



# Climate Change and Communities in the NWT

March 29-30, 2011

Yellowknife, Northwest Territories

Final Report from the Forum



# Acknowledgements

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## Partners



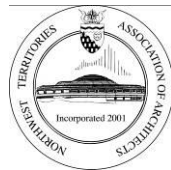
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*Member of Parliament  
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# Climate Change and Communities in the NWT

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# 1. Background

The western Arctic is rapidly changing due to climate change, and there will be significant impacts over almost every aspect of the social, economic, and environmental systems in the North. Specifically, rising temperatures will lead to permafrost degradation and infrastructure instability and will threaten transportation systems, food security, water use, traditional cultural activities and human health. Communities in NWT are on the front lines of this change. Municipal governments will be required to consider climate change in almost every decision they make in the future.

Community leaders may not be aware of the resources and expertise available to them at the community, territorial and national level, or may not have access to these resources. In addition, research needed to inform the decisions of community leaders in the planning may not yet be complete, or may not be readily available. While some communities have engaged in long-term planning processes to adapt to climate change impacts, others have not yet done so. Those communities who have completed the planning may have valuable lessons to share with those who have not. There is a need to share knowledge across communities in order to reduce the overall costs of adaptation, and to allow community leaders to learn best methods and practices from each other.

This project aims to increase the decision-making capacity of community leaders to address climate change effects in their community.

The objectives of this project are:

- Build the capacity of municipal governments to address climate change in everyday decision making
- Create a dialogue between community leaders, and climate change researchers and agencies on best practices and lessons learned on climate change adaptation and mitigation
- Develop an action plan for regional approaches and research on climate change in the NWT

There are four project phases:

1. Set up advisory committee
2. Scan of climate change initiatives in NWT communities and compile pre-forum discussion paper
3. Two-day forum
4. Follow-up activities

## ***Phase 1: Set up advisory committee***

An advisory committee for the project was struck, made up of representatives from government departments, research agencies, and non-governmental organizations. The advisory committee

aided in defining the forum outcomes and developing the forum agenda. The list of advisory committee members is included in Appendix C.

### ***Phase 2: Pre-forum discussion paper***

A scan of climate change adaptation and mitigation initiatives in NWT communities was conducted to assess current and past work in this area. This scan was compiled into a discussion paper that provided background information to forum participants.

### ***Phase 3: Forum***

A forum was held March 29 and 30, 2011 at the Explorer Hotel in Yellowknife. Bursaries for travel and accommodation for community leaders and staff were provided where needed. About 125 people attended the forum, and participants represented 27 of the 33 communities in the NWT. The list of forum participants is in Appendix B. An evaluation summary is provided in Appendix A and copies of the media coverage in Appendix D.

### ***Phase 4: Follow-up activities***

The scope and type of these activities are being determined based on the outcomes of the report.

## **1.0 About the host organizations**

**The Pembina Institute** is an independent non-profit research and policy organization that develops and promotes progressive public policy and provides leading edge sustainability consulting services. The Pembina Institute has extensive experience working with municipalities to develop tools and strategies that enable them to effectively address climate related risks, balance social, economic and environmental considerations, and deliver on community expectations both now and over the long term. Pembina's Arctic Energy Solutions Program has been working with partners in Northern Canada on issues of energy and climate change since 2002, and a Pembina office was established in Yellowknife in 2008. The Pembina Institute was a lead organization in developing and facilitating the Northern Young Leaders Summit in Inuvik in 2009.

**Ecology North** is a charitable, non-profit organization based in Yellowknife that was formed in 1971 to support sound environmental decision-making on an individual, community and regional level. Ecology North's programs focus on three priorities: public education and awareness, climate change, and sustainable living. Recent climate change work by Ecology North includes plain language papers on climate change, adaptation plans for the community of Tsiigehtchic and Fort MacPherson, a report on potential impacts of climate change on municipal water and wastewater systems, and public education workshops on reducing greenhouse gas emissions, and, in partnership with the Dene Nation, hosting the 2007 NWT Climate Change Leadership Summit.

**Northwest Territories Association of Communities (NWTAC)** is a non-profit, non-governmental organization that represents the interests of 27 of 33 official NWT communities. NWTAC provides access to knowledge, technical expertise or capacity to community governments in the NWT. NWTAC also regularly distributes information on tools, best

practices, and project results to member communities, including the recent Integrated Community Sustainability Planning Toolkit. In 2009, NWTAC developed a Climate Change Working Group, consisting of representatives from member communities and the territorial government, to promote adaptation initiatives and share information between communities. In addition, the NWTAC is working on a project in 2010 and 2011 called “State of knowledge regarding permafrost degradation and community infrastructure in the NWT.”

## 2. Forum agenda

Day 1 March 29 Explorer Hotel			
Time	Activity	Details	Location
8:30–9:00 a.m.	Participant sign -in	Coffee and tea	Lobby
9:00–10:00 a.m.	Welcome and introductions Opening prayer	Organizers and dignitaries	Katimavik A/B
10:00–10:15 a.m.	Icebreaker		Katimavik A/B
10:15–10:30 a.m.	Break		Lobby
10:30–11:00 a.m.	Plenary: Climate change in the NWT	Overview of climate change science by Heather Auld, Environment Canada	Katimavik A/B
11:00 a.m.–12:00 p.m.	Climate change research in the NWT	Pembina; NWTAC; INAC; NRCan	Katimavik A/B
12:00–1:00 p.m.	Lunch	Story wall introduced Film: Climate Change and Great Bear Lake (12 minutes)	Katimavik A/B
1:00–2:30 p.m.	Breakout sessions	1) Implications of permafrost change for municipalities	Katimavik A
		2) Climate change impacts on water and waste water	Katimavik B
		3) Emergency management and climate change	Katimavik C
		4) Energy efficiency for buildings	Janvier Room
2:30–3:00 p.m.	Break — Sponsored by FSC Architects & Engineers		Lobby
3:00–4:30 p.m.	Breakout sessions	1) Community energy planning and renewable energy	Katimavik A
		2) Impact of climate change on transportation	Katimavik B

**Day 1 March 29 Explorer Hotel**

<b>Time</b>	<b>Activity</b>	<b>Details</b>	<b>Location</b>
		3) Adaptation planning- tools and funding	Katimavik C
		4) Infrastructure standards	Janvier Room
4:30–5:00 p.m.	Wrap-up and closing		Katimavik A/B
5:00–6:30 p.m.	Resource fair	Appetizers and bar service	Katimavik A/B

**Day 2 March 30 Explorer Hotel**

<b>Time</b>	<b>Activity</b>	<b>Details</b>	<b>Location</b>
8:00–8:30 a.m.	Participant arrival	Coffee and tea	
8:30–9:15 a.m.	Plenary : "Alaska Planning for Climate Change Adaptation: Reflections for the NWT"	Terry Chapin, University of Alaska Fairbanks	Katimavik A/B
9:15 am–10:00 a.m.	Case studies of adaptation planning in the North	NWT, Yukon, Nunavut	Katimavik A/B
10:00–10:30 a.m.	Break — Sponsored by EBA <i>Engineering Consultants</i>		Lobby
10:30 a.m.–12:00 p.m.	Breakout sessions (duplicated from day 1)	1) Implications of permafrost change for municipalities	Katimavik A
		2) Adaptation planning- tools and funding	Katimavik B
		3) Emergency management and climate change	Katimavik C
		4) Energy efficiency for buildings	Janvier Room
12:00–1:00 p.m.	Lunch — Sponsored by Northwest Territories Power Corporation		Katimavik A/B
1:00–2:30 p.m.	Breakout sessions (duplicated from day 1)	1) Community energy planning and renewable energy	Katimavik A
		2) Climate change impacts on water and waste water	Katimavik B



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**Day 2 March 30 Explorer Hotel**

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<b>Time</b>	<b>Activity</b>	<b>Details</b>	<b>Location</b>
		3) Impact of climate change on transportation	Katimavik C
		4) Infrastructure standards	Janvier Room
2:30–3:00 p.m.	Break		Lobby
3:00–5:00 p.m.	Regional action planning		Katimavik A/B
	Summary of forum		
	Closing prayer		

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# 3. Forum outcomes

## 3.0 Attendance numbers

The forum was attended by a wide variety of partners working on climate change issues. This fostered a high level of networking. A complete list of organizers, presenters and delegates can be found in Appendix B and it should be noted that 27 of 33 NWT communities were represented at the forum.

Community Government Representatives	50
Aboriginal Government Representatives	4
Consultants	17
Federal Government	9
Territorial Government	25
Other Government	3
NGOs/Agencies	17
Other	8
<b>TOTAL ATTENDEES</b>	<b>133</b>



Photo above: Twenty-seven out of the 33 communities in the NWT were represented at the forum.

### 3.1 Participant satisfaction

Overall there was a very high level of participant satisfaction with the forum. Details of the 49 surveys that were completed can be found in Appendix A.

Forum element	Average (out of 5)
Forum location	4.5
Accommodations	4.4
Quality of food	4.0
Mix of presentations and discussion	4.2
Degree of forum organization	4.5
Forum pace	4.4
<b>Average</b>	<b>4.4</b>

### 3.2 Day 1 – Opening, welcome and icebreaker

The forum MC, Lois Little, opened the forum by inviting MLA Bob Bromley to give an opening prayer.

Welcoming comments were provided from the following dignitaries:

- Mayor Gordon Van Tighem, Yellowknife
- Honourable Michael Miltenberger, Government of the Northwest Territories Minister of Environment and Natural Resources
- Dennis Bevington, Member of Parliament for the Western Arctic

Representatives from the host organizations spoke for a few minutes on the forum goals, objectives, and agenda. Presentations were made by:

- Gordon Van Tighem, President of NWT Association of Communities
- Doug Ritchie, Ecology North
- Peggy Holroyd, Pembina Institute

Lois Little facilitated an icebreaker activity after the opening addresses. Participants were asked to choose from one of the questions on the table in front of them (printed on index cards) to discuss with the table. After ten minutes of discussion, each table was asked to present one issue that had arisen as a result of the discussion.



Photo above: Lois Little facilitated the two-day forum.

### 3.3 Day 1 – Climate change science

Heather Auld, a meteorologist and climatologist with Environment Canada, provided an overview of climate change science for forum participants. She highlighted some of the major changes as a result of climate change:

- temperatures
- sea ice
- ice road season
- ground ice
- snow depths

Some key points in her presentation included:

- Northerners are on the front lines of climate change.
- Transportation and communication infrastructure in the North is at risk under climate change.
- Climate change mitigation is critical but is getting increasingly difficult to reverse the climate change trend.
- Adaptation is critical.
- Arctic ice is melting much faster than projected by most climate models.
  - » This provides new marine hazards, disaster risks, sovereignty challenges
  - » Increased open water, increasing storm intensities and storm surges, sea level rise, regional land subsidence (West)... erosion, flooding...
- Warming winters are shortening the winter road season and increasing demand for air transport.

- Permafrost will partially or completely disappear over large areas of the Arctic.
  - » Requires new designs of foundations, mining tailings ponds, etc for warming permafrost
- Variable and more unpredictable weather, winds, snow changes, freezing rain.
  - » Fire risks in boreal regions.

Heather referenced climate change science resources with global and regional climate change models, such as the Canadian Climate Change Scenarios Network ([www.cccsn.ca](http://www.cccsn.ca)). Climate change scenarios have been developed for 23 sites in the North.

Heather raised the question of “To act or not to act. If we don’t manage opportunities – we may not feel it. If we don’t manage risks – we will most definitely feel it.” She concluded with the following thoughts:

- Climate change is a moving target, jumping faster than anyone can predict, so we should expect surprises, expect the unexpected.
- Rapid pace and profound uncertainty are the biggest challenges coming to us from climate change.

### 3.4 Day 1 – Climate change research in the NWT

Four presenters provided an overview of some of the research related to climate change underway in the territory.

**Peggy Holroyd** provided an overview of the forum discussion paper on climate change initiatives in the territory. The report is mainly focused on NWT, with the exception of a number of databases and tools that are aimed at municipal leaders which have applications for NWT but may not have been specifically developed in NWT.

The report focuses on the initiatives or projects that address impacts felt by communities. It is not a full summary of the existing literature on all climate change related issues. Ecosystem impacts such as changes to wildlife populations (except in terms of a food source, e.g. caribou), shifts in habitat or invasive species are not included within the review. This report summarizes information that is publicly available, and thus the full body of academic research that has taken place in the NWT was not included.

The initiatives are summarized in ten categories:

- General resources
- Infrastructure and transportation
- Community planning
- Planning tools
- Water and wastewater
- Economic and social impacts
- Food security and impacts
- Emergency planning
- Funding opportunities

- Academic research programs and initiatives
- Communication and outreach

Gaps in current initiatives and opportunities for additional work on climate change mitigation and adaptation were summarized. The discussion paper will be updated after the forum and the opportunities will be combined into an action plan for future climate change initiatives in the NWT.

**Steve Kokelj** is an environmental scientist with the Cumulative Impact Monitoring Program of INAC. Steve completed a cursory review of the types of permafrost in the NWT. He explained the many factors that can influence permafrost thaw. Information on the impacts of permafrost slumps on lakes was provided. A stop-motion demonstration of a large permafrost land slump was highly effective in showing the critical nature of water in the degradation of permafrost.

**Dr. Stephen Wolfe**, permafrost section head at the Geological Survey of Canada, then took the discussion further to review how degrading permafrost impacts on infrastructure in communities. By relating infrastructure to the types of factors that can impact on permafrost stability from the previous presentation, Dr. Wolfe was able to demonstrate the importance of selecting thaw-stable ground and ensuring effective design.

**Sara Brown** of the NWT Association of Communities then presented the findings of the Association’s project “State of knowledge regarding permafrost degradation and community infrastructure in the NWT.” Sara presented a high-level review of the project scope, gap analysis and recommendations for action. Many of the recommended actions were echoed by participants during break-out sessions and regional meetings.



**Photo above: Dr. Stephen Wolfe presented on the permafrost change impacts on infrastructure in northern communities. Regional media were present to document the forum.**

### 3.5 Day 2 – Alaska planning for climate change adaptation: reflections for the NWT

**Terry Chapin** is a faculty member in ecology at the University of Alaska Fairbanks. Most of his research is about the effects of changes in climate and wildfire on Alaskan ecology and rural communities. He presented on the challenges that communities in Alaska are experiencing as a result of climate change. He drew the connection between changes in ecology and changes in Aboriginal culture. Climate change will affect people’s ability to hunt and track on the land. He identified that solutions to climate change must be considered holistically with other community issues. He gave the example of a working group on rural Alaskan self-reliance that is building a knowledge network for community members and university students. He spoke about the need for good communication about the implications of climate change to avoid negative messaging leading to inaction.



Photo above: Dr. Terry Chapin’s research focuses on the impacts of climate change on Alaskan ecology, subsistence resources and indigenous communities, as a basis for developing adaptation plans.

### 3.6 Day 2 – Climate change adaptation planning in the North

Three presenters provided an overview of some of the research and planning related to climate change adaptation underway in the three territories. Yves Theriault of Indian and Northern Affairs Canada facilitated this session.

**Robert Chapple** is the senior manager of planning and lands for the department of community government services, Government of Nunavut. His presentation was on how the Government of Nunavut has been involved in climate change adaptation planning in Nunavut communities. He highlighted a number of studies complete in partnership by the Government of Nunavut that were complete in community related to climate change (e.g., geotechnical, watershed, snow drifting, drainage studies and shoreline erosion.) The Community and Government Services Planners were also involved with the Climate Change Adaptation Plans which were prepared by



Canadian Institute of Planners. A series of community meetings were held to incorporate community concerns about climate change into community plans.

**Ryan Hennessey** coordinates Northern Climate Exchange’s community adaptation projects in Yukon. Community adaptation projects have been underway in four communities in Yukon since 2007 (Dawson City, Whitehorse, Atlin and Mayo.) Some of the lessons from the communities have been: residents want to take action, there is much knowledge in the communities, and capacity is a crucial issue. Adaptation planning challenges include: lack of implementation funding, limited policy development and uneven distribution of resources.

**Camilia Zoe-Chocolate** is a Tlicho citizen, currently working at Ecology North as a Tlicho climate change planner intern, and is also a Wekeezhii Land and Water board member. She presented the Tlicho Climate Change Planning Project, which is intended to prepare the four Tlicho communities for climate change and to identify climate change risks to the communities, along with strategies and options for dealing with the risks. The project involved two years of research by Ecology North and the Tlicho Government. Reports, posters and booklets were completed for each Tlicho community. Recommendations were made for plan implementation, to increase the adaptive capacity of Tlicho communities, and to ensure climate change is considered in future decision-making.



Photo above: Camilia Zoe-Chocolate presents the results of the Tlicho Climate Change Planning Project.

### 3.7 Day 1 and 2 – Breakout group sessions

Below are descriptions of the sessions held on both days of the forum. The notes from the sessions are included in Appendix F.

#### ***Implications of permafrost change for municipalities***

How will climate change and melting permafrost impact on infrastructure in the communities? What are your ideas about the support and tools that are needed by your community to protect your infrastructure? How can we work together to protect infrastructure in the NWT from



permafrost deterioration? Here is your chance to hear from and ask questions of a panel of permafrost experts from both the scientific and engineering fields as well as to establish the needs of the communities.

### ***Infrastructure standards***

Standards and codes are important tools in tackling climate change but they are not one-size fits all solution. It is now clear that the rate and impact of climate change will continue to be most pronounced in the North. Given the recognized acceleration of climate change in the North versus the rest of Canada, development of northern-based standards becomes critical. After establishing the current standards and codes situation, the communities will have an opportunity to dialogue with and provide suggestions to those currently involved in standards and codes work for the North.

### ***Emergency management and climate change***

There is much more to emergency management than just response. Other aspects such as prevention and loss reduction become even more critical as the NWT is impacted by climate change. As communities are starting to experience more flooding, storms, forest fires and coastal erosion, it is important to hear about how to reduce the impacts and losses associated with these events for the community and its residents and businesses.



**Photo above: Community members share their experiences.**

### ***Energy efficiency for buildings***

How can you improve the energy efficiency of your buildings? What do you feel are the biggest challenges to greater energy efficiency? The energy efficiency breakout session will look at how energy efficiency planning and practices can impact comfort, health, savings and GHG emissions. Presentations will focus on energy efficiency standards, recommended practices, resources and case studies.

### ***Impact of climate change on transportation***

What is the impact of climate change on how we move around in and out of our communities? What are the impacts on highways, winter roads, airports and more? In this session we will discuss the risks to the transportation sector associated with climate change and how communities can best participate in the adaptation planning process. The Department of Transportation will share its work on a climate change adaptation plan and related stakeholder engagement process.

### ***Community energy planning and renewable energy***

Communities engage in energy planning as a way of setting goals and evaluating energy use. What have we learned to date? How well are energy plans being implemented? In this session we will reflect on the successes, challenges and lessons learned from community energy planning in the NWT. Case studies of energy projects will be discussed.

### ***Climate change adaptation tools and funding***

At this session you will learn about the basics of climate change adaptation planning. What are the benefits? What are the risks, if any? This session will include one main presentation to be followed by a group discussion. To aid the discussion, a group of experienced climate change planners will be available to help answer your questions. After this session we hope that you will have a better idea of what good adaptation planning looks like, how to fund and coordinate it in your community, and how to get it started.

### ***Climate change impacts on water and wastewater***

Managing water and wastewater is important in every community, and climate change may have impacts on the current systems and infrastructure. At this session, we will discuss the management of water and wastewater, and what implications climate change may have. Topics include source water protection, sewage lagoons, municipal water infrastructure and water monitoring.

## **3.8 Day 2 – Regional action planning**

Lois Little facilitated a regional action planning session. Participants were asked to divide into regional groups and to identify key issues relating to climate change in the region and opportunities for action. The discussion included:

- The need for a research database that is online accessible and in plain language.
- The need to identify additional sources of funding for climate change related work.
- Commitment to partner with neighboring communities to take advantage of economies of scale.
- The need for community mapping of permafrost and waterflow.
- We need to more than adapt to climate change, we need to fight it.
- The need to raise awareness locally about climate change issues and include youth and elders.



**Photo above: The Beaufort –Delta region participants engage in regional action planning on the last day of the forum.**

### **3.9 Day 2 – Summary of the forum and forum closing**

Jamie Bastedo summarized the forum discussion in each of the breakout sessions and provided overall reflections on the forum. His summary is included in Appendix G.

With participants standing in a circle around the plenary room, Besha Blondin gave a closing prayer and song.



**Photo above: Organizations, governments and consulting agencies set up resource booths around the perimeter of the main plenary room to share information about their work on climate change issues.**

# Appendix A: Participant evaluation

## Evaluation summary

### Section A: Logistics and scheduling

	Very Satisfied 5	4	3	2	Very Unsatisfied 1	Total	Average (Out of 5)
Forum location	28	17	4			49	4.5
Accommodations	20	8	3	1	1	33	4.4
Quality of food	16	21	9	1	1	48	4.0
Mix of presentations and discussion	21	19	9			49	4.2
Degree of forum organization	29	16	4			49	4.5
Forum pace	25	18	5	1		49	4.4
Totals	139	99	34	3	2	277	4.4

**49 surveys completed**

***For any areas of dissatisfaction, please explain what could have been improved.***

- More discussion around personal responsibility and climate change
- Some presenters didn't explain what they were talking about well

- Should have more information from communities
- Need more time and discussion
- Traditional food
- More traditional knowledge

## **Section B: Forum content and quality**

### ***What were the highlights of this forum for you?***

- All was good
- None
- Networking, finding new contacts (9)
- Community representation and group discussions (9)
- New info (7)
- Content of presentations - high quality
- Raising awareness of communities
- To see so many community people sharing
- Confirming plan limitations are common to many communities
- Good mix of people from different disciplines and communities
- Educating about climate change
- Hearing about climate change impacts on local infrastructure and environment (2)
- Energy efficiency for buildings (2)
- Steve Kokelj's slump video was incredible to see (2)
- Infrastructure (2)
- Water
- Good points to consider for future planning

### ***What aspects/ topics/ concepts from the forum can you apply directly to your work?***

- All/Most ( 4)
- Not much

- Lots – too much to pick
- How to approach engaging people/community in discussion (2)
- Networking/partnership/economies of scale (2)
- Hope to keep communication lines open between NWT and Alaska
- Better understanding of community needs and barriers, ideas how to engage
- Funding sources
- Providing communities access to tools
- Adaptation planning using scenario planning (7)
- Energy conservation and planning – for new and existing facilities (6)
- Climate change impacts on waste and water (4)
- Transportation (3)
- Climate change planning as it relates to community development and infrastructure (3)
- Waste management /hazardous waste (3)
- Implications of permafrost for municipalities (2)

***Did you find out everything you wanted to?***

- Yes (23)
  - » Exceeded expectations (4)
  - » Tremendous amount and quality of information (3)
  - » For now
- So/so
- No (2)
  - » No but I have a better sense of where to go and whom to talk to (3)
  - » No but good reason for another session
  - » No need more (positive)
  - » No but a lot
  - » No couldn't get to as many sessions as wanted to

» No, meaning of life wasn't revealed

<b>Number of Attendees Mar 29 / 30</b>	<b>Number of rankings as “Most interesting and informative session”</b>	<b>Session</b>	<b>Number of rankings as “Need Improvement” and comments</b>
		Day 1: Opening and welcome addresses	(1)
	15	Day 1: Overview of climate change science	(2) With elders input; too technical
	12	Day 1: Climate change research in the NWT	(1)
	14	Day 2: Alaska planning for climate change by Terry Chapin	
	11	Day 2: Case studies of adaptation planning in the NWT	(1) More examples
20 / 17	15	Breakout session: Permafrost	(2) More on science; with elders input
39 / 24	22	Breakout session: Water and waste water	(1) More concrete tools
8 / 6	5	Breakout session: Emergency management	
17 / 19	8	Breakout session: Energy efficiency	(3) Too many speakers; more group discussion
15 / 25	12	Breakout session: Energy planning	(1) Need more examples
15 / 23	10	Breakout session: Transportation	(2) Both governments
21 / 34	13	Breakout session: Adaptation planning tools	
13 / 7	5	Breakout session: Infrastructure Standards	Need more examples; make sure everyone

			involved
	8	Day 2: Final action planning session	Everyone working as team on final action Good for sum up and final plan

## Section C: Further information

### ***What more information do you or your organization need about climate change?***

- A place – centralized agency for info access (3)
- More examples from communities – support, ideas, scientific data (2)
- Publications resulting from community initiatives
- Educational information
- Permafrost
- Mitigation
- Accessible language
- Want to see action items once completed
- More workshops
- More tools and resources
- Need help with funding
- Community climate change vulnerability assessments
- Watershed, geological and long term water sampling data and mapping relevant to climate change
- Due to lack of specific funding at the community level, GNWT should commit regional personnel to assist communities
- Satellite imagery – historic and recent to see trends

### **Any additional comments?**

- Thank you (6)
- Very well organized/good presenters/ engaging (4)
- Good conference (3)



- Mahsi cho
- It is a good start finally!
- Need more fed/GNWT commitment to resources (2)
- Wish for more climate change education to be brought to the community level so the elders can share their knowledge on climate change (Youth as well) (2)
- Realized the implications and seriousness of the overall and long term impacts that are as a result of climate change
- So much more needs to be known and communicated about baselines before change can be considered
- Need a follow-up conference
- Way too warm – even in hotel at night
- Internet service was terrible in venue

# Appendix B: List of organizers, presenters and delegates

First Name:	Last Name:	Category	Organization:
Grace	Angel	Municipal/Hamlet	Community Government of Wekweeetĭ
Brenda	Black	Municipal/Hamlet	Town of Fort Smith
Raymond	Bonnetrouge	Municipal/Hamlet	Hamlet of Fort Providence
Margaret	Ireland	Municipal/Hamlet	Jean Marie River
Rick	Campbell	Municipal/Hamlet	Town of Inuvik
Jim	Dives	Municipal/Hamlet	Hamlet of Enterprise
Adeline	Football	Municipal/Hamlet	Community Government of Wekweeti
Mabel	Gon	Municipal/Hamlet	Community Government of Gameti
Donna	Ruben	Municipal/Hamlet	Hamlet of Paulatuk
Merven	Gruben	Municipal/Hamlet	Hamlet of Tuktoyaktuk
Janet	Kanayok	Municipal/Hamlet	Hamlet of Ulukhaktok
Lawrence	Kotchilea	Municipal/Hamlet	Bechoko Community Government
Robert	Long	Municipal/Hamlet	City of Yellowknife
Amanda	Mallon	Municipal/Hamlet	City of Yellowknife
Terry	Molenkamp	Municipal/Hamlet	Town of Hay River
Greg	Morash	Municipal/Hamlet	Hamlet of Gameti
Tammy	Neal	Municipal/Hamlet	Jean Marie River
Charlie	Neyelle	Municipal/Hamlet	Charter community of Deline

Morris	Neyelle	Municipal/Hamlet	Deline Land Corporation
Archie	Norbert	Municipal/Hamlet	Charter Community of Tsiigehtchic
Raymond	Ruben	Municipal/Hamlet	Hamlet of Paulatuk
Kelly	Schofield	Municipal/Hamlet	Town of Hay River
Diane	Simba	Municipal/Hamlet	Ka'agee Tu First Nation (Kakisa Lake)
Patrick	Simon	Municipal/Hamlet	Hamlet of Fort Resolution
Ruby	Landry	Municipal/Hamlet	Ka'agee Tu First Nation (Kakisa Lake)
Evelyn	Storr	Municipal/Hamlet	Hamlet of Aklavik
Richard	Wilson	Municipal/Hamlet	Hamlet of Fort Mcpherson
Sonny	Zoe	Municipal/Hamlet	Community Government of Whati
Mary	Zoe-Chocolate	Municipal/Hamlet	Community Government of Behchoko
Joe	Lalonde	Municipal/Hamlet	Hamlet of Enterprise
Terry	Halifax	Municipal/Hamlet	Town of Inuvik
Betty	Haogak	Municipal/Hamlet	Hamlet of Sachs Harbour
Mark	Henry	Municipal/Hamlet	City of Yellowknife
Victoria	St-Jean	Municipal/Hamlet	K'Atl'Odeeché First Nation Lands and Resources
Henry	Catholique	Municipal/Hamlet	Lutselke Dene First Nation - Wildlife Dept.
Susan	Christie	Municipal/Hamlet	Hamlet of Fort Providence
Kirk	Dolphus	Municipal/Hamlet	Charter Community of Deline
Lena	Egotak	Municipal/Hamlet	Hamlet of Ulukhaktok
Lyle	Fabian	Municipal/Hamlet	K'Atl'Odeeché First Nation
Joe	Tambour	Municipal/Hamlet	K'Atl'Odeeché First Nation
Charlie	Neyelle	Municipal/Hamlet	Deline First Nation
Dolphus	Jumbo	Municipal/Hamlet	Sambaa K'e Band
Albert	Boucher	Municipal/Hamlet	Lutselke Dene First Nation - Wildlife Dept.
Frederick	Andrew	Municipal/Hamlet	Tulita Renewable Resources Council

Frank	Arrowmaker	Municipal/Hamlet	Gameti Community Corporation
Collin	Bayha	Municipal/Hamlet	Deline Renewable Resources Council
Russell	Kenny	Municipal/Hamlet	Deline Renewable Resources Council
Paul	Modeste	Municipal/Hamlet	Deline Renewable Resources Council
Todd	Slack	Municipal/Hamlet	Yellowknives Dene First Nation
Charlie	Football	Aboriginal Government	Tlicho Assembly
Peter	Arrowmaker	Aboriginal Government	Tlicho Alternative Energy Committee
Jennifer	Johnston	Aboriginal Government	Inuvialuit Regional Corporation
Sam	Gargan	Aboriginal Government	Dehcho First Nations
Wendy	Barner	Consultant	FSC Architects and Engineers
Nick	Bevington	Consultant	Maskwa Engineering
Troy	Bourque	Consultant	Maskwa Engineering
Jamie	Bastedo	Consultant	Cygnus Environmental
Harriet	Burdett-Moulton	Consultant	FSC Architects & Engineers
Alex	Eriksen	Consultant	AMEC
Geoff	Harcombe	Consultant	Urban Systems Ltd
David	Wells	Consultant	AMEC
Dwayne	Wohlgemuth	Consultant	Ko Energy Accounting
Kevin	Hodgins	Consultant	FSC Architects and Engineers
Ed	Hoeve	Consultant	EBA, A Tetra Tech Company
Rita	Kors-Olthof	Consultant	EBA, A Tetra Tech Company
Lois	Little	Consultant	Lutra Associates Ltd.
Lorien	Nesbitt	Consultant	Lorien Environmental Consulting
Ann	Peters	Consultant	Dillon Consulting Limited
Ataur	Rahman	Consultant	NUNArctic Inc.
Kristen	Smith	Consultant	FSC Architects & Engineers

Steve	Faulkner	Consultant	Urban Systems Ltd
Aleta	Fowler	Government representative	Canadian Northern Economic Development Agency
Kevin	Brezinski	Government representative	Municipal and Community Affairs GNWT
Craig	Yeo	Government representative	Legislative Assembly of the Northwest Territories
Bob	Bromley	Government representative	Legislative Assembly of the NWT
Greg	Cousineau	Government Representative	Department of Transportation - GNWT
Lorie	Fyfe	Government representative	Municipal and Community Affairs GNWT
Dave	Inglis	Government representative	Industry Tourism and Investment GNWT
Brian	Sieben	Government representative	Environment & Natural Resources GNWT
Walters	Tubua	Government representative	Environment & Natural Resources GNWT
Wade	Carpenter	Government representative	Environment & Natural Resources GNWT
Robert	Fraser	Government representative	Geological Survey of Canada
Andrew	Rencz	Government representative	Natural Resources Canada
Mary	Kelly	Government representative	Environment Canada
Matthew	Kennelly	Government representative	Public Works and Services GNWT
Olivia	Lee	Government representative	Municipal and Community Affairs GNWT
Jonathon	Michel	Government representative	Aurora Research Institute
Annika	Trimble	Government representative	Aurora Research Institute - Aurora College
Dave	Nightingale	Government representative	Industry Tourism & Investment GNWT
Bryan	Pelkey	Government representative	Environment & Natural Resources GNWT
Jon	Posynick	Government representative	Department of Transportation - GNWT
Laura	Prazeres	Government representative	Indian and Northern Affairs
Loretta	Ransom	Government representative	Environment & Natural Resources GNWT
Alan	McIntosh	Government representative	Municipal & Community Affairs, GNWT
Jim	Sparling	Government representative	Environment & Natural Resources GNWT

Yves	Theriault	Government representative	Indian and Northern Affairs
Eleanor	Young	Government representative	Municipal & Community Affairs, GNWT
Alan	MacIntosh	Government representative	Municipal & Community Affairs, GNWT
Michael	Miltenberger	Government representative	Minister of Environment & Natural Resources
Dennis	Bevington	Government representative	MP for the Western Arctic
Yvonne	Doolittle	Government representative	Municipal and Community Affairs GNWT
Gerald	Enns	Government representative	Environment & Natural Resources GNWT
Steve	Kokelj	Government representative	Indian and Northern Affairs
Heather	Auld	Government representative	Environment Canada
Ryan	Hennessey	Government representative	Northern Climate Exchange/Yukon College
Shanna	Epp	Government representative	Yukon Government
Bob	Chapple	Government representative	Nunavut Government
Peggy	Holroyd	NGO/Non-profit	Pembina Institute
Jenn	Dagg	NGO/Non-profit	Pembina Institute
Merrell-Ann	Phare	NGO/Non-profit	Centre for Indigenous Environmental Resources
Doug	Ritchie	NGO/Non-profit	Ecology North
Leanne	Robinson	NGO/Non-profit	Arctic Energy Alliance
Caroline	Lafontaine	NGO/Non-profit	Northern ICE NWT
Karyn	Ferguson	NGO/Non-profit	CSA Standards
Paul	Steenhof	NGO/Non-profit	Canadian Standards Association
Linda	Todd	NGO/Non-profit	Arctic Energy Alliance
Austin	Tokarek	NGO/Non-profit	Arctic Energy Alliance
Christine	Wenman	NGO/Non-profit	Ecology North
Besha	Blondin	NGO/Non-profit	Northern ICE NWT
Camilia	Zoe-Chocolate	NGO/Non-profit	Ecology North
Shannon	Ripley	NGO/Non-profit	Ecology North

Sara	Brown	NGO/Non-profit	NWT Association of Communities
Susan	Coyne	NGO/Non-profit	NWT Association of Communities
Ron	Dennill	NGO/Non-profit	NWT Association of Communities
Gordon	Van Tighen	NGO/Non-profit	NWT Association of Communities
Jennifer	Fresque	Other	Wilfrid Laurier University
Gary	Jaeb	Other	True North Safaris Ltd.
Terry	Chapin	Other	University of Alaska Fairbanks
Jack	VanCamp	Other	Stand Alone Energy Systems Ltd.
David	Dewar	Other	Northwest Territories Power Corporation
Geraldine	Byrne	Other	Northwest Territories Power Corporation
Daniel	T'seleie	Other	
Rocky	Norwegian		

# Appendix C: Advisory committee members

<b>First Name</b>	<b>Last Name:</b>	<b>Organization</b>
Sara	Brown	NWT Association of Communities
Doug	Ritchie	Ecology North
Peggy	Holroyd	Pembina Institute
Jennifer	Dagg	Pembina Institute
Greg	Cousineau	GNWT Department of Transportation
Jim	Sparling	GNWT Environment and Natural Resources
Eleanor	Young	GNWT Department of Municipal and Community Affairs
Linda	Todd	Arctic Energy Alliance
Ed	Hoeve	EBA Engineering
Yves	Theriault	Indian and Northern Affairs



# Appendix D: Media articles

## **Yellowknife Forum on Climate Change**

***CJCD Radio, Thursday, March 31, 2011, 3:00 p.m.***

ANDRE JEREMIAH, CJCD: Organizer of a forum in Yellowknife this week are hoping new ideas will be used to fight climate change in the North. Peggy Holroyd with the Pembina Institute says a workshop brought people together from various regions, allowing everyone to start from the same page in addressing climate change.

HOLROYD: The forum has created an opportunity for people to share information together, to meet each other at minimum, to learn about what else is going on in the Territory and create a stronger network into the future of people who want to continue to address climate change in the communities.

CJCD: Ecology North, the NWT Association of Communities and the Pembina Institute held the forum and explored areas like permafrost and its effects on infrastructure and buildings. Holroyd says they will take the information gathered from the forum and use it to create a resource for communities and governments who want to start initiatives on their own. Twenty-seven communities from around the NWT were represented at the climate change forum, including Aboriginal governments, organizations, researchers and MLAs from the territorial government.

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## **Yellowknife Conference on Climate Change**

***CBC Radio, Wednesday, March 30, 2011, 5:30 p.m.***

SONYA KENEG, CBC: Researchers from Alaska say when it comes to adapting to climate change, communities need to take the future into their own hands. Terry Chapin is an ecologist with the University of Alaska. He spoke at a pan-territorial conference on climate change in Yellowknife this week. Chapin says over the next several decades he believes there will be few opportunities to access federal funding and that communities will have to be proactive.

Chapin: The village of Newtok [has seen] declines in sea ice and increasing storm swells. The village is washing into the Bering Sea. So what they've done is found a new place to relocate their village and started doing this relocation on their own.

CBC: Chapin says communities should also look to other agencies for funding and advice when it comes to adapting to the warmer climate.

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***CJCD Radio, Thursday, March 31, 2011, 6:00/8:00 a.m.***

NATASHA RIEBE, CJCD: Over 100 delegates from various organizations have been showing research and ideas this week at a forum in Yellowknife on how to deal with climate change in the North. Peggy Holroyd with the Pembina Institute says hopefully the workshops will help communities deal with permafrost, infrastructure, energy efficiency, and climate.

HOLROYD: Quite frankly our capacity is limited in the North. There's only so many people, only so much money to do this research and this work. So if we can share our knowledge and develop regional action efforts then we all benefit.

CJCD: The Tlicho First Nations Grand Chief Sam Gargan says the research put forward during presentations this week lacked Aboriginal viewpoints on climate change.

GARGAN: Most governments rely too much on western science to get answers on why things are that way as opposed to using traditional knowledge to learn more of how we can try to reverse the trends.

CJCD: Besides the topics on how climate change will affect infrastructure and transportation, Gargan says he would have liked more discussion on underground water sewage systems and treatment plants. Ecology North, the NWT Association of Communities and the Pembina Institute will use the information gathered at the workshops to create a list that people and governments can use to coordinate efforts on climate change.

\*\*\*\*\*

***Yellowknife Meeting to Discuss Climate Change Underway***

***CJCD Radio, Tuesday, March 29, 2011, 5:00 p.m.***

NATASHA RIEBE, CJCD: Some non-profit organizations in the NWT want to do more than just talk. Community chiefs, government workers and non-profits are meeting in Yellowknife this week to discuss climate change and will be exchanging concrete ideas on what each one can do to curb the problem. Jennifer Dagg with the Pembina Institute says the exchange of ideas should have tangible benefits.

DAGG: The real goal of this forum is to promote action. So not just saying here's problems, but here's ways other communities have gone about addressing it and so those lessons can be taken home to the communities that haven't done anything yet and they can help move forward.

CJCD: For example, Dagg says each community can have standards in constructing buildings and what is permitted to go into the landfills. Sessions at the Explorer Hotel will continue tomorrow exploring issues on how climate change will affect transportation, permafrost and water and waste water.

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***CJCD Radio, Tuesday, March 29, 2011, 6:00 p.m.***

NATASHA RIEBE, CJCD: Over 100 delegates are in Yellowknife today and tomorrow to talk about taking action on climate change in the North. The Pembina Institute, Ecology North and

the NWT Association of Communities have organized the forum for people to exchange information, research and ideas. Jennifer Dagg with the Pembina Institute says they're taking a holistic approach to climate change.

DAGG: This needs to be considered in every decision that you make as a community. So from now on every time that you decide to build a building or zone land or decide what to do about your water or your food or your infrastructure, in all those things we need to consider climate in every aspect of those communities.

CJCD: Delegates including community chiefs, government workers and non-profit representatives are divided into small sessions to explore issues, such as the implications of permafrost, the impacts of climate change on water and energy efficiency for buildings. Dagg says 27 of the Territory's 33 communities are represented at the two-day climate change forum at the Explorer Hotel. When it's finished the Pembina Institute, Ecology North and the NWTAC will develop a list of action items they want to see the three levels of government work on over the next five years.

\*\*\*\*\*

***CBC Radio, Wednesday, March 30, 2011, 7:30 a.m.***

ROBYN BURNS, CBC: People from across the Northwest Territories are in Yellowknife for a conference this week learning how to adapt to climate change. Many people are saying they're already feeling the impacts in their communities and as Kate Kyle reports, the financial cost of climate change is beginning to add up.

EGOTAK: For our sewage lagoon, the berm, cracks are starting to form in the middle. So we had to reinforce that last fall.

KYLE: At the climate change trade show, Nina Egotak describes how her hamlet of Ulusuktuk [Ulukhaktok] is already paying the price of climate change. As the hamlet's senior administrator officer she says her community spends a lot of money keeping up maintenance caused by the warming climate.

EGOTAK: This affecting buildings, houses, some of the roads and the land also.

KYLE: Egotak is here at this conference to get some guidance from scientists and engineers on how to keep the costs from escalating. Doug Ritchie is the program director with Ecology North. Ritchie says prevention is the key when it comes to adapting to climate change.

RITCHIE: Certainly in 2006 a study that focused on foundations within community buildings estimated that in a worst case scenario it could be upwards of \$420 million. With sort of preventative work, trying to get ahead of the problem, that figure could be reduced by half.

KYLE: Ritchie says there still needs to be more research on how thawing permafrost could impact sewage lagoons and water reservoirs. Today the discussion will continue on how municipalities can prepare for the changes ahead. Kate Kyle, CBC News, Yellowknife.

# Appendix E: Plenary presenter bios

## Forum summarizer

### ***Jamie Bastedo***

Jamie Bastedo is a northern naturalist, educator, broadcaster and internationally acclaimed author. He has written 12 books celebrating northern nature, including *On Thin Ice*, a novel about Arctic climate change, and its sequel, *Sila's Revenge*. His next book, to be released in April, is the *Trans Canada Trail Guide to the Northwest Territories*. Jamie's passion for popularizing natural science brought him national honour in 2002 when he won Canada's Michael Smith Award for Science Promotion and Queen Elizabeth's Golden Jubilee Medal.

## Opening addresses

### ***Minister Michael Miltenberger***

J. Michael Miltenberger is one of the longest-serving Members of the Legislative Assembly of the Northwest Territories, serving the constituents of Thebacha since his election in October of 1995.

Mr. Miltenberger currently serves on Cabinet as Deputy Premier, Government House Leader, Minister of Finance, and Minister of Environment and Natural Resources. During his time in the legislature he has served in a number of other portfolios as well. Mr. Miltenberger also stands as Chair of the Financial Management Board and leads the Committees on Climate Change and Refocusing Government.

Born in Ottawa March 17, 1951, Mr. Miltenberger was raised in the Northwest Territories since 1962. He earned a B.A. (Sociology) from the University of Lethbridge and later received his certification as a Journeyman Carpenter through Arctic College in Fort Smith. Prior to his election to the legislature Mr. Miltenberger worked for the GNWT and served as councillor and mayor for the Town of Fort Smith.

### ***Dennis Bevington, Member of Parliament, Western Arctic***

- Elected the Member of Parliament for Western Arctic in 2006
- President of Stand Alone Energy Systems Ltd.
- Served as Special Advisor on Energy to the Premier of the Northwest Territories
- Mayor of Fort Smith from 1988 to 1997 and served on the Green Funds Council of the Federation of Canadian Municipalities

- Served as a board member on the Northern River Basin Study and as a federal government representative on the Mackenzie Valley Environmental Impact Review Board
- Former co-chair of the Constitutional Development Steering Committee for the Western Arctic

***Gordon Van Tighem, Mayor of Yellowknife, President, NWT Association of Communities***

His Worship Mayor Gordon Van Tighem was born in Calgary, Alberta. He is a graduate of the University of Manitoba and a lifelong learner. He moved to Yellowknife from Edmonton in 1992 with his wife Carol and their three children. His election to Mayor of the City of Yellowknife was in October 2000 and he was acclaimed in 2003, again in 2006 and re-elected in 2009. Prior to his election as Mayor, Gord served as Executive Director of the NWT Community Mobilization Partnership for one year after three years as Chairman of their Volunteer Board. He chose early retirement from the Bank of Montreal in 1999 having served for 24 years in marketing management, the last eight years as NWT Territorial Manager. He has broad experience with a variety of organizations such as the Yellowknife and the NWT Chamber of Commerce and as a Founding Director of the Stanton Hospital Foundation and the SideDoor Youth Centre.

Current appointments include: Chair of the Northern and Remote Forum and member of the Executive Committee of the Federation of Canadian Municipalities, President of the NWT Association of Communities, Director of the Northwest Corridor Development Corporation, Director of the Canadian Wildlife Federation, and the Fly Kid Foundation.

Mayor Van Tighem was involved in many volunteer organizations including: Edmonton Ringette, Edmonton Federation of Community Leagues, Scouts Canada, Junior Forest Wardens, Parish Council, Arctic Winter Games, Sport North, NWT Federation of Shooting Sports, NWT Wildlife Federation, Ducks Unlimited and the Model Aeronautics Association of Canada.

## **Overview of climate change science**

***Heather Auld, Adaptation and Impacts Research Section, Environment Canada***

Heather Auld has over 31 years of work experience as a meteorologist and climatologist with Environment Canada. She has worked across the country and been posted to Edmonton, Vancouver, Toronto and with Canada’s military in eastern Ontario. Her work experience has bridged the areas of weather forecasting, meteorologist training, climate and climate change science and management.

For much of the past two decades, Heather has served as an engineering climatologist, researching and developing climatic design values and climate change guidance for national codes and standards that govern designs of buildings, bridges, telecommunications structures, power lines, sewers and other infrastructure. Heather’s team has developed initial climate change projections for many Northern communities and provided guidance on Arctic climate change for a national permafrost and foundations standard, for national building codes, transportation adaptation planning and disaster management. Throughout her career, Heather has provided

expert witness testimony for a variety of disaster inquiries, including waterborne disease outbreaks and infrastructure failures. She is involved in several international activities, including expert teams on disasters and energy under the World Meteorological Organization, a lead author of a special report for the IPCC on Disaster Reduction and Climate Change and a past participant on Canadian delegations to the United Nations biodiversity convention.

## **Research on climate change in the NWT**

### ***Steve Kokelj, Environmental Scientist, Indian and Northern Affairs Canada***

Steve Kokelj is an Environmental Scientist with the Cumulative Impact Monitoring Program of INAC. He has lived in Yellowknife for 11 years and based from the NWT Geoscience office he studies permafrost and hydrology in the NWT. He has worked extensively in the Mackenzie Delta region researching the physical and chemical characteristics of permafrost and the impacts of permafrost degradation on aquatic systems. Steve has also examined the viability of permafrost as a waste containment medium. Steve works closely with northern communities, resource managers and infrastructure planners.

### ***Dr. Stephen Wolfe, Geological Survey of Canada***

Dr. Stephen Wolfe joined the Geological Survey of Canada in 1994 as a permafrost geologist. His research includes ground ice and climatic impacts in the Great Slave and Mackenzie Delta regions. He has further led a compendium of GSC publications on the geological impacts of climate change in Canada. From 1999 to 2007, Dr. Wolfe led research into climate change and drought impacts on the Canadian Prairies. In 2007, Dr. Wolfe returned to research on permafrost in order to address the increasing demand for Northern expertise related to resource development. He has been the Permafrost Section Head at the Geological Survey since 2009.

## **Alaska planning for climate change adaptation: reflections on the NWT**

### ***Terry Chapin, Institute of Arctic Biology, University of Alaska Fairbanks***

Terry Chapin has been a faculty member in ecology at the University of Alaska Fairbanks since 1973. Most of his research is about the effects of changes in climate and wildfire on Alaskan ecology and rural communities. He is especially interested in ways that communities and agencies can develop options to increase sustainability of ecosystems and human communities over the long term in spite of rapid climatic and social changes. Through his research, he tries to determine how climate, ecology, and subsistence resources are likely to change in the future. This information should enable people to make more informed choices about options for long-term sustainability.

## **Adaptation case studies session**

### ***Ryan Hennessey***

Ryan Hennessey coordinates Northern Climate Exchange's community adaptation projects in Yukon. Four Yukon communities are involved in this process, which will see them develop capacity to deal with climate change.

Ryan Hennessey has been in the Yukon for four years. He has spent the last three years coordinating community adaptation projects in Dawson, Whitehorse and Mayo, Yukon, and in Atlin, B.C.. Prior to working for Northern Climate Exchange, Ryan was employed by the Canadian Climate Impacts and Adaptation Research Network, where he actively promoted awareness of climate change impacts on Canadians and why adaptation is an important component of preparing for climate change. His past work encompasses a broad range of environmental experience including the preparation of land use, infrastructure and conservation management plans, environmental assessments, development of communication resources, and project management.

Ryan has a Masters of Environmental Studies from Dalhousie University and a Bachelor of Landscape Architecture degree from the University of Guelph.

### ***Bob Chapple***

Bob Chapple has been working for the Planning and Lands section of the GNWT/ Nunavut for 15 years. He has worked in Iqaluit, Rankin Inlet and Kugluktuk. He started to work for the GNWT back in 1995 in Iqaluit. Bob is currently the Senior Manager of Planning and Lands for Department of Community and Government Services, Government of Nunavut stationed in Kugluktuk. His section is responsible for Planning, Lands, Assessment and Mapping.

### ***Camilia Zoe-Chocolate***

Camilia Zoe-Chocolate is a Tlicho citizen, born and raised in Behchoko. She comes from a very traditional family where both of her parents were trappers. Her professional experiences include working at Canadian Parks and Wildlife Society, Dene Nation, Mackenzie Valley Environment Impact Review Board, Diavik Diamond Mines and BHP Billiton. She is currently working at Ecology North as a Tlicho Climate Change Planner Intern and is also a Wekeezhii Land and Water board member.

Camilia is a Natural Resource Technology graduate from Aurora College. She also attended the University of Northern British Columbia for two years. She is keen on promoting environmental education and awareness especially on climate change.

# Appendix F: Breakout group session summaries and action items

<b>Emergency Management</b>	
Facilitated by: Alan MacIntosh and Ron Dennill Session Panel: Alan MacIntosh, Ron Dennill	
<b>Key discussion items</b>	
<b>March 29</b>	
<ul style="list-style-type: none"> <li>• Climate change is another factor in the standard emergency management plan, an extension of normal risk planning</li> <li>• Emergency management starts at a low level (communities are very important) and the response escalates to other levels of government</li> <li>• Resilience – “Keeping things at a functioning level”</li> <li>• When people believe that government has a situation in control they remain calm, when they believe government has lost control there is a risk of anarchy</li> <li>• Emergency management functions – prevention and mitigation, preparedness, response, and recovery (these four functions are not independent of each other)</li> <li>• Emergency management includes planning for unknown risks</li> <li>• Planning steps – Inventory (resources, facilities, people, etc.), establish contact lists</li> <li>• NWT top ten risks – Forest fires, floods, pandemic, air accident, dangerous goods spill, infrastructure failure, severe weather, road accident, marine accident, critical facility failure</li> <li>• Emergency management planning as bottom-up vs. top-down process</li> <li>• When planning for climate change, you need to get people to think of issues that may happen ten years in the future (you need to plan for issues that happen on a time scale that is longer than the life of a government)</li> </ul>	
<b>March 30</b>	
<ul style="list-style-type: none"> <li>• Role of loss prevention program in addressing climate change i.e. risk management</li> <li>• Review of what climate change impacts insurance will cover now and in the future</li> <li>• Already observing an increase in weather-related losses e.g. storms, forest fires and</li> </ul>	



floods

- Prevention is related to proactive preventative maintenance
- Contracts must be followed
- Fuel tank replacements and spills
- Importance of geotechnical work with subdivision planning and design
- Review of losses not covered during events e.g. roads, landfills, sewage lagoons.  
Example: Akalvik
- Landfills and dumpsites
- Community government responsibilities
  - Staff, SAO, Councillor and Chief must have knowledge of policies and procedures
  - Personnel files – staff must be reviewed and updated

#### **Action items**

- Alan McIntosh – Emergency Planning – will visit every community to train and assist with emergency plans

## **Adaptation Planning**

Facilitated by: Doug Ritchie

Session panel: Doug Ritchie, Brian Siebens, Merrell-Ann Phare

#### **Key discussion items**

### **March 29**

- Plan better than no plan, planning thinking about ways to overcome vulnerabilities
- Risk management tools can help select best actions to take and reduce risks (probability and consequence) to acceptable levels
- Risk management tool can help convince people with funds of what needs to be done
- Difference in risk perception. Important to develop local community capacity
- No news on new federal funding for several months (existing funding sunsets in two days)
- Cannot assume everyone at same level of knowledge, need basic info and must keep educating
- In Yukon, best way to start process is to ask what are you worried about (vulnerabilities), then what do you want to do
- Government funding is never secure, thus need to focus on community self reliance, part of overall sustainability strategy
- Guidebooks from CIER will help engage local communities; need to consider all plans (e.g. capital, zoning etc)

<ul style="list-style-type: none"> <li>• CIER risk management tools developed with input from Northerners</li> </ul>
<p><b>March 30</b></p>
<ul style="list-style-type: none"> <li>• Need to mainstream adaptation into Land Use Plans</li> <li>• Need to have healthy well educated communities for successful adaptation</li> <li>• If plan is not implemented it has no benefits</li> <li>• Big cities slower to adapt as not seeing impacts as much as smaller communities</li> <li>• Too many plans – energy plan, wildfire plan – all need to be integrated</li> <li>• Some communities have segmented adaptation e.g. Hay river with separate flood and wildfire plans</li> <li>• Yellowknife has an adaptation plan but nobody knows about it. Perhaps Yellowknife’s plan was too ambitious and not realistic enough.</li> <li>• Ways to create enthusiasm – cake, bingo, real time voting (allows immediate feedback, is anonymous and meetings not dominated by one person)</li> </ul>
<p><b>Action items</b></p>
<p><b>March 29</b></p>
<ul style="list-style-type: none"> <li>• What you need to do is use yourself: knowledge, experience, skills, you know what is happening</li> <li>• Already have tools in your community. A lot can be done with existing resources</li> <li>• Don’t wait to start doing your job. Everybody has to start caring</li> <li>• If you care for the environment, must do job if you have money or not</li> </ul>
<p><b>March 30</b></p>
<ul style="list-style-type: none"> <li>• Cannot just adapt, need a solution: mitigation</li> <li>• Can take action on adaptation planning with no money <ul style="list-style-type: none"> <li>» Can integrate adaptation into land use plans</li> <li>» Utilize NGOs</li> <li>» Share knowledge between elders and youth</li> <li>» Encourage dialogue and info sharing</li> </ul> </li> <li>• Need to go back to harmonious relationship with the land</li> </ul>

**Energy Planning**

Facilitated by: Peggy Holroyd  
Session panel: Wade Carpenter, Geraldine Byrne, Brian Pelkey, Linda Todd,  
Mark Henry, Jack Van Camp

**Key discussion items**

**March 29**

- What are the barriers to renewable energy technologies in the North?
- What are the opportunities of renewable energy systems and energy planning?
- Community energy planning and renewable energy systems can help communities reduce costs and greenhouse gas emissions.
- There are still barriers to installing renewable energy systems in the North (institutional and technological barriers).

**March 30**

- Many opportunities can come from energy planning/renewable energy projects (reduce costs, energy independence, helps to adapt to climate change, reduce GHG emissions etc.)
- Barriers that need to be overcome – create and maintain capacity in communities, expensive upfront costs for renewable energy technologies, too much time and money spent on planning.

**Action items**

**March 29**

- Find ways to communicate information on renewable energy technologies in an understandable way.

**March 30**

- Policy issues are moved by the communities. Communities can request change in policy
- Explore funding opportunities through GNWT and federal government
- Learn from other jurisdictions
- Ensure proper engagement and awareness in the community
- Negotiate opportunities for community-owned utilities

## Energy Efficiency

Facilitated by: Aleta Fowler

Session panel: Linda Todd, Dwayne Wohlgemuth, Matthew Kennelly

### Key discussion items

#### March 29

- Simple/inexpensive measures to improve energy efficiency (EE) in new and existing buildings
- More extensive/costly measures to improve energy efficiency in new and existing buildings
- Tracking energy use is key in assessing baseline energy use and creating targets for improving EE
- There is a need for education and training, from school-age children to building users, residents, building owners, and maintenance staff.

#### *Issues*

- How to encourage tenants to conserve energy and building owners to implement EE measures or plan for EE from the start?
- How to increase awareness in NWT residents, building owners, policy makers, etc?
- How to overcome barriers such as costs for the technology and to implement changes?
- Some communities can't even get energy efficient appliances from local vendors.
- There are a lot of funding opportunities available in the NWT for residents, businesses, and community groups
- There is a responsibility to reduce energy use at the regulatory level as well as at the individual level
- Implementing EE standards/policies/bylaws may work well for some communities and not others. There are technologies/issues which are region specific.
- Community organizations should pool energy tracking info for comparative analysis

#### March 29

- Measures to improve energy efficiency (EE) in new and existing buildings
- There is a need for education and training, from school-age children to building users, residents, building owners, and maintenance staff.
- There are a lot of funding opportunities available in the NWT for residents, businesses, and community groups
- The need for more extensive building inspection services in the NWT
- The need for partnerships between community groups and communities
- Policies/standards may or may not be in place territory-wide for new buildings; however, communities can create their own policies/standards/bylaws

<p><b>Issues</b></p> <ul style="list-style-type: none"> <li>• How to encourage tenants to conserve energy and building owners to implement EE measures or plan for EE from the start?</li> <li>• How to increase awareness in NWT residents, building owners, policy makers, etc.,?</li> <li>• How to overcome barriers such as up-front costs for EE technology and to implement changes?</li> </ul>
<b>Action items</b>
<b>March 29</b>
<ul style="list-style-type: none"> <li>• Implementation of EE bylaws/standards in some communities.</li> </ul>
<b>March 30</b>
<ul style="list-style-type: none"> <li>• There is a need for education and training, from school-age children to building users, residents, building owners, and maintenance staff</li> <li>• The need for more extensive building inspection services in the NWT</li> </ul>

<b>Permafrost</b>
<p>Facilitated by: Sara Brown</p> <p>Session panel: Ed Hoeve, Stephen Wolfe, Steve Kokelj, Paul Steenhoff</p>
<b>Key discussion items</b>
<b>March 29</b>
<ul style="list-style-type: none"> <li>• Need to monitor change – partnership opportunity – model exists</li> <li>• Need to partner with NWT Housing Corporation</li> <li>• Communities need resources to have the ability to participate and make planning comments</li> <li>• Need resources in terms of guidelines, guidebooks, training</li> <li>• Communities do not have planners, no expertise, no capacity to comment</li> </ul>
<b>March 30</b>
<ul style="list-style-type: none"> <li>• Community roundtable of visible changes in communities.</li> <li>• Value of partnerships of community governments and scientists and engineers to work together to collect data, analyze and provide solutions <i>together as a cooperative effort</i>.</li> <li>• The importance of working together to marry the community observations of changes with technical data.</li> <li>• There is a need to look at impacts of permafrost melting from a municipal perspective vs. a cultural perspective.</li> </ul>

- Collaboration is more successful if the community is a driver of the process and wants to take action
- Awareness of what is happening with the melting of the permafrost is important to move forward.
- Take action to be proactive in anticipation of changes in permafrost melting for future development.
- Resources, tools, websites, and information need to be brought to the table to make it easier for communities.
- Climate change adaptation is overwhelming and assistance in alleviating pressure is welcomed at community level.

### **Action items**

#### **March 29**

- Need to establish monitoring programs through partnerships
- NWT Housing Corp needs to function as a partner with communities and respect community planning
- Vulnerability mapping (permafrost) needed for all communities
- Climate change and project management need to be integrated into all School of Community Government programs
- Explore communal opportunities to do some of the engineering, planning and research required

#### **March 30**

- Explore opportunities for community governments, scientists and engineering firms to partner together to do work.
- Develop standards for roads and other infrastructure to assist communities in dealing with permafrost adaptation for their existing infrastructure and also for new infrastructure.
- A vulnerability assessment to be completed on the specific situation of each community.
- Explore opportunities to collaborate together to look at data collection, analysis, and determining solutions to move forward.
- Develop resource book, website, forum of discussion – portal of community, experts, scientists.

<b>Transportation</b>	
Facilitated by: Ed Hoeve Session panel: Ed Hoeve, Greg Cousineau	
<b>Key discussion items</b>	
<b>March 29</b>	
<ul style="list-style-type: none"> <li>• Vulnerability of winter roads</li> <li>• Importance of drainage</li> <li>• Community reliance on limited options for transportation e.g. medivac, community resupply, within the community, water and sewer</li> </ul>	
<b>March 30</b>	
<ul style="list-style-type: none"> <li>• Importance of granular plans to ensure the availability of the right materials</li> <li>• Community drainage plans</li> <li>• Inventory of community infrastructure ie/ asset management</li> </ul>	
<b>Action Items</b>	
<b>Both days</b>	
<ul style="list-style-type: none"> <li>• Need to complete vulnerability assessments for entire communities (Airport is not enough)</li> <li>• Need to work together to formulate solutions</li> <li>• Need more education and training on the issue</li> <li>• Sharing of information is critical amongst communities</li> <li>• Agencies need to get information from communities e.g. route selection for ice roads</li> <li>• Need a review of climate changes like wind changes and runway friction and their impact on airport operations</li> </ul>	

<b>Water and Wastewater</b>	
Facilitated by: Eleanor Young Session panel: Eleanor Young, Olivia Lee, Gerald Enns, Christine Wenman, Mary Kelly	
<b>Key Discussion Items</b>	
<b>March 29</b>	
<ul style="list-style-type: none"> <li>• NWT water stewardship strategy: source water protection for clean, safe, abundant</li> </ul>	

drinking water. Developing a model source protection plan for a number of communities — coming up

- GNWT is developing maps – identifying catchment areas, drinking water intake, landfills, sewage
- Water monitoring issue – what are your concerns, what would you monitor to address this?
- Funding – what options are out there? How to apply and when? GNWT is working on this
- Ecosystem Indicators – what would you monitor if you were concerned about upstream impacts, hunting etc.
- Need to integrate traditional knowledge into map work to capture community knowledge
- Costs of climate change are hidden – why is our water slowly being polluted – downstream impacts from the oil sand
- Look at the costs of this – cleaning up water, fixing the impacts of climate change, are impossible, can't fix what has been damaged already
- Need to address these problems before they happen
- Impacts on air as well, changes to animal populations
- Water monitoring – GNWT is trying to assess what is happening already, and what factors are being monitored, try to coordinate monitoring and present this information together
- Oilsands impacts – are they happening to the lakes and rivers? Can't answer yet, but that will be part of the focus of the monitoring. Monitoring will be happening in both rivers and lakes
- Water treatment plants – most meet Canadian drinking water quality guidelines. The few that don't meet these guidelines will be upgraded in the next few years
- Many water treatment plants now are able to handle the increased turbidity that we will see with climate change
- Turbidity is tested every day at water treatment plants – fluctuates seasonally, so it's hard to attach this to climate change
- Community monitoring program – it would be good to gather water from water intake and send for testing
- MACA offers support for water operators, project management, hiring consultants etc., circuit riders in many communities
- Infrastructure assessment every 3 years – monitor structural changes. Water intake is probably the highest risk. This could be incorporated into community based monitoring – visual inspection of the pipe.
- Fire protection, emergency response – water might be one of the highest risk issues in your community
- Funding for capital infrastructure – gas tax, operations and maintenance – water and sewer service funding, capacity building (gas)
- Mercury and arsenic testing south of the lake – test once a year in a grab sample, but



MACA is not looking at trends over time right now

- Water treatment plants – there are 30. If you don't have one, feasibility study could be funded from operations and maintenance funds
- Privately-owned water systems are not monitored right now
- Hazardous waste – needs to be identified and managed. Needs to be disposed of properly, not just left in the landfill
- Not uncommon to find landfills upstream of drinking water intakes
- Are soils and water being tested for contamination? really want to be proactive, don't have the money to clean it up, create strategies to better manage waste. Undergoing a change of mindset right now, but doesn't alleviate fears n community about drinking water, sewage, garbage dumps
- Many subsurface too – previous disposal of materials by govt, army. People want to know where this stuff is buried.
- Protective about the safety of water – contaminants in the river move down to the ocean.
- Sewage treatment – lots of questions in how well lagoons can treat sewage. Intensive sampling is happening now, results assessed about what is working.
- This will be used to eventually developed a new standard for treatment, closer to the standard in the rest of Canada.
- Looking to keep the sewage systems simple, low-tech, functional
- Planning exercise to assess climate change impacts on infrastructure, increased leaching of hazardous waste, drinking water and sewage lagoons
- Contaminants in fish is increasing in some areas, but still at low levels right now.
- Prioritizing community needs in water monitoring, coordinating monitoring efforts
- Concerns about pipeline – impacts on water. Better to have the pipeline aboveground. Belowground is dangerous for water.
- Focus on prevention rather than treating problems.
- Research is going on in many communities, need to engaged locals to find out what's going on, for everyone to work together
- Lot of point sources of contamination that communities are concerned about, many communities are not certain what to do, need to plan and map these sources and access funding to follow up
- Action needed, incorporated potential for climate change into planning, some communities are undergoing upgrades to water plants, need to included climate change in this
- Finding- where to find out about new and additional funding
- Being equipped to handle a larger spill, who is responsible
- Resource water protection plan – communication needs to be addressed in the plan, need to know the baseline information, where is the information coming from, where has it been gathered, where is it compiled, where can communities access this information
- Lots of studies information who are you going to believe? Share what you have with

community to inform community

- Community workshops – share this with regulatory boards, gather community concerns, make sure that decision makers are involved at the very beginning with researchers, one of the big sticking points he has seen is mistrust of outsiders, need to keep people informed and involved in the process, inclusive not exclusive, this will gather trust.
- Make sure consultation is meaningful – lots of rhetoric
- Make sure key people are involved – influential people, regardless of whether they are chief or council
- Hazardous waste what to do – do not want it in the dump, 5 communities working to backhaul landfill, how can this be coordinated and shared through communities? ENR has information that should be shared.
- Probably waste oil, batteries, paint are the worst things going in there. What's in the dump, what can be removed?
- Put rules in the form of bylaws or guidelines – then contractors and industry have to oblige. Set the standard for what you want to accept in your community, make it clear that your community is not a dumping ground

### **March 30**

- Assessment of water quality trends over time is not being done by MACA. Maybe other depts. are doing this
- MACA only tests municipal wells, not private wells
- Oilsands tailing ponds – government is working on negotiations on transboundary issues, and need to make water monitoring better to incorporated oilsands impacts
- Climate change being incorporated in how you manage water treatment plants, intakes and outtakes – the current infrastructure is designed according for best practices, and this will change with climate change. New designs will be developed
- Contaminants associated with climate change, mercury. Contaminants found in fish, health advisories for fish, but no problems with water right now. Will upgrade plants based on the latest information about health
- Concern in Aklavik about cancer. The community didn't trust the results from regular water testing, and paid for independent testing at a private lab.
- Caribou that died suddenly, small fish that suddenly died. Need to know what to do about this. ENR should be available to deal with this, not asking the community to collect samples.
- New guideline for sewage treatment plants
- How will climate change affect sewage treatment plants – if there is increased precipitation and snow, the lagoon will fill faster and may overflow, or you may have to release the excess at a different time of year
- Other lagoons are associated with a stream – there may be less water in that stream, or that stream may flow to a different area.
- Sewage research is going on in a number of communities, but not all in NWT – also Quebec and Nunavut

- Are other options for sewage treatment like septic tanks available? For public opportunities, south of the lake is more common for septic tanks
- Regulation from HSSA is lacking around private system (septic)
- Is there help from the govt for replacing water and sewer tanks for private homes? Maybe from the housing corp, maybe from the federal government
- Climate and water issues in communities, make sure climate change is being considered when communities are planning water, wastewater infrastructure
- Hazardous waste – there could be increased leaching with climate change
- Mercury in some fish with warming climate – not in water, only fish
- Plan water use, broader picture of climate change and water impacts. There is a lot of uncertainty, so monitoring is important.
- Chlorine addition to counteract turbidity, can we improve our filtration to add less chlorine? Organics in the water interact with chlorine to DCM. But chlorine is necessary for settling
- Actions that community needs to take – assessment of facilities, location, drainage, impacts of existing facilities, planning for future impacts
- Support needed – continuous adaptation to changing standards, access to standards, increased information, education, ongoing dialogue, training for operators on site
- Hazardous waste in your community, how does this impact your water, how does this get implemented into community plans, some communities have well-organized dumps with an attendant, others don't have organized dumps
- Take example from Inuvik – well-organized dump, use ENR help to dispose of hazardous waste
- Gate on landfill – trying to control waste dumping without a gate is almost impossible
- When dump site is full, how to find a new dump site
- Very concerned about water, these are important issues, incentives need to be in place
- There's a will to work on these issues, but very costly
- Importance of elders in these discussions, they know what changes have taken place, where historic sites exist
- Research in the community, govt, hamlet, academic – many types of research going on in Delta communities,
- Research in Yellowknife, how to deal with sewage without having to use trucks
- Community-based monitoring, community partnerships, every community has different concerns, different issues
- Monitoring should be developed to answer specific questions that the community has, community needs to ask the questions
- For example Enterprise gets trucked water from Hay River, have to conserve, looking for local source of water
- Jean Marie River is moving intake from Jean Marie River to Mackenzie River
- Concerns about cancer and health
- Partnerships and communication – sharing knowledge, develop better communication.

<b>Action items</b>
<b>March 29</b>
<ul style="list-style-type: none"> <li>• Take steps to slowly change how we handle things – don't just dump stuff, don't burn garbage, place water intake away from these sources. Bad practices that we need MACA to make commitment before we start to make change.</li> <li>• If we could change our thinking about water, sewage, dumps, think about protection of community, it's not really being done. Always funding restraints on their ability to address this. Need to move beyond this.</li> </ul>
<b>March 30</b>
<ul style="list-style-type: none"> <li>• Communities can get independent testing of water if they want.</li> <li>• Plan for water monitoring, with the uncertainties of climate change.</li> <li>• Partnerships and communication – sharing knowledge, develop better communication.</li> <li>• Support needed – continuous adaptation to changing standards, access to standards, increased information, education, ongoing dialogue, training for operators on site.</li> </ul>

<b>Infrastructure Standards</b>
<p>Facilitated by: Sara Brown</p> <p>Session panel: Sara Brown, David Malcolm, Paul Steenhoff, Heather Auld</p>
<b>Key discussion items</b>
<b>March 29</b>
<ul style="list-style-type: none"> <li>• Presentation slideshow – David Malcolm – no additional discussion beyond presentation</li> <li>• Environment Canada key discussion item – Nature of snow and precipitation is changing – Data is needed.</li> <li>• Gaps identified in building codes (for building permitting and compliance) and capacity in enforcement</li> <li>• Voluntary enforcement is not an option if there are no standards in place.</li> <li>• CSA – Permafrost guide helps to manage new infrastructure. No guide for existing infrastructure.</li> <li>• Climate change prevention of risk management and insurance claims</li> <li>• Inspection process does not help to move along projects – short cuts are taken without building inspections</li> <li>• Access to inspector</li> </ul>

**March 30**

- There is a lack of good quality data – as a result is a challenge for scientists.
- Lack of building inspectors and structure of building inspections – sharing of resources might be helpful.
- Change in the way engineers are designing, building and constructing. Developing best practices.
- Challenge in the way NWT HC builds and inspects housing units – construction issues are flagged.
- Communities need to change habits e.g. the way they deliver water – overflow is accelerating permafrost degradation.
- Communities need to know how to reach out to residents and develop education tools in ways to reduce impact.
- Lack of Environment Canada resources to collect and interpret data – more support needs to go into data collection.
- Permafrost mapping could be a good monitoring tool for communities to be a partner in monitoring.

**Action items****March 29**

- Recommendation for CSA Permafrost Guide for “Existing Infrastructure”
- For insurance purposes, it will be helpful to have northern standards and guidelines for existing and new infrastructure.
- Inspections – support needed for community governments to incorporate inspection practices into building developments.
- Standards are needed for use of alternative energy technology for northern communities.

**March 30**

- Explore opportunities for building inspectors to service all communities and do follow up spot checks.
- Tools, standards and enforcement tools that are meaningful provided for building inspectors to service all NWT communities.
- Explore opportunities to enhance level of inspections – e.g. video conferencing inspections.
- Develop a plain language education tool for all communities to educate the general public on how to maintain the existing permafrost – e.g. Things people can do to help with minimizing changes to permafrost.
- Explore opportunities for sharing of ideas of foundations – successes of Igloo Church, Inuvik, NWT.
- Develop checklists as guidance and assistance for community governments to look at

during inspections.

- Look at opportunities to provide assistance for communities that want to take action on the wood pile foundations and making sure existing foundation problems are addressed.
- Give EC more resources and support to collect data and interpretation.
- Work with Ecology North on how to reduce overflow during truck fills
- Research the work of other northern jurisdictions on the adaptation work to deal with melting permafrost

# Appendix G: Summary of the forum discussion

By Jamie Bastedo

## PERMAFROST CHANGE

### **ISSUES**

- Tuk: sea ice loss, foundation shifts, ponding
- Sachs: foundation shifts
- Aklavik: lack of knowledge & expertise
- Paulatuk: coast erosion, sea ice, dry lakes, ponding
- Ulukaktok: foundation houses, sewage lagoon
- Inuvik: lack of construction standards
- Gemeti: erosion, winter roads, water supply
- Behchoko: cemetery, solid waste site
- JMR: can't fill water reservoir
- Ft. Res: ponding, road flooding & failure

# PERMAFROST CHANGE

## **...ISSUES**

- Importance of monitoring
- Lack of capacity & training
- CC adaptation issues can be “overwhelming”

# PERMAFROST CHANGE

## **ACTIONS**

- More funding & training to build capacity
- Geotechnical specialists work with community
- NWTAC should review existing zoning bylaws
- More attention to water & drainage management
- Assistance in reinforcing roads
- Revise road standards in light of CC impacts
- Remediation &/or relocation of solid waste sites
- Look at CC with both municipal & cultural lenses
- “Marry” comm. observations with technical data
- Cultivate comm-govt-sci-engineer dialogue & co-op



# PERMAFROST CHANGE

## **...ACTIONS**

- Community-level monitoring
- Build knowledge & expertise to choose priorities
- Develop community-specific profiles of CC issues
- Develop web “portal” of resources, experts, info.

# TRANSPORTATION

## **ISSUES**

- Vulnerability of winter roads
- Changes in drainage (*on roads & by roads*)
- Over-reliance on limited transportation options
- CC impacts on airport operations
- CC issues around re-supply via barge & sea-lift

## **ACTIONS**

- Community granular plan (for thaw-stable materials)
- Community drainage plan
- Vulnerability assessment

# TRANSPORTATION

## **...ACTIONS**

- Regular infrastructure inventory & assessment
- Get input from communities (eg. ice road routing)
- Assess CC impacts on airport operations

# EMERGENCY MANAGEMENT

## **ISSUES**

- CC needs to be *central* to normal risk planning
- EM functions - prevention, mitigation, preparedness, response, recovery - not well integrated
- Hard to plan for unknown risks!
- Fuel tank stability, replacement, spill prevention
- Landfill site stability
- More firebreaks with new fire regime?

# EMERGENCY MANAGEMENT

## **ACTIONS**

- Plan for *long term* issues (10 years)
- Make EM planning bottom-up not top-down
- Good inventory (facilities, services) & contact list
- Regular review of EM policies & procedures with CC
- Establish Emergency Plans in every community
- Enhanced EM training in communities

# ENERGY EFFICIENCY (Buildings)

## **ISSUES**

- How to encourage residents, tenants to do it?
- How to increase EE awareness?
- How to overcome technol. & regulatory barriers?
- Some communities can't even get EE *appliances!*
- Need for more extensive inspection services
- How to overcome up front costs for EE technol.?

## **ACTIONS**

- Enhance partnerships bet. Commun & EE agencies
- Wider use of simple & cheap EE measures

# ENERGY EFFICIENCY (Buildings)

## **...ACTIONS**

- Implement locally relevant EE bylaws & standards
- Track building energy use & create targets
- Pool energy tracking info among communities
- Better training & education
- Take full advantage of existing EE funding

# ENERGY PLANNING

## **ISSUES**

- Good energy planning lower \$\$ & greenhouse gases
- Regulatory barriers to renewable energy (NTPC)
- Complexity +/- or perception (eg. Con geothermal)
- Success stories need to be shared more widely
- Costly up-front costs of renewable energy tech
- Lack of community capacity
- Too much time spent on planning!



# ENERGY PLANNING

## **ACTIONS**

- Plain language information on renewable energy
- Create community energy profile
- Communities should request energy policy changes
- Enhance GNWT & federal energy funding
- Learn from other jurisdictions
- Promote community awareness & buy-in
- Negotiate for community-owned utilities

# WATER & WASTEWATER

## **ISSUES**

- Costs & impacts of CC on water are hidden
- What ecosystem indicators to monitor?
- Funding for infrastructure maintenance & upgrade?
- How are oil sands water impacts linked to CC?
- More turbidity may stress water treatment plants
- Increased leaching of hazardous wastes from CC
- No assessment of water quality trends by MACA
- Water could be one of highest risks with CC!
- Present infrastructure designed with *past* climate

# WATER & WASTEWATER

## **...ACTIONS**

- Implement Water Stewardship Strategy!
- Regular (3 year) assessment of water infrastructure & drainage
- Community-set standards for water quality
- Translate these standards into bylaws & guidelines
- Develop water protection plan
- Identify water monitoring priorities
- Focus on prevention rather than reaction
- Incorporate potential CC impacts into water planning
- Independent water testing
- Share success stories (eg. containment of Inuvik dump site)

# INFRASTRUCTURE STANDARDS

## **ISSUES**

- Need to reflect snow & ppte changes
- Gaps in building codes
- Lack of inspection capacity
- Lack of enforcement capacity
- Voluntary compliance doesn't work if no standards
- No CSA guidelines for *existing* structures
- CC not reflected in risk management & insurance
- Short-cuts taken without building inspections

# INFRASTRUCTURE STANDARDS

## **...ISSUES**

- Lack of data - *and* the capacity to collect it
- Limited access to inspectors
- Water delivery spillage worsens permafrost decay

# INFRASTRUCTURE STANDARDS

## **ACTIONS**

- CSA Permafrost Guide for *existing* structures
- Insurance reflects northern standards/guidelines
- Community gov'ts include CC inspection practices
- Develop standards for alternative energy technology
- Enhance inspection capacity & followup spot checks
- Plain language education tools on p.frost protection
- Develop checklists & guidelines aimed at community
- Better funding for climate data collection & interp
- Share success stories (eg. Inuvik's iglu church)



# ADAPTATION PLANNING

## **ISSUES**

- Different perceptions, priorities in assessing risks
- People not convinced adaptation important
- Lack of community capacity
- Lack of continuity in federal funding
- Lack of basic information and education tools
- Big communities slow to adapt (not feeling impacts)
- Too many plans! Need to be integrated

## **ACTIONS**

- Identify priority risks & actions
- Don't wait - act now!

# ADAPTATION PLANNING

## **...ACTIONS**

- Monitor change, know what is happening
- Wider use of Centre for Indigenous Environmental Resources (CIER) CC planning tools
- Draw on local knowledge, experience, skills
- \$ never secure; focus on community self-reliance
- Identify ways to generate enthusiasm & interest
- Integrate adaptation into land use plans
- Use NGO's (AEA, EN, Pembina, CIER, etc.)
- Share knowledge (elders-youth, between commun.)
- Go back to harmonious relationship with the land