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Effects of rewetting on the evaporation of peatland meadows in the Netherlands

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Decomposition of peat, caused by drainage to support agricultural activity on the land, results in land subsidence and high greenhouse gas (GHG) emissions. To reduce emissions and subsidence in the Netherlands, and mitigate climate change, rewetting of peatlands by raising groundwater tables is seen as the most effective and straightforward measure. The Dutch National Research Program on Greenhouse Gas Emissions from Peatlands (NOBV) was initiated to quantify the effects of rewetting measures on GHG emissions. However, the effects of higher water tables on water usage through evaporation remain unexplored. Freshwater shortages in summer are an already occurring problem and increased evaporation of peatlands due to rewetting potentially further increases this problem.

This study aims to quantify the increase in evaporation under wetter conditions on peatland meadows in the Netherlands. We have built a dataset with both evaporation and water table depth data, measured on five different Dutch peat meadows in the years 2020-2024. Both transparent automated flux chambers and eddy covariance measurements are used to establish the water flux. Water management practices, and consequently water table depth, varied between sites. As a result, the direct effects of a higher water table on the amount of evaporation can be studied.

First results suggest that higher groundwater tables on peatland meadows lead to higher evaporation. Looking at yearly averages, evaporation increased with $5.9 \pm 2.5\%$ for every 10 cm water level increase. This indicates that rewetting substantially increases the water use of peatlands.

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