PHOTO COURTESY OF JAMES MALONE

Dawson Climate Change Adaptation Plan

Local champions are important for mainstreaming adaptation in the community.

Dawson, Yukon, (population 1900) is built mostly on a narrow floodplain near the confluence of the Klondike and Yukon rivers. The town site – located just below the Arctic Circle at 64° north latitude – is situated in a region characterized by discontinuous permafrost, rolling hills and deeply incised river valleys. Dawson residents are becoming increasingly concerned about the impacts of a rapidly warming northern climate on their community and livelihoods.

In 2007, the Northern Climate ExChange, a Yukon-based non-profit organization, began working with three Yukon communities on climate change adaptation planning. Dawson was the first to complete development of an adaptation plan, in large part because it was able to work with enthusiastic local and national partners and build on a solid base of climate change experience. The adaptation plan received full support from the City of Dawson and Tr'ondëk Hwëch'in councils.

Development of Dawson's adaptation plan has created a community resource to support ongoing local adaptation planning and decision making. The project was designed as a collaborative process that would draw on the experience and knowledge of residents and integrate it with scientific information. A Local Advisory Committee (LAC), which included representatives from the Government of the Tr'ondëk Hwëch'in, the City of Dawson and the Conservation Klondike Society, was formed to provide project guidance and ensure community priorities were reflected throughout the planning process. A local coordinator was hired to lead the project, produce the final plan and chair the LAC.

RESILIENCE TO FLOODING

The community has been subject to frequent spring floods resulting from snow melt and ice jams. In 1979, a devastating flood caused $28 million (in 2009 dollars) of damage to the town. In response, a dike was constructed in the 1980s to protect the community from a 1 in 200 year flood event.

The planning process proceeded in four steps:

1) CLIMATE CHANGE PROJECTIONS

The Pacific Climate Impacts Consortium was commissioned to produce climate change projections (i.e. changes in temperature and precipitation for 2041 to 2070) specific to the Dawson region. The resulting maps were presented to the community in workshops and open houses during the Community Input Week in November 2008. These maps, along with periodic project updates, were also displayed at the community library throughout the planning process.

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LOCAL CLIMATE CHANGE IMPACTS OF PARTICULAR CONCERN TO THE COMMUNITY

- Permafrost thaw could destabilize soils and thereby threaten the integrity of local buildings and infrastructure.
- Drier summers might increase the frequency and intensity of forest fires, a major health and security risk, particularly for residents living in remote areas.
- Earlier river freeze-thaw periods and more extreme precipitation events may increase the risk of an extreme flood. Such an event could overwhelm present flood defences.
- The small communities of West Dawson and Sunnydale are connected to the main Dawson town site by an ice bridge in winter and by boat in summer. A longer seasonal transitional period could disrupt travel across the river and increase periods of isolation.

2) IDENTIFY SENSITIVITIES AND OPPORTUNITIES

Extensive public consultations were undertaken during the Community Input Week to identify community vulnerabilities and potential opportunities arising from climate change. Participants discussed important local climate change impacts such as permafrost thaw, forest fires, flooding, and changing precipitation patterns, as well as the ensuing consequences, both positive and negative, for the community and the natural environment. Potential consequences included compromised access, degradation of community utilities, damage to buildings, an increased growing season for local farmers, changes in land use, economic impacts and pressures on traditional harvesting (see Local climate change impacts inset box). A Technical Advisory Committee, made up of government and academic experts, reviewed the consequences identified for scientific validity.

3) RISK EVALUATION

The project team and LAC distilled community issues into a list of 78 "community consequences." A risk assessment framework was then used to identify the priority level for addressing each consequence (e.g. low, medium and high). Suggested adaptation actions were formulated for all consequences, and one or more partner organizations (e.g. Yukon government and City of Dawson council) were identified to provide leadership on each action. The results of the risk evaluation were also reviewed by the Technical Advisory Committee.

4) FINAL RECOMMENDATIONS

The final plan included a list of 43 high priority actions, 21 for immediate implementation and 22 for consideration by 2020. Many of the proposed actions included in the adaptation plan responded to more than one community consequence. Proposed actions range from "investigate flood proofing of the proposed sewage facility" to "implement preparedness education to respond to potential climate change related emergencies."

RISK EVALUATION FRAMEWORK

For each of the 78 community consequences identified, risk evaluation tables were completed jointly by the project team and Local Advisory Committee, and then vetted by the Technical Advisory Committee. See the example of a completed table below.

COMMUNITY CONSEQUENCE		Permafrost decline forces re-engineering of the town site.
RISK EVALUATION CRITERIA	1. LEVEL OF IMPACT	High
	2. LIKELIHOOD	Unknown (i.e. the knowledge needs to be gathered)
	3. ADAPTIVE CAPACITY	Low
OVERALL PRIORITY LEVEL		High
SUGGESTED ADAPTATION ACTION		Detailed permafrost assessment
LEAD PARTNER(S)		Yukon Government, Government of Canada, Tr'ondëk Hwëch'in, City of Dawson

The Northern Climate ExChange allocated $120,000 to help implement the plan: $30,000 was used to hire a local project coordinator, and the remaining money was awarded to four local adaptation projects chosen through a competitive process. The projects focused on food and energy security as well as climate change education. The Tr'ondëk Hwëch'in government, for example, obtained funding to construct a community greenhouse to increase local food security by extending the growing season and producing more locally produced food.

One important objective of the plan was to integrate adaptation decision making into standard government planning and operational practices in the Dawson region. The final report included recommendations organized by the following standard operational practices: land use, emergency response, fire management and infrastructure planning. Although the planning process helped raise awareness, there remains considerable work to be done before climate change considerations are fully integrated into day-to-day decision making in the community.

All four funded projects were completed in an eight-month period ending June 2010. In addition, 15 recommendations from the final plan were implemented by various government and non-government organizations. The projects include an emergency response plan by the Dawson fire department, an assessment of food security along the Dawson River (Tr'ondëk Hwëch'in), a compilation by the Yukon government of a publicly accessible inventory of permafrost conditions and an assessment of the vulnerability of Yukon government buildings to permafrost degradation.

The Dawson adaptation plan was a first in Yukon. The project success was due to the large number of volunteers, a high level of community participation, strong support from the Tr'ondëk Hwëch'in council and the work of the local project coordinator. Many of the best practices and lessons learned are being applied to adaptation planning initiatives in other Yukon communities, including Whitehorse and Mayo.

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This case study is one in an ongoing series prepared by the Climate Change Impacts and Adaptation Division, Natural Resources Canada. The series illustrates a range of climate change impacts and adaptation responses from communities across Canada.

Watch for updates at **adaptation.nrcan.gc.ca**.

ADDITIONAL INFORMATION

Hennessey, R., Jones, S., Duerden, F., and Swales, S. (2009) *Dawson Climate Change Adaptation Plan.* Dawson, Y.T.: The Northern Climate ExChange. www.taiga.net/nce/adaptation/Dawson_Plan_Final.pdf. [accessed January 2, 2011]

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