

Permafrost Thaw

Is the ground beneath your feet solid?

What is Permafrost?

In cold regions, beneath the seasonally thawed surface soil layer, there can be a layer of ground which stays at below 0°C for at least 2 consecutive years, known as "permafrost." [1][2]

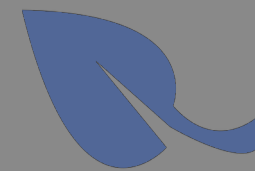
What is Permafrost Thaw?

As temperatures in the arctic and subarctic increase due to climate change, areas that were once cold enough to support permafrost are now seeing more and more thawed soil. These changes in the soil can affect its properties, leading to vertical and horizontal displacement of material, greater susceptibility to erosion, and increased water penetration among many other factors. [3][2]

Due to low plant decomposition rates, permafrost areas often contain high amounts of organic material known as peat. [1]

Permafrost areas contain nearly half of all northern peatlands, making permafrost a large carbon sink. [1]

Peat



Peat can also affect the properties of permafrost: peat soils are poorly drained, which means that it requires more energy to heat up, thus tending to preserve permafrost. [4]

The problem with peat

Peat's ability to store carbon is what makes it so great for the environment—but also what makes it so dangerous. When permafrost thaws, the stored carbon in peat will be exposed to the atmosphere and released as methane or CO₂. [1]

The permafrost feedback loop:

As global temperature increases, the rate at which permafrost thaws accelerates. [3]



As a result of increasing permafrost thaw:

Carbon stored in the soil is released into the atmosphere, which due to the greenhouse effect raises global temperatures. [1]

Collapsing landscapes (thermokarst terrain) expose more permafrost carbon to the atmosphere, thus increasing carbon release. [1]

A significant amount of permafrost thaw is due to **wildfires**, a phenomenon that is expected to increase in the near future due to climate change. [5]

An estimated **25%** of thermokarst bog expansion in the past 30 years can be attributed to wildfires. [5]



In 2017,

155,714

Canadians lived on permafrost across 108 settlements. [2]



Permafrost thaw in these regions will lead to infrastructure destabilization, food accessibility reduction, and water supply disruption. [2]



Coastal and other erosion-prone regions are the most vulnerable to damage to built structures. [2]

What do we do?

Tackling the root of the problem requires global action in reducing climate change: as long as global temperatures increase, permafrost will continue to thaw. [3]



When communities get affected by permafrost thaw, we will need to be ready for either

relocation of affected populations or **rebuilding** of damaged infrastructure. [2]

Scan for references:

