

CINDERELLA Update IV

New harvesting technologies from Poland

Adam Dubowski, a researcher from the Power and Dynamics of Agricultural Machines Group, PIMR requested for cooperation with the CINDERELLA project. He invites our team for an excursion to visit his institute in Poznan to look over his newly developed technologies for wetland harvesting. You may remember his oral presentation at the Greifswald reed conference RRR or you have recognized his article in the mires & peat online magazine (<http://mires-and-peat.net/pages/volumes/map13/map1311.php>). He is strongly interested in further cooperation, also in international projects.

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Coop with Czech partners

As you know our Czech partners were kicked out from our project consortium after the first phase as their implementing state agency refused to reserve budget for their project part. Nevertheless, Hana Čížková, University of South Bohemia, České Budějovice and her team are furthermore interested to cooperate with our project team in projects on paludiculture. During the conference “wetlands in agricultural landscapes” next week we should discuss opportunities on cooperation in research projects.

Paludiculture in Italy

Claudia visited during her Erasmus period in July the LandLab Institute of Scuola Superiore Sant'Anna, one of the universities in Pisa, Tuscany. Joint field excursions to the 15 ha of rewetted peatland in the north of Pisa at the Massaciucoli Lake Basin gave interesting insights to methods and working practices of Vittoria Giannini and her colleagues (working group of Prof. Bonari). They study different perennial rhizomatous grasses (*Arundo donax*, *Phragmites australis*, *Miscanthus x giganteus*) and woody crops (*Poplar* and *Salix*) growing under wet conditions in their experimental sites. For comparison a constructed wetland and succession research site were implemented next to the paludiculture site. The goal of their project is to minimize nutrient uptake from the fields around the Massaciucoli lake as well as to decrease peatland destruction which was intensified by drainage based agriculture. The basin was intensively drained in the 1930ies the first time, and until today some meters of peatland are gone, so that the field around the lakes lay deeper as the lake level. The Region of Tuscany supported the rewetting project. Working group in Pisa as well as Greifswald are looking forward to work closer together in the next time.

End of project Conference `Wetland Energy` in Belarus

The closing conference of the Europe Aid funded project “Implementation of new concepts for wet peatland management for the sustainable production of biomass-based energy (wetland energy)” will take place the 17th and 18th November 2015 in Minsk, respectively in Lida, Belarus. The first day the outcomes of the project will be presented at the National Library of Belarus. The project dealt with implementation of paludiculture on rewetted, partly excavated peatlands, and using the biomass for the replacement of peat as a fuel. A new production chain for pellets and briquettes from paludiculture biomass has been set up and will be opened up the second day at the site of Lida Peat Factory. Find more information at: <http://www.succow-stiftung.de/wetland-energy-sustainable-use-of-wet-peatlands-in-belarus.html>. The programme of the conference is attached to this e-mail. If you are interested to participate, please register soon, as for people from western Europe visas are necessary and a personal invitation must be in place.

EcoSummit 2016 Ecological Sustainability: Engineering Change

From 29th of August to 1st of September 2016 the EcoSummit conference will take place in Le Corum, Montpellier, France. Our proposal entitled Paludiculture – Challenges for science and practice, has been accepted. Another session, registered by colleagues from Rostock University, will deal with ecological aspects of the rewetting of peatlands. A general call for abstracts will be open still in October. Applicants wishing to present a talk or poster will choose from the 100 sessions listed. Please bookmark the conference web-site at <http://www.ecosummit2016.org/> to keep up-to-date with changes as they occur. This conference is a good opportunity to have a meeting with all CINDERELLA project partners. So please orientate yourself on the web-site as soon as possible.

News from Sweden (Stefan Weisner)

Installation of constructed wetlands

During this summer 4 experimental wetlands with peat soil have been constructed at our experimental facility at the Rural Economy and Agricultural Society at Lilla Böslid outside Halmstad. The wetlands are rectangular with a length of 6 m and a width of 2 m and are specifically designed to enable complete mass balance investigations to measure nutrient removal from water from an agricultural stream passing through the wetlands. Two of the wetlands are filled with peat soil from intensively cultivated arable land, and the other wetlands are filled with peat soil from less intensively used pasture land. The water level in the wetlands will alternate between 10 cm below the soil surface and 20 cm above, simulating “normal” water level and flood events. The wetlands have been planted with *Phalaris arundinacea* that will establish fast enough to get relevant results within the project period. Some of the equipment (pumps, etc) will be installed during the winter to be able to start measurements during summer 2016. Other measurements can be performed in addition to the measurements of nutrient removal from water, e.g. differences in GHG emissions at different water levels. Attached pictures show the wetlands in September.



Figures: Constructed wetlands for the treatment of waters from agricultural catchment areas

PhD studies

Two PhD-students (Anna Hansson and Niklas Karlsson) at the Wetland Research Centre at Halmstad University are focusing on how to further the interest amongst landowners to adopt Paludiculture on privately owned farmland. Two parallel studies are carried out aiming at providing knowledge of how agricultural business models can be structured to include ecosystem service values. The first study (Niklas) is looking into the value of growing and refining of wetland reeds to produce bioenergy. Measurements and quantification of biomass growth and bioenergy output are studied to estimate earning potential for landowners that convert part of their business models to involve paludiculture. In an ongoing study we work with estimating wetland biomass growth and biogas yield. We

investigate two main variables; differences between species (*Phragmites australis* and *Glyceria maxima*) and differences due to harvest frequency. Biogas yield is investigated through digestion tests in lab scale. The overall aim with the study is to quantify and highlight the value of wetland biomass and to show landowners how this can be included as part of a new business model." The second study (Anna) is focusing on the landowners' views of the large scale land use change connected to paludiculture as well as their business considerations connected to the changes. Through interviews information on motives, barriers, perceived threats and their willingness to change will be obtained. An open interview approach will be used with openness and flexibility to find both predicted and unpredicted information. The interviews will be steered into the issues of land use change connected to rewetting of peatlands and cover direct aspects such as financial, operative and practical issues. It will also contain more indirect aspects such as the landowners' willingness to make business changes, their view of their own possibilities to perform such changes and identification of knowledge gaps.

The studies are aiming at finding ideas and solutions that will increase the chances of establishing long-term landscape management of ecosystem service values for the landowners and the society. Based on the information obtained by the interviews, new business models will be developed in workshops including landowners and landscape managers. The business models will give a holistic view of values and value chains that the wetland can provide in the light of ecosystem services (such as production of biomass for bioenergy, climate and water regulation, recreation and nutrient cycling) and connect them with the ongoing agricultural business. We hope to get the possibility to gather part of our information in cooperation with partners within the CINDERELLA project, to learn and increase our understanding of how these business models can be developed to be useful in an international perspective.

News from Denmark (Hans Brix)

We are now in the process of harvesting our fertilization growth experiment. We have tested the growth of 7 different genotypes (4 *Phragmites*, 2 *Arundo* and 1 *Typha latifolia*). We have had the plants growing (5 replicates) at 5 different fertilization levels. We have measured some growth parameters throughout the summer, and also gas-exchange (Pmax) and pigments at peak biomass. We will later do more tissue analyses. We are now harvesting the plants to get biomass production. We did initially plan NOT to harvest the plants now, but to leave them until winter to be able to deliver winter stands to Linkøping for biogas tests. However, it turned out, that the amount of biomass we have in many of particularly the low fertilization treatments are too low to be able to deliver enough material for the biogas tests. Hence, we decided to harvest everything now to estimate biomass production. For the biogas tests, we will set up a fertilization experiment again next spring, but with fewer fertilization levels and maybe also only a subset of the genotypes, but with more plant material. Hence, we foresee to be able to deliver plant material for the biogas tests next year. I hope this will be OK?

For the field studies, we have two sites: Branbrand Lake with *Phragmites* and Egå Lake with *Typha latifolia*. We have chosen stands where *Phragmites* and *Typha* are the dominant species and the biomass of the other species is insignificant (there is only a bit of *Carex* in some of the *Typha* plots). We have sampled soil cores, interstitial water and biomass following the instructions we have received from Christian (NL). We will send all to NL for the analyses. The soil cores are of 20 cm. We

did not manage to take deeper samples with our corers (Christian wanted one 1m-core for each site in addition to the 20 cm-cores). We need to buy a new corer. Christian: can you tell us the supplier of the D-core you are using?

News from Netherlands (Christian Fritz & Jeroen Geurts)

The work on the pilot project "Paludicultuur in Zegveld" (WP4 & WP 5) took a great deal of time. 4 potential paludi-crops have been planted on 0,2 ha at two water levels: *Phragmites*, *Typha lat.*, *Salix ssp* & *Miscanthus* with 4 replicates per water table. This means that in total 32 plots have been installed. More than 8000 plants have been planted by hand.

The only small downer was that the farmer could not manage during summer time to inundate the sites totally. This seems to be the main reason why *Miscanthus* & *Typha* did not grow very good because it was too dry. Also the quality of the plant material played some role. Especially the *Typha* plants which have been raised at University and planted in the field grow magnificent and can compete with weeds.

In respect to awareness raising several activities can be reported: Symposium in Boskop was marked by paludiculture (newspaper article available as PDF). Several presentations have been given.

The contact with Hanze Wetlands is much alive. 2 sites from Hanze Wetlands have been sampled the 10th of September. The investigations here (measurements, sampling) should be coordinated by WP 6 in Greifswald.

We have done a small trial for response of young *T. latifolia* to nutrients (NPK) and soil type. The results are very clear. We will update our field activities and experiments this week. We are still in the process of harvesting.

Biomass for biogas: Based on our field surveys and rewetting of former agricultural sites and nature conservation sites Nijmegen can provide a rough estimate of the lower thresholds for nutrient availability. From my perspective it is not necessary to go too low because *Typha* may become overgrown there anyway. So biomass supply would be low and *Typha* may disappear after some seasons anyway. Let's keep in touch about coming months. Yes we will make resources available to analyse them for a range of nutrient fractions. Please let us discuss which fractions you have considered in earlier research with *Phragmites* so that we can compare (to some extent).

Shipment of samples: Claudia in Greifswald ships them by cooled transport (+2 to +7). For most samples that is fine. Shipping them frozen is better but probably more costly and it is questionable whether that reduces substantially variation in soil chemistry deriving from transport.

D-section corer: Easiest would Eijkelkamp <https://en.eijkelkamp.com/products/augering-soil-sampling-equipment/peat-sampler.html> . It's good quality and easy to use. The prices are, however, shocking. You can also hire them from a local supplier. In the Netherlands we can also hire equipment at Boels. They also have coring devices (don't know about D-section corers though). Does Greifswald have a cheaper source? The corer is called 'Russian' or 'polish' peat sampler. Maybe that saves a few thousand €. By the way deeper samples can always be taken later. Biogeochemistry below the zone of high root density is somewhat slow.

Important: Are you sampling soils from fertilization experiment? In March we discussed that the experimental garden can be regarded as a Danish core site. Environmental gradients in there are obviously very steep. The easiest for WP 2 & WP 5 would be to have analysed the same set of parameters when it comes to soil chemistry. Please let me know what might be feasible. In fact, I regret that I can't just take the train to Aarhus to assist for soil and root sampling or other laborious tasks.

News from Greifswald

Data Base on organic soils and paludiculture potential in project countries

The paludiculture potential analysis will concentrate on area potential, economic and technical potential will not be considered for now. With the help of our project partners we collected geo-spatial data for the Netherlands, Germany and Denmark, for Sweden it is not that easy maybe we will only analyse smaller regional sites. The data of the different countries differ in accuracy, format and completeness and we have to decide how to unify the data for comparable analysis. Currently we are thinking about a deeper analysis for the north of Denmark (Alex Barthelmes and Cosima Tegetmeyer).

Field week

During the project field week (24th -27th of August) Christian Fritz, his coworker Peter (both from Nijmegen), Claudia und student assistant Max have been on sampling tour in Mecklenburg Western Pomerania. Several nice *Typha*-stands nearby Greifswald could be located for further investigations. The weather was optimal for sampling and for good spirits. Many of the investigated sites are normally inundated during summer but lay dry in this season as this year seems to have been a very dry one, at least in Northeastern Germany. Ideally several sites could be detected where Common Reed as well as *Typha latifolia* are near to each other which is optimal for further regular sampling. In total during this field week and in the following days during September 5 Reed and 5 *Typha*-stands could be sampled. At each site biomass samples were taken in a central plot of 1m². Additionally four smaller subplots of 0.25 m² have been harvested for a mixed sample. In parallel soil samples were taken from the central plots (up to one meter depth) in different sections. This will make possible to describe soil characteristics on one hand, and to take pore water samples with some small lysimeters for analysis of nutrients on the other hand. On some sites we sampled pore water in different depth but it seems to be too dry to get enough water in every section. At two *Typha*-sites 8-9m² were mown and the biomass was taken away, to investigate on effects of continued mowing regime during the next years (Claudia Oehmke). In the next summer the sampling will be repeated.

Integration into national legal and policy contexts

Peatlands are often considered as marginal land where land use decisions are strongly influenced by subsidies provided by the EU Common Agricultural Policy or further national incentives. Wet peatlands and their associated ecosystems, have, however, become rare in many European countries (e. g. Germany, Netherlands and Denmark), and their utilisation is strongly regulated by law (nature conservation law in particular). This task analyses and compares the judicial and political framework

in participating countries in order to assess their implications for establishing and using paludicultures, especially on formerly drained peatlands (Laura Kölsch).

Overview: Paludiculture and Law

Helpful for a clear legal analysis of paludiculture its division into three sectors is helpful: area preparation, cultivation and biomass utilisation. These sectors touch on many legal areas, mainly pertaining to water, land, nature conservation and agri-environment law. These judicial areas comprise legal constraints and loopholes, due to the fact that the climate-friendly use of organic soil through paludiculture has hardly been considered in national or European law. On the other hand, some vegetation types, e.g. reed beds, can be protected under nature conservation law as habitats and ecosystems and consequently paludiculture may also touch upon the legal aspects of biodiversity conservation. The biomass use can challenge regulations on the prevention of air pollution.

It is necessary to gain/obtain a basic understanding on how these areas are regulated in Germany, Denmark, Sweden and the Netherlands. Then fostering and hampering conditions must be analysed to finally give recommendations on the implementation of paludiculture.

Research topics

Area preparation: Regulations on the permanent raise of the water level, maybe by means of water (de)construction measures (water law, nature conservation law, regulations on the conversation of permanent grassland).

What administrative procedures (involving which stakeholders) apply to these water related preparations for paludiculture areas?

Cultivation: Compatibility of paludiculture with nature conservation law (protected areas, species protection etc.).

EU Common Agricultural Policy (CAP): availability of support payments for paludiculture areas (direct payments according to EU Regulation 1307/2013, payments for Rural development (2nd CAP Pillar according to EU Regulation 1305/2013), e.g. payments for agri-environment-climate measures, support for investments etc.)?

biomass utilisation: Regulations on the admission of relevant power plants and on emission restrictions regarding the combustion of paludiculture or comparable biomass. Availability of support measures for electricity and/or heat production from renewable sources (e.g. by grants, subsidies).

Methods / state of work: Collecting the different national regulations has been more challenging than expected. The web search for English translations was hardly successful. Only few, often outdated translations of acts and regulations exist. Due to the language barrier the use of legal databases was nearly impossible. Therefore information had to be gathered by contacting relevant ministries (Justice, Nature Conservation, Agriculture, Environment). These requests have had some success, in parts the necessary information is not yet available.

Subsequent to the pre-selection of the relevant parts of regulations their translation from Dutch, Swedish and Danish into German respectively English (student assistants) has started in August and will presumably be completed until November 2015. Analysis and recommendations have to be delivered until 31st of March 2016.

Needed support from the partners in NL, DK and SE:

The recommendation of people who are legally educated in the relevant fields would be very helpful!

Draft AGENDA

Closing Conference of the Europe Aid funded project
“Implementation of new concepts for wet peatland management for the sustainable production of biomass-based energy (wetland energy)”

17-18 November 2015
Minsk, Lida/Belarus

Tuesday, November 17

Venue: National Library of Belarus, 116 Independence av., Minsk

09:00 Registration and internal welcomes

by Aleg Sivagrakau (Project Coordinator, International Sakharov Environmental Institute of Belarusian State University)

Wendelin Wichtmann (Project Coordinator, Michael Succow Foundation for the Protection of Nature, Germany)

Larisa Ushkova (Project Manager, International Sakharov Environmental Institute of Belarusian State University)

09:45 Opening ceremony. Welcome speeches (5 min each) and project specific aspects

1. Welcome, project results, further perspectives for EU funding in Belarus

by Elena Rakova, Delegation of the European Union to Belarus

2. Welcome from the Ministry of Education of the Republic of Belarus

Ministry of Education of the Republic of Belarus

3. GHG emissions reduction: state politics and measures

Ministry of Natural Resources and Environmental Protection of the Republic of Belarus

4. Peatlands, men, nature

by Prof. Michael Succow, Michael Succow Foundation for the Protection of Nature

5. Peatlands studies in Belarus – a basis for paludiculture

by Academician Alexander Karabanov, Institute for Nature Management of the National Academy of Sciences of the Republic of Belarus

6. Higher education and research activities for paludiculture

by Prof. Sergei Maskevich, International Sakharov Environmental Institute of Belarusian State University

7. The potential of biomass from wet peatlands for the energy supply in Belarus

by Beltopgaz representative

10:30 General talks/presentations (20 min each)

1. Peatlands and their role in environment/ Greifswald Mire Centre projects and activities for climate

by Prof. Hans Joosten, Michael Succow Foundation for the Protection of Nature

2. Development of peatlands in Belarus

by Academician Nikolai Bambalov / Nina Tanovitskaya / Alexander Kozulin, Institute for Nature Management of the National Academy of Sciences of the Republic of Belarus

3. Alternative energy demands in Belarus: chances for paludiculture

by Juri Skubin, Beltopgaz

**12:30-
13:30**

Lunch

**13:30-
15:15**

Presentations, Part I (15 min each)

1. Paludiculture worldwide – perspectives for Belarus + WE project short introduction

by Wendelin Wichtmann, Michael Succow Foundation for the Protection of Nature

and Aleg Sivagrakau, International Sakharov Environmental Institute of BSU

2. Practical issues of introduction of paludiculture for energy needs in Belarus - the project example

by Ivan Zaleski, Director of Lida Peat Factory

3. Peatlands investigated in 'Wetland Energy' project (productivity of biomass in wet peatlands)

by Viacheslav Rakovich/Nina Tanovitskaya/Olga Ratnikova/Nikolai Bambalov, Institute for Nature Management of the National Academy of Sciences of the Republic of Belarus

4. Suitability of biomass from wet peatlands for production of briquettes and pellets

by Vasili Pashinski / Sergei Golovatij / Sergei Kuchur / Sergei Pazniak / Ch. Romanovski / Andrei Butsko, International Sakharov Environmental Institute of BSU

5. Machines suitable for harvesting wet peatlands and pellets (briquettes) production from wetland biomass

by Prof. Semjon Kundas, Belarusian National Technical University / Nikolai Vaitsehovich, International Sakharov Environmental Institute of BSU

**15:30-
15:45**

Coffee break

**15:45-
17:15**

Presentations, Part 2 (15 min each)

1. Rural development and energy production from wetlands (socio-economic aspects)

by Leonid Mastsiuhin / Aleg Sivagrakau / Uladzimir Yelsukou / Volha Shuleika

2. Reorientation of peat factories from fossils to renewables

by Andreas Haberl, Michael Succow Foundation for the Protection of Nature

3. Life cycle assessment of paludiculture in Belarus

by Aleh Rodzkin, Center "Ecology" of the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus

4. Vegetation management and GHG emissions

by Andrej Burlo / Nadzeja Liachinskaya, The Scientific and Practical Center of the National Academy of Sciences of Belarus for Bioresources

5. Perspectives and Conclusions

by Wendelin Wichtmann / Andreas Haberl

Discussion on perspectives of paludiculture by peat factories

by everyone

18:00-19:00 **Project Steering Committee meeting**

Members of the Steering Committee

19:30 **Joint Dinner (Steering Committee)**

Wednesday, November 18

Venue: Lida/Dokudovskoe

07:00 **Leave from Minsk**

09:30 **Presentation of the project to public (aims, activities, results), press release distribution**

by Aleg Sivagrakau, Viacheslav Rakovich, and other staff of project

10:30 **Visit to harvesting sites in the peatlands**

12:00 **Opening ceremony of Briquetting/Pelleting facilities**

Welcome speeches from:

*Elena Rakova, Delegation of the European Union to Belarus
Ministry of Education of the Republic of Belarus
Ministry of Natural Resources and Environmental Protection of the Republic of Belarus
Michael Succow, Michael Succow Foundation
Juri Skubin, Beltopgaz / Ministry of Energetic of the Republic of Belarus
Lida / or Grodna Administration
Ivan Zaleski, Lida Peat Factory*

12:45 **Final Remarks, Closing of the Conference**