Pulling Together to Tackle Climate Change

2018 Climate Change Forum and Charrette

COASTAL AND RIVER EROSION

Communities along the Northwest Territories' (NWT) coast and rivers are vulnerable to climate change.

Background

Rising temperatures are impacting ground stability and erosion risk as the permafrost thaws and the length of the open-water season increases. Weather patterns and extremes may become more unpredictable, resulting in changes in precipitation, storm intensity (wave heights and storm surges), all contributing to coastal and inland flooding and erosion.

Changes in precipitation and snowmelt may significantly affect the timing and volume of river flows. Some effects stem directly from rising seasonal temperatures, such as earlier snowmelt peaks and the projected tendency for the snow line to migrate to higher altitudes in mountainous areas. The timing and severity of spring freshet along main NWT river systems (Hay River, Mackenzie River and the Arctic Red River) can cause ice jamming during ice break-up which will lead to significant water build-up and inland flooding.

The changes already witnessed are expected to continue and may accelerate. **Understanding the magnitude and extents of the flood and erosion hazards is the first step in understanding and addressing these hazards in a changing climate.**

Structural and non-structural options to mitigate risks associated with coastal and river erosion hazards, public safety considerations, land use and disaster resiliency planning, and funding require community input, focused knowledge sharing and capacity building to ensure that the proposed solutions are compatible with community needs.

Climate Change Impacts

- Permafrost and Ground Ice Thaw
- Increased Ground Subsidence
- Decreased Sea Ice Thickness and Extent
- Increased Open Water Season
- Increased Fetch Distances
- Increased Storm Surge Flooding
- Increased Storm Frequency and Intensity
- Increased Coastal Erosion
- Low River and Lake Levels
- Impacts to Snowmelt and Spring Freshet
- Increased Riverbank Erosion and Channel Instability
- Delayed River Freeze-up and Early Breakup
- Change in the Frequency and Severity of Ice Jams

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Disaster Mitigation: A Case Study at Tuktoyaktuk and Aklavik

Recognizing the implications that climate change may have on communities, the Government of the Northwest Territories recently commenced disaster mitigation studies for the communities of Tuktoyaktuk and Aklavik. The disaster mitigation studies are focused on understanding and mitigating long-term river and coastal erosion hazards. Each project includes a specific component on long-term resiliency in a changing climate.

At Tuktoyaktuk, the coastline is composed of fine sediments and massive ground ice which are vulnerable to wave erosion. The rate of shoreline erosion is anticipated to increase due to climate change impacts. The disaster mitigation study includes evaluation of the following key components impacting coastal erosion:

- Tide and Storm Surge Analysis
- Wave Climate Analysis
- Coastal Geomorphology Assessment
- Sea Ice and Shore Ice Analysis
- Climate Change Assessment

A variety of structural and non-structural erosion mitigation options (i.e. shore protection, development setbacks, etc.) are being developed to assist the community and its residents.

At Aklavik, flooding has occurred in recent years, which has resulted in evacuations and damage to infrastructure. A detailed hydrological and hydraulic assessment is being undertaken to identify flood hazards and develop and evaluate options to mitigate flood and river bank erosion risks to the Hamlet.

The key components of the Aklavik flood mitigation study include:

- Hydrology Assessment
- Hydraulic Modelling of Open Water and Ice Jam Floods
- Floodplain Mapping
- Channel Stability Investigation
- Permafrost