

## PERMAFROST PATHWAYS

Connecting Science,  
People, and Policy for Arctic  
Justice and Global Climate

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Loss and damage in the circumpolar North

# Permafrost thaw: Evidence of a rapidly changing Arctic

A devastated subsistence fish camp in Nome, Alaska after Typhoon Merbok.

Photo by Jeremy Edwards / FEMA.

**The Arctic is warming three to four times faster than the global average. Depending on future emission scenarios, average Arctic temperatures are expected to reach 3.3-10° above the 1985-2014 average by 2100. These rising temperatures will exacerbate a host of climate hazards, including wildfire, sea ice melt, coastal erosion, altered abundance and distributions of key Arctic species, and perhaps most significantly, permafrost thaw.**

Arctic residents and scientists have been observing permafrost thaw for decades. Thaw destabilizes once-solid ground, causing subsidence, landslides, and erosion, as well as contributing to the disappearance or development of lakes, and driving saltwater encroachment into aquifers and surface water. These phenomena damage or destroy critical infrastructure and public utilities that ensure access to electricity and clean water. Other slow-onset processes - such as coastal and riverine erosion and the loss of sea ice along coastlines - and extreme events - such as floods and wildfire - can accelerate permafrost thaw and exacerbate its impacts on the surrounding environment.

**WHAT IS PERMAFROST?:** Permafrost is ground that has been continually frozen for at least two consecutive years and often for thousands of years. Permafrost

extends across the boreal and tundra biomes and in mountain regions across the globe, underlying roughly 15% of the exposed land surface area in the Northern Hemisphere. As global temperatures rise, this once-frozen ground is beginning to thaw, creating an increasingly unstable and dangerous environment.

### “LOSS AND DAMAGE” FROM PERMAFROST THAW

Loss and damage generally refers to the destructive impacts of climate change that cannot be avoided. Both *economic loss and damage*, relating to livelihoods and property, and *non-economic loss and damage*, which includes loss of life, biodiversity, and cultural heritage, are occurring across the Arctic due to permafrost thaw.

**ECONOMIC LOSSES:** Permafrost thaw destabilizes the built environment leading to concrete and quantifiable physical asset loss and damage. Destruction of roads and essential infrastructure, such as utilities, homes, schools, and places of work that are underlain by permafrost interfere with income-earning opportunities and impose direct costs on local communities. Social protections and economic safeguards are often insufficient to protect against damages. Costs of repair and recovery may be prohibitive and recurring. Few Arctic communities can afford to implement adaptation strategies such as protection in place, managed retreat, and voluntary relocation.

**NON-ECONOMIC LOSSES:** Changes to the physical environment due to permafrost thaw often transcend western market valuation, especially for Indigenous

Peoples of Alaska and the circumpolar North—communities that have contributed the least to climate change. Erosion and sedimentation from permafrost thaw can divert water courses, thereby disrupting subsistence fishing; ground subsidence and collapse affects use of traditional hunting grounds; and shifts in species distributions or an increase in abundance of pests and pathogens may pose public health risks. For some communities, relocation is the best option for survival, but it requires leaving behind remaining sites of cultural significance.

## **INTERNATIONAL CLIMATE NEGOTIATIONS ON “LOSS AND DAMAGE” MUST INCLUDE ARCTIC INDIGENOUS PEOPLES**

Indigenous Peoples, as well as women and youth populations, are afforded special protections under the Paris Agreement, but they bear the greatest burden of uncompensated loss and damage due to climate change. International climate negotiations have shown a dedicated commitment to address this issue through the Warsaw International Mechanism (WIM). The WIM recognizes that loss and damage can

emanate from slow-onset events, such as permafrost thaw, but focuses on developing countries that are particularly vulnerable to the adverse effects of climate change. The parallels between the loss and damage experienced in developing countries, especially Small Island Developing States, and the loss and damage experienced in the Arctic are striking. Yet, Indigenous Peoples living within national borders of developed Arctic States are not readily included within the WIM mandate or visible in loss and damage dialogues.

International climate negotiations on loss and damage cannot exclude Arctic Indigenous Peoples. The following actions will help ensure inclusion of these communities in loss and damage discussions: Inviting a permafrost expert to join the WIM Expert Group on Slow Onset events; incorporating Indigenous Knowledge when collecting information on and evaluating loss and damage; and recognizing the rights of Indigenous Peoples to self-determination within the context of a dedicated loss and damage finance facility.



**The Indigenous People of Alaska and the circumpolar North have maintained their connection to culture and traditional ways of life that have sustained Tribes and communities in the Arctic for over 10,000 years. The Alaska Native groups are Aleut, Inuit, Tlingit, Haida, Tsimshian, Eyak, and Athabaskan. Within Alaska, there are five significant geographic areas and 229 Federally recognized Tribes. Many Alaska Native communities are in the most remote parts of Alaska. Only 20 percent of Alaska’s 586,412 square mile land mass is accessible by road. Due to this remoteness, subsistence livelihoods are still an important part of cultural practices.**

*“Alaska Native Tribes have faced complete subsistence salmon closures as salmon species decline. Salmon is both a primary food source central to health and food security, and a traditional food source with deep cultural significance. While the exact causes of decline remain unclear, climate change plays a role through higher river and ocean water temperatures.”*

### **Brooke Woods**

*Alaska Native traditional fisher and Arctic Policy Coordinator at Woodwell Climate Research Center*

Brooke Woods and her son Shane Wright, Jr. fishing for whitefish.

Photo by Keri Oberly.