

Paludiculture on marginal lands – sustainable use of wet peatlands

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Peatlands are marginal lands. If they are drained, they show a short initial productive period. Soil degradation due to peat oxidation leads to numerous problems which increasingly restrict agricultural use and cause significant environmental impacts such as greenhouse gas emissions and eutrophication and thereby produce high external costs.

Worldwide greenhouse gas emissions from drained peatlands have a significant share (~10%) in the emissions from agriculture, forestry and other land use (AFOLU) sectors (Smith et al. 2014). In Germany they contribute more than 35% to the total emissions from agriculture (agricultural sector and cropland and grassland management) (UBA 2016).

Rewetting drained peatlands can significantly reduce environmental problems caused by peatland drainage. Continuation of agricultural use with adapted crops and machinery, so called paludiculture (Latin ‚palus‘ = swamp) stops further degradation, maintains the peat body, reduces climate change mitigation and produces renewable fuels and raw materials.

Fen and bog soils are suitable for various different paludicultures. The biomass of Sphagnum (sphagnum farming) cultivated on cut-over bogs or degraded bog grasslands can be used as raw material for horticultural growing media. Flood-tolerant and productive plant species like Common Reed, Reed Canary Grass, Cattail, Black Alder and different Sedge species are suitable for paludiculture on fen soils. Biomass utilization ranges from traditional forms, like fodder production or the use of Common Reed as roof thatch, to new utilization options, that includes biomass use for heat generation, co-substrates for biorefineries or construction and insulation products.

The above-ground biomass of one hectare Common Reed (winter yield=8 t DM) equates to an energy content of 3,000 litre heating oil. A district heating plant (800 kW) in NE Germany demonstrates the feasibility of using biomass from wet fen meadows for local heat generation. Moreover, tests of biomass pellets from paludiculture showed promising results for small (<100KW) and medium scale boilers (<500kW). More examples for paludiculture production and utilization, harvest and logistics, ecosystem services, and economics are described in Wichtmann et al. 2016.

Paludiculture is the only sustainable land use concept for marginal peatlands. The implementation of paludiculture on degraded organic soils after rewetting and its biomass use offers renewable biomass sources that have great potential for contributing to the local supply and therewith to the regional added values while preserving organic soils and reducing greenhouse gas emissions.

Umweltbundesamt (UBA) (2016) National Inventory Report for the German, Greenhouse Gas Inventory 1990 – 2014, Dessau-Roßlau, 1035 p.

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Wichtmann, W.; Joosten, H.; Schröder, C. (2016): Paludiculture, productive use of wet peatlands. Climate protection, biodiversity, regional economic benefits. Schweizerbart Science Publishers, Stuttgart, 272 p.