



Peatlands and Permafrost in a Changing Climate

The far north of Ontario has a unique and beautiful landscape. It is home to the Hudson Bay Lowlands, the largest peatland in North America, and boasts some of the southern-most lowland permafrost in the northern hemisphere. Climate warming is happening everywhere, but temperatures in the north are rising at twice the rate of other areas. What does this mean for Ontario's peatlands and permafrost?

What are peatlands?

Peatlands are wetlands where the soil is made almost entirely from dead and decaying plants. In these constantly wet areas, decomposition happens slowly and dead plants accumulate, storing a lot of carbon. Peatlands also play an important role in regulating water flow (since they retain water like a sponge), and water filtration (by trapping pollutants and storing materials).

What is permafrost?

Permafrost is ground that stays frozen for two years or more. Due to the cooling effect of Hudson Bay, permafrost in Ontario extends further south than in other areas of Canada. In the Hudson Bay Lowlands, permafrost contains peat and has stored carbon for thousands of years.

How will climate change impact peatlands and permafrost?

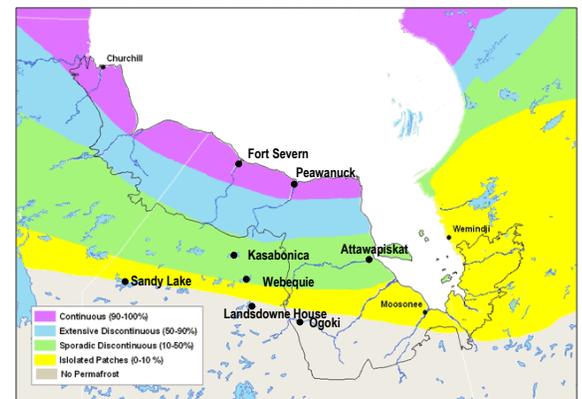
The north and its peatlands are predicted to warm which will cause decomposition to speed up. Climate change will be made worst by the fact that once you start to warm the peatlands, a positive feedback loop begins. Warming temperatures can cause the dead vegetation that makes up the peatland to decompose, releasing the stored carbon as greenhouse gases (carbon dioxide and methane) which causes more warming, which leads to more decomposition, and so on. Any permafrost within the peatland that thaws will increase this effect. A warming world means thawing permafrost which can affect the stability of the land. For instance, the land surface may sink, dry areas may become wet, bank erosion can accelerate, and slumping can occur. All of this affects plants and animals, complicates overland travel, and threatens infrastructure.

What have people noticed?

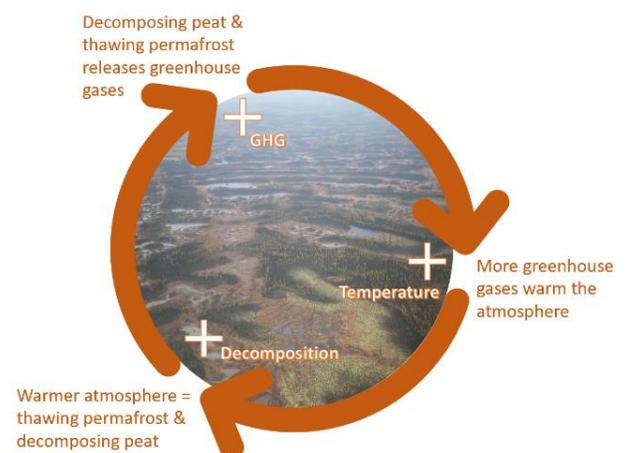
Changes in the land are already being noticed by people across the north. In places like Peawanuk and Fort Severn, thawing permafrost is said to be changing the landscape as palsas disappear and riverbanks erode. Along the coast of James Bay, people say the wetlands are now growing more shrubs, like willows. In communities across the northwest of Ontario, people say swamps and muskeg are drying up.



The Hudson Bay Lowlands is the largest peatland in North America



Permafrost in Ontario with bands that represent the percentage of land that has permafrost





How can we prepare?

Identify and Protect Important Areas

Peatlands and the underlying permafrost are vulnerable to disturbance like ATV travel, deforestation, pollution and changes in water level. Removing shade-providing trees and disturbing insulating mosses can lead to permafrost loss and damage the ecosystem for years. Peatlands that are well connected to aquatic systems, those that house important wildlife or plants, or peatlands that may be especially sensitive to climate change are examples of areas that should be identified and offered extra protection. Protection may mean limiting logging, industrial activities, road development, and restricting ATV travel to roads and well used trails. Increasing public awareness of the significance of peatlands is also an important step in protecting these sensitive ecosystems.

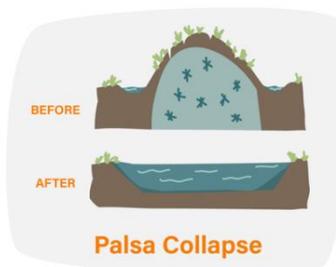


Sphagnum mosses are a common feature of healthy peatlands in northern areas.

Monitor

Monitor the land for signs of changes. In peatlands, features such as height of the water table, dryness, and which plants, animals or insects are found there can be important in assessing the health of these systems.

Changes in the landscape can indicate permafrost loss. Palsas (frost heaves with an underlying ice lens) may collapse and leave an area wetter. Along slopes and hillsides, thawing permafrost can lead to landslides and thaw slumps. On flatter areas, the ground may become uneven and wetter. Roads can become wavy and houses can shift and crack when the permafrost underneath them thaws.



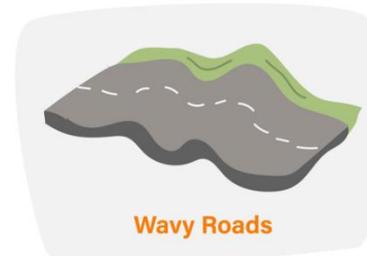
Palsa Collapse



River Slumping/Erosion



Uneven Ground



Wavy Roads

Possible indications of permafrost loss.

Fire and Contaminant Prevention

Taking extra precautions to prevent burning of peatlands is an important mitigation effort. Peatlands are very sensitive ecosystems, and many plants found in peatlands can't survive fires. Burning decreases the cover of mosses and affects the ability of the peatland to recover, which leaves underlying permafrost at risk of faster thawing.

Many species found in peatlands are sensitive to contamination and pollutants. Prevent contaminants from entering peatlands ecosystem by keeping garbage and other waste away from these areas.

Proper Engineering

Living and building on permafrost can be challenging. Properly engineering buildings and roads can prevent the thaw of permafrost and keep infrastructure from being damaged.

Peatland and the underlying permafrost are important to the well being of plants, animals and people. These sensitive areas are under threat of climate change and monitoring and protection are necessary.