Implementing paludiculture
How we can avoid land-use conflicts

Wendelin Wichtmann*

* based on:
Christian Schröder 2017: Strategy for Paludiculture in Mecklenburg-Vorpommern
Great, now we have a solution to manage our protected sites!

Oh no, don‘t use our last unspoilt areas!

No chance to earn money with this!

We do not have problems!

What should I do with my land?

No matter what, but make it wet!

Mhh, maybe not so wet, 10 cm below surface would be nice!

Who should pay for it?

That‘s no agriculture!
Strategy for Paludiculture in Mecklenburg-Vorpommern

Publisher:
Ministry for Agriculture and Environment Mecklenburg-Vorpommern

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Goal:
Summarising all current research results on paludiculture with special regard of the specifics of Mecklenburg-Vorpommern

The Strategy aims to create the basis for as many implementation projects as possible on a voluntary basis
Paludiculture strategy MV
Implementation of paludiculture on agriculturally used peatland in Mecklenburg-Vorpommern

1. Initial situation
1.1 Programs and Positions of the State of MV
1.2 Peatlands in Mecklenburg-Vorpommern
1.3 Previous support instruments for peatland protection in MV

2. Peat consumption reduction & peat conserving utilization opt.
2.1 Definition of good agricultural practice in peatland use
2.2 Reed mowing as conventional peat-conserving use of peatlands
2.4 Management measures for the establishment and management of paludicultures

3. General conditions
3.1 Agricultural policy framework
3.2 Legal framework
3.3 Financing/support options for the introduction of paludiculture

4. Potentials
4.1 Criteria
4.2 Area potentials - backdrops for the implementation of paludiculture
4.3 Implementation of paludiculture

5. Goals and need for action

6. References
Definition: Paludiculture

Definition (sensu lato): Paludiculture is the **productive** use of **wet** peatlands.
- productive → Harvesting and Utilisation of plant material
- wet → long term sustainable (preservation of peat)

Definition (sensu stricto): Paludiculture is the **agricultural or forestry production** of **rewetted organic soils which preserves the peat body**.
- agricultural or forestry production → production of plant or animal products
- rewetted → exclusion of undrained, peat forming mires
- Preservation of the peat body → highlight the main goal of paludiculture
- organic soil → inclusion of former peatlands

Ecosystem services that go beyond the preservation of the peat body and productive use are not necessarily linked to the concept of "Paludiculture"!
Definition: Peat preserving conditions

**Peat preserving land use (=Paludiculture):** The groundwater level is year round near the surface, in summer maximum 20 cm below surface.

→ Currently very few sites in Mecklenburg Western Pomerania ~ 500 ha (not accepted as agricultural use)

**Land use where peat degradation is reduced (=no paludicuctose):** If the required water level for peat preservation is not possible, but the water level is as high as possible, in summer: 20 to 40 cm below surface.

→ Less than 1.500 ha in Mecklenburg Western Pomerania
Definition: Paludiculture plants

**Perennial** plants that grow under **permanent wet** conditions and supply **usable** aboveground biomass.

- Perennial → no regular preparation of soil needed
- Aboveground biomass → exclusion of belowground plant parts

- Common Reed
- Sundew
- Rice
- Water Chestnut
### Paludicultures for Mecklenburg-Vorpommern

<table>
<thead>
<tr>
<th>Wet meadows</th>
<th>Water buffaloes</th>
<th>Reed canary gras</th>
<th>Black alder</th>
<th>Common reed</th>
<th>Cattail</th>
<th>Peat mosses</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Nasswiesen</em> <em>(Carex spp.)</em></td>
<td><em>Wasserbüffel</em></td>
<td><em>Rohrglanzgras</em> <em>(Phalaris arundinacea)</em></td>
<td><em>Schwarz-Erle</em> <em>(Alnus glutinosa)</em></td>
<td><em>Schilf</em> <em>(Phragmites australis)</em></td>
<td><em>Rohrkolben</em> <em>(Typha spp.)</em></td>
<td><em>Torfmoos</em> <em>(Sphagnum spp.)</em></td>
</tr>
</tbody>
</table>

Flyers with basic information how to establish, manage and use.
Paludiculture – Where to implement?

What are the requirements of the cultures?

Important factors and measures for establishment and management

- Field size
- Site preparation (tillage, leveling, infrastructure)
- New establishment (sowing, planting, "succession")
- Water management (passive, active, flooding? summer / winter)
- Nutrient requirement (low, moderate, high)
- Harvest (summer, autumn, winter)

What kind of restrictions have to be considered on site?

Premise:
Paludiculture has to respect the existing legal framework (e.g. protection of grassland, protected areas)!
Paludiculture – Where to implement

Wet pastures – grazing
Wet meadows - biomass

Black Alder
Reed
Reed Canary Gras / other grasses
Cattail
Peatmoos
Sundew

→ Cropping-paludicultures are only possible where the existing vegetation is not protected!!!

→ Maybe shift of the composition of plant community after rewetting

→ Existing vegetation will be replaced!
Categories for paludiculture

1st Class: no restriction, all kinds of paludiculture possible

2nd Class: restrictions have to be considered and may limit the establishment of cropping-paludiculture (e.g. Bird Directive area (SPA), development zone of protected areas like Biosphere reserves and National Parks)

3rd Class: grassland is protected and has to be preserved, only a transfer to wet meadows is possible, no cropping-paludiculture (e.g. flora fauna habitat types, nature reserves)

4th Class: no paludicultures are possible (e.g. core zone of protected areas)
Permanent grassland (143,998 ha)
Cropland (20,531 ha)
Other agricultural use (1,351 ha)
Forested peatland (48,459 ha)
Other peatlands (77,023 ha)
Areas with traditional cutting of natural reedbeds, c. 550 ha (the size of the circles does not reflect the size of the mown area)

Peatland area in MV total: 291,361 ha
Categories for paludiculture on agricultural used peatlands

1st Class: no restriction 85,468 ha
2nd Class: possible after review 49,929 ha
3rd Class: just wet grassland paludiculture 28,827 ha
4th Class: no paludiculture possible 1,656 ha
peatland without agriculture 125,481 ha

>50% of agriculturally used organic soils in MV are appropriate for (cropping) paludiculture

47,5% of agriculturally used organic soils in MV show limited suitability for paludiculture

1% paludiculture is not suitable

peatland area:
Total: 291,361 ha
Used for agriculture: 165,880 ha (57%)

Source:
Landwirtschaftliches Feldblockkataster - Feldblöcke (2015), 1:10,000, MLUV.
Küstenüberflutungs Moore (Stand: 10/2016) 1:10,000, LUNG M-V.
Konzeptbodenkarte – Moorbohnenformgesellschaften (Stand: 15.5.2014) 1:25,000, LUNG M-V.
# Categories for paludiculture on agricultural used peatlands MV

<table>
<thead>
<tr>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
<th>Ineligible</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Any paludiculture possible</strong></td>
<td>ha Permanent grassland paludiculture or cropping paludiculture possible (with administrative check)</td>
<td>ha Only permanent grassland paludiculture possible (with administrative check)</td>
<td>ha</td>
</tr>
<tr>
<td><strong>Areas without restrictions</strong></td>
<td>Sum 85,468</td>
<td>Sum 49,929</td>
<td>Sum 28,827</td>
</tr>
<tr>
<td>Areas eligible to EAFRD funding: low intensity grassland (funding period 2014–2020)</td>
<td>16,619 Biosphere reserves (transition zones)</td>
<td>2,031 Biosphere reserves (buffer zones)</td>
<td>1,431 Biosphere reserves (core areas)</td>
</tr>
<tr>
<td>Special Protection Areas (SPA):</td>
<td>68,849</td>
<td>42,596 National parks (buffer and transition zones)</td>
<td>2,646 National park (core areas)</td>
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<tr>
<td>Natura 2000 habitat types (Habitats Directive Annex I; provisional map)</td>
<td>12,753 Legally protected wetland biotopes</td>
<td>10,674 Legally protected dryland and woodland biotopes</td>
<td>896</td>
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<tr>
<td>Areas owned by nature conservation organisations</td>
<td>1,268 Nature conservation areas</td>
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<td>9,732</td>
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<tr>
<td>Areas eligible for EAFRD funding: ‘valuable grassland habitats’ (funding period 2014–2020)</td>
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<td>6,302</td>
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<tr>
<td>Natural monuments</td>
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<td>357</td>
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<tr>
<td>Protected landscape elements</td>
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<td></td>
<td>124</td>
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<tr>
<td>Areas with priority plant species (flora protection concept)</td>
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<td></td>
<td>8,939</td>
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<tr>
<td>Expert landscape plan, class ‘wet biotopes’</td>
<td></td>
<td></td>
<td>7,813</td>
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<tr>
<td>Natura 2000 habitat types (Habitats Directive Annex I)*</td>
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<td>2,093</td>
</tr>
<tr>
<td>Areas with Habitats Directive Annex II habitats</td>
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<td></td>
<td>6,666</td>
</tr>
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</table>
Assessment of the potential of different paludiculture types on rewetted agricultural land MV

<table>
<thead>
<tr>
<th></th>
<th>Wet pasture</th>
<th>Wet meadow</th>
<th>Black Alder</th>
<th>Reed</th>
<th>Reed Canary Grass and other grasses</th>
<th>Cat-tail</th>
<th>Peat-moss</th>
<th>Sundew</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Permanent grassland paludiculture</td>
<td>Cropping paludiculture</td>
<td></td>
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<tr>
<td>State of development</td>
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<tr>
<td>Implementation possible, ready for practical use</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>(x)</td>
<td>(x)</td>
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<tr>
<td>Recognized as agricultural crop</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>(x)</td>
<td>(x)</td>
<td></td>
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<tr>
<td>Demonstration site needed to show that ready for practical use</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<tr>
<td>Experimental site needed for further research in MV</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Sites</td>
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<tr>
<td>Suitable sites existing in MV</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>(x)</td>
<td>(x)</td>
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<tr>
<td>Profitability</td>
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<tr>
<td>Economically promising, as tested and/or demand/market existing</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<tr>
<td>Economic potential, revenues expected from material/medicinal use</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Nature conservation</td>
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<tr>
<td>Favouring biodiversity (habitat value)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>(x)</td>
<td></td>
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<tr>
<td>Landscape maintenance, protection of open/cultural landscapes</td>
<td>x</td>
<td>x</td>
<td>(x)</td>
<td>(x)</td>
<td>x</td>
<td>(x)</td>
<td>x</td>
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<tr>
<td>Climate protection</td>
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<tr>
<td>Carbon store (peat preservation)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>(x)</td>
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<td></td>
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<tr>
<td>Carbon store and sink (peat preservation and formation)</td>
<td>(x)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>?</td>
<td>(x)</td>
<td>x</td>
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<tr>
<td>Obstacles</td>
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</tr>
<tr>
<td>Not unequivocally recognized as agricultural crop</td>
<td>(x)</td>
<td>(x)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Difference to legal biotope protection ambiguous</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Impairment of objects of protection</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Soil</td>
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<td>–</td>
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<tr>
<td>Water</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td>Existing vegetation</td>
<td>–</td>
<td>–</td>
<td>(x)</td>
<td>(x)</td>
<td>(x) (x) (x) (x)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
**Excursus to other federal states**

Schleswig-Holstein

- 68%
- 12%
- 20%

Brandenburg

- 28%
- >71%
- 0.2%

Närmann et al. 2020
Aim of this classification

Guide for spatial planning

- Classification of sites is not binding, deviations are possible!
- Estimation of the planning effort and the need for approval.
- Shows possible alternatives for farmers and consultants.
- Make clear where nature conservation interests are of priority!
- Help us in finding representative demonstration sites.
- Basis for future grant decisions (agri-environmental schemes).
- Estimate the mitigation potentials of paludiculture.
Conclusions

- Paludiculture discussed with stakeholders
- Joint information base created
- Concept of paludiculture was sharpened and focused towards a practice
- Sceneries for implementation of paludiculture formulated
- Continuation of the dialogue planned
  - Facilitate paludiculture
  - Demonstrate paludiculture
Make clear what and where?
### Chapter 4: Scenarios for annual emission reductions by rewetting and conversion to paludiculture for peatlands in paludiculture eligibility classes 1–3

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Area [ha]</th>
<th>Emission factor [t CO₂eq ha⁻¹ a⁻¹]</th>
<th>Emission [t CO₂eq a⁻¹]</th>
<th>Emission reduction [t CO₂eq a⁻¹]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rewetting drained cropland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference: drained, cropland</td>
<td>20,531</td>
<td>32.8</td>
<td>673,417</td>
<td></td>
</tr>
<tr>
<td>Rewetting and cropping paludiculture</td>
<td>20,531</td>
<td>6.7</td>
<td>137,558</td>
<td></td>
</tr>
<tr>
<td><strong>Rewetting drained grassland (class 3 only)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference: drained, grassland</td>
<td>28,827</td>
<td>25.5</td>
<td>735,089</td>
<td></td>
</tr>
<tr>
<td>Rewetting and permanent grassland paludiculture</td>
<td>28,827</td>
<td>7.9</td>
<td>227,733</td>
<td></td>
</tr>
<tr>
<td><strong>Rewetting drained crop/grassland - classes 1/2/3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference: drained cropland</td>
<td>20,531</td>
<td>32.8</td>
<td>673,417</td>
<td></td>
</tr>
<tr>
<td>Reference: drained grassland</td>
<td>143,693</td>
<td>25.5</td>
<td>3,664,172</td>
<td></td>
</tr>
<tr>
<td>Rewetting and cropping paludiculture</td>
<td>20,531</td>
<td>6.7</td>
<td>137,558</td>
<td></td>
</tr>
<tr>
<td>Rewetting and permanent grassland paludiculture</td>
<td>143,693</td>
<td>7.9</td>
<td>1,135,175</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 5 Recommendations

1. Convening a paludiculture working group (including the development of a climate protection area premium to reward climate protection performance)

2. Implementation of demonstration projects and research sites

3. Support for the implementation of practical utilization processes:
   a) Thermal utilization
   b) Cultivation of black Alder

4. Promoting the use of biomasses in areas that have already been rewetted.
Chapter 5: Recommendations

6. Strengthening university education

7. Consideration of climate protection potentials in the land use sector

8. Create financial incentives for paludiculture through the development of carbon credits (MoorFutures 3.0)

9. Revision of the reed mowing guidelines

10. Updating of data on peatland distribution

11. Establishment of a climate protection department

12. Strengthening the acceptance of paludiculture through better presentation of climate protection potentials in the field of peatland use
Transformation pathway for peatland use until 2050

- approach to operationalizing the politically agreed targets
- Peatlands considered alone
- Target: max. reduction of existing GHG source; potential as sink minimal.
DESIRE WP 2.3 DIALOGUE OF MULTIDISCIPLINARY WORKING GROUP ON PALUDICULTURE IMPLEMENTATION

Leader – PP 2: Succow Foundation, Greifswald, Germany
DESIRE-Strategy for paludiculture in the Neman basin

Strategy

- Formulation of criteria on necessity of measures, temporal availability of peatland sites, status of sites and other site specific conditions
- Identification of priority paludiculture areas for rewetting and paludiculture
  refer to inventory and maps produced in the Inventory of peatlands in the Neman basin

Timeplan

- currently under development, needs support by PPs
- continue until EoP (December 2021)
- finalize with a brochure
Target group(s) and use of the main output

Target groups

• National and regional authorities:
  – policy development, involvement into strategic spatial planning aimed at reduced nutrients runoff, ownership

• Farmers:
  – designation of priority areas for planning of paludiculture, identify new business perspectives via providing ecosystem services (nutrient retention, GHG reduction) and harvesting of biomass.

• Nature conservation authorities and NGOs:
  – avoid conflicts of land use, make clear where (in which peatlands sites) nutrients retention is a priority, where nature protection goals have to be considered or are more important - as a basis for grant decisions (agri-environmental schemes).
Brochure on strategy for paludiculture for the Neman catchment area

Contents:
• Introduction, Situation of peatlands in the catchment area, aim of the brochure, target group
• Possibilities to develop degraded peatlands for different ecosystem services
  – natural succession / paludiculture (definition, ....)
• Necessary measures to be taken to implement paludiculture
• Sites for paludiculture in the catchment
  – General criteria for site selection - Criteria for bogs and fens/transgression mires
  – temporal availability of peatland sites
  – status of sites and other site specific conditions
• priority of a paludiculture areas for rewetting and paludiculture
• Assessment of ecosystem services by peatland restoration and implementation of paludiculture
  – Reduction potential for nutrient emissions
    • Reduced losses from mineralization, purification potential for waters from catchment ???
  – Reduction potential of GHG emissions
• recommendations for peatland restoration and implementation of paludiculture
DESIRE-Strategy for paludiculture in the Neman basin

The strategy will

• create the basis for implementation of paludiculture projects in the whole catchment of the Neman river.
• will discuss and therefore help to avoid land use conflicts like contrary interests of users, nature conservation and overarching objectives like nutrient retention.
• will describe peatland management schemes (different options for paludiculture), measures to be realised towards change to paludiculture, framework conditions for wet peatland utilisation for optimised nutrient retention and potential for implementation.
• guide identification of priority areas for upscaling of rewetting and paludiculture in the catchment and avoid conflicts.
• shed light on open questions and conflicts for which the working group and further post-project discussion can find solutions.
• raise awareness and ownership of working group members and institutions for the progress of the proposed project but also for the implementation of paludiculture per se.

It is an important element for potential future larger scale expansion of the proposed measures in priority areas and for the sustainability of project results after closing of project.