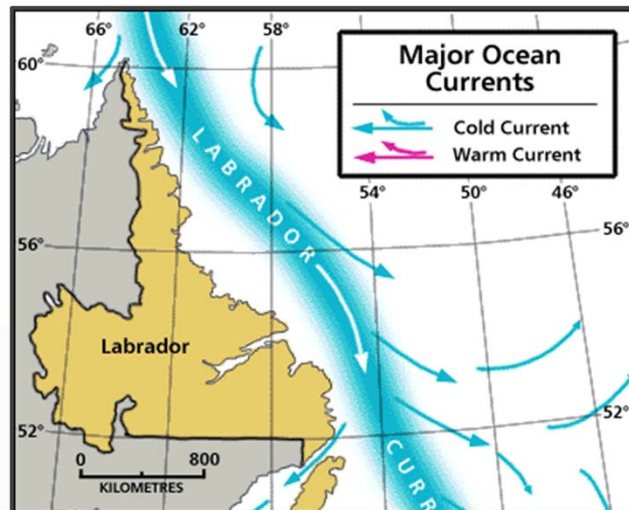


This transformation also includes community growth and expansion and an associated infrastructure deficit.

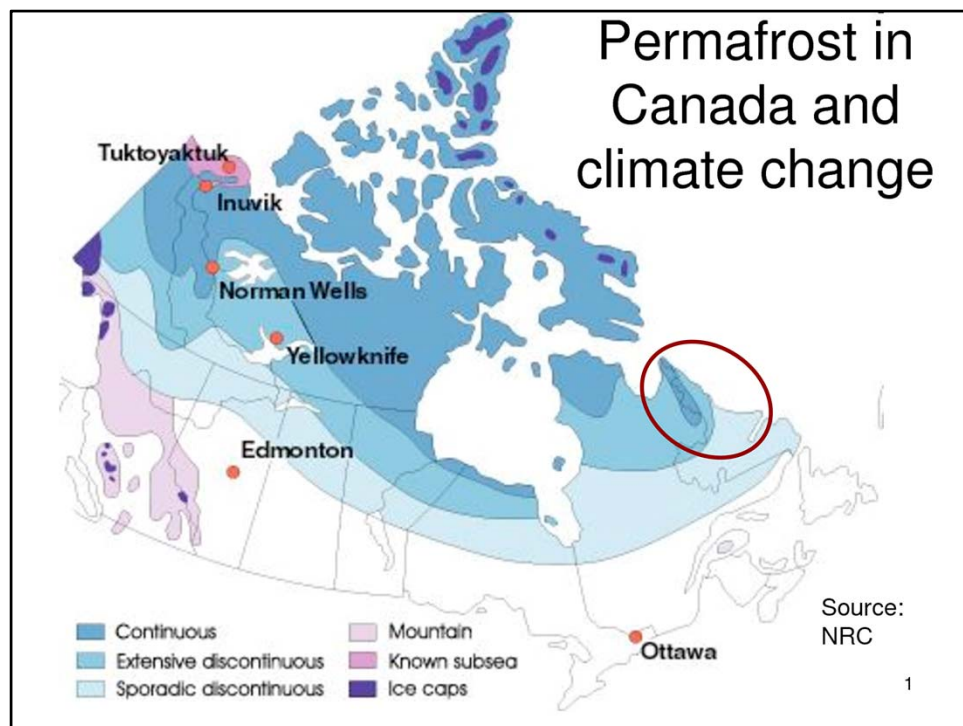
Five communities with populations from 200 to 1200.

Legacy of provincial government control of community growth and infrastructure development. Now part governed by Inuit Community Governments.

Coastal subarctic landscape



Although the geographic location of Nunatsiavut is south of 60 degree latitude, which has its own governance challenges, the cold Labrador Current gives the region an arctic to subarctic climate.



And for relevance to this workshop Nunatsiavut communities occupy sporadic discontinuous permafrost.

Mixed economy with strong ties
to land and ice for subsistence



Snowmobile parade to celebrate
the 100th school day in Makkovik

Changing Climatic and Environmental Conditions



Nunatsiavut experienced the largest percentage loss of sea ice from 1968 to 2010 in all of Arctic Canada.

Statistics Canada, 2011



Some of the strongest and earliest impacts of climate change are being felt in the region. Observed changes in temperature, sea ice loss, and precipitation are negatively affecting the general sense of safety and security of residents. It is affecting the ability of residents to travel outside the community, to hunt and harvest traditional foods and to gather wood to heat their homes.

While all sea ice regions in Canada have shown a decline in summer sea ice coverage over the past 40 years, the largest rate of decline was in the northern Labrador Sea along the coast of Nunatsiavut, where sea ice shrank by 73% (or 1,536 km²).

Energy Security



- **55%** of homes in Nunatsiavut rely on wood for heat
- Local diesel generators do not meet winter demand – **frequent winter power outages**



-Nunatsiavut homes mostly rely on firewood for heat because limited energy capacity means they are unable to use electric. Less than 5% of homes in Nunatsiavut use electric heat. This makes it next to impossible for a family to leave home together for the weekend to hunt, go to their cabin, or participate in other activities on the land without fear of returning to a frozen house and burst water pipes

-When access to firewood sources are compromised, i.e. when the sea ice is not safe to travel on, as it was in winters 2009 and 2010, residents struggle to heat their homes

-We know that in the 2009-10 winter, the following occurred in Nain:

- 56% of residents did not get enough wood to heat their home (energy insecure)**
- 67% spent more on wood despite milder temperatures, because their travel routes on the ice had changed**
- 34% used pallets to heat their home**
- 17% used their oven to heat their home**
- 7% used wood from their house (such as their shed, deck, or stairs) to heat their home**

-Residents clearly need access to a sufficient, secure and affordable source of power.

Food Insecurity



- **44%** of homes in Nunatsiavut are food insecure
- **75%** of households reported difficulty accessing country foods

(Inuit Health Survey)



Photo courtesy of Brent Jacque

- More than half of Nunatsiavut households reported that they had enough food to eat (food secure).
- Severe food insecurity is defined as disrupted eating patterns and reduced food intake- about 16% of households reported severe food insecurity. This is twice as high as the national average for Canada (8%).



If we look more closely at communities, they are located at the coast, like many Arctic communities, and have severe physical restrictions on where they can build and expand.

This is Nain, the largest community.



Housing is primarily single family dwellings, designed and built as if the community was in St. John's, not in a subarctic environment. As a result new houses have a life span of 10 years before they need major repair.

Land use restrictions: Contaminated Sites



In addition to landscape constraints on community expansion, there is also a legacy of contamination from former US military sites

Unstable ground



38% of Nunatsiavut residents live in a home needing major repair (Minich et al. 2011)



85% of surveyed buildings display foundation damage (Bell et al. 2010)



Housing Mould

Nunatsiavut has the **highest rate** of housing mould across all areas of Inuit Canada.

(Minich et al. 2011)



- cold and damp conditions promoting the growth of mould may cause respiratory health problems, especially in Inuit children (Banerji et al. 2009)
- 34% live in a house with mould (Minich et al. 2011)

Overcrowding



3% of homes in
Canada, **13%** of
homes in Nunatsiavut
are overcrowded

(Statistics Canada 2008)



“Time to try something different...”

JOINT MANAGEMENT COMMITTEE OF THE NUNATSIAVUT GOVERNMENT

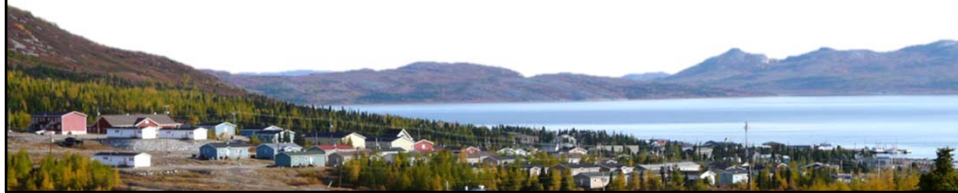


Sustainable Communities Initiative
SakKijānginnatuk Nunalik

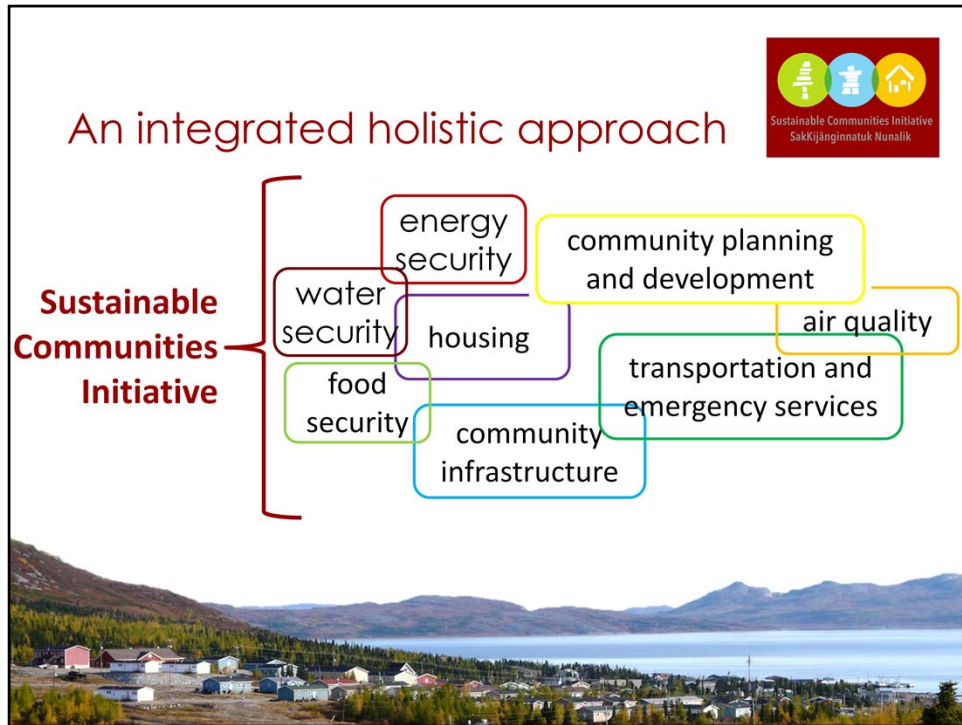


Most importantly, together with partners, we are trying something different and innovative...

Sakkijânginnatuk Nunalik: an Inuit Government-University partnership



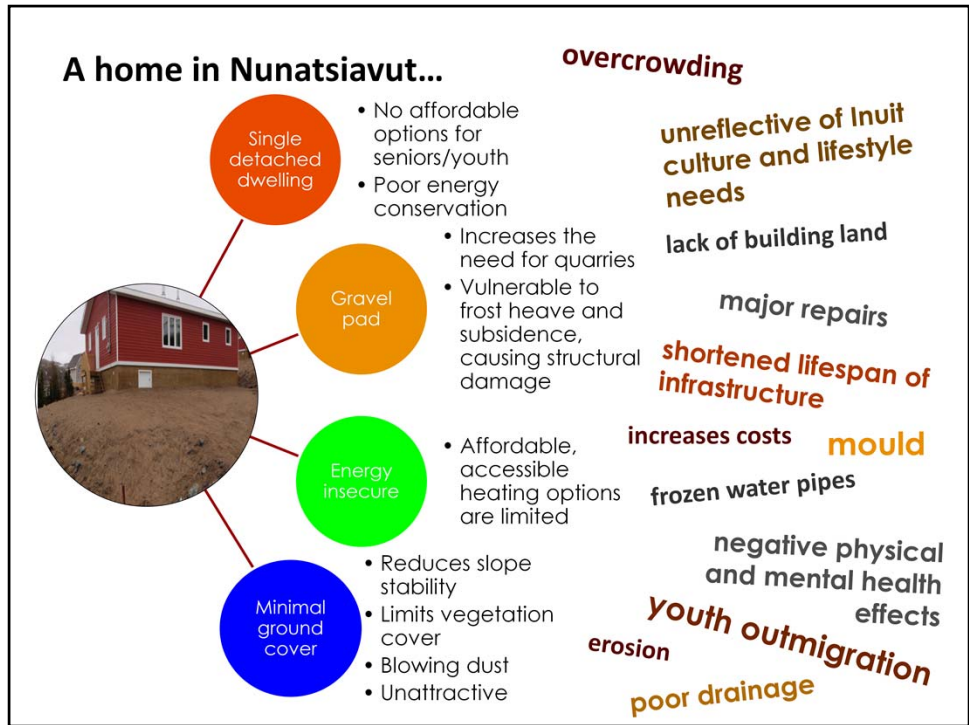
Led by NG and ICG, partnered w/ universities. Memorial is the principal research partner, and researchers from other Universities are involved. (Do away with T and UG logo, get transparent MUN logo)



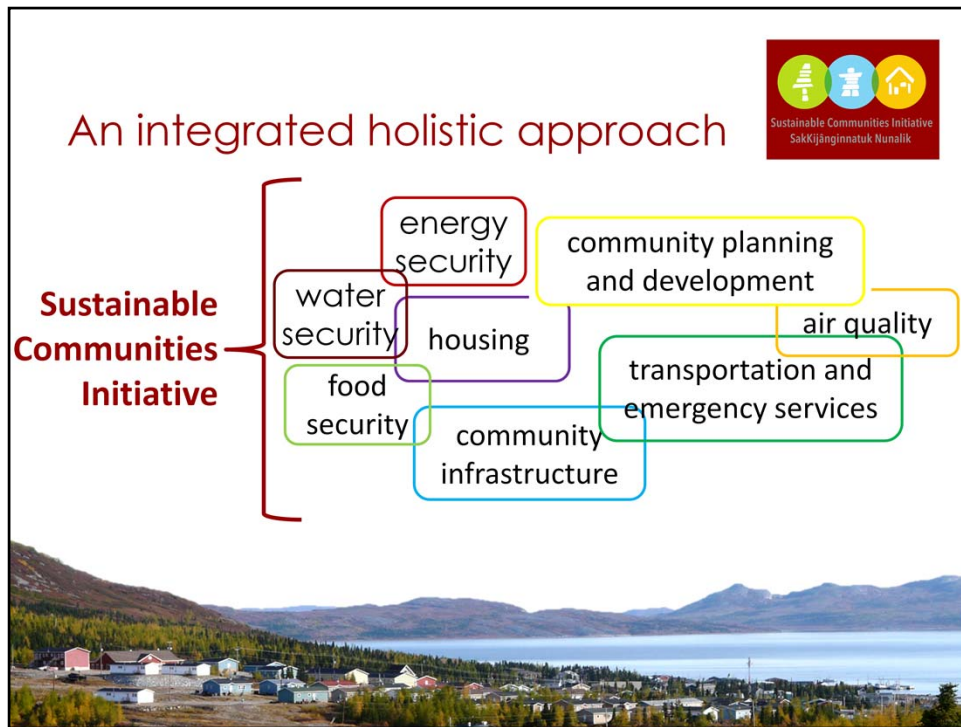
We are working towards more sustainable communities in Nunatsiavut. We're doing this by looking at a systematic re-build... not patching cracks. As the JMC directed, it's time to 'Try something different'.

That includes considering: housing, community planning and development, transportation and emergency services, energy security, water security, food security, community infrastructure and air quality, among other areas...

We are taking a broad, holistic approach. Recognizing the complexity of these issues and their connections with each other rather than tackling each of these areas individually. If you were to zoom in further and explore each of these areas you would find a web of underlying issues relating to community health, the environment, and local economies etc.



- Long-term solutions to current housing issues must be approached through a holistic lens, considering cultural, social, economic, and environmental factors in order to be effective.
- For example, when we think of the mould issue in houses, the JMC wanted to address the root cause of the mould, not simply cover or clean it up!
- In other words, must eliminate the cold damp conditions that promote mould, by building stable infrastructure, heating homes, removing moisture and avoiding burst pipes.
- Community development issues are inherently complex and messy...



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Digital Information Systems for Communities (DISC)

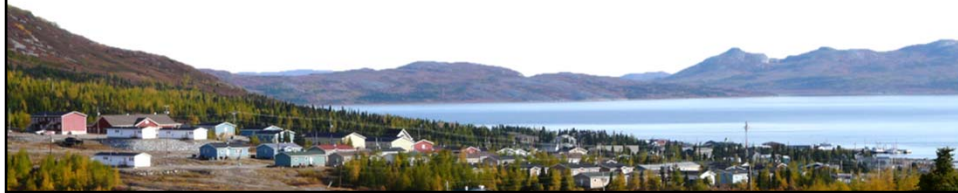


ISSUE

- Severe shortage of suitable building land

ACTION

- *Identify suitable areas for future development across a range of land uses and under current and projected climate states to support community planning decisions*



Available building space is constrained by a combination of landscape hazards, restricted areas and ground that is unsuitable for development. Land uses, including garbage dumps, airports, cemeteries, quarries and housing developments, are competing for the minimal amount of desirable land that is available. Meanwhile, changing climate may be impacting land suitability as a result of the effects of thawing permafrost on land stability or changing precipitation and snowmelt patterns exceeding community drainage capacity.

Our DISC project addresses the issue of building land in Nunatsiavut communities through the production of planning constraint maps that identify available, suitable areas for development across a range of land uses and under current and projected future climate states.

These maps combine existing community information with Inuit Knowledge and new geoscientific data in a georeferenced information database to support community infrastructure planning and development decisions. Each community database will compile for the first time digital information on community infrastructure and resources, landscape characteristics and hazards, regulated land areas, protected and valued spaces and places, climate and environmental modeling, and sustainable planning.

Compile existing knowledge into digital data layers:



Aerial photos



Topographic maps



Satellite imagery



Community plans



Reports

Bring in better sat image (worldview II). Bring in colorful report (climate scenario). Emphasize the issues surrounding accessing existing knowledge and data. We struggle to access data, to do so is a significant part of the project. It is a barrier to communities. Use specific example: nobody can locate the digital files of the last community planning update. Hence: Time to try something different. (Important slide!)

Field assessment: landscape hazards, valued spaces, etc.

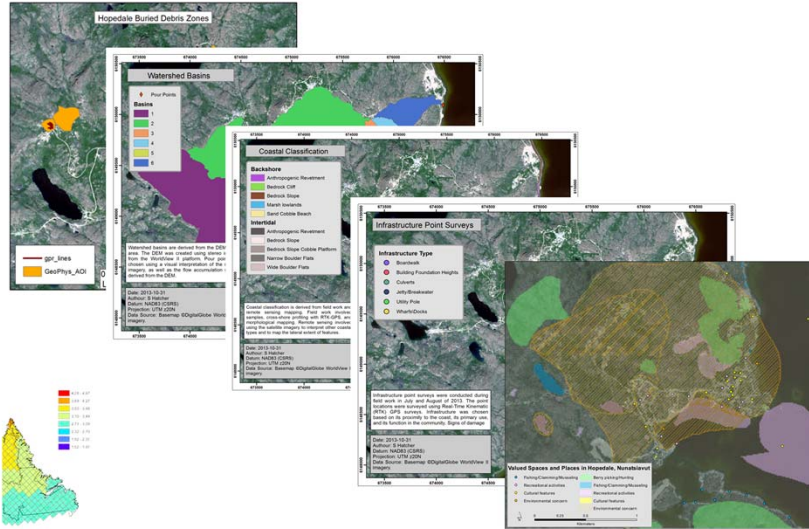


Second, a research team completes an assessment of physical landscape hazards in each community, considering the implications that climate projections may have on current and future hazards.

The assessment includes, a review of slope instability, coastal erosion, flooding, climate susceptible ground conditions, snow drifting patterns and surface runoff. Specific field methods include terrain and surficial material categorization and classification according to standard protocols. Accurate surveying refines preliminary surficial geological boundaries and sediment sampling categorizes textural and material properties. Shallow drilling provides additional subsurface samples and material stratigraphy, whereas deep drilling provides data on depth to bedrock and occurrence of frozen materials at depth. Instrumentation of deeper drill holes provides an opportunity for ground temperature monitoring and characterization of the seasonal and inter-annual ground thermal regime.

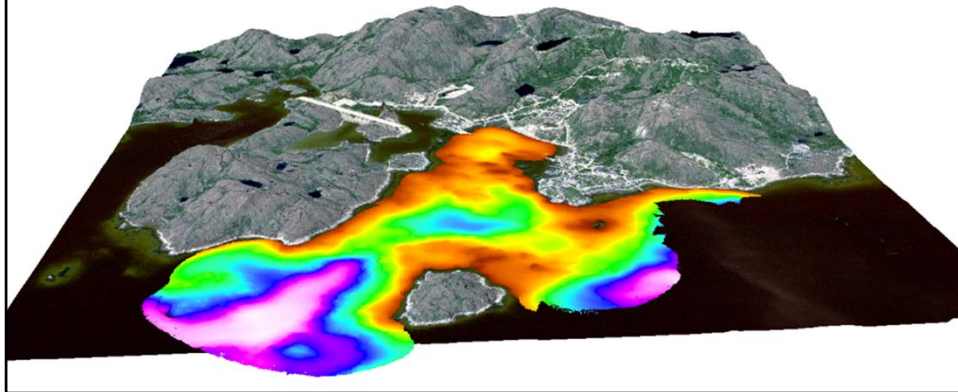
While in the community the team also compiles local knowledge of resource harvesting (e.g. berry picking, shore-based fishing), recreational areas (e.g. swimming holes, picnic areas, walking trails), places and spaces of important cultural significance, and local experience and expertise in seasonal ground conditions, construction practices and legacies, and historic hazard events. These data are also digitized and incorporated into the community information database.

Digital knowledge layers



Digital Information Systems for Communities (DISC)

All data combined to visualize existing and future land use constraints for community



Third, the geoscientific information, both mapped and sampled data, are combined and interpreted to classify community terrain with respect to natural ground stability (both on slopes and due to seasonal vertical adjustments), sensitivity to change (e.g., erodability of ground materials, frost susceptible materials, ground ice content), and exposure to disturbance (e.g., coastal location, sloping terrain, river floodplain, drainage channels, community development), both under current climate conditions and future climate variability and change.

Community lands that present a composite hazard for land use and infrastructure will be classified as high, medium or low risk, depending on the nature, frequency and magnitude of the primary hazards. Not all hazards impact land uses and infrastructure to the same degree and therefore hazard classification is linked to existing or future community development. For instance, infrastructure foundation design can mitigate unstable ground conditions.

Community planning process to incorporate DISC data



The DISC project will also provide each Nunatsiavut community with the infrastructure and training to access and update their digital database to support local decision making, sustainable planning, informed by knowledge of a changing climate and environment.



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Funded by:



Adapting the Built Environment in a Changing Northern Climate
 A systematic review of climate hazard-related mapping and vulnerability assessments of the built environment in Canada's North to inform climate change adaptation.

Clara Champalle, Pamela Tudge, Erik Sparling, Rudolf Riedlsperger, Dr. James Ford, Dr. Trevor Bell

Find the final report and searchable database here:
www.jamesford.ca/archives/2266

Adapting the Built Environment in a Changing Northern Climate
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With funding from Natural Resources Canada Northern Working Group

Natural Resources Canada

Sustainable Communities Initiative
 Sakkijanginnatuk Nunaitik

To document and evaluate hazard mapping and vulnerability assessments focusing on the built environment in Canada's north.

The aims of this study are to: (i) Identify vulnerability and climate hazard mapping initiatives, completed since 2007 in Northern Canada in relation to the built environment; (ii) evaluate the methodologies used in different projects and the outputs they have generated, with a particular focus on examining their comparability and consistency; (iii) identify and describe priority information gaps that need to be addressed through future climate hazard mapping and vulnerability assessments; and (iv) consider whether these tools might be standardized in the future to provide improved accessibility and comparability across Northern Canada, and be understandable to different types of users.

Report recommendations informed in part the DISC research approach



- Prioritize stakeholder inclusion and engagement
- Consider interdependencies among climate change impacts and socioeconomic factors
- Foster collaboration through interdisciplinary research and multi-sectoral adaptation
- Monitor and evaluate adaptation actions



Taking stock, Identifying issues



First task of the initiative was to meet with communities to openly discuss issues, challenges and sustainable visions for the future.