

Permafrost thaw threatens up to 3 million people in the Arctic

January 16 2025, by Sara-Lena Brännström



Like in many regions of the Arctic, in Ilulissat, Greenland, roads built on sensitive permafrost terrains are particularly prone to ground surface deformations. Faced with limited budgets and numerous challenges, local stakeholders are concerned about the costs of repeated maintenance, and difficulty of prioritizing and planning on the long-term. Credit: Johanna Scheer

Permafrost thaw poses multiple risks to local Arctic communities, their livelihoods, infrastructure and environment. A transdisciplinary study led

by Umeå University and others has identified key risks across four Arctic regions. This allows communities to adapt and make informed decisions.

Permafrost underlies about 15% of the northern hemisphere's land area and is rapidly degrading due to [climate change](#). Thawing permafrost not only poses a global threat through the release of greenhouse gases, but is also expected to have far-reaching implications for about 3 million Arctic inhabitants who live in areas most susceptible to permafrost degradation.

"In Sweden, permafrost lands are important as soil carbon reservoirs and for traditional land use practices, such as reindeer herding. Like in other regions of the Arctic, [permafrost thaw](#) is causing landscape changes and hazards that impact local ecosystems and livelihoods," says Johanna Scheer, postdoctoral fellow at the Department of Ecology and Environmental Science at Umeå University.

A team of scientists, led by Umeå University, University of Vienna and Technical University of Denmark, investigated permafrost thaw risks alongside local stakeholders in four Arctic regions: Longyearbyen (Svalbard, Norway), the Avannaata municipality (Greenland), the Beaufort Sea region and the Mackenzie River Delta (Canada), and the Bulunskiy district (Republic of Sakha, Russia).

Five key hazards

The researchers identified five key hazards related to infrastructure, mobility and supply, water quality, food security and health. The findings have been [published](#) in *Communications Earth and Environment*.

"The physical processes, hazards and societal consequences associated with permafrost thaw constitute risks that are perceived differently

across the Arctic depending on the local context and place-dependent specificities. Understanding the complex nature of these risks is essential to support the resilience and adaptive capacity of Arctic communities," says Johanna Scheer.

Endangering local ecosystems

Infrastructure failure and disruptions of mobility and supplies raised concerns across all regions due to their widespread impacts on society and the economy. In Canada, the release of contaminants from failing industrial legacy infrastructure, such as abandoned oil and gas wells, was notably considered a serious threat to both animal and human health.

Finally, in regions where traditional land use practices and subsistence are important parts of local populations' [cultural identity](#), permafrost thaw's negative effects on food security also represented a major concern.

Permafrost thaw risks considerably endanger local ecosystem and population health. In a follow-up project, researchers at Umeå University are now focusing on the [complex relationships](#) between permafrost thaw, vegetation changes, pollution and land use.

By combining field-based and remote sensing techniques, their focus will specifically be directed towards mapping and assessing the impacts of legacy oil wells and permafrost thaw on vegetation in the Mackenzie River Delta region, Canada.

More information: Susanna Gartler et al, A transdisciplinary, comparative analysis reveals key risks from Arctic permafrost thaw, *Communications Earth and Environment* (2025). [DOI:](#)

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