Addressing the thawing of permafrost and its impact on the environment

Background

Permafrost, characterized as “any ground that stays frozen for at least two consecutive years,” covers 24% of land masses in the northern hemishpere and can be up to 700 meters deep in parts of northern Russia and Canada. Some of these deep areas have been frozen for 11,000 years. Home to around 4 million people, its thawing poses a constant threat, as it steadily leads to more landslides and damaged infrastructure.

Degraded permafrost doesn’t only threaten its inhabitants. Estimated to contain up to 1,700 billion tonnes of carbon (almost double the amount in the Earth’s atmosphere and four times the amount of what has already been emitted by humans since the Industrial Revolution), its thaw leads to carbon dioxide and methane being released into the atmosphere. When frozen into permafrost, this organic carbon is no threat whatsoever. Permafrost degradation, however, leads to microbes eating into it, causing decay and the release of carbon dioxide and methane. Both of these are powerful greenhouse gases. This increase in CO_2 and CH_4 in turn further accelerates global warming, turning permafrost into, ironically, one of the sources of heat that is melting it. This is known as the positive feedback loop, and it is among the most detrimental effects of the permafrost thaw.

Its partly self-induced thaw, however, does not stop at the positive feedback loop. Previously frozen earth is turning into ponds and swamps, which continue to further accelerate its melting process.

Thawing permafrost may also lead to a reemergence of ancient viruses and bacteria that have been frozen into the earth for thousands of years (some since the last ice age). Not only could they harm Arctic ecosystems, but they could potentially be a threat to humans as well. Four ancient viruses have already been discovered in thawed permafrost since 2004, and they have most likely not been the last.

It is important to note that the effects of the permafrost thaw are not contained to the Arctic. Permafrost degradation works in tandem with the reduction of Arctic sea ice, which is raising ocean levels all over the world. The release of an alarming amount of greenhouse gases also contributes to massive wildfires, which in turn affect air quality even thousands of miles away from their source. The permafrost thaw is thus a serious and overlooked global issue that must be addressed as soon as possible in order to attempt to mitigate its effects and protect our planet and the environment as much as possible.

UN Involvement

In 2012, the UNEP (UN Environment Programme) released its “Policy Implications of Warming Permafrost.” in which it outlines policy recommendations to address not only the environmental but also the social and economic impacts of warming permafrost. Some policies mentioned are, for example, an urging to commission a special report on permafrost emissions,

the creation of national permafrost monitoring networks, and a suggested plan for adaptation, targeting nations with substantial permafrost.

In 2024, the UN General Assembly adopted a resolution titled “Decade of Action for Cryospheric Sciences, 2025-2034” that urges the UN Educational, Scientific and Cultural Organization to lead the implementation of the Decade of Action by developing activities and programmes to help protect the cryosphere (which permafrost is a part of).

The IPCC (Intergovernmental Panel on Climate Change) is the UN body for assessing the science related to climate change. In 2024, its Chair spoke at the Opening of the Copenhagen Climate Ministerial about the effect of global warming on permafrost degradation and the threat it poses to our environment.

Unfortunately, despite awareness of the impact of thawing permafrost, the topic is largely missing from many international (and national) climate plans, and no direct global effort to mitigate its effects or prevent permafrost degradation overall has yet been adopted.

Question to Consider

1. How directly does permafrost degradation affect my country? Does permafrost cover any part of my country’s land? Do rising sea levels affect my country?
2. Has my country addressed permafrost degradation in any way?
3. Does my country have any regulations concerning permafrost?
4. Is my country working with any initiatives or programs aiming to lessen or prevent the permafrost thaw?

Sources

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