

Paludiculture Newsletter

With this newsletter the Greifswald Mire Centre (GMC) 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 publications. Sign up per e-mail to communication@greifswaldmoor.de for upcoming issues! The newsletter is currently provided by the BOnaMoor project coordinated by the Greifswald Mire Centre and financed by the German Federal Ministry of Food and Agriculture through the Agency for Renewable Resources (FNR).

Content

| | |
|--|----|
| 1. General information and news on peatlands and paludiculture | 2 |
| 1.1. RRR2021 – Registration + programme online | 2 |
| 1.1. Webinar: Livelihoods and conservation on peatlands-strengthening resilience in response to COVID-19 | 2 |
| 2. News from other paludiculture projects | 3 |
| 2.1. Projects international | 4 |
| 2.1.1. Peat/Land: Strategies for Restoration, Design, and Planning of North Carolina Peatlands..... | 4 |
| 2.2. Projects in Germany | 6 |
| 2.2.1. Review on the Paludi-PRIMA project in 2020 | 6 |
| 2.2.2. Winners in the nationwide university competition “Show your research” | 9 |
| 2.2.3. Now online: presentations of virtual event on utilisation of peatland biomass..... | 9 |
| 3. Events on peatlands and paludiculture | 10 |
| 4. Literature | 10 |

1. General information and news on peatlands and paludiculture

1.1. RRR2021 – Registration + programme online

The [registration for the virtual conference Renewable Resources from Wet and Rewetted Peatlands - RRR2021](#), organised by the partners in the Greifswald Mire Centre, is now open and the [preliminary programme](#) is online. The RRR2021 takes place from 9th - 11th March 2021 and will allow you to share and widen your knowledge about paludiculture worldwide. Register now at participation fees of 60 EUR (regular) or 30 EUR (reduced).

You can expect passionate [keynote speakers](#) in plenary sessions at the beginning of conference day 1 and day 2. Altogether more than 100 scientific oral and poster presentations are divided over 21 parallel sessions. The [session on Finance options for livelihoods from wet peatlands is co-organised with FAO, UNEP, IUCN and WWF](#). Excursions usually represent one of the most enjoyable and inspiring part of the programme when traveling to conferences. Since this part cannot take place, eight inspiring virtual paludiculture excursions will be presented. The [workshops, literature evening, and an art session](#) are some other highlights in the programme. Several booths in the virtual exhibition hall expose wetland-related products, techniques, and services. The virtual platform provides the best networking opportunities with discussion forums, open spaces, and face to face conversations to get in contact with scientist, practitioners, pioneers, and other experts from all over the world. The RRR2021 conference is organised by the partners in the Greifswald Mire Centre and funded by the German Research Foundation. For questions, please contact info@rrr2021.com.



1 RRR2021-Invitation (Photo: lensescape.org)

1.1. Webinar: Livelihoods and conservation on peatlands-strengthening resilience in response to COVID-19

The 26th of November 2020, the project “Sustainable Use of Peatlands and Haze Mitigation in the Association of Southeast Asian Nations (ASEAN)” by the Gesellschaft für internationale Zusammenarbeit (GIZ) hosted a webinar titled [Livelihoods and conservation on peatlands-strengthening resilience in response to COVID-19](#). It was a result of GIZ and other stakeholders having taken interest in how communities affected by haze could be placed at a higher risk of suffering COVID-19 symptoms due to the higher vulnerability of their respiratory symptoms from long-term exposure. The webinar’s 197 attendees discussed how livelihoods and the conservation of peatlands link to COVID-19. A Facebook live-stream reached over 2270 people.

The keynote speakers Lukas Gajdos (EU Mission to ASEAN) and Warthane Puvanarajah (German embassy in Indonesia) brought up issues on how the problem of peat fire and haze can potentially exacerbate the COVID-19 pandemic within the region, how socioeconomy and biodiversity are impacted by the pandemic. Here short summaries of lectures held:

Johanna Son (ASEAN Program) asked “Will ASEAN go greener in response to COVID-19?": Nearly a year into COVID-19, the region has experienced an economic contraction of approximately 3.8% and a 12.4% decline in trade flows. Despite not having released a recovery plan as yet, the region has set up

structures such as the ASEAN Comprehensive Recovery Framework, Regional Reserve of Medical Supplies and a COVID-19 response fund to be released soon. These responses are focused on addressing the impacts of COVID-19 while neglecting the importance of shift towards a greener approach after the pandemic. Sustainability issues should be transformed into governance issues to ensure green shifts after the pandemic.

Maria Nuutinen (FAO) reported on “Livelihoods in wet peatland landscapes: building back better”: The sudden socio-economic shocks on the markets, livelihoods, income, food security and wellbeing have resulted in an increase in land claims, fire use and pressure on forest and wildlife in peatland landscapes. The re-orientation of food systems to be more resilient, sustainable and equitable will minimise trade-off with nature. To ensure the resilience of communities in peatland landscapes, priority actions should include ensuring the restoration of peatlands together with the communities.

Sonya Dewi (World Agroforestry, ICRAF) spoke about “Sustainable peatland management: methods and resilience to pandemics in Indonesia and Malaysia”: The overall adaptive capacity has declined due to income declines and subsequent increases in poverty rates and food security challenges. To avoid intense pressure on peatlands as a food estate, resilience should be increased through diversification of agricultural commodities to increase and stabilise incomes. An effective environmental and social safeguard in the form of an ecosystem-based approach should effectively involve all stakeholders in integrated peatland management efforts to ensure that their use of peatlands remains sustainable at levels that meet their demands.

Other contributions highlighted issues of biodiversity conservation as a way to mitigate the risk of further pandemics.

Author: Gina Gumindega, Greifswald Mire Centre, Germany

The poster is for a webinar titled "Livelihoods and Conservation on Peatlands - Strengthening Resilience in Response to COVID-19". It is organized by the Ministry of Environment, Forestry and Fisheries of the Republic of Indonesia, in cooperation with the European Union and the ASEAN Centre for Biodiversity. The event is scheduled for Thursday, 26 November 2020, from 13:00 to 17:00 Jakarta time (GMT+7). The registration link is <http://bit.ly/SUPAWebinarRegistration>. The poster lists a moderator, Stefan Bannach, and seven speakers: Johanna Son (Reporting ASEAN Program), Maria Nuutinen (Food and Agriculture Organization (FAO)), Sonya Dewi (World Agroforestry Centre (ICRAF)), Francesco Ricciardi (Asian Development Bank (ADB)), Theresa Mandita Lim (ASEAN Centre for Biodiversity (ACB)), and Orbita Roswintarti (National Institute of Aeronautics and Space (LAPAN)). The webinar is implemented by GIZ.

1 Announcement of the webinar (Source: GIZ)

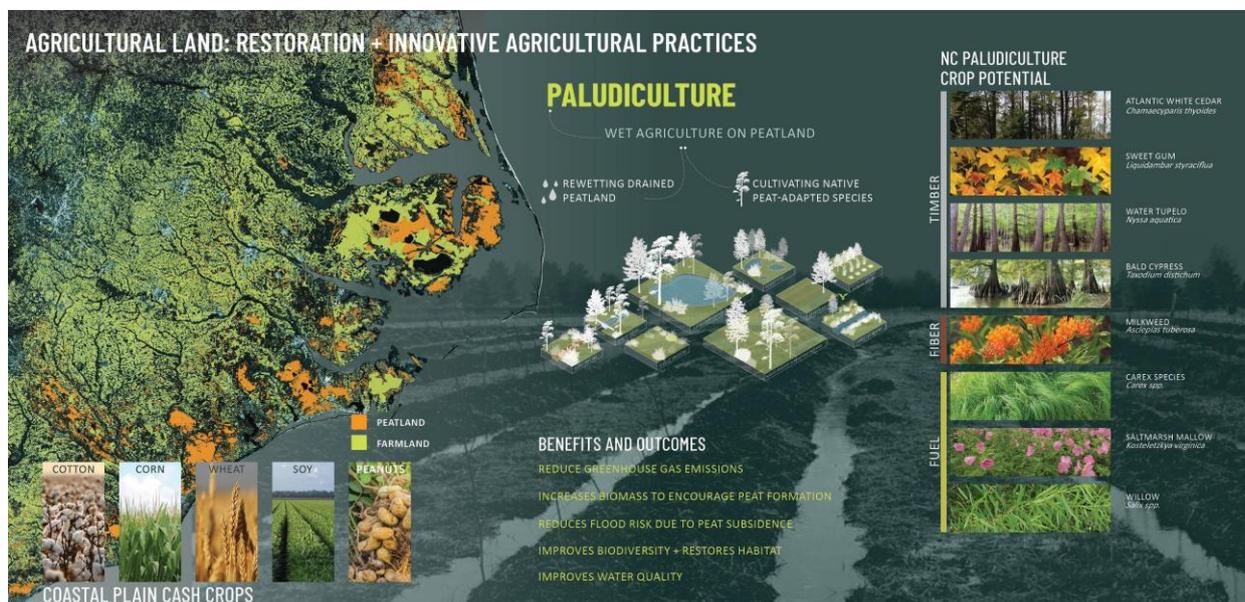
2. News from other paludiculture projects

This section compiles news from current projects and initiatives on paludiculture from various regions and countries.

2.1. Projects international

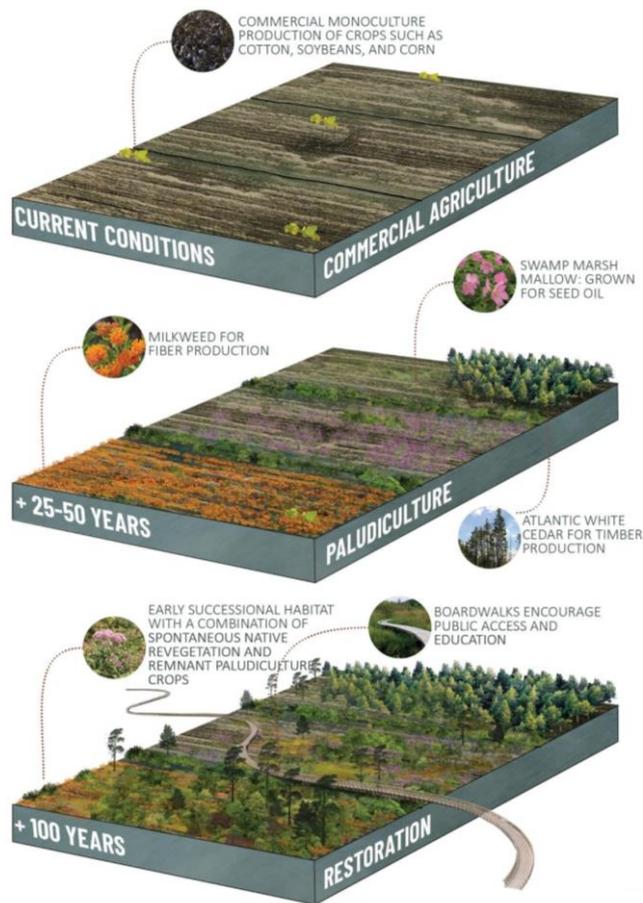
2.1.1. Peat/Land: Strategies for Restoration, Design, and Planning of North Carolina Peatlands

As of late 2020, there are two ongoing peatland restoration efforts in North Carolina, USA. Large-scale hydrologic restoration in the Pocosin Lakes National Wildlife Refuge prioritizes rewetting of drained peat for habitat restoration, wildfire prevention, and flow/discharge regulation. Nearby, Duke University, in partnership with a private landowner, is working to establish peatland restoration techniques for a 10,000-acre carbon farm. In conjunction with these initiatives, carbon accounting methodologies have been developed for restoration of peatland in the U.S. southeastern coastal plain. So far, research on peatland restoration in North Carolina has primarily focused on restoring habitat and ecological function to a pre-disturbance state, but given the abundance of drained agricultural land, adoption of paludiculture practices on coastal NC farms could provide unique opportunities to promote large-scale peat restoration while simultaneously sustaining farm income.



2 Infographic explaining paludiculture concepts and potential application in North Carolina (Illustration: Mandalyn Baldwin)

Currently, the most important crops grown on NC coastal plain farms are corn, cotton, soybeans, wheat, and peanuts, all of which require drained land for cultivation. Paludiculture presents a unique opportunity to shift from singularly productive agriculture to regenerative landscapes without drastic disruption to rural economies and ways of life. The monetization of carbon sequestration and storage through emerging carbon markets and the imperative for communities of all sizes to address issues of climate resilience can also create economic opportunities for rural peatland communities that have historically relied on agriculture. At present, there are no reported paludiculture operations in the state, and there are numerous and significant barriers to transitioning from current commercial agricultural practices to paludiculture, including limited domestic markets for production of native peatland species and a need to retrofit or replace existing agricultural equipment for use on re-wetted peat.



3 Infographic describing the transition from current commercial agriculture to paludiculture as part of a phased restoration effort. (Illustration: Mandalyn Baldwin)

In fulfillment of her Master of Landscape Architecture degree at NC State University, Mandalyn Baldwin explored peatland restoration strategies with potential application in North Carolina. As the ecological significance and climate implications of peatland is not widely recognized outside of natural resource and environmental science disciplines, this project explored and developed frameworks for land planning and design in North Carolina peatlands through the lens of landscape architecture and environmental planning. Informed through geospatial analysis, literature review, historical and archival research, and design-based research, speculative design and planning strategies were developed for the following contexts:

- Improving public access and expanding educational and recreational opportunities in already conserved peatland areas.
- Resilience and adaptation strategies for rural towns built in and around peatlands.
- Paludiculture as an alternative production technique during phased peatland restoration.

In addition to identifying design strategies suitable for peatland contexts, one of the primary goals of this project was to develop graphics for effectively communicating the range of ecological values, consequences of continued peatland degradation, and opportunities for innovative restoration efforts. Since paludiculture is not established as a viable agricultural practice in NC, and the term 'paludiculture' is not widely understood or recognized, developing graphics to explain the concept and communicate potential benefits and local application was of particular importance. Ideally these graphics will help facilitate discussion with landowners, elected officials, regulatory and land management decision makers, conservation groups, and researchers to enable a transition to paludiculture in the state.

Author: Mandalyn Baldwin, North Carolina State University, USA

Editor's note: For her project Mandalyn Baldwin was awarded the Honour award of the [ASLA Student price 2020](#).

2.2. Projects in Germany

2.2.1. Review on the Paludi-PRIMA project in 2020

Since June 2019, the [project Paludi-PRIMA](#) puts paludiculture with rReeds and CCattails into practice. For this purpose, a field-scale cultivation trial with 50,000 Cattail seedlings (*Typha angustifolia* and *T. latifolia*) was established on a fen grassland in North Eastern Germany. Stand establishment and growth were monitored during the first growing season. In addition, two mesocosm experiments were conducted at the Arboretum of the University of Greifswald, where plant growth in response to different environmental factors was investigated. First findings from these two areas of work as well as on the genetics of common Reed (*Phragmites australis*) and the market potential of Reed for roofing will be presented here.



5 Bird's perspective on PRIMA pilot site (Photo: lensescape.org)

Field-scale cultivation trial - Difficult start for young *Typha* plants - After planting the *Typha* seedlings in mid-September 2019, the pilot site was rewetted with water from the adjacent river, the Teterower Peene. Unfortunately, late planting due to the delayed project start turned out to be unfavourable for the establishment of the seedlings. Some of the plants flushed out with the first irrigation, requiring manual replanting. Early frost in October prevented seedlings from taking root before winter. In spring 2020, late frosts until mid-May delayed sprouting and harmed new shoots. Birds damaged shoots or pulled plants out of the peat entirely to eat the roots. In addition, the 8 hectare site is still heterogeneous despite of the surface levelling by soil removal during installation. Thus, optimal water level adjustment for young *Typha* plants, near surface, was not feasible. While in the western and southern part of the area inundation of 10-15 cm was rather detrimental to the seedlings, in the rather dry northern and eastern parts also weeds established.

Seeding and germination from the seed bank - In early summer of 2020, about one-third of the planted *Typha* stand was well developed and the formation of new shoots could already be observed. *Typha* seeding was conducted in June 2020 to close remaining gaps. Due to the high water level and soggy ground, both the use of machinery and manual seeding on 4 ha were not possible. Instead, next

to small-scale manual seeding a drone with a newly developed dosage unit was used. Seeds had previously been obtained by hand, processed into pellets with clay and adjusted to the two deployment forms to achieve optimal dosage on the peat surface, as well as at a flight height of 4 to 5m. In parallel with these activities, *Typha* germinated from the existing seed bank, leading to a rapid densification of the stand despite low planting density. By September 2020, a dense *Typha* stand had developed in some places, with fruiting already evident.

Wildlife deterrence - In fall 2019, strings were spanned over the field to deter geese, but they had to be replaced with other means due to little success in deterrence and durability. Warning tape was attached when setting up permanent observation plots. In addition, coloured pool animals were placed in areas particularly affected by feeding damage, as recommended by bird deterrence experts. Electric fences were installed in fall 2019 to keep away wild boars.

Irrigation management - A smoothly working water management is crucial for the establishment success. Only then the emergence of weeds can be reduced, and the biomass yields and the quality of Cattail biomass can be increased. In addition to the challenge of optimising water levels with strong level differences of the surface, obtaining appropriate technology during the Covid-19 pandemic already turned out to be difficult. Thus, mostly rental services were used in 2020, resulting in a de facto ebb and flood regime. The fluctuating water levels with periods of inundation followed by water levels near surface promoted *Typha* germination. However, a constantly higher water level should be kept during the 2nd growing season. A hybrid irrigation system is planned to be in place for this purpose. Because there is no power supply a solar pump shall ensure a continuous basic supply, especially on days with strong solar radiation and thus high evapotranspiration. If necessary, an emergency generator is meant to support the system. This will ensure irrigation even in case of failure of one technical component.

Mesocosm experiment I: From May 2019 to February 2020, a mesocosm experiment was conducted on the effect of water level and nutrient supply on yield and biomass quality of Reed and Cattail. For this purpose, 5 regional clones of *Phragmites australis* from thatching Reed stands and the Cattail species *Typha angustifolia* and *T. latifolia* were cultivated. The mesocosm experiment consisted of two sub-experiments. The plants were grown in (A) a gradient of nutrient availability (3.6 - 400 kg N ha⁻¹a⁻¹), and (B) a water level gradient (45 cm below to 40 cm above ground level). The following characteristics were recorded:

- plant growth and development by weekly measurements of maximum plant height, number of stems or shoots and number of leaves;
- physiological fitness using photosynthesis measurements;
- functional traits showing plant adaptation to cultivation conditions, in particular aerenchyma formation, specific leaf area, and specific root length (*P. australis* only);
- above- and belowground biomass (dry weight); Cattails were harvested in November and Reeds in February.

In addition, biomass from the experiment was used for analysis of biomass quality and for genetic characterization (*P. australis*). Preliminary results show that both *Typha* species grew well with low nutrient supply and dry conditions, and that *T. latifolia* tended to be the more productive species. The evaluation of the data on *P. australis* is still in progress.

Mesocosm experiment II: In another mesocosm experiment, the response of Reed clones (*P. australis*) of different ploidy levels to a drought gradient was investigated in summer 2020 (May to September).

In total 6 Reed clones were used for the experiment, one pair each of an octoploid and a tetraploid clone from Hungarian, Russian and Romanian origins. Plants were exposed to a drought gradient from 0 to 40 days of drought. The following characteristics were recorded:

- plant growth and development by bi-weekly measurements of maximum plant height and stem number;
- physiological fitness using photosynthesis measurements;
- aboveground biomass;
- functional parameters such as leaf area, number and diameter of stems, number of leaves at the end of the drought treatment.

Plant material from this experiment was also used for genetic analysis.

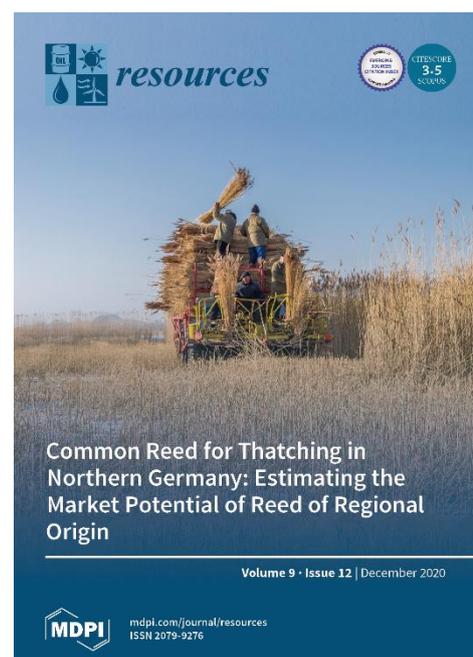
Genetic Studies on common Reeds - *Phragmites australis* from 24 populations along the Baltic Sea coast of Mecklenburg-Vorpommern has been genetically analysed. Genotyping of the samples revealed the presence of high genetic diversity and a high level of gene flow, which means that Reeds in this region can freely spread seeds and pollen across a large distance. However, the reproduction by rhizome is strongly geographically limited. Also, the Reed stands with a high level of disturbance (regularly mown and coastal stands) don't show a tendency to have lower or higher genetic diversity.

Furthermore, the Aarhus botanical garden (Denmark), housing a huge collection of Reed from all over the world, was visited and 40 specimens from five continents were selected to be planted in the Greifswald Arboretum. In this regard, the sampling along the Baltic Sea coast was extended and Reed samples from 10 populations in Denmark were collected, which corroborate the findings from Mecklenburg-Vorpommern.

Additionally, a workflow for gene expression analysis has been established, which makes the comparison of samples from the mesocosm experiments with different treatments accessible (e.g., water or nutrient levels, drought duration) with respect to differential gene activity.

Market Potential of Reed in Northern Germany - Reed (*Phragmites australis*) has a long tradition as locally available thatching material in Germany, as well as in other countries such as the Netherlands, Great Britain or Denmark. Nowadays, however, thatch is a globally traded commodity. Within the project Paludi-PRIMA, a written survey was conducted among all thatchers in Northern Germany in 2019 and published under [Common Reed for Thatching in Northern Germany: Estimating the Market Potential of Reed of Regional Origin](#).

Out of 141 contacted companies, 47 participated in the survey. The majority of respondents (59%) used Reed for rethatching roofs completely, 24% for newly constructed roofs, and 17% for roof repairs. The total market volume of Reed for thatching was estimated for 2018 with $3 \pm 0,8$ million bundles of Reed with a monetary value at sales prices of $\text{€}11.6 \pm 2.8$ million. Reed from Germany held a low share of 17% of the



6 Cover of "Resources"

total consumption in 2018. Less than 9% of the responding companies harvested their own Reed, another 26% had given up Reed cutting during the last decades.

Thatchers reported especially insufficient availability of regional Reed, but also a lack of quality. The cultivation of Reed in paludiculture as well as research on e.g. suitable genotypes and optimised management can increase availability and quality of regional thatch in Germany and in other countries with a thatching tradition.

A production area of 10,000 ha would be more than enough to cover not only the demand for regional Reed (additionally needed harvest area $1,046 \pm 784$ ha), but to cover the entire market volume (corresponding ca. $6,000 \pm 1,600$ ha). Thatching Reed is only one use option. Other possibilities of utilising Reed biomass as well as other paludiculture crops and their utilisation have to be investigated and tested in order to create economically viable paludiculture options for Germany's currently drained organic soils encompassing around 383,000 ha cropland and 852,000 ha grassland (National Inventory Report, UBA 2019).

Author: Josephine Neudert, Greifswald Mire Centre, Germany

2.2.2 Winners in the nationwide university competition “Show your research”

The Greifswald Mire Centre (GMC) is one of [ten winners in the nationwide university competition “Show your research” in the Science Year of the Bioeconomy \(2021\)](#). It awarded lively communication ideas that make research accessible to the general public and at the same time show their social significance. The peatland researchers won the competition with the idea of taking the Paludi Tiny house on a roadshow. In this mobile “house on wheels”, Reeds, Cattails and alder are used as energy-efficient building materials in insulation, panels, roofing or sound proofing. The “little house” shows a big idea: Wet peatlands are extremely important as carbon stores for climate protection. In order to make this form of bioeconomy better known among municipalities, land owners and users, administrators and consumers, the roadshow will take its route through peatland areas in northern Germany in autumn 2021. It will also be accompanied interactively on social media.



7 Paludiculture Tiny house (Photo: N. Körner)

2.2.3. Now online: presentations of virtual event on utilisation of peatland biomass

The presentations of the virtual event on [Bioeconomy with a climate protection bonus - utilisation of peatland biomass](#) on 10th and 11th of December in 2020 are now available online. The event of the MoKli-project, organised by the Greifswald Mire Centre and the German Association for Landscape Conservation (DVL), dealt with material use e.g. as building material, with energetic use and with the production of substrates. The event provided with presentation of companies and other experts a practical overview of utilisation possibilities of biomass from wet and rewetted peatlands and sale markets, and how these can be adapted and established for Reeds, Sedges, Cattail or peat moss.

3. Events on peatlands and paludiculture

| | |
|---------------------|---|
| 09.-11.03.2021 | RRR2021 – Conference week “Renewable resources from wet and rewetted peatlands”, virtually, www.rrr2021.com |
| 16./17.03.2021 | KTBL Fachtagung „Boden gut machen – Neue Ackerbausysteme“, virtually, https://www.ktbl.de/ktbl-tage |
| 25.-30.04.2021 | EGU 2021, virtually, https://www.egu21.eu/ |
| 02.-07.05.2021 | International Peatland Congress 2021, virtually https://www.peatlandcongress2021.com/ |
| 17.-21.05.2021 | TISOLS 10th International Symposium on Land Subsidence, Netherlands, www.tisols2020.org |
| 15.-17.06.21 | Virtual Annual meeting of the Society of Wetland Scientists Europe Chapter, https://tourduvalat.org/agenda/europe-chapter-of-the-society-of-wetlands-scientists-arles-15-17th-of-june-2021/ |
| 21.-24.06.2021 | SER 9th World Conference on Ecological Restoration, virtually, http://www.ser2021.org |
| 27.06. – 08.07.2021 | VI International Field Symposium West-Siberian peatlands and carbon cycle: Past and present, Khanty-Mansiysk, Russia https://mukhrinostation.com/wspcc2021/ |
| 22.-27.08.2020 | II. ISHS International Symposium on Growing Media, Soilless Cultivation, and Compost Utilization in Horticulture, Ghent, Belgium; https://www.growingmedia2021.com/ |
| 23.-27.08.2021 | Eurosoil2020, virtually, https://eurosoil-congress.com/ |
| 31.08.-04.09.2021 | SER conference “A NEW GREEN DEAL FOR EUROPE’S NATURE. Science and political action towards socio-ecological restoration”, Alicante, Spain; https://www.sere2021.org/ |
| September 2021 | Symposium “Mires of Northern Eurasia: biospheric function, diversity, management”, Petrozavodsk, Russia; mire2020@krc.karelia.ru |
| 20.-22.09.2021 | Landscape 2021 - Diversity for Sustainable and Resilient Agriculture, virtually; www.landscape2021.org |
| 01.-08.10.2021 | International conference "Peatlands of Siberia: functioning, resources, restoration", Tomsk, Russia, hybrid; https://peatlands2021.ru/ |
| 10.- 15.10.21 | 11. INTECOL International Wetlands Conference, Christchurch, New Zealand; https://www.intecol2021.com/ |

4. Literature

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Joosten, H. (2020) Landwirtschaft auf organischen Böden: Die tiefhängenden Früchte bei der Bekämpfung des Klimawandels. ASG Ländlicher Raum, 04: 26-29 [LR0420-Schwerpunkt-Klimakrise.pdf \(asg-goe.de\)](#)

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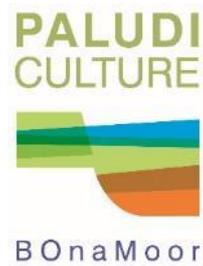
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Wichmann, S. (2021) Moore – Wiedervernässung als Chance. Fleischatlas 2021. S. 28-29. [Fleischatlas 2021 – Daten und Fakten über Tiere als Nahrungsmittel \(bund.net\)](#)

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: <http://www.imcg.net/pages/home.php>

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Responsible in terms of press law: Nina Körner, Dr. Wendelin Wichtmann



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