

Scenario Planning as a Tool to Ensure Robust Adaptation

Experiences from Whitehorse, Yukon



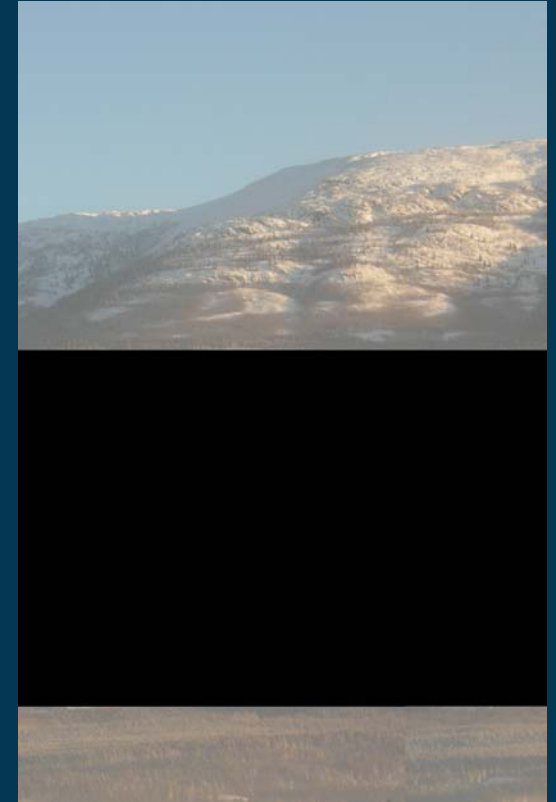
Climate Change and Communities: A Call to Action
2010 CIP International Congress



Overview of Presentation

Grey Mountain (Whitehorse)

- Climate change and Yukon
- Climate Change Adaptation Project
- Introduction to Whitehorse, YT
- Rationale for integrating scenario planning into adaptation planning process
- Methodology used to develop Future Histories of Whitehorse
- Outcomes of Project
- Utility of Scenario Planning Approach



Climate Change in Yukon

Western Arctic is already experiencing rapid change.

ACIA¹ reports an increase in winter temperatures of 3-4°C over the past 50 years and an estimated 8% increase in precipitation. Subsequent effects have been reported in Yukon Communities since 2000²:

- Increased weather variability
- New species
- Changing species distributions
- Permafrost decline
- Warmer winters

Permafrost Slump (Ft. McPherson)



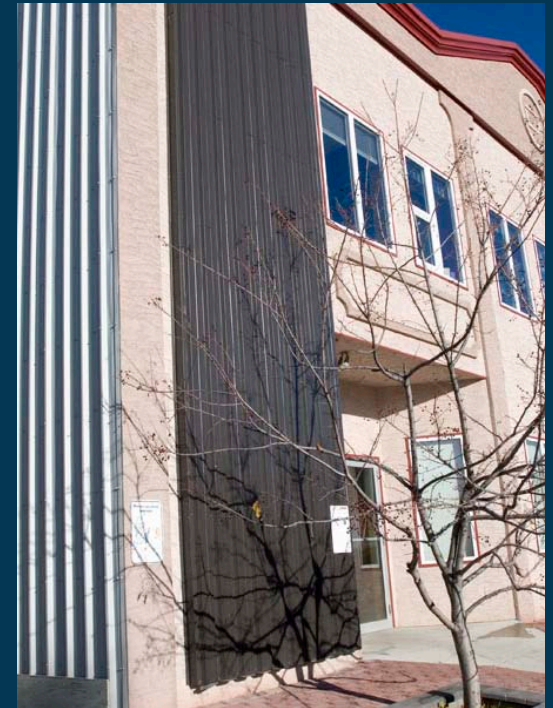
Musk Ox (Yukon/NWT Border)

Climate Change and Communities

Today the threat of a changing climate and its consequences is seen as potentially threatening the well-being of Yukon communities.

- Similar suite of climate related consequences for all Yukon communities: permafrost decline, forest fire, flooding, isolation, etc.
- Communities have varying capacity to respond to challenges and opportunities
- Limited resources may lead to maladaptation. Maladaptation occurs when an action increases the vulnerability of the community³.

Solar Panel Installation (Whitehorse)



Community Adaptation in Yukon

The Community Climate Change Adaptation Project (CCCAP) is led by NCE/Yukon College in partnership with:

- Yukon Government
- Municipal Governments
- First Nation Governments
- Private sector
- Community groups

Community adaptation projects in 3 Yukon communities (2007-2012)

Dawson City, YT



Mayo, YT



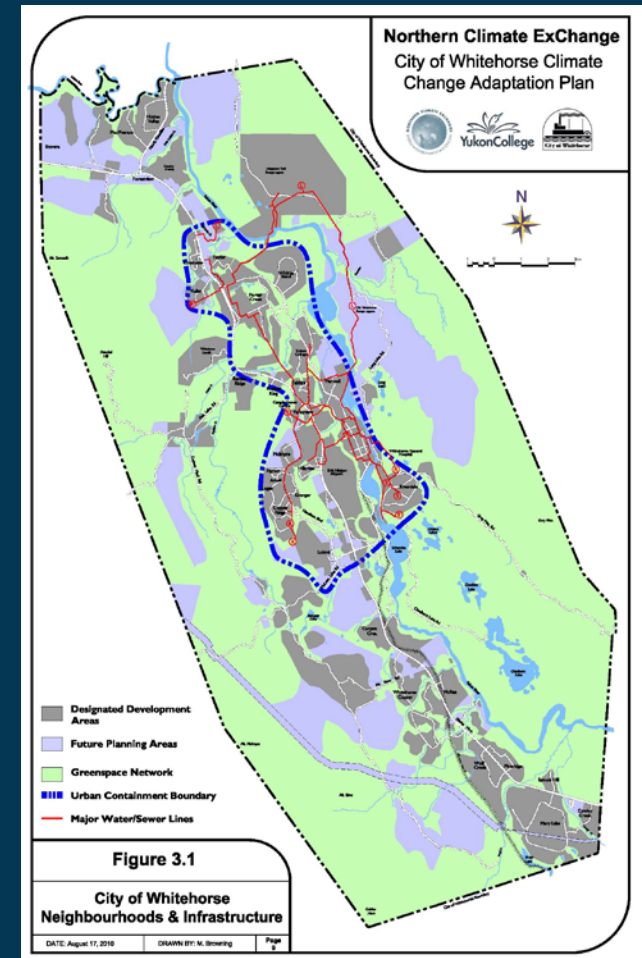
Whitehorse, YT



The Wilderness City: Whitehorse

Whitehorse is the capital of the Yukon Territory (administrative and transportation hub of Territory)

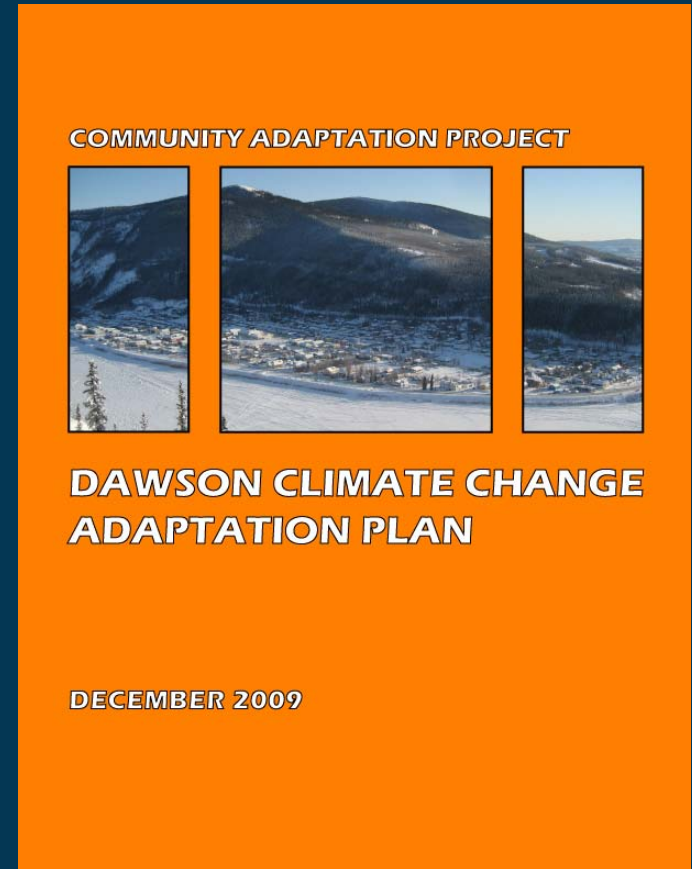
- Large municipality ~41,900ha
- Dispersed settlement pattern following the Alaska Highway
- Located in the traditional territory of two First Nations: Kwanlin Dün and Ta'an Kwäch'än
- 2009 population = 25,690
- Economy characterized by 26% public sector employment
- Population is aging
- Commitment to sustainable development



Dawson Adaptation Project: Lessons Learned

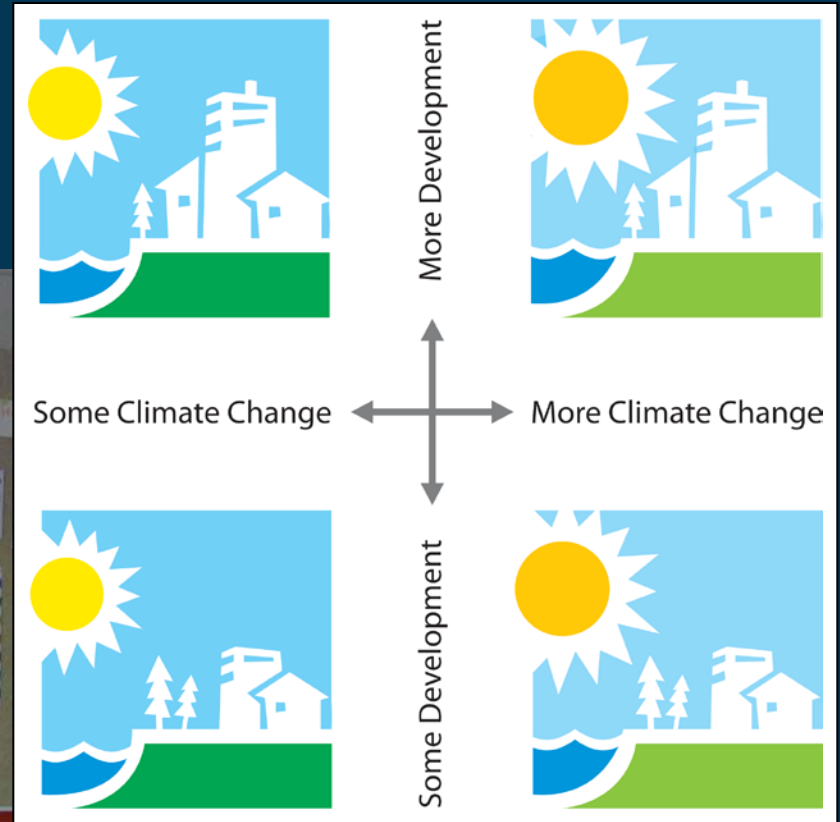
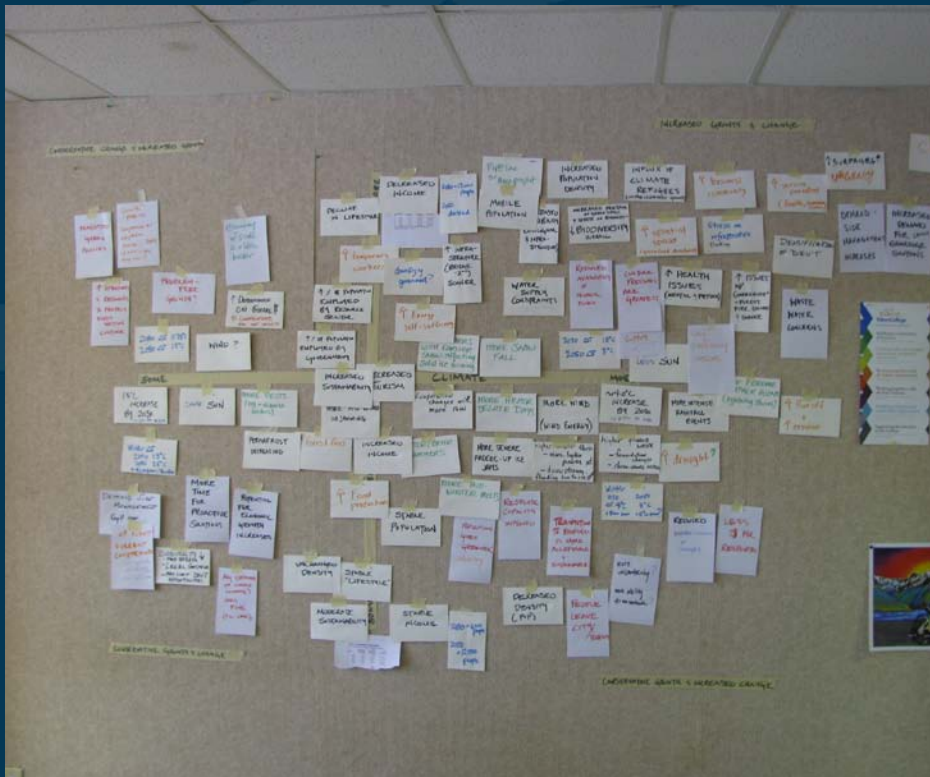
- High level of uncertainty associated with climate change in Yukon (more than estimated)
- Evaluating variability is essential to determining community vulnerability
- Climate change will not act in isolation when influencing vulnerability

Outcome: Generate multiple scenarios to evaluate possible future vulnerability



Methodology: Creating a Vulnerability Framework

First Scenarios Meeting:
November 9, 2009



Methodology: Evaluating Community Vulnerability

Whitehorse Community Input
Session: January 7, 2010



Scenario 1: City of Wilderness

Some Climate Change and Some Growth

- Population increase of 12,000 people
- Regional MAT increase of 2°C
- Moderate increase in forest fire risk despite wetter landscape conditions
- Increased variability in precipitation has stressed aging infrastructure, rate of decline acceptable.
- Sufficient institutional capacity exists to respond to climate related changes.
- Moderate sustainable development has occurred: increases in housing efficiency.
- Opportunities for agriculture, limited by land-use conflicts



Scenario 2: City of People

Some Climate Change and Lots of Growth

- Population increase of 24,000 people
- Regional MAT increase of 2°C
- Sprawling mixed density development
- Urban sprawl has affected biodiversity and exposes infrastructure to severe forest fire risk
- Community has become increasingly cosmopolitan
- Highway washouts have become more common; increasing transportation costs and creating delivery delays.
- Food security has subsequently declined
- Increased support for locally produced foods has stabilized the agriculture sector.



Scenario 3: City of Mettle

Lots of Climate Change and Some Growth

- Population of 12,000
- Regional MAT increase of 4°C
- Drought conditions frequently occur
- Forest fire risk has increased in the hinterlands
- Residents have embraced sustainable development
- Forced densification of new development
- Infrastructure decline has been reduced because of drought and concentrated development
- Green principles have formed the foundation of economy
- Drought conditions has stressed the regional environment; no agriculture sector has emerged



Scenario 4: City of Crossroads

Lots of Climate Change and Lots of Growth



- Population of 24,000
- Regional MAT increase of 4°C
- Rapid growth and drought have decreased water quality, stressed riparian systems and affected local species
- Infrastructure has been strained due to rapid growth and climate change
- Sustainable development strategies have been abandoned
- Issues now outstrip any benefits of an improved economy of scale.
- Global food shortages have decreased food security, which has been compounded by reduced access to country foods

Future Histories of Whitehorse: Limitations and Lessons

Future histories provided additional information for use in risk assessment, however:

- Challenging concept to bring to community
- Information could often be limited to one participant
- Rigour could be challenging to maintain (how much is too much speculation?)
- Masking of effects

**Requires care to keep it simple,
keep it robust.**



Two-Mile Hill, Whitehorse

Future Histories of Whitehorse: Uncertainty and Variability

Common elements identified in the Whitehorse future histories represent climate change consequences more likely to occur

- Increased risk of forest fire
- Shifts in the availability of water, increase or decrease in water budget
- Infrastructure decline
- Energy security
- Food security
- Potential land-use conflicts due to the various interests currently established there (limits agriculture)

COMMUNITY ADAPTATION PROJECT



**FUTURE HISTORIES OF
WHITEHORSE:
SCENARIOS OF CHANGE**

SEPTEMBER 2010
DRAFT 1

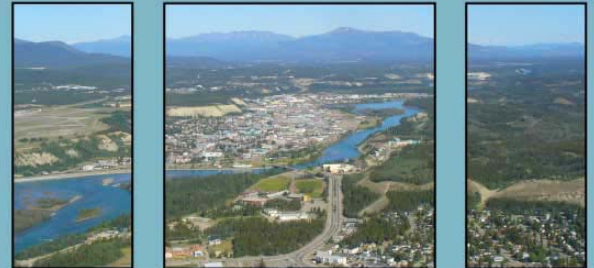
Whitehorse Adaptation Plan: Ensuring Robust Adaptation

Assuming the future fits within the suggested range of change (which it may not), recommended adaptations should benefit the community and carry a limited risk of failing to respond to anticipated change – avoiding concerns of maladaptation.

Scenario planning assists with:

- Evaluating range of impacts the adaptation addresses
- Evaluating “fit” - correlation to other planning initiatives

COMMUNITY ADAPTATION PROJECT



WHITEHORSE CLIMATE
CHANGE ADAPTATION
PLAN

SEPTEMBER 2010
DRAFT 1

Community Adaptation Project:

<http://www.taiga.net/nce/adaptation/projects.html>

References:

- ¹ Whal, H., Fraser, D., Harvey, R., and Maxwell, J. 1987. Climate of Yukon. Environment Canada, Ottawa Canada.
- ² NCE. 2000. Exchanging ideas on climate change in the Yukon. Northern Climate Exchange. Yukon College: Whitehorse, CA
- ³ IPCC, 2007b. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds. Cambridge University Press, Cambridge, UK: 976pp.

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Northern Lights over Whitehorse