Annex C3.1 Basic principles of establishment and management of paludicultures

Background

Rewetting of drained organic soils is a proven approach to re-establish major regulating and cultural services of wet organic soils, including carbon storage, flood control, water purification, archive function and biodiversity (Fig. 1; see Wichtmann et al. 2016 and Joosten et al. 2017 for details). The provisioning services of these formerly productive lands, however, were mostly lost as the rewetted areas were often abandoned and earmarked for nature conservation.

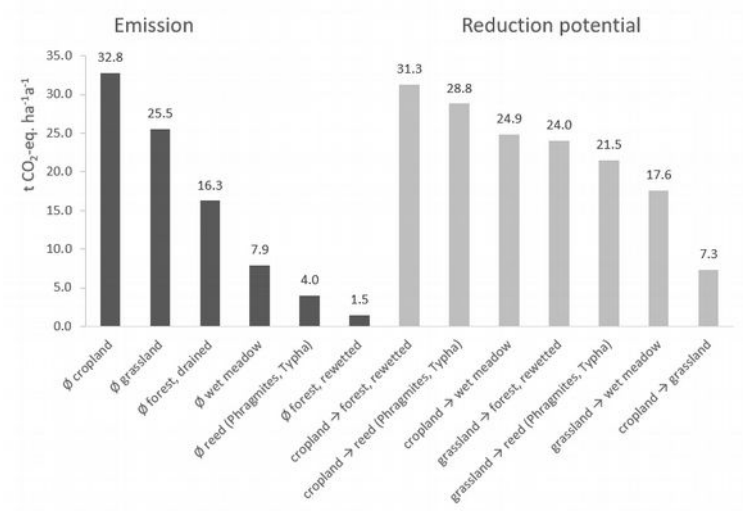

Fig. 1: Greenhouse gas emission of drained and rewetted peatlands under different land use and potential emission reduction under land use change (Ministry of Agriculture and Environment Mecklenburg-Vorpommern 2016).

Therefore, management innovation is required to allow the productive use of rewetted organic soils while simultaneously restoring or maintaining their ecosystem services (Joosten et al. 2012). In contrast to conventional agriculture, paludicultures (Latin 'palus' = swamp; Wichtmann et al. 2016) utilise biomass from wet and rewetted peatlands in a way that the peat body is preserved, natural peatland ecosystem services are maintained or restored and (ideally) peat accumulation is re-established or continues. In the temperate, peat is often formed by roots and rhizomes and the above ground biomass of such peatlands can (partially) be harvested without substantially harming peat formation and conservation (Wichtmann & Joosten 2007).

Paludiculture comprises any biomass use from wet and rewetted peatlands, from harvesting using spontaneous vegetation on natural sites to harvesting artificially established crops on rewetted sites. Besides traditional yields of food, feed, fibre, and fuel, the biomass can be used as a raw material for industrial biochemistry, for producing high quality liquid or gaseous

biofuels and for further purposes like extracting and synthesising pharmaceuticals and cosmetics. Such new production techniques are under development in several European countries (see e.g. Wichtmann et al. 2016). A project under the European Climate Initiative (EUKI; "Paludiculture in the Baltics") coordinated by Michael Succow Foundation, partner in the Greifswald Mire Centre (www.greifswaldmoor.de) has recently started an information campaign about such climate-smart use of organic soils in the Baltic states (Fig. 2).

Fig. 2: Leaflets produced by the EUKI project informing about paludiculture in Latvian.

Site selection for paludiculture demonstration sites

The careful identification of suitable priority sites for paludiculture demonstration is crucial prior to implementation. An advanced modelling approach on basis of existing GIS data has been developed by the EUKI project (Fig. 3). It is based on up-to-date peatland distribution maps for the respective region, soil properties, land use data (agriculture, forestry, mining), and conservation status etc. In further steps, the site conditions (peat depth, nutrient status, and hydrology) will be checked in order to specify which paludi-crop is most suited to the respective site infrastructure for site management, logistics and processing of biomass will be included in the model. Based on the short-listed priority sites, they will be checked on the ground in participation with land users and owners and other stakeholders (administration, farmers' association, forestry service, water boards, nature conservation etc.) to raise awareness and avoid conflicts. Finally, the best suitable sites are selected and planning and design documents for the water management and establishment of paludi-crop cultivations can be drafted.

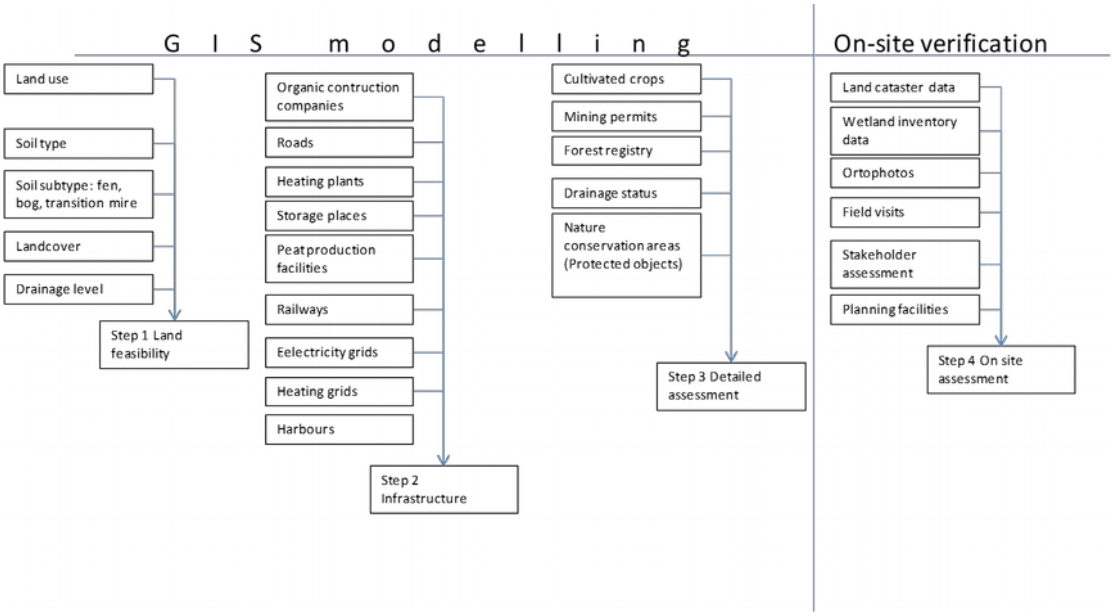

Fig. 3: Simplified scheme of GIS-based site selection (from EUKI "Paludiculture in the Baltics" project).

Demonstration of paludicultures

The project will demonstrate 3 types of rewetting and climate-smart land management (Fig. 4):

- Management of black alder (*Alnus glutinosa*) stands, focus on GHG emission reduction and production of roundwood and biofuel;
- Management riparian buffer zone under forestry management (black alder *Alnus glutinosa*), focus on reduction of nutrient leakage and production of roundwood and biofuel;
- Management of riparian buffer zone under agricultural management (reed *Phragmites australis* or cattail *Typha* spp.), focus on reduction of nutrient leakage and production (building materials)

Fig. 4: Examples of paludiculture in Germany – planting of alder (left) and of cattail (right). Pictures from Wichtmann et al. (2017).

References

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