



## Paludiculture-Newsletter

With this newsletter the Greifswald Mire Centre aims to keep a growing community informed on peatlands and paludiculture. You will find news from research, practice, politics, as well as announcements of conferences and other events and recommended publication. Sign up per e-mail to [communication@greifswaldmoor.de](mailto:communication@greifswaldmoor.de) for upcoming issues!

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## 1. General information and news on peatlands and paludiculture

### 1.1. UN resolution on peatlands

The United Nations Environment Assembly of the United Nations Environment Programme adopted during its 4<sup>th</sup> session in Nairobi 11–15 March 2019 the resolution [UNEP/EA.4/L.19, Conservation and Sustainable Management of Peatlands](#)<sup>1</sup>. Published in six languages, the resolution urges member states and individual stakeholders to give greater emphasis to the conservation, sustainable management and restoration of peatlands worldwide. The Greifswald Mire Centre supported UN Environment staff with background information and text. The resolution also calls for more coordinated effort and was followed up by a workshop with global conventions and organisations co-organised by the Federal Agency for Nature Conservation (BfN), UN Environment, GMC and Wetlands International in May 2019.

### 1.2. ISSN 2627-910X - New GMC proceedings

The Greifswald Mire Centre publishes the GMC proceedings for better accessibility and citation of own reports and other project results. Two new volumes are now available. In the first volume 2019, emission assessment for peatlands in Greifswald, management recommendations and other results of the MORGEN project are summarised; in the second volume, the current status and new ideas for voluntary finance instruments for peatland protection are presented. This study was carried out within the MoorDialog project. The [Proceedings of the Greifswald Mire Centre](#) with its own ISSN (2627-910X) already include two earlier publications (2018) and appear online at irregular intervals.

### 1.3. Burning of reedbeds in Odessa region, Ukraine

Weather conditions in central and southern Ukraine in late February and early March were unusually dry, snow-free and with light winds. These circumstances are ideal for burning reeds which has been practised in the region for perhaps centuries. Traditionally, reed is burned to provide early shoots for cattle grazing. More recently, protected areas have used the practice to introduce mosaics of age-



Figure 1: Satellite image (Landsat-8 True Colour) of Lower Dniester, 3. April 2019

stands which have benefits for biodiversity. Unfortunately, the prolonged stability of the weather meant that many fires set went out of control and burned over extensive areas often for many days. Moreover, there is growing evidence that setting fires particularly in protected areas such as the Danube Biosphere Reserve around Vylkove and Lower Dniester National Nature Park around Mayaki were deliberate and even coordinated acts of arson by local people discontented with the protected area

authorities. Similar reports have come from across the Danube in Romania. The extent of the fires and their effects on the environment, human health and economy has attracted national attention to the issue, and the need for better management of reedbeds as a valuable resource (Report provided by Paul Goriup).

#### 1.4. Thawing permafrost: one of five largest environmental threats

The report [Frontiers 2018/19: Emerging Issues of Environmental Concern](#) issued by the United Nations' Environmental Programme (UN Environment) defines five pressing but hitherto underestimated environmental threats. Thawing Arctic permafrost is one of them. The chapter [Permafrost peatlands: Losing ground in a warming world](#) is authored by Prof. Hans Joosten (GMC). Besides detailed background information the chapter offers a new circumpolar map on the distribution of permafrost and Arctic peatlands based on the [Global Peatland Database](#) of the GMC. UNEP's „Frontiers“ reports regularly address environmental threats of global implications which are not yet being sufficiently recognised and tackled. The report is translated into six languages and made available to governments and environmental institutions worldwide.

## 2. A paludiculture project presented: BOnaMoor

### 2.1. Project content and kick-off

The joint project [BOnaMoor](#) examines in the period November 2018-October 2021 how to optimise the sustainable utilisation of wet fens and combustion of biomass from wet fens in Northeast-Germany. Peatland scientists and landscape ecologists of the University of Greifswald survey growth and scheduling of harvest on wet meadows managed by the Voigt farm near Neukalen in Northeast-Germany. They also conduct an economic assessment. Engineers of the Hochschule für Technik und Wirtschaft Berlin (HTW Berlin, University of Applied Science) analyse combustion at the district heating plant Malchin (the first fen biomass heating plant in the region) as well as in the laboratory. The project is financed by the Federal Ministry of Food and Agriculture through the Agency for Renewable Resources (FNR). The project started with a kick-off of all project partners at the heating plant Malchin on 14<sup>th</sup> December 2018.



Figure 1: The BOnaMoor -project team in front of the heating plant in Malchin (Photo: T. Dahms, lensescape.org)

Find more information about BOnaMoor on these websites:

<https://www.fnr.de/index.php?id=11150&fkz=22400518>

<https://www.moorwissen.de/de/paludikultur/projekte/bonamoor/index.php>

## 2.2. Work packages

There are four work packages within the project. Three work packages are run by the Working Group of Peatland Sciences and Paleoecology (WP 1, WP 2) and the Working group General Makroeconomics and Landscape Economics (WP 4), both at the Institute of Botany and Landscape Ecology of Greifswald University, and one by the Department of Renewable Energy at HTW Berlin (WP 3).

### **WP 1: Project coordination, communication and practice transfer**

This work package is in charge of the project's organisational issues, its scientific exchange and the transfer of knowledge into practice. This will be achieved by synthesis, preparation and presentation of project results tailored for several target groups.

### **WP 2: Evaluation and optimisation of harvest scheduling related to combustion properties and nutrient transfer**

The work package analyses the elementary composition of biomass (sedges, reed canary grass, common reed, cattail, straw, wood chips) combusted during trials at the heating plant Malchin to determine characteristics relevant for combustion. Seasonal changes in elementary composition, differences in species composition and the effects of processing (hay/silage) are being examined at the studied farm near Neukalen.

### **WP 3: Evaluation and optimisation of combustion**

The work package runs and monitors trials at the heating plant, and develops recommendations for operating combustion in practice. Systematic trials in the laboratory deliver recommendations for transferability. Both helps unlocking the potential of the new energy plants' thermal utilisation.

### **WP 4: Economic and environmental life cycle assessment**

The costs and environmental impact of various fuel supply chains are studied in this work package. It identifies the benefits of converting drainage-based land use into sustainable wet land use and analyses the opportunity costs. Moreover, it assesses the bioenergy costs and benefits with regard to macroeconomics.

## 2.3. BOnaMoor at Sakharov Readings in Belarus

This year's [Sakharov Readings](#) at the International Sakharov Environmental Institute of the Belarusian State University in Minsk from 23<sup>rd</sup>-24<sup>th</sup> May addressed the environmental problems of the 21<sup>st</sup> century. Prof. Dr. Mirko Barz (HTW Berlin) held a lecture on thermal use of renewable energy sources from fens titled „Rewetted Peatlands as Source for Bioenergy Production“ presenting data from the BOnaMoor project.

## 2.4. Gathering data during reed harvest on Rügen

The work package ‘Economic and environmental life cycle assessment’ gathered data during a mechanical reed harvest on Rügen island (NE-Germany) in February 2019. Data on biomass production, area output, energy consumption and working time were taken. A first evaluation is followed by feeding the data into a stochastic simulation. The data also provides material for a master thesis ‘Capturing biomass productivity with UAV based point clouds’, which is supervised in cooperation with the [WETSCAPES project](#). For the third quarter of 2019 further data collection is planned on a farm and with a conservation mowing service near the Lake Constane.



Figure 2: Aerial photograph of reed harvest on Rügen island (Foto: T. Dahms/lenseescape.org)

## 2.5. First measurements at heating plant Malchin

To determine the emission of pollutants during combustion of fen biomass first BOnamoor measurements were undertaken in January 2019 at the heating plant in Malchin. A regular check by the Technical Supervisory Association (Technischer Überwachungsverein, TÜV) offered an excellent opportunity to do so. The plant operated on graminoid pellets – a mix of sedge, reed and reed canary grass – and had a performance of 600-700 kW (c. 80% of its nominal capacity). Emissions proved to be clearly below the emission limit for combustion of hay and similar materials as described in the Technical Instructions on Air Quality Control (Technische Anleitung Luft, TA Luft). Variations of primary and secondary air supply did not have significant consequences on emissions. The low amount of carbon remaining in the ashes (rust ashes < 1%, cyclon ashes < 2% and filter ashes < 1%) as well as the low variation of emissions during combustion (on average below 20%) indicated that requirements of an environmentally friendly combustion – a largely complete exploitation of combustibles with minimal release of emissions – were being met. However, after finishing measurements a considerable amount of slag had accumulated in the combustion chamber due to a high specific energy density. It had to be manually removed from the chamber. Since the plant is usually operated with chopped biomass, this problem is not to be expected in normal operation. There will be further measurements during combustion of loose graminoids in the heating plant. In parallel the quality of combustibles with their consequences on combustion (moisture content, heating value, ash content, volatile components, coke content) are being analysed in the laboratory of HTW Berlin as well as physical and mechanical characteristics such as bulk and stock density, gross density and size distribution/dust content).



Figure 3: Furnace of the heating plant Malchin (Photo: G. Kabengele)

### 3. News from other paludiculture projects

This section compiles news from current projects and initiatives on paludiculture. In this issue, projects at the Greifswald Mire Centre are presented. Future issues will include more news from other regions and countries.

#### 3.1. PRIMA puts paludiculture into practice

From May 2019 onwards, paludiculture on fen sites will be implemented and studied in depth by the new project 'Bringing paludiculture into practice: integration – management – cultivation'. [Paludi-PRIMA](#) investigates the cultivation and profitability of cattail (*Typha latifolia*, *Typha angustifolia*) and common reed (*Phragmites australis*). A demonstration site of c. 10 ha will be established in NE-Germany to gain large-scale experience, including machine planting and harvesting of cattail. A mesocosm experiment investigates the influence of genetics, water level and nutrient availability on the development of plants and their biomass quality, e.g. the suitability as thatching reed. In addition, PRIMA aims at improving the framework conditions of paludiculture, organises field days and develops practical guidelines and recommendations. The three year joint project is carried out by four working groups of the University of Greifswald in cooperation with the Research Centre for Agriculture and Fisheries Mecklenburg-Vorpommern. The project is funded by the German Federal Ministry of Food and Agriculture (BMEL).

#### 3.2. Paludimed installs site for certified sundew cultivation

From 7<sup>th</sup> 12<sup>th</sup> May 2019 it took hard work to install the largest site for sundew cultivation in Europe. It is located at Breesener Moor, a former peat extraction site area in the biosphere reserve Schaalsee in N-Germany. Helpers manually spread 60 tons (115 cbm) of peatmoss originating from paludiculture sites at Hankhauser Moor (Lower Saxony) on 2.5 ha. Thereafter the site was flooded creating a 'bed' for thousands of sundew specimen. Balazs Baranyai and Dr. Jenny Schulz, founders of [PaludiMed GmbH](#), a first spin-off of the Greifswald Mire Centre, will cultivate bio-certified sundew for medical

use. Dr. Till Backhaus, Minister of Agriculture and Environment of Mecklenburg-Vorpommern, had set the first delve of spade at Breesener Moor at the ground-breaking ceremony in October last year.

### 3.3. KLIBB is 'project of the month'

The GMC project [KLIBB – Climate-friendly and biodiversity-promoting use of fen soils in Germany](#) was elected [project of the month](#) by the Federal Agency of Nature Conservation (BfN) in April 2019. KLIBB develops a paludiculture land classification in the peatland-rich federal states of Schleswig-Holstein, Brandenburg and Baden-Württemberg. It updates fact sheets of various paludiculture types and assesses the potential of reducing greenhouse gas emissions from peatlands by rewetting and paludiculture. In particular, it examines the impact of paludiculture on biodiversity and additionally recommends actions regarding nature protection. End of March the project consortium (University of Greifswald, University for Sustainable Development Eberswalde, Humboldt University Berlin) held a fruitful workshop in Berlin. It gathered expertise on peatland biodiversity from all parts of Germany and defined species, which may benefit from rewetting, as well as measures that promote them during productive utilisation/paludiculture.

### 3.4. Interreg project DESIRE started

The international joint project [DESIRE](#) develops suggestions for sustainable peatland management to enhance nutrient retention and other ecosystem services through restoration and paludiculture within the entire Neman River catchment. The project is part of the regional programme Interreg Baltic Sea and is coordinated by the GMC (Greifswald University and Succow Foundation). It supports politicians and other decision-makers in assessing their region's paludiculture potential and in utilising peatlands sustainably. DESIRE develops demonstration sites of paludiculture in Lithuania, Kaliningrad region and Poland, fosters communication on wet peatland management and assesses it economically. The project started with a kick-off at 20<sup>th</sup> March 2019 in Greifswald.

### 3.5. MoKli – work on the ground large scale

The [project MoKli](#) – abbreviated and merged from the German terms 'Moor' (peatland) and 'Klima' (climate) – wants to implement practical solutions for sustainable peatland use by joining forces with land users. For this new project, which started in March 2019, the University of Greifswald and the Succow Foundation, both partners in the GMC, team up with the German Association for Landcare (DVL).

While facts on peatland and climate are sufficiently known, action is now urgently needed: MoKli therefore develops strategies for climate friendly use of peatlands in Germany and their regional adaptations. The project conveys knowledge on peatlands and paludiculture to land owners and users and to local authorities, associations and enterprises in the fields of water management, agriculture and nature conservation. In five peatland-rich federal states of Germany MoKli will develop and apply cooperative solutions in model regions at water (sub)catchment area level. Together with local stakeholders, new production methods for the utilisation of peatland biomass will be initiated. In addition, the project wants to create and promote the profession of the 'peatland carbon farmer' (German: Moor-Klimawirt) who delivers ecosystem services to society and is recognised for doing so. Jointly with political decision-makers at local, state, federal and EU level MoKli acts to improve framework conditions for peatland climate protection.

### 3.6. Greifswald Peatland Study

How large are peatlands within the area of Greifswald? To what extent are they drained, and what are the emissions caused by them? How can these emissions be reduced by rewetting, and could those peatlands contribute to local efforts for climate protection? Answers to these questions can now be found in the [Greifswald peatland study – emission assessment and recommendations for the peatlands in the city \(German only\)](#) published in March 2019. The study was compiled within

the MORGEN project, a joint project of Michael Succow Foundation, University of Greifswald (both partners in the GMC) and the municipality of Greifswald. It demonstrates that peatlands may contribute greatly to climate protection and calls for a local peatland restoration strategy.

#### 4. Events on peatlands and paludiculture

24.-28/06/2019 [ISHS-IPS III International Symposium on Growing Media, Composting and Substrate Analysis](#), Milano, Italy

04/07/2019 [German Landcare Day](#), Göttingen, Germany

09/07/2019 Symposium on climate protection ‚What’s the agriculture’s part?’ ([Fachtagung Klimaschutz „Was kann die Landwirtschaft tun?“](#)), Braunschweig, Germany

02.-16/08/2019 [IMCG Field symposium](#), Mongolia

10.-13/09/2019 [WETSCAPES - Understanding the ecology of restored fen peatlands for protection and sustainable](#), Rostock, Germany

#### 5. Publications

Beyer, F., Jurasinski, G., Couwenberg, J. & Grenzdörffer, G. (2019): Multisensor data to derive peatland vegetation communities using a fixed-wing unmanned aerial vehicle. *International Journal of Remote Sensing*. DOI: [10.1080/01431161.2019.1580825](https://doi.org/10.1080/01431161.2019.1580825)

Kekkonen, H., Ojanen, H., Haakana, M., Latukka, A. & K. Regina (2019): Mapping of cultivated organic soils for targeting greenhouse gas mitigation. *Carbon Management*: 115-126. DOI: [10.1080/17583004.2018.1557990](https://doi.org/10.1080/17583004.2018.1557990)

Lucke, T., Walker, C. & Beecham, S. (2019): Experimental designs of field-based constructed floating wetland studies: A review. *Science of the Total Environment* 660: 199-208. <https://www.researchgate.net/publication/330635097>

Ren, L., Eller, F., Lambertini, C., Guo, W., Brix, H. & Sorrell, B. (2019): Assessing nutrient responses and biomass quality for selection of appropriate paludiculture crops, *Science of The Total Environment* Volume 664: 1150-1161. DOI: <https://doi.org/10.1016/j.scitotenv.2019.01.419>

Salomaa, A., Paloniemi, R. & Ekroos, A. (2018): The case of conflicting Finnish peatland management – Skewed representation of nature, participation and policy instruments. *Journal of Environmental Management* 223: 694-702. DOI: <https://doi.org/10.1016/j.jenvman.2018.06.048>

Searchinger, T.D., Wierseni, S., Beringer, T. & Dumas, P. (2018): Assessing the efficiency of changes in land use for mitigating climate change. *Nature Letter* 564: 249-264. <https://www.nature.com/articles/s41586-018-0757-z>

Vroom, R., Xie, F., Geurts, J., Chojnowska, A., Smolders, A., Lamers, L. & Fritz, C. (2018): Typha latifolia paludiculture effectively improves water quality and reduces greenhouse gas emissions in rewetted peatlands. *Ecological Engineering* 124: 88-98. DOI: <https://doi.org/10.1016/j.ecoleng.2018.09.008>

Zak, D., Stutter, M., Jensen, H. S., Egemose, S., Carstensen, M. V., Audet, J., Strand, J. A., Feuerbach, P., Hoffmann, C.C., Christen, B., Hille, S., Knudsen, M., Stockan, J., Watson, H., Heckrath, G. &

Kronvang, B. (2019): An assessment of the multifunctionality of Integrated Buffer Zones in Northwestern Europe. *J. Environ. Qual.* 48: 362-375. [DOI:10.2134/jeq2018.05.0216](https://doi.org/10.2134/jeq2018.05.0216)

**Volume 25 Special Volume: Renewable Resources from Wet and Rewetted Peatlands (2019)**  
(<http://mires-and-peat.net/pages/volumes.php>)

Guest editors J. Couwenberg and W. Wichtmann

A collection of articles based on selected presentations from the Second International Paludiculture Conference (RRR2017) held in September 2017 at the University of Greifswald, Germany.

- Article 1: [\*Annual CO<sub>2</sub> fluxes from a cultivated fen with perennial grasses during two initial years of rewetting\*](#)  
by S. Karki, T.P. Kandel, L. Elsgaard, R. Labouriau and P.E. Lærke Published online: 08.04.2019
- Article 2: [\*Testing the three-phase technology for harvesting biomass from wetlands\*](#)  
by K. Zembrowski and A.P. Dubowski Published online: 08.04.2019
- Article 3: [\*Spatial potential for paludicultures to reduce agricultural greenhouse gas emissions: an analytic tool\*](#)  
by A. Schlattmann and M. Rode Published online: 08.04.2019
- Article 4: [\*The effects of harvest date and frequency on the yield, nutritional value and mineral content of the paludiculture crop cattail \(\*Typha latifolia\* L.\) in the first year after planting\*](#)  
by J. Pijlman, J. Geurts, R. Vroom, M. Bestman, C. Fritz and N. van Eekeren Published online: 13.05.2019
- Article 5: [\*Greenhouse gas fluxes from soils fertilised with anaerobically digested biomass from wetlands\*](#)  
by R. Czubaszek, A. Wysocka-Czubaszek, S. Roj-Rojewski and P. Banaszuk Published online: 13.05.2019
- Article 6: [\*The fate of nitrogen derived from mown wetland biomass in a swampy river valley landscape\*](#)  
by A. Wysocka-Czubaszek, R. Czubaszek, S. Roj-Rojewski and P. Banaszuk Published online: 26.05.2019
- Article 7: [\*Potential for renewable use of biomass from reedbeds on the lower Prut, Danube and Dniester floodplains of Ukraine and Moldova\*](#)  
by P. Goriup, A. Haberl, O. Rubel, V. Ajder, I. Kulchytskyy, A. Smaliychuk and N. Goriup Published online: 26.05.2019

Further new publications on peatlands and mires, restoration and rewetting of peatlands as well as nature conservation can be found in the [IMCG bulletins](#), which are regularly published on the IMCG homepage.

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