

Permafrost melt posing ‘significant risks’ to Arctic regions’ communities, scientists warn

Thawing permafrost can lead to the mobilization of contaminants, affecting drinking water quality and food safety in Arctic regions.

SHARJAH, EMIRATE OF SHARJAH, UNITED ARAB EMIRATES, March 17, 2025 /EINPresswire.com/ -- The Arctic permafrost thaw is hazardous to the livelihood, safety, health, food security, and the infrastructure of communities living in Arctic regions, an international group of scientists have warned.

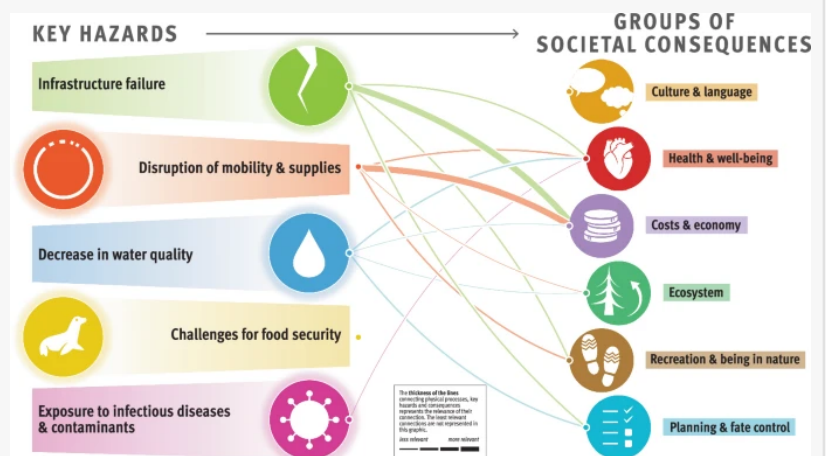
In a comparative interdisciplinary study, the scientists analyze four arctic regions, one in each of Russia, Canada, Norway and Greenland, to identify and assess the key hazards of permafrost thaw.

Their findings, published in the journal *Communications Earth and Environment*, show that due to the melting of ice in their soil, the four Arctic regions suffer from infrastructure failure, disruptions to mobility and supply chains, declining water quality, food security challenges, and increased exposure to diseases and contaminants.

They write, “Since our study areas represent perspectives from a range of human and natural Arctic permafrost



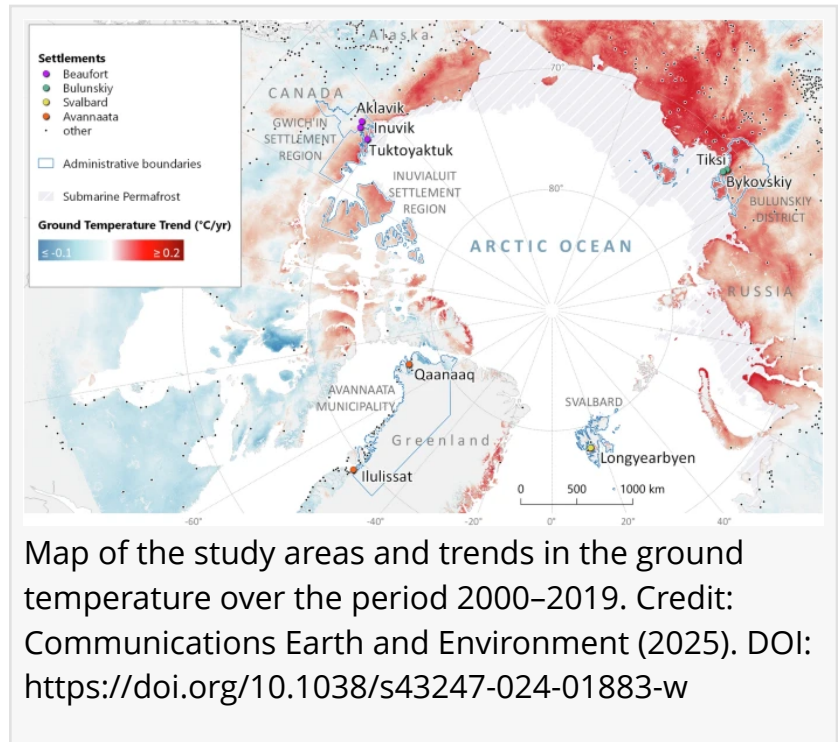
A transdisciplinary, comparative analysis reveals key risks from Arctic permafrost thaw. Credit: *Communications Earth and Environment* (2025). DOI: <https://doi.org/10.1038/s43247-024-01883-w>



Local risk graphic for the Beaufort Sea region and the Mackenzie River Delta, Canada. Credit: *Communications Earth and Environment* (2025). DOI: <https://doi.org/10.1038/s43247-024-01883-w>

settings, the framework and risk assessment we present here are applicable to other (continuous) permafrost regions experiencing similar hazards and impacts, thereby supporting the development of overarching adaptation and mitigation strategies.”

The study is something of a novelty as the scientists adopt a comparative approach that spans a variety of disciplines, and environmental and societal contexts, with a transdisciplinary synthesis that takes various risk perceptions into account.



Adding weight to the findings is the fact that the research is the fruit of a consortium-based collaborative effort with contributions from the world’s leading institutions in climate change research.

Climate change is blamed for the erratic and long-term shifts in the Earth’s weather and temperature with scientists reporting a world that has been warming up quickly in the past decades.

The Earth’s warming is behind the permafrost thaw – a process which refers to the melting of the ice in the frosty soil of Arctic regions. A thawing permafrost can have grave consequences on the environment and the inhabitants as the frozen soil melts.

“Climate change is accelerating Arctic permafrost thaw, posing significant risks to both the environment and human communities,” said Dr. Khaled Abbas, University of Sharjah’s associate professor in environmental health sciences and a co-author. “This research examines these threats, focusing on the growing concerns associated with permafrost degradation and human activity.”

Through a risk analysis framework that integrates both environmental and societal perspectives, the study provides valuable insights into how climate change drives permafrost degradation and its cascading effects on Arctic communities. At the same time, it proposes strategies for mitigation and adaptation, aiming to enhance resilience in affected regions.

“The research underscores the critical role of interdisciplinary collaboration in tackling these complex challenges. By bringing together experts from environmental science, public health, engineering, and policy, the study offers a comprehensive understanding of how permafrost

thaw impacts not only Arctic communities but also global populations," Dr. Abbas maintains.

The authors' findings emphasize that climate change is not just a regional issue confined to the Arctic but a global crisis with far-reaching consequences. "Permafrost thaw poses diverse risks to Arctic environments and livelihoods. Understanding the effects of permafrost thaw is vital for informed policymaking and adaptation efforts," says Dr. Abbas. "Our findings show that permafrost thaw is not only an environmental issue but also a direct challenge to the safety, health, and well-being of Arctic communities."

The authors pursue an inter- and transdisciplinary risk analysis based on multidirectional knowledge exchanges and thematic network analysis. They underscore the vital role of permafrost within Arctic ecosystems and highlight the main risks associated with its vulnerability to climate change.

They assess permafrost risks in the four regions they have studied "by characterizing the relationships between the physical processes, key hazards, and societal consequences on life domains via thematic network analysis and how each of these relationships was perceived across the four case studies."

Their description of the risks from permafrost thaw across the four regions is five-pronged with the failure in infrastructure cited as the first hazard "resulting in adverse consequences for costs and economy, planning and fate control, and health and well-being."

The second hazard, according to the scientists, relates to "disruptions of mobility and supplies, often created by ground instabilities and erosion, impact costs and the economy, as well as recreation and being in nature."

The third risk emanates from ground instability the permafrost thaw causes as the ice in the soil melts which "affects health and well-being as well as costs and the economy."

The fourth hazard the authors attribute to the changes in flora and fauna and hydrological and biochemical cycles which pose "challenges for food security ... [and] consequences for local costs and the economy as well as culture and language."

Finally, the study dwells on the health and well-being of communities inhabiting these regions. It shows that the thawing of permafrost exposes these communities "to infectious diseases and contaminants ... driven by changes in climate and weather conditions ... which creates concerns for human and ecosystem health".

Dr. Abbas says the study is a wake-up call for the world that climate change is causing Arctic permafrost to thaw, leading to severe environmental and societal challenges. "This research underscores the urgent need for improved planning and adaptation strategies to help Arctic communities navigate these growing threats. As the frozen ground warms, roads, houses, and

infrastructure are collapsing, disrupting transportation and access to essential supplies.

“Water sources are becoming polluted, while food security is at risk due to changes in hunting and fishing patterns. Additionally, thawing permafrost is releasing long-trapped pollutants and potentially harmful bacteria and viruses, creating new health risks.”

The research is of implications for policymakers, environmental agencies, and industries involved in infrastructure and resource management, affirms Dr. Abass, adding. “Organizations focused on climate adaptation, indigenous community development, and sustainable governance may find the study highly relevant.

“This study provides critical information for governments and policymakers to develop climate adaptation strategies in Arctic regions and beyond. It emphasizes the need for improved urban planning, infrastructure reinforcement, and sustainable resource management. The research also highlights the urgency of preparing for permafrost thaw’s consequences on ecosystems and human livelihoods.”

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