

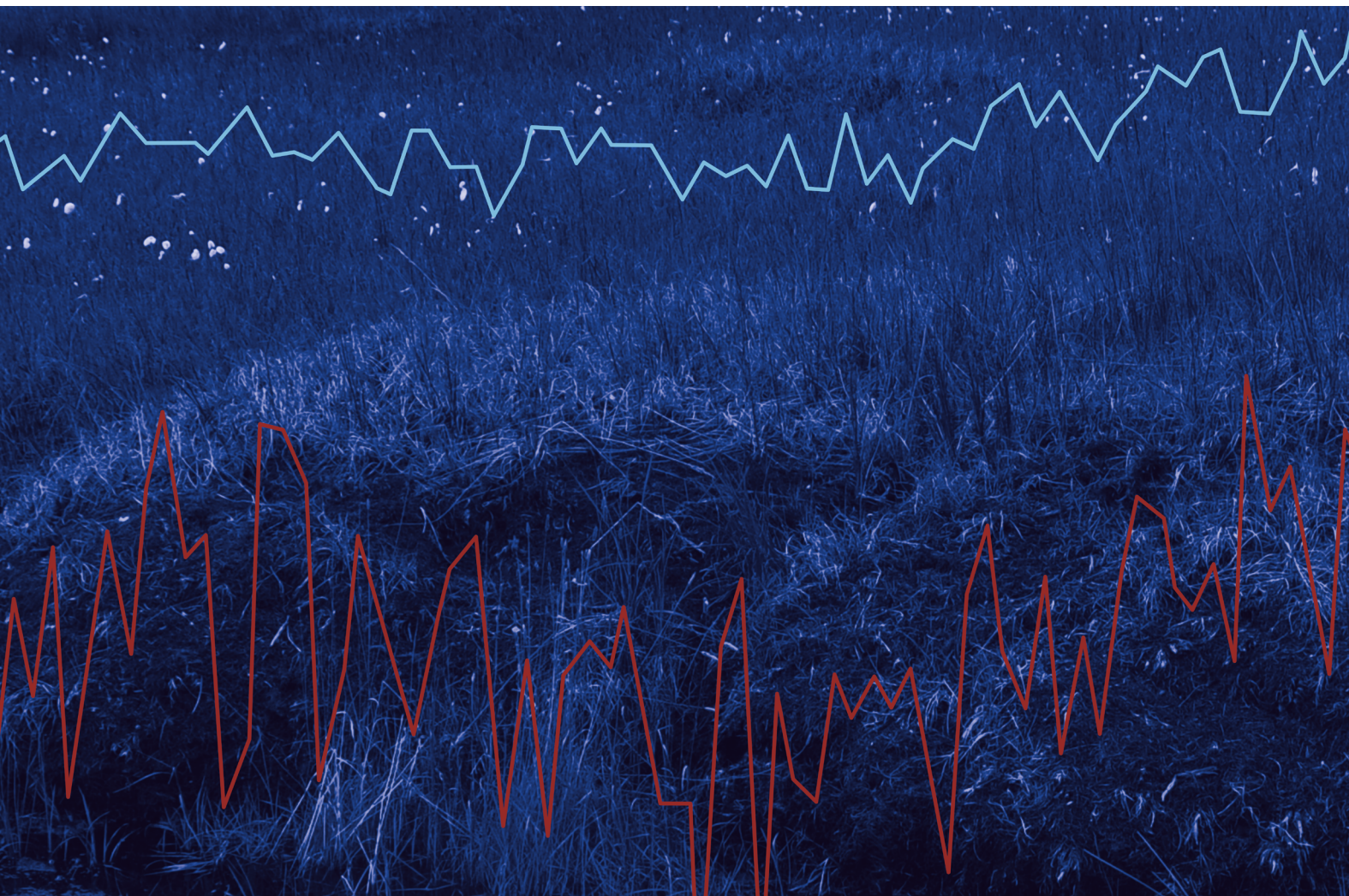


**Global Peatland Hotspot Atlas:
The State of the World's Peatlands in Maps**
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Peatland in permafrost

Permafrost conditions significantly influence the dynamics and structures of peatlands in polar/arctic and boreal regions, with climate change strongly degrading or altering them by thawing permafrost.



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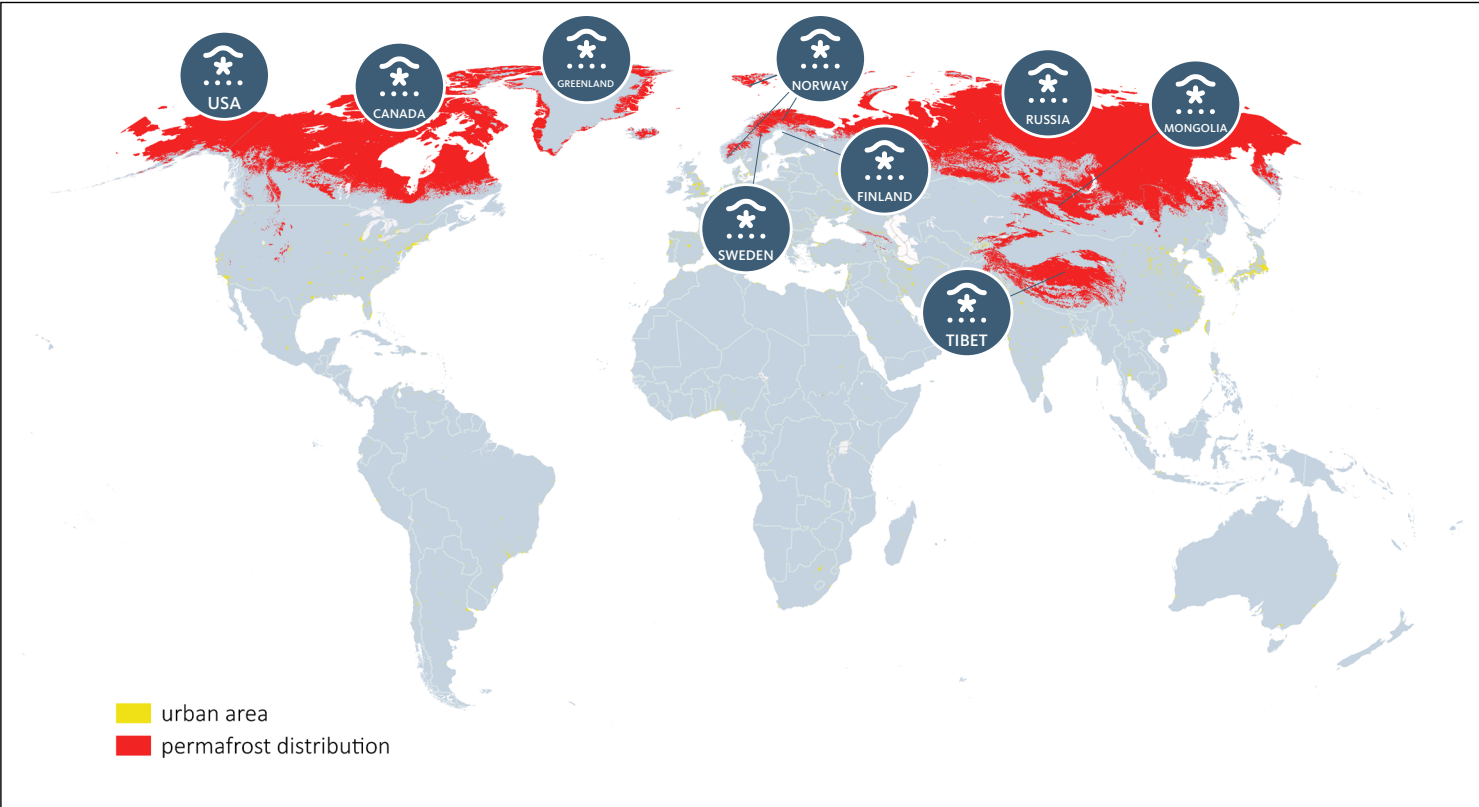
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Peatland in permafrost



Map 1 World permafrost distribution [4]

Permafrost peatlands exist within the permafrost zones of several northern hemisphere countries, spanning over 1.4 million square kilometers with a peat layer thicker than 40 centimeters, and encompassing an even larger area with shallower peat [1]. Additionally, extensive permafrost peat deposits can be found far outside the polar and sub-polar regions. For example, they occur in Mongolia and on the Qinghai-Tibetan plateau, where mountain ranges

inhibit the inland movement of warm oceanic air and winter temperatures are very low [2]. Hotspots of urban areas on permafrost peatlands occur in the Western Siberian lowland, Yakutia and Mongolia, with weaker occurrences on the Canadian Shield, Northeast China, and the East European Plain. Climate change and permafrost thawing are likely to have a destabilizing effect on the infrastructure in these regions.

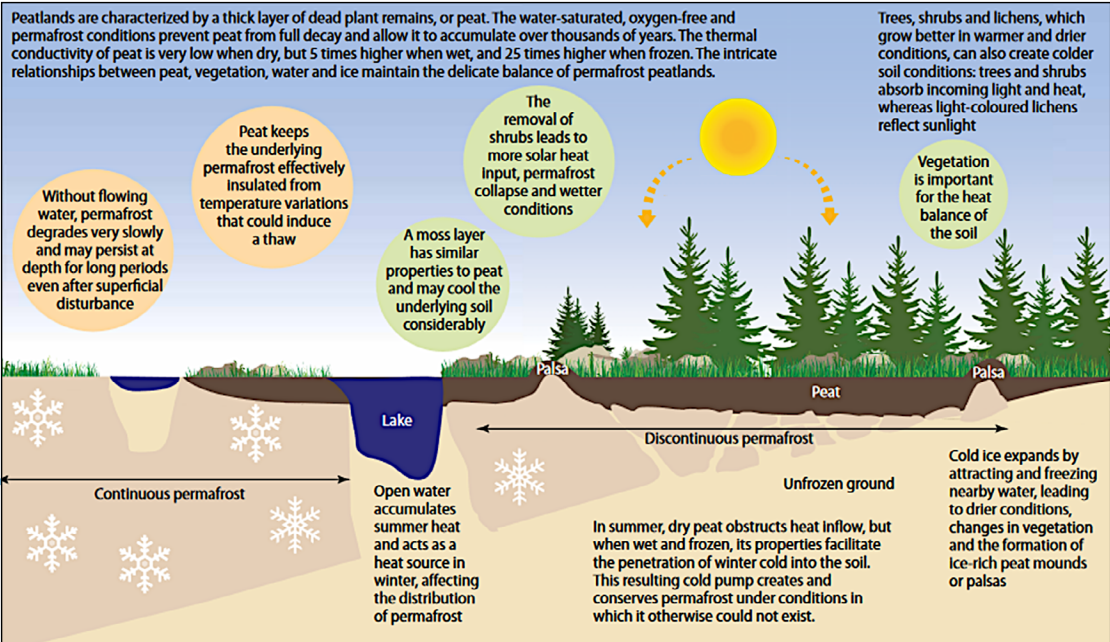


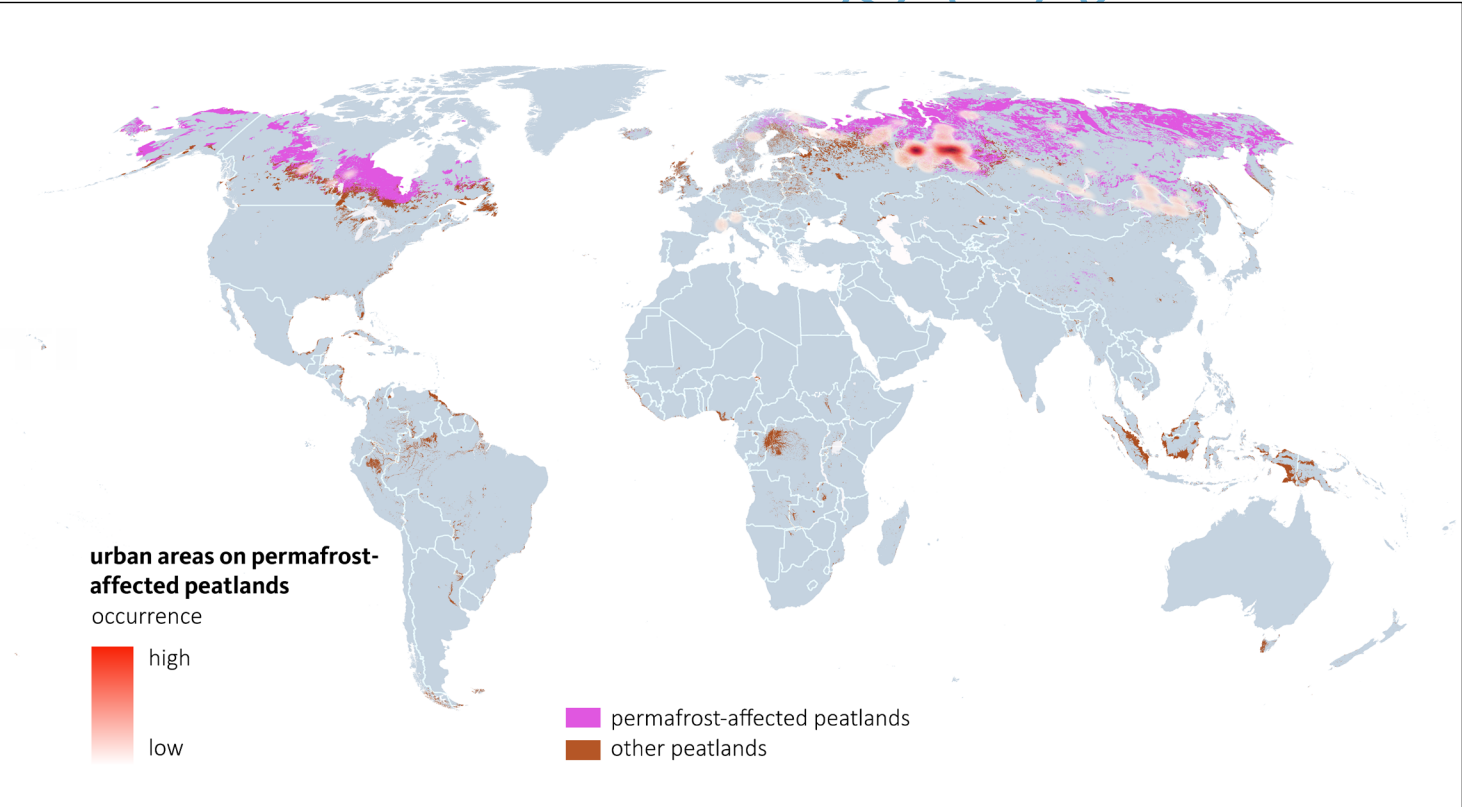
Figure 1 Relationships between permafrost, peat, plants, and water [3]

Permafrost and the role of peat, plants, and water

The presence of a permanently cold climate with frost, natural thawing, and freezing at the soil surface influences the hydro-

logy, structure, peat formation, and vegetation of peatlands. While peat formation depends on permafrost conditions, it also stabilizes and favors such conditions in the soil. And, the ice

within the peat layer provides stability and prevents peat subsidence and erosion (Figure 1 [3]).



Map 2 Permafrost-affected peatland [2, 4]

Permafrost conditions significantly influence the dynamics and structures of peatlands in polar/arctic and boreal regions, with climate change strongly degrading or altering them by thawing permafrost.

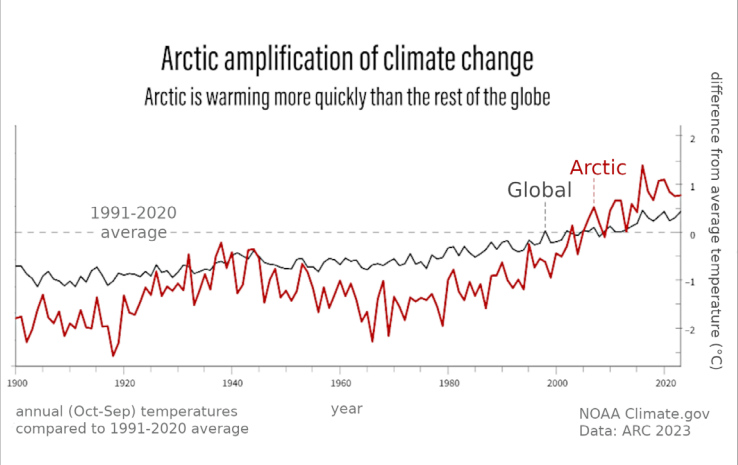


Figure 2 Temperature rise globally and in the arctic zone. [4]

With global warming and the consequent rise in temperature (Figure 2 [4]), permafrost soils and peatlands are thawing at an increasing rate. This could lead to waterlogging, changes in water flow patterns, drainage, and eventually the decomposition of peat, which would release vast amounts of greenhouse gases.



Palsa permafrost mire, Russia © F. Tanneberger



Polygonal tundra landscapes (Bylot Island, Nunavut) © L. Rochefort



Palsa in Pokhodsk, Yakutia © H. Joosten



Thermokarst from permafrost thawing in Russia © H. Joosten

Sources: 1. UNEP (2022) Global Peatlands Assessment – The State of the World's Peatlands: Evidence for action toward the conservation, restoration, and sustainable management of peatlands. Main Report. Global Peatlands Initiative. United Nations Environment Programme, Nairobi. 2. Greifswald Mire Centre (2022) Global Peatland Map 2.0. Underlying dataset of the UNEP Global Peatland Assessment. 3. UNEP (2019) Frontiers 2018/19 Emerging Issues of Environmental Concern. United Nations Environment Programme, Nairobi. 4. Obo J., Westermann S., Kaab A., Barsch A. (2018) Ground Temperature Map, 2000-2016, Northern Hemisphere Permafrost. Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bremerhaven. PANGAEA, <https://doi.org/10.1594/PANGAEA.888600>