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## STRENGTHENING PAN-ARCTIC, GLOBAL POLICY RESPONSES TO ARCTIC CLIMATE CHANGE: Recommended Policy Actions for Enhanced Permafrost Thaw & Boreal Wildland Fire Adaptation and Mitigation

Rising temperatures and climate hazards are catalyzing irreversible changes to the Arctic landscape and communities across the Circumpolar North. Among the most dangerous phenomenon is thawing permafrost, i.e., continuously frozen ground that underlies roughly 15% of the exposed land surface in the Northern Hemisphere. As permafrost thaws, it destabilizes critical infrastructure, destroying homes, schools, roads, and public utilities. Thaw-induced ground collapse and compounding natural disturbances, including wildfires across the boreal region, can also catalyze flooding and land degradation. Moreover, permafrost contains an estimated 1.5 trillion tons of carbon, or roughly twice as much carbon as is currently in the Earth's atmosphere; without aggressive, near-term climate mitigation, resulting greenhouse gas emissions (carbon dioxide and methane) from permafrost may be on par with the highest-emitting countries. Avoiding the worst emissions scenarios and addressing impacts of permafrost thaw requires urgent responses from global policymakers in collaboration with Arctic communities, scientific experts, youth leaders, and innovators in both the public and private sectors.

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The following recommendations are intended to align with a new era of cooperation in Arctic governance, as marked by Norway's Chairmanship of the Arctic Council. Priorities below reflect the expressed focus on climate and environment, and specifically, goals to enhance Arctic knowledge, improve access and use of research data, strengthen cooperation, address GHG emissions (e.g., methane), and support international climate action.

### PRIORITY 1. INVESTMENTS IN MONITORING, MEASUREMENT, DATA COLLECTION, AND NEW RESEARCH



#### Develop improved representation of permafrost thaw processes and interactions with wildfire in climate change projections (Earth System Models)

The Intergovernmental Panel on Climate Change (IPCC) has recognized the threats posed by permafrost thaw; yet only 2 of the 11 Earth System Models (ESM) featured in the latest IPCC report cycle (AR6) and which are used to inform global carbon budgets included permafrost; neither of these ESMs fully accounted for wildfire-permafrost dynamics. Policymakers should dedicate funding (est. US \$10 million per ESM) to support development of increased model complexity for future IPCC reports. Model development should focus on the integration of missing or underrepresented processes, particularly disturbances from wildfire and abrupt thaw, as well as hydrology, plant, carbon uptake, and snow physics; funding is also necessary to support training for developers and users.



#### Establish terms for open access and data sharing on GHG (CO<sub>2</sub> and CH<sub>4</sub>) monitoring data (and gaps) across the Arctic region.

Limitations in existing atmospheric data due to low-level clouds and ionospheric activity, and restricted access to high-resolution satellite imagery are undermining certainty and accuracy surrounding likely GHG emissions from permafrost thaw across the Arctic. Partnerships with research and academic institutions and Tribal and local governments can help integrate and increase the accessibility of GHG data from various observing systems and sources and contribute to the completeness of coverage of all sources and GHGs for the Arctic region.



#### Monitor fires and thaw via early detection, mapping, community-based observations, local, Traditional and Indigenous Knowledge.

Sustained Arctic observing networks that prioritize Indigenous knowledge of landscape changes, community survey and mapping, and sustainability indicators will help inform understanding about permafrost thaw. Intergovernmental efforts should include partnerships with communities, land management agencies and other entities that are involved in on-the-ground observations of landscape changes.



#### Account for estimated GHG emissions from permafrost thaw, wildfires and other "natural systems" in national emission reduction commitments.

Activity-based ("bottom-up") emissions accounting based on data collected by governments often do not include GHG emissions from permafrost thaw and other natural land-based processes, including those occurring on "unmanaged"

lands. More accurate accounting of these emissions and removals that are inextricably linked to, but do not directly result from human activity, will better inform national carbon and methane budgets and GHG reduction commitments.



Support co-produced pilot projects in the Arctic region to study the effect of permafrost-focused safeguards and fire ecology due to climate changes.

Policy decisions that place permafrost at the center may ultimately support climate adaptation and resilience, as well as global climate change mitigation; but additional research is required. The US government, for example, recently dedicated 1.6 million acres of the yedoma-rich Yukon Flats refuge in Eastern Alaska to pilot a new firefighting regime, one designed to protect carbon, in addition to human lives and property. Findings from this and other pilots–deployed in close collaboration with and informed by fire scientists, fire managers, and Indigenous knowledge-holders could provide vital information for policymakers on new and effective responses to climate change.

## PRIORITY 2. GOVERNANCE FOR ADAPTATION, RESILIENCE, AND IMPACT ASSESSMENTS



Develop disaster response and recovery laws, policies, and programs to include gradual geophysical processes, including permafrost thaw.

Slow-onset disasters are often excluded from government laws, policies, and programs dedicated to emergency preparedness and disaster response, and recovery. Legislative changes may be required to ensure that the most permafrost-affected communities are eligible for government assistance; In the US, the Executive branch should exercise its broad discretion to declare permafrost thaw as a “major disaster,” and the Federal Emergency Management Agency should implement regulatory changes to better support Alaska Native villages.



Pan-Arctic guidance on the integration of metrics on permafrost/carbon, smoke exposure/human health, habitat/ecosystem into fire management policy frameworks.

Current fire management in Pan-Arctic countries often prioritizes the potential risks of fires to human lives and infrastructure, but fails to account for the long-term costs of GHG emissions, including those from permafrost thaw, that result from boreal Arctic fires. The unique challenges and significance of forests across boreal regions warrants the development of more tailored decision-making processes, ones which explicitly account for the permafrost-carbon cycle, community displacement, smoke exposure, habits/animal health, subsistence and traditional ways of life.



Establish community-led relocation governance frameworks for communities facing displacement due to permafrost thaw and indirect effects of wildfires.

Communities in the Arctic are susceptible to climate-forced displacement and migration, and are taking responsive measures to protect in place, and manage retreat, where necessary. In some locations, permafrost thaw and other natural disturbances are rendering lands uninhabitable, leaving communities with no other option but to relocate. To support this decision, national governments should develop community-led relocation governance frameworks – such frameworks will coordinate government entities, dedicate public funding, enumerate steps for hazard assessments and site evaluation, and define legal safeguards for affected communities.



Include robust assessment of permafrost thaw processes and impacts as part of the national environmental impact assessments, and exempt cultural burning from these reviews.

Permafrost thaw has not yet been consistently or effectively weighed in cost-benefit analyses for development in the Arctic region. Even when national environment review processes are in place for major government projects, expected impacts on permafrost thaw and land stability are significant and associated GHG emissions are reasonably foreseeable. Meanwhile, cultural burning by Indigenous peoples who have successfully managed wildfires are either outright prohibited under law, not afforded a legal rights-based definition, and/or heavily restricted and subject to environmental review. Governments should reassess the efficacy of a process that is enabling the advancement of development projects, including oil and gas exploration, yet impeding Indigenous stewardship of Arctic lands..



Evaluate permafrost degradation and as part of critical infrastructure assessments and resilience-based improvements.

An estimated 30-50% of all critical circumpolar infrastructure may be at high risk by 2050 due to anthropogenic warming; permafrost degradation of roads, railroads, airport runways and buildings, alone, is estimated to reach USD 276 billion by mid-century under a high-emissions scenario. Public-private partnerships and coordination with local communities can contribute to infrastructure resilience assessments that anticipate, evaluate, and protect against impacts of thaw on transportation, energy, and communication systems.

### PRIORITY 3. STEPS TOWARDS COORDINATED, COMMUNITY-LED, AND EQUITABLE DECISION-MAKING



#### Formalize co-stewardship agreements with dedicated funding for Indigenous-led fire and ecosystem management.

Laws that undermine or contradict Tribal governance regimes are more likely to result in violations of fundamental rights, including those that guarantee Indigenous communities' option to hunting, fishing, harvesting, husbandry, and other means of subsistence procurement. Governments should formally acknowledge the co-benefits of traditional land stewardship, and seek to reconcile natural resource protections, wildlife refuges, and conservation lands with Indigenous rights to self-determination and sovereignty. The result should be formal agreements for self-governance funding and partnerships for co-management in collaboration with government land and fire managers..



#### Develop a supplemental funding mechanism to compensate Arctic communities for Loss and Damage due to climate change, with available avenues for redress, intergenerational justice.

Arctic Indigenous communities that have experienced both economic loss and damage (infrastructure, income-earning opportunities) and non-economic loss and damage (loss of sites of cultural significance, traditional ways of life) due to permafrost thaw. Developed country contributions to Loss and Damage funds under UNFCCC and responsibilities owed to developing countries does not undermine the rights of Arctic Indigenous populations to receive representation in this discourse or access compensatory funding.



#### Increase representation of Arctic Indigenous communities and attention to permafrost thaw and high-latitude fires in National Arctic frameworks and entities.

National policies and strategies for the Arctic Region (from US, Norway, Canada, Sweden, Iceland, Finland, Denmark, Russia) focus generally on security, economic development, and trade, but lack adequate attention to permafrost thaw and its consequences. Plans to implement these frameworks should detail concrete steps to prioritize climate adaptation and mitigation and provide for Indigenous representation at the highest level of government decision-making. This includes elected positions, appointment to advisory committees, and the designation of thematic working groups to wildfires, address biodiversity loss, ecosystem services, and sustainable development.



#### Remove barriers to Tribal governance of subsistence resources and amend legal frameworks that undermine Tribal sovereignty and fundamental human rights of Arctic Indigenous peoples.

Salmon declines and disruptions to wildlife in the Arctic region due to climate change are disproportionately harming First Nations, Alaska Native communities, and other Indigenous peoples in the Arctic. These communities are not only best equipped to manage Arctic ecosystems based on traditional knowledge, but rely on subsistence practices to maintain health, well-being, and culture. Policy interventions, including those that advance *rural* rather than *subsistence* preference in the US, and moratoriums on subsistence salmon fishing in the Yukon River (US and Canada), and emergency regulations on reindeer feeding/herding (Norway), have the adverse effect as intended; additional guidance and oversight is required to ensure that governments are appropriately and meaningfully consulting and engaging with Indigenous communities on critical resource management decisions.

### PRIORITY 4. INCREASED VISIBILITY IN PAN-ARCTIC FORUMS AND INTERNATIONAL CLIMATE NEGOTIATIONS



#### Include permafrost thaw and boreal wildfires as key indicators for the Global Goal on Adaptation, ensuring adequate means of implementation for the Arctic.

The GGA framework should promote coherence across various adaptation initiatives of the UNFCCC to ensure policy consistency and avoid duplication or burden. An equitable outcome for the GGA means including metrics and indicators that address integration of Indigenous knowledge, co-production, and rights-based approaches to adaptation.



#### Support Arctic research and integration of Indigenous Knowledge of permafrost thaw and Arctic "tipping points" into Intergovernmental Panel on Climate Change reports.

The delays inherent in the peer-review process and drafting for AR6 create a lag in the latest scientific information on permafrost that is considered as part of the "best available science." Permafrost expertise is essential for the upcoming IPCC AR7 to ensure that the global carbon budget, mitigation responses, and adaptation efforts are appropriately scaled to reflect the implications of the full spectrum of emissions from permafrost thaw on global temperature rise and co-production of knowledge to better understand Arctic "tipping points."



#### Operationalize the Arctic Science Agreement to amplify pan-Arctic collaboration on permafrost thaw research and adaptation.

Despite the adoption of the Agreement on Enhancing International Arctic Scientific Cooperation negotiated in the Arctic Council in 2017, there remains much to be done to implement the text among the Arctic states. Improved data

collection, information sharing and collaborative research across geopolitical borders, and open-access of maps, geospatial data and other tools to support community-led adaptation across the region require accelerated and intentional action from Arctic States.



Reinforce carbon avoidance approaches that rely on the equitable phase-out of fossil fuels and community-led natural climate solutions to minimize overshoot of Paris Agreement temperature goal.

Financial and technical support from Arctic countries for reducing carbon emissions is critical for the slowing of permafrost thaw and consequent avoidance of GHG emissions; this action will ultimately contribute to the minimization of overshoot of the 1.5°C goal. While research should support innovative mitigation approaches, an overreliance on potentially false solutions, including technological quick fixes, could have unintended negative consequences on the Arctic and should not be pursued without formal consultation with Indigenous peoples and local communities in the region.



Revise Nationally Determined Contributions to account for GHG emissions from permafrost thaw and wildfires on unmanaged Arctic lands.

Recognizing that permafrost thaw and increasingly severe boreal wildfires are the result of global climate change, more accurate reporting of these emissions by Arctic nations is still necessary to guide more realistic and ambitious emission-reduction targets. Guidance from IPCC may be necessary to inform how countries should account for emissions that do not directly result from human activity (*i.e.*, industry).



Initiate dialogue on alternative mechanisms for funding Loss and Damage in the Arctic due to climate change.

Arctic Indigenous communities have been fundamentally excluded from the UNFCCC Loss and Damage discourse and resulting fund. While efforts to operationalize this fund are ongoing, Arctic states cannot overlook the calls from Arctic Indigenous communities for attention to this matter. States should convene to discuss an alternative mechanism for providing compensation to Indigenous communities that are disproportionately affected by permafrost thaw, wildfires, sea level rise, flooding, and other natural hazards exacerbated by climate change.

*2024. Woodwell Climate Research Center launched the Permafrost Pathways project in 2022 with funding through the TED Audacious Project—a collaborative funding initiative catalyzing big, bold solutions to the world's most urgent challenges. Through partnerships with the Arctic Initiative at Harvard Kennedy School, the Alaska Native Science Commission, among others, and in collaboration with Alaska Native Tribes, Permafrost Pathways seeks to harness the combined expertise of leading research institutions and on-the-ground organizations specializing in climate science, policy, and environmental justice to inform and develop adaptation and mitigation strategies to address permafrost thaw.*