

Shrubs are cool! They protect permafrost against climate change

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(PhysOrg.com) -- Tundra shrubs can reduce the thawing of permafrost caused by climate change. This unexpected finding is from research done by Wageningen University in the Siberian tundra. It means that shifts in the plant population of the tundra can slow permafrost thawing.

We speak of “[permafrost](#)” if a soil is frozen throughout the year, and the upper layer thaws only during the summer. These permafrost soils store gigantic amounts of carbon in the form of dead plant material; according to estimates, amounting to even twice the quantity of carbon that currently exists in the atmosphere. If these carbon-rich soils thaw, the consequences for the climate could be substantial.

In the [Arctic region](#), substantial warming is now taking place. Although the winter in the Netherlands was cold, in the Arctic regions it was actually much warmer than usual. This considerable warming could have immense consequences for the stability of permafrost and its release of the greenhouse gasses carbon dioxide and methane. With an increase in temperature, however, the plant population changes as well: shrubs such as the dwarf birch (*Betula nana*) especially profit from rising temperatures and have thus been able to vigorously expand in the Arctic region. Because the vegetation of the relatively darker coloured dwarf birch absorbs more sunlight, the expectation is that its expansion could bring about warmer conditions - thus accelerating permafrost thawing.

However, field research carried out in the pristine tundra of north-east Siberia by Daan Blok, with Monique Heijmans and Frank Berendse, of the [Nature Conservation](#) and Plant Ecology Group at Wageningen University, showed something else entirely. They demonstrated that a denser covering of shrubs in the tundra vegetation results primarily in an increased shading of the soil, and therefore actually leads to reduced thawing of the underlying permafrost.

Daan Blok: “On test plots measuring ten metres in diameter we removed the dwarf birch, then compared the soils with neighbouring test plots on which we had left the dwarf birch undisturbed. That way we could establish the effect of the dwarf birch on permafrost thawing. Somewhat unexpectedly, we showed that changes in vegetation, caused by an increasing temperature, can in fact slow the thawing of permafrost. This could be an explanation for the stabilisation of permafrost temperatures that has been observed in a number of Arctic regions over the past 10 years.”

More information: This study was published in the scientific journal *Global Change Biology*: Blok D., Heijmans M.M.P.D., Schaepman-Strub G., Kononov A.V., Maximov T.C. & Berendse F. (2010) Shrub

expansion may reduce summer permafrost thaw in Siberian tundra.
Global Change Biology, 16, 1296-1305.

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