How to prevent degrading wetlands from contributing to water pollution? – Management of peatlands and constructed wetlands to protect the water quality of receiving waters

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PRACTICE ABSTRACT

Author: ULUND

www.wateragri.eu

Wetlands are vulnerable to hydrological change and the increase in temperature as a result of global warming. A warmer condition may accelerate the rate of decomposition and release of nutrients.

We investigated the effect of climate change on water quality in peatland and constructed wetland ecosystems subject to water level management. We simulated the current climate scenario based on data for the south of Sweden for 2016 and 2017, as well as the future climate scenarios for the last 30 years of the century based on the representative concentration pathway (RCP) and different regional climate models (RCM). For future climate change, we simulated low (RCP 2.6), moderate (RCP 4.5) and extreme (RCP 8.5) climate scenarios. All simulations were conducted within climate chambers.

Our results show that the effect of the climate scenario is significantly different for peatlands and constructed wetlands (interactive effect) for the combined chemical variables. The warmest climate scenario RCP 8.5 is linked to a higher water purification function for constructed wetlands but to a lower water purification function and a subsequent deterioration of peatland water qualities, even if subjected to water level management. The explanation for the different responses of constructed wetlands and peatlands to climate change could be due to the fact that the substrate in the constructed wetland mesocosms and peatlands was different in terms of the organic matter quality and quantity. The utilization of nutrients by the plants and microbial community readily exceeds the mineralization under a limited nutrient content when the temperature rises. However, concerning the extreme scenario RCP 8.5, the peatlands have shown a tendency to have reverse processes.

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