Focus Paper on Peatlands with Paludiculture as Natural Carbon Sinks

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1. Definition

This paper focuses on **rewetting** of already **farmed peatlands** (organic soils) and shows how **farming with paludiculture with high water levels** can work. Intact peatlands must not be converted to farming land.

- **Paludiculture** is the productive land use of wet and rewetted peatlands that preserves the peat soil and thereby minimizes CO_2 emissions and subsidence.[1] It includes wetland-adapted crops, hay production and extensive grazing with adapted species.
- **Peatlands** are "a type of wetland with a thick water-logged organic soil layer (peat) made up of dead and decaying plant material" (Ramsar Convention on Wetlands). We distinguish between:
  - **Fens**: mineral-rich, fed from groundwater or surface water, with vegetation consisting of sedges, reeds, grasses, and sometimes shrubs and trees.
  - **Bogs**: nutrient-poor, fed from rainwater, in areas with precipitation >800mm/year, with vegetation consisting of sphagnum moss, heathers, cranberries, insectivorous plants (e.g. sundew), and dwarf shrubs. They usually emit less GHG than fens. Only degenerated bogs with a thin peat layer should be used to grow paludiculture like *Sphagnum* moss.

- In the **Common Agricultural Policy (CAP)** Regulation (EU) 2021/2115 peatlands are defined according to the Ramsar Convention. Each Member State (MS) defines and maps those areas individually.

2. Potential of peatlands for climate protection and other public goods

- **Reducing Green House Gases (GHG) and storing CO_2**: Peatlands are holding up to a third of the world's soil carbon, while covering only 3-4% of its land surface. 12% of peatlands are in Europe. Draining peatlands leads to soil subsidence and peat oxidation resulting in high GHG. Almost 50% of the European peatland area is degraded, and they are estimated to emit 600 Mt CO_2 equivalent per year. Drained peatlands represent only 3% of the EU's agricultural land and rewetting them would **avoid up to 25% of the EU's greenhouse gas emissions** from agriculture.[2]

[1] Wichtmann, W., Schröder, C. & Joosten, H. (eds.) (2016) Paludiculture - Productive Use of Wet Peatlands. Climate Protection - Biodiversity - Regional Economic Benefits. Schweizerbart Science Publishers, Stuttgart.

[2] UNEP (2022). Global Peatlands Assessment – The State of the World's Peatlands: Evidence for action toward the conservation, restoration, and sustainable management of peatlands. Summary for Policy Makers. Global Peatlands Initiative. United Nations Environment Programme, Nairobi.

- **Preserving nature and biodiversity** (→ EU Biodiversity Strategy 2030 & Nature Restoration Law) as they are habitats for many plants and animals, such as birds, mammals, reptiles, amphibians, fish and invertebrate species.
- **Supporting water purification** and **water retention** capacity affecting groundwater levels (→ EU Water Framework Directive)
- **Reducing effects of extreme weather situations** like water erosion, floodings and landslides during heavy or constant rains and drying up and wind erosion during droughts (→ EU Climate Adaptation Strategy & EU Water resilience strategy)
- Wetlands are important **cultural landscapes** and part of the **cultural heritage** of humanity (→ European Landscape Convention)

3. Key success factors for rewetting and farming on peatlands

For rewetting

- **Central coordination**: the rewetting of a hydrologically connected area requires that all stakeholders owning and managing the land (e.g. farmers, landowners, administration) agree to the change in land use and management.
- **Include und support farmers**: fair compensation, incentives, free consultation, support for planning, administration and inclusion in decision-making facilitate the transition.
- **Manage water level**: The water level is manged consistently with the goal to keep it as close to the surface and above as possible and avoid strong fluctuations to prevent peat oxidation.
- **Rewetting technique**: Gradual, controlled rewetting is used. It maintains plant cover and thus reduces emissions compared to open water surfaces which promote the formation of CH_4.
- **Individual approach:** Every peatland is different. Therefore, factors like local topography & hydrology, soil chemistry, and previous agricultural use are considered in the restoration.
- **Secure long-term maintenance:** Rewetting comes with ongoing monitoring and management.

For farming with paludiculture

- **Specialized machinery:** soil protecting machinery is used, e.g. small and lightweight, wide tyres/caterpillar tracks. Contractors with specialized machinery for peat soils can be hired.
- **Extensive grazing** is possible with robust livestock, e.g., traditional cattle or water buffalo that can tolerate wet areas. A seasonal/rotational grazing concept and management, avoid trampling damage of the peat surface or vegetation cover.
- **Wetland-adopted crops** like Cattail (*Typha*), Reed (*Phragmites*), Sedge (*Carex*), Alder (*Alnus*) are grown on fens; *Sphagnum* moss on bogs.
- **Extensive farming:** the control of fertilizer prevents eutrophication and GHG emissions. Wetland biomass is cut and used on mineral soils.
- **Sales**: Paludiculture crops are sold as bioeconomy products (e.g. insulation, biomaterials, and fodder) in regional value chains. New products from paludiculture biomass are developed in cooperation with the industry. Facilitators take care of quality management and the organisation of the market entry. They organize the provision of larger amounts of the same quality of paludiculture biomass for the use in industry.

Necessary framework for National Strategies and the CAP

Step 1: Long term perspective in National Peatland Strategies

As CAP cycles are short (7 years), MS should develop National Peatland Strategies with an integral vision between sectors (agriculture, nature conservation, land & water management) that allow for continuity. **The strategy should include the protection of intact peatlands from land management change as well as building and strengthening regional value chains for paludiculture products.** Restoring peatlands' hydrology and function as carbon sinks takes many years/ decades. Therefore, rewetting and farming peatlands are permanent long-term interventions, and long-term funding must be secured so farmers can adapt their farming concept and business model. Rewetted areas should be freed from land tax and rewetted public land should be leased to farmers for free as these lands provide public services.

Step 2: Peatlands in CAP National Strategic Plans

It must be secured in the National Strategic Plans that agricultural areas with high water levels are eligible for direct payments. They must meet the definition of 'eligible hectare' to be eligible for CAP payments (Article 4 (EU) 2021/2115). Additionally, paludiculture must be formally recognized as "agricultural activity" under CAP and recognized by the agricultural administrations. This is currently only the case in Denmark, France, Germany, Ireland, Italy, and the Netherlands.[3]
Additionally, we recommend MS make use of "**Risk management tools" (Article 76, 2021/2115),** for example with insurance schemes for yield or income loss, mutual funds (collective reserve funds) and Income Stabilisation Tools (IST), e.g. compensation if the farm income drops > 30 % or another agreed threshold.

Step 3: Implementation of GAEC 2

In the CAP wetlands are currently covered by GAEC 2 in Regulation (EU) 2021/2115 "Protection of wetlands and peatlands". The definitions lie within the MS. We suggest these regulations as mandatory:

- Restriction on introducing new and restoring old drainages for lowering the water level
- Tillage restrictions/no ploughing to avoid exposure of the soil
- No extraction/excavation/burning of peat
- Restrictions on nutrient input in the hydrological catchment area
- Restriction on modifying vegetation, e.g. planting trees, introducing invasive species
- No farming with short rotation coppices
- Use of soil protecting machinery

Step 4: Fund the transition to farming with high water levels

- Raising the water level on drained soils to re-establish water saturated conditions, e.g. by blocking drainage ditches or disabling pumping facilities (e.g. Denmark, Finland, Germany)
- Improved water/drainage management to achieve the highest possible groundwater level, accounting for agricultural activities (e.g. Finland)
- Planning, water rights procedures, hydraulic engineering measures

[3] Norbeck, R., K. Hogl and L. Schaller (2025): The integration of peatlands into the EU Common Agricultural Policy: Recent progress and remaining challenges.

- Support for investments, e.g. Machinery for wet biomass harvesting, levelling, seeding material, storage and processing technology or water management infrastructure (e.g. dams, weirs)
- Conversion of arable land to permanent grassland (e.g. Germany)

Step 5: Funding schemes for farming with high water levels

Farmers should receive money for growing paludiculture with high water levels per hectare and year until a market for paludiculture is established. Examples are:

- Keeping a minimum water level during winter
- Growing wetland-crops (e.g. The Netherlands) as paludiculture and yearly harvest
- Extensive grazing (e.g. Belgium, France, Germany, Ireland) with adapted species/herbivores and a management plan
- Grazing management: fencing sensitive habitats (e.g. Austria)
- Extensive peatland management with permanent plant cover, no use of artificial fertilizer, annual cutting and removal of the biomass fencing sensitive habitats (e.g. Denmark)
- Multiyear grass cultivation on peatlands without tillage or pesticides (e.g. Finland)

Step 6: Offer advice and support on farming on peatlands

The MS should include a financing instrument that enables consulting of farmers on paludiculture, provides support with rewetting and organizes sales of paludiculture biomass. Ideally, financial instruments are eligible, not only for farming advisory services but also for qualified NGOs like Landcare(-like) organizations and model farmers. The consultation is a holistic approach including education on peatlands ecology and hydrology, carbon sink function and farming practices for paludiculture. Consultants prepare training materials and organize trainings.

Step 7: Collective approaches

Because rewetting peatlands often requires the management of land, farmed by several farmers, collective approaches need to be funded by the MS. For instance, Ireland supports an AECM cooperation approach under ENVCLIM70 supporting teams of project managers, administrative staff, hydrologists, ecologists, environmental scientists, field officers and farm advisors. The measure funds individual farm and landscape measures executed by a cooperation of several farmers. They must include large-scale water level manipulation, drain blocking, or rewetting actions.

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