

Résumé / Abstract

Peatland restoration and flows of carbon and methane. Ecosystem services for carbon storage and greenhouse gas release

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Intact peatlands are carbon stores (C) of global significance. Annually, northern peatlands store 11-38 g C m⁻² in form of carbon dioxide (CO₂) (Yu, 2012). However, they also release methane (11 g m⁻², temperate sites, Turetsky et al., 2014).

When drained, peatlands become sources of CO₂, and sometimes nitrous oxide (N₂O) as well. The magnitude of the CO₂ release differs depending on site conditions and the land use associated with drainage. In the temperate zone, arable land on peatlands release ca. 33 CO₂-equiv. ha⁻¹ yr⁻¹. Peatlands managed as grasslands release ca. 0-70 CO₂-equiv. ha⁻¹ yr⁻¹ (Niedersächsisches Ministerium für Umwelt, Energie und Klimaaschutz, 2016; Tiemeyer et al., 2016). In temperate countries like Germany and Austria, GHG release from drained peatlands may amount to 3% of the nationwide GHG emissions, putting the on the same level as the nation's air traffic.

A data analysis has shown that the water table is a good global proxy for potential GHG release: Sites drained to 150 cm depth can be expected to release 60 CO₂-equiv. ha⁻¹ yr⁻¹ and at a water table at the ground surface, peatlands do not release GHG (Jurasinski et al., 2016).

When rewetting peatlands, CO₂ fluxes change their sign to net CO₂ uptake and, starting at a water table of ca. 10 cm below ground, CH₄ is released (Jurasinski et al., 2016). In case of flooding, the site can be expected to initially up to 2.6 t CH₄ ha⁻¹ yr⁻¹, turning the site into a large source of GHG (Hahn et al., 2015). However, this transient effect has been shown to level off after a few years.

In summary, it is imperative to consider the large contribution of drained peatlands to GHG emissions of countries in the temperate zone in nationwide GHG reporting. When rewetting, flooding the site should be avoided but even flooding will result in a large reduction of GH release compared to the unsustainable drained situation.

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