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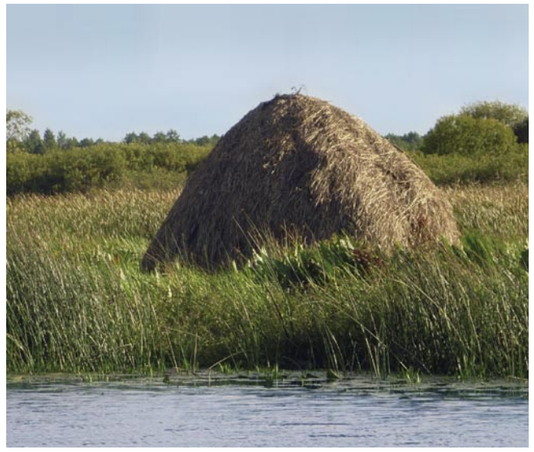
PALUDI-CULTURE



Paludiculture – Rewetting and farming degraded peatlands

On highly degraded peatlands, conversion of conventional farming practices by rewetting and wetland adapted production of reeds, wood or other crops or livestock breeding can provide benefits for climate, water and biodiversity. Drained peatlands, when used for conventional drained agriculture, cause significant nutrient losses as well as emissions of up to >50 tons of CO_2/ha/y (in extreme cases up to 70 tons/ha/y). After rewetting of degraded peatlands, paludiculture offers alternatives for agricultural and forestry use under wet conditions. Environmental benefits are manifold, CO_2 abatement costs are low.
Pilot projects show that the production of high quality wood (alder), fibres and construction material (common reed, Cattail and sedges), as well as growing substrates (Sphagnum) can be economically viable. Placed as hydrological buffer zones around nature reserves, paludiculture can contribute to hydrological restoration of natural, e.g. NATURA 2000 areas, that are currently also drained.
However, agricultural subsidies of drainage-based agriculture under the CAP rather counteract the further establishment of paludiculture. At the same time, some forms of paludiculture do not receive funding through the CAP.

keywords: Paludiculture, rewetting, nutrient and water retention, agricultural run-off, drainage, reduction of N and P, eutrophication, biomass, wood, fibre, reeds, climate change adaptation and mitigation, biodiversity, wetlands, buffer zones, NATURA 2000

Pressures/ Drivers

Continued drainage of peatlands and conventional farming on drained peatlands is resulting in further degradation of organic soils along with very high greenhouse gas (GHG) emissions, nutrient efflux, loss of biodiversity and increasingly impaired land use options.

Quality objectives

The restoration of wetlands and water dependent semiaquatic habitats help to accomplish ecologic and economic objectives at the same time. Rewetting degraded peatland helps to buffer climate change mitigation by reducing greenhouse gas emissions, thus accomplishing effective cooling of the atmosphere. Simultaneously, rewetted peatlands recover their ability to protect waterbodies such as surface water and ground water by retention of excess nutrient loads in the rewetted soil (carbon and nitrogen retention). Rewetting prevents soil subsidence as well as soil erosion, but also eventual flooding, since water retention capacity is re-established.
Economically, rewetted peatlands can be sustained in a productive state: farming and subsequent crop harvesting is a sustainable alternative for conventional farming. The raw materials can be used for construction purposes, for energy generation or for fodder production. Rewetting peatland helps to revitalize and sustain biodiversity by offering valuable wildlife habitat. Especially around nature reserves, rewetted peatland can act as buffer zones for nutrient and water retention, with benefits for nature conservation.

MS/region/ locality/location/ river basin

Peatlands can be found in at least 175 countries and cover around 4 million km² (3 % of the world's land area). In northern hemisphere the climatic conditions are generally cold and humid or mild and humid – very suitable for strong accumulation of peat. In Europe, peatlands extend to about 515,000 km². Hotspot regions are e.g. Northwestern Germany (Lower Saxony, Schleswig-Holstein), Northeast Germany (Mecklenburg-Western Pomerania, Brandenburg), Bavaria, North Pennines (UK), Camargue (France), North-Holland (Netherlands).

Lessons learned

The use of wet peatlands allows the re-establishment or maintenance of ecosystem services such as sequestration and carbon storage, water and nutrient retention as well as local climate cooling and habitat provision for rare species. Paludiculture combines the reduction of greenhouse gas emissions through peatland rewetting with the avoidance of greenhouse gas emissions through substitution of fossil fuels and raw material. Land use with plants and machinery adapted to wet site conditions can offer a solution for the trade-off between agricultural production and peatland protection. Beside traditional examples for wet peatland use such as reed cutting for thatching, large-scale implementation of paludiculture and long term experience is still rare. Also, incentives for investment in paludiculture (rewetting measures, harvesting technology) have to be established just as a carbon credit system like:

- *www.moorfutures.de*.

Contacts

Greifswald Mire Centre
- *https://www.moorwissen.de*
- *https://www.greifswaldmoor.de*
- *http://www.paludiculture.uni-greifswald.de/de/projekte.php*

Friesemilieufederatie
contact: Arnoud de Vries
- *www.friesemilieufederatie.nl*
- *www.innovatieprogrammaveen.nl*

Literature / Links

Links to three specific projects on the ground:

DE:
- *www.niedermoor-nutzen.de/*
- *https://www.moorwissen.de/doc/infothek//positionspapiere/Moore%20im%20Klimaschutzplan%202050%20%E2%80%93%20Eine%20Analyse.pdf*

NL:
- *https://www.friesemilieufederatie.nl/mens-en-omgeving/valuta-veen-verdienmodel-veenweidegebieden/; www.innovatieprogrammaveen.nl*

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Motivation – What are the problems?

Drained peatlands are hotspots of CO_2 emissions from agriculture. Although peatlands cover only 7 % of the total area used by agriculture in Germany, they are responsible for 37 % (43 million tons of CO_2 equivalents per year) of the total agricultural greenhouse gas emissions (incl. animal husbandry). Rewetting can help to avoid further emissions and restore carbon sequestration in organic soils. Rewetting can also reduce the immense nutrient release (N and P) from drained peatlands, a key task especially for river basin management in northwestern Europe and for regions near the Baltic Sea. Many lakes and coastal areas in Europe suffer from high nutrient loads and are heavily eutrophic. Agriculture is the single most significant source of excess nutrients polluting our watersbodies – groundwater, surface and coastal waters as well as lakes. Another undesired effect of peat oxidation is the ongoing subsidence of the ground level, that decreases up to 2 cm/y. This continuous height loss necessitates continuous deepening of ditches, which again enhances peat oxidation and height loss, necessitating further deepening of ditches. All exploitation of peat soil involves drainage and loss of water to surrounding agricultural land, thus leads to loss of productive soil. The resulting damage to water, land and urban infrastructure is a huge economic problem: The Netherlands Enviromental Assessment Agency PBL has estimated for the netherlands damage costs of many billions of Euros up to 2050.

Harvesting biomass from rewetted peatlands export nutrients from the system. In Northern Germany Groundwater-fed peatlands (fens) take up approximately 820,000 hectares, 300,000 of which are located in the State of Mecklenburg-Western Pomerania. Fens are highly productive, since both sufficient water and nutrients are available. In contrary, rainwater fed peatlands celled bogs and show different characteristics.

Relevance for Water Framework Directive (WFD)

WFD quality standard for ground and surface water is 50 mg N/l. Art. 1 prevents further deterioration and protects and enhances the status, with regard to their water needs, of terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems. Subsidence causes further drainage in agricultural and urban areas which threatens sustainable water use as well as the quantitive groundwater status in aquatic ecosystems and protected areas. Potential problems arise from the fact that re-establishing connectivity of water courses has a high priority, this may be counterproductive for rewetting.

Objectives & measures adopted

Rewetting of drained peatlands has beneficial effects on peatland conservation as well as climate mitigation (reduction of CO_2-emissions but also CO_2 sequestration) and climate adaptation. Different measures can be combined in order to create natural climate buffers. Rewetting also increases natural water retention, i.e. leads to improvements with regards to water quantity. Water quality improvement results not only from a decrease of peat mineralization but also by establishing certain sorts of wetland plants. Suitable plants have proven to exhibit positive water purification effects.

In addition, animal husbandry contributes to a better nutrient balance: rearing of less productive cattle results in less pollution. Benefits for nature/biodiversity conservation are manifold.

The ALNUS project tested the production of alder wood on rewetted peatlands (2002–2005).

The Dutch projects “Omhoog met het veen – rising peatland” and “Innovation Programme Peat” in North Holland are testing the production and commercial use of cattail:

- *www.innovatieprogrammaveen.nl*

Dominik Zak presents paludiculture related CLEARANCE research results to a stakeholder audience in the Greifswald town hall on 28th November 2018. – photo: Melanie Lindner (GRÜNE LIGA e.V.)

The DONAUMOOS project examined the cultivation of cattail on fense (report DBU-Projekt Nr. 10628).

The CLEARANCE (CircuLar Economy Approach to River pollution by Agricultural Nutrients with use of Carbon-storing Ecosystems) project aims to develop an integrated landscape-ecological, socio-economic and policy framework for using wetland buffer zones (WBZ) in circular economies of water purification and nutrient re-use in agriculturally used catchments.

- *https://www.moorwissen.de/de/paludikultur/projekte/clearance/index.php*

Actors/ Procedure

University of Greifswald, Michael Succow

Foundation and Institute DUENE e.V. – Partners in the Greifswald Mire Centre

Rising peatland: - *https://www.landschapnoordholland.nl/project/omhoog-met het-veen*

Radboud University Nijmegen, The Netherlands

Results/ Assessments

The failure to integrate environmental goals into farm subsidies is a central reason why paludiculture is not applied more widespread: Granting farm subsidies for drainagebased agriculture has an enormously adverse effect. Also, most forms of paludiculture do not receive funding through the CAP.

Natuurmonumenten, Staatsbosbeheer and Landschappen NL can point to thousands of hectares rewetted peatland, fens and bogs in The Netherlands realized over the last decade. Some of them act as natural climate buffers at the same time (see - *www.klimaatbuffers.nl* - “Projecten”).

Costs and benefits

Good practise examples implemented in single European Member States that a) provide incentives to invest in rewetting, to maintain target water levels, and to adapt management, b) ensure efficiency (e.g. target areas, indicator species, scoring systems) and c) facilitate implementation (advisory services, land consolidation, cooperation at landscape scale):

Wichmann, S. (2018): Economic incentives for climate smart agriculture on peatlands in the EU. University of Greifswald, Partner in the Greifswald Mire Centre. Report, 38 p. – Link:

- *https://www.moorwissen.de/doc/paludikultur/projekte/cinderella/Wichmann_2018_Economic%20incentives%20for%20climate%20smart%20agriculture%20on%20peatlands_Report.pdf*

„MoorFutures”, a way to make CO_2 Emissons tradable and thus make them economically relevant:

Joosten, H. et al. (2013): MoorFutures®. Integration of additional ecosystem services (inculding biodiversity) into carbon credits - standard, methodology and transferability to other regions. BfN-Skripten 407. Bundesamt für Naturschutz, Bonn-Bad Godesberg.

Additional Information

Paludiculture:

Wichtmann, W., Schröder, C. & Joosten, H. (2016): Paludiculture – productive use of wet peatlands. Climate protection - biodiversity - regional economic benefits. Schweizerbart. Stuttgart.

Legislation:

Peters, J. & von Unger, M. (2017): Peatland in the EU Regulatory Environment. Bundesamt für Naturschutz – Skripten. Bonn.

Climate Protection:

- *https://www.moorwissen.de/doc/infothek//positionspapiere/Moore%20im%20Klimaschutzplan%202050%20%E2%80%93%20Eine%20Analyse.pdf*
- *https://www.moorwissen.de/doc/infothek//positionspapiere/Briefing%20paper%20accelerating%20action%20to%20Save%20Peat%20for%20Less%20Heat.pdf*