

Alaskan lake bed cores show expanding Arctic shrubs may slow erosion

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The relationship between permafrost, Arctic vegetation, soil erosion, and changing air temperatures is complicated at best. For instance, rising temperatures melt surface permafrost layers and increase shrub growth. These shrubs can catch drifting snow, insulating the soil during the winter, and accelerate permafrost degradation—facilitating their own proliferation.

Alternatively, increased vegetation can shift energy transfer dynamics, cooling the surface and protecting permafrost. Hence, expanding Arctic shrub populations may either reinforce or counteract permafrost erosion. The complexity of the interactions makes firsthand accounts of these dynamics particularly important.

To figure out how the permafrost ecosystem has evolved under modern warming for the northernmost reaches of Alaska, Tape et al. pulled observations from a diverse set of sources.

The authors took sediment cores from lake beds in the study area to determine changes in sedimentation rates, and hence watershed erosion, for the past 60–100 years. Tree ring analyses indicate the changing growth rates of tall [shrubs](#), and satellite observations show changes in shrub extent.

The authors find that erosion rates were increasing or fluctuating prior to 1980, after which they declined for three of the four lakes under investigation. The authors suggest that this reduction in erosion rate was

driven by the observed 18 percent increase in the coverage of tall shrub, whose roots could have helped stabilize the soil.

The authors suggest that their technique, of using lake bed soil cores to detect permafrost degradation at the watershed scale, will be particularly important for furthering the understanding of the changing Arctic.

More information: "Twentieth century erosion in Arctic Alaska foothills: The influence of shrubs, runoff, and permafrost" *Journal of Geophysical Research-Biogeosciences*, [doi: 10.1029/2011JG001795](https://doi.org/10.1029/2011JG001795) , 2011

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