



Paludiculture as a chance for peatland and climate: the greenhouse gas balance of biomass production on two rewetted peatlands does not differ from the natural state

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In Europe, rising prices for farm land make it increasingly difficult for government administrations to compete with external investors during the acquisition of land for wetland conservation. Thus, adding economic value to these, otherwise “lost”, areas by combining extensive land use with nature conservation efforts could increase the amount of ground available for wetland restoration. Against this background, the concept of paludiculture aims to provide biomass for multiple purposes from peatlands with water tables high enough to conserve the peat body. However, as plants have been shown to contribute to greenhouse gas exchange in peatlands, manipulating the vegetation (by harvesting, sowing etc.) might alter the effect of the restored peatlands on climate.

Here, we present greenhouse gas data from two experimental paludiculture systems on formerly drained intensive grasslands in northern Germany. In a fen that has been rewetted more than 15 years ago three species of reed plants were harvested to simulate biomass production for bioenergy and as construction material. And in a peat bog that has been converted from drained grassland to a field with a controlled water table around ground surface Sphagnum mosses were cultivated to provide an alternative growing substrate for horticulture. In both systems, we determined carbon dioxide, methane, and nitrous oxide exchange using closed chambers over two years. Additionally, water and peat chemistry and environmental parameters as recorded by a weather station were analyzed.

Both restored peatlands show greenhouse gas balances comparable to those of natural ecosystems. Nitrous oxide was not emitted in either system. Fluctuations of the emissions reflect changes in weather conditions across the study years. In the fen, relative emission patterns between plant species were not constant over time. We did not find a negative short-term effect of biomass harvest or Sphagnum cultivation on net greenhouse gas balances. Therefore, paludiculture may likely provide a possibility to add economic value to restored peatlands while retaining the positive effects of rewetting for greenhouse gas mitigation.