Science Societies

Water Table's Impact on Carbon Sequestration in a Restored Fen

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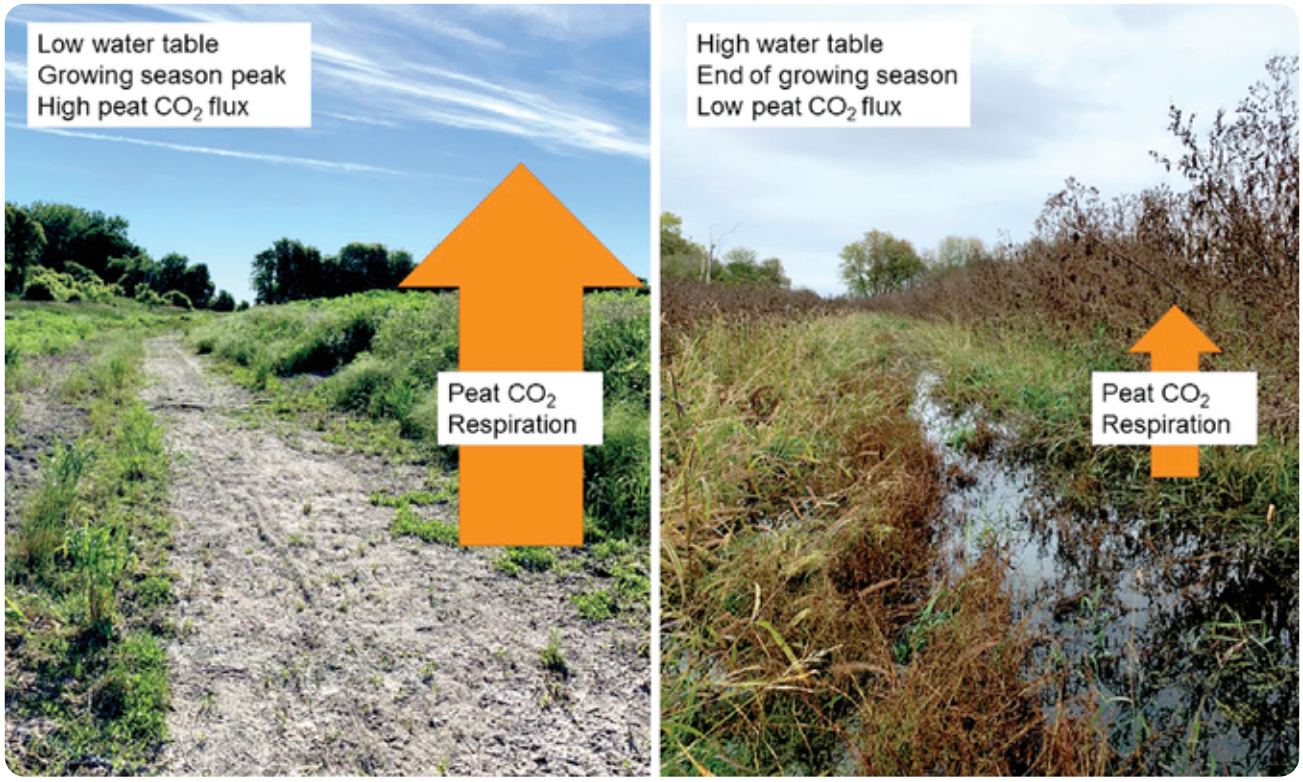

A water diversion constructed during the restoration of Minneso- ta's Cold Spring fen, the study site, is depicted at different points in the growing season. Peat carbon dioxide emissions are high when it is dry and low when it is wetted. Photo by Anu Wille.

Peatlands drained for human land use can emit large amounts of carbon dioxide into the atmosphere, exacerbating global climate change. The water table position in a peatland is a primary factor governing carbon cycling—higher water tables generally result in reduced CO_2 production. Due to the high carbon accumulation rates of organic soils, restoring degraded peatlands has the potential to provide climate benefits through the sequestration of atmospheric carbon.

Researchers monitored growing season water table elevation and peat carbon dioxide flux at two sites in a temperate fen in Minnesota, which was restored after decades of disturbance by row crop agriculture. Carbon dioxide emissions were highest during warm and dry conditions at the peak of the growing season and lowest during wet conditions when the water table was high. Throughout the growing season, there was a statistically significant relationship between lower emissions and an elevated water table.

These results indicate that hydrological restoration efforts successfully elevated the water table to mitigate peat carbon dioxide emissions. While the benefits of such interventions will vary by site, this study demonstrates that highly degraded peatlands can be restored to offer important ecosystem services.

Adapted from Wille, E. A., Lenhart, C. F., & Kolka, R. K. (2023). Carbon dioxide emissions in relation to water table in a restored fen. *Agricultural & Environmental Letters*, *8*, e20112. https://doi.org/10.1002/ael2.20112