CLEARANCE Workshop

on September 14th, 2018

in Aarhus, Denmark

Draft Workshop report by Kläre Enßlin and Michael Bender

Lene Moth:

Lene Moth introduced the audience to the importance of cooperating with local farmers when it comes to paludiculture. She works for the only municipality and farmers organization in Denmark. She finds it important that the local authorities in Denmark implement methods to reduce nutrient leaching. Wetland restoration seems like a simple concept: you just have to find the right spot and stop the pumps. But most of the land where soil is drained is owned by farmers. And they of course risk a loss of income by restoring the wetland. So Moth started a real estate survey to cover the farmers positions on this matter. While noticing that most of the farmers were either not interested or not even informed about the possibility of installing wetland buffer zones, she also realized that the only way of reaching the farmers is to talk to them face-to-face.

It is understandable that the landowners expect compensation for the land they are losing. In Denmark they can either sell it or keep it and get compensation.

Lene Moth also named a wetland example: the Heager A-Folling Baeck, which was restored from 2010-2017. The land covered 46ha, owned by 14 different farmers. Moth explained that most of the time 7 years were needed to negotiate with the farmers. Afterwards they stopped all the drain systems by disconnecting two pipes. Also, they had to reinforce the dykes, because fish like sea trout and salmon have trouble crossing big lakes.

Recommendation: Be patient, meet the farmer face to face, don't make promises you can't keep.

Jesper Blaabjerg:

Moths college, Jesper Blaabjerg started by explaining his company, which is an agricultural agency located in Tonder, Denmark. Their objective is to create 13,000 ha wetland from 2016 – 2021 with a budget of 1.6 billion Danish krones. Moths and his job is to convince the farmers to participate in the project. The process is as follows: first stands of course the idea which land one could use. A pre-investigation follows and a public meeting with the landowners committee is organized. A land valuation together with the farmers and land consolidation follows. After the commission has given it's consent, the restoration can start.

There are different ways to come up with compensation for the farmers. One way is to offer them additional land consolidation in exchange for the land which is needed for the installation of the

wetland buffer zone. Many farmers own separated parts of lands, because it was not possible for them to buy the land in between. But in fact is it more efficient for them to own land located closely together. There is also the possibility of keeping the land, but receiving the income loss over 20 years, paid by the government. When they decide to sell the land, the contract always includes a "buy-back-option". The price is of course way lower than the price they sold the land for.

The selling is handled by the land consolidation agency, because they then can handle the trade in one document and one process. The land valuation is handled by the land owners committee, the local consultant, the Danish agricultural agency and the farmers together. The agency searches for the best land in the area, rates it "100" and evaluates its price. That land is used as a scale for all the other parts in the area that need to be consolidated. They evaluate the land parts together with the farmers, which is also a good way to connect.

The farmers do indeed get a lot out of this: they can exchange poor land against good land, acquire additional lands close to theirs and contribute to the common goal of restoring nature. And still some farmers want to keep the land, because they either want to use it for hunting, don't see the advantages of wetlands and see them as a waste of money, demand unduly high prices or the substitute land which would be interesting is just not available.

After those two presentations, the audience had quite a few questions. Of very high interest was for example who was responsible for the management of the wetland after the project was finished. The answer was that the land is still privately owned – either by the farmer who kept it, sold back or sold to someone new. The private owner is completely responsible for the land, but there is a declaration that it has to remain wetland forever. There is no other agreement on active management. Funds from the EU (5 %) and the Danish government (25 %) are available for the farmers (the money they get during the 20 years), but not always used to manage the wetlands. The audience suggested that one could allocate money to manage the use of wetlands. They should be more multifunctional.

Then the conversation turned towards paludiculture and the possible use of wetland harvesting for the production of biogas. Apparently there is a discussion going on in Denmark about the restrictions and controls that would have to be initiated for paludiculture.

The rivers are managed by the local authorities. They restore the river and decide on restrictions and criteria. But what happens if the river lands are not managed and turn into forest? Moth and Blaabjerg don't see that as a problem, just as a nature conservation issue in terms of biodiversity. They did indicate though, that there is discussion going on about whether the land should be kept open or one should allow forest to grow on it.

Another question was whether exact measurements are needed to protect buildings. Blaabjerg explained that there can be occasional problems when it comes to protecting old houses, but wetlands are mostly far out on the countryside.

The discussion ended with a final suggestion from the audience, to carry out a survey after the project is finished to question the farmer if he is satisfied with how everything went and the outcome

itself. In the best case, that survey could be used to convince other farmers to also voluntarily join the project.

Carl Hoffmann:

In the following presentation Carl Hoffmann, professor of the University of Aarhus, gave the audience input on the functioning of wetland buffer zones and their capacity for nutrient removal. There is a Danish monitoring program, established by the EU, focusing on the hydrological and biological interplay between river and river valley. This program encourages managing the retention of phosphorous by turning agricultural land into wetland. There are different types of projects to do so. The first is irrigation with drainage water to help getting rid of the nutrients in drainage water. Another way of managing the retention of nutrients is giving the river back its natural landscape which leads to inundation of floodplains and riparian areas. That would mean that all natural processes have been restored. The restoration of shallow lakes is another project included in the program. The program in general means to restore the hydrological processes. There is one quite famous example where an extremely polluted and drained running water, the river Skjern, covering an area of 2,200 ha was completely restored. It took about 20 years, but was then successful.

Wetlands have a high efficiency in removing nitrogen, which can get even higher when working with constructed wetlands. The river Brede for example often has problems with the leaking of phosphate. During the research study they found, using electromagnetic flow meters as tools, that in wet years there is a very high removal of nitrogen notable, whereas in dry years the leaching might be non-existent. Hoffmann forms the questions whether this indicates that the phosphorous retention is not as successful in dry years.

Hoffmann explained that the new ground water running from a stream flows at the surface. The ground is like clay, a condition called “Gyttja” in Danish. When you trace the flowline, there will be no nitrate at all, but sulfate increasing in concentration. That is because of the autotrophic denitrification. The sulfate flowing into the wetlands attacks toxic compounds containing phosphate. The released phosphate is consequently washed out.

The high removal of nitrate results in the release of a high amount of phosphate and in some cases also the release of iron. One can find them as actual plates of iron coming out of the ground.

Denitrification is also a matter of organic material. If there is no organic presence, there cannot be denitrification.

The question is though whether the long-term stability is at risk because of the high amount of nitrate.

There is a relationship between the stream discharge and the ground water. But it is only a small percentage of 5 to 7% of the landscape generated subsurface water flow that contributes to the stream discharge.

In the end Hoffmann stated, that he thinks the researchers are too optimistic regarding buffer zones and that more technical solutions are necessary.

Conclusions: the long term stability is in question, nutrient loads are still to high, the description of the soil profile is important

John Strand:

The contributor was John Strand, coming from Sweden. He said that the problem with constructive wetlands is, that they are only cost efficient, if there is a large hydrological load. In the best case scenario the wetland buffer zone helps producing surface run-off. In Sweden they combined the ecosystem services of wetlands in terms of nutrient retention with the site of a traditional buffer zone. They opened the pipes, created a small ditch and then removed the top soil in the infiltration area. That way, there is no water coming directly from the field into the stream.

In Sweden, there are 15 integrated buffer zones 11 of those are part of the LIFE-Goodstream Project, Strand and his colleges are working on. 6 IBZ are located in Denmark, one in Scotland and one is to be established in Germany.

The problems of a stream without an integrated buffer zone are fish migration, floods, low biodiversity and eutrophication. With an IBZ the expected results are to lower the phosphorous concentration, that fish migration would be possible in the whole stream, that floods could be reduced and that biodiversity could be increased, in particular the salmon density. The LIFE-Goodstream Project runs from 2015 till 2021. To reach the desired results it needs about eight wetlands, 30 integrated buffer zones, 60 Creotopes, 500 nest boxes and one needs to remove all present migration barriers.

Once integrated, the buffer zones offer multifunctional purpose: recreational, biodiverse, agricultural, environmental and educational.

In the following discussion Strand explained that it is their goal to reduce the phosphorous concentration to less than 50 ug to reach the environmental objective.

When asked the question how the seasons influenced the process of the wetland buffer zone, Strand explained that they had so far only done their studies in summer. The Swedish state does not support the Project yet. But there is a discussion with the board of agriculture about a rural development program going on, so the farmers can get paid for using the IBZ.

When the nutrient retention time came up, Strand explained that 2 years after the buffer zones had been established, there was no increase of the efficiency notable. But he expects that the performance will be way higher when the wetland trees grow higher and that the period was too short to come to any conclusions.

Then the audience and Strand started comparing the Swedish program with the Danish one. It was evaluated that the Swedish only take the nutrient concentrations (N and P) into consideration

whereas the Danes compare a lot of different parameters. Also the Danes study their wetland buffer zones throughout the whole year, while the Swedish only perform their studies in summer. That is because in Denmark only some winters bring frost, but mostly it is just wet. So the drainage water coming out is still about 8 degrees warm, which is enough for denitrification. Denitrification can happen down to zero degrees.

There was another question whether there was still any drainage or just natural flow in the Swedish wetlands. Strand explained that there is an outlet well with a system to adjust the water level, which the farmer is able to use.

www.wetlands.se

Marek Giergicny:

Giergicny, a polish contributor talked about their research to evaluate the economic value of wetland buffer zones. He defined the economic value as the consumers aggregated willingness to pay. Therefore they used the revealed preferences method where peoples choices are observed in actual market situations. Market economy will not provide comprehensive date for the economic evaluation, however as ecosystem services are public goods and many environmental goods are not traded in the market! Thus the stated preferences method will be used asking for the perception of attributes connected to vegetation and riverbed type with regard to the recreational value.

The so called “Questionnaire” is supposed to find out how important rivers are to the people in terms of recreational value by asking about which rivers they have yet visited and what the attributes affected the “consumers”. The questionnaire will show people attributes related to the river type and attributes related to the wetland type and they can then choose which ones they prefer. There are of course informed about the importance of wetland buffer zones beforehand. Each country would or will receive the same questionnaire and 300 people - representative samples of different ages, genders, etc. – will be consulted. The Polish want to establish this program for they think it necessary for the new wetland program to be financed by additional tax. This additional tax would be calculated by what the people are willing to pay for the buffer zones. So it would be a cost – benefit analysis.

The discussion was filled with different inputs on how the pictures representing the different types of rivers and wetland should look like and what perspective should be chosen.

Claudia Oehmke:

Claudia Oehmke, from the University of Greifswald gave a broad introduction on the CLEARANCE Project. Drained peatlands, she explained, have enormous greenhouse emissions and also lead to subsidence, a word which describes the loss of soil. Studies of the University of Greifswald have found Paludiculture – which can be described as wet agriculture – to be a good alternative solution to those problems. It is also internationally recognized.

The ecosystem services of paludiculture are for example that the GHG emissions can be reduced. Also, water and nutrient retention are enhanced, it preserves peat soils as agricultural land and promotes flood protection.

The biomass produced by paludiculture can be used in various ways. First of all it can be used to produce energy with the help of biomass heating plants. It can also be used as an actual material for the insolation of houses for example. This material is even better than conventional material, because it is biodegradable and can thus be recycled by composting. Also it can be used as a fertilizer for biogas production.

Although paludiculture offers all these aspects, a large-scale implementation is still difficult. The demand is that the EU member states raise more awareness for paludiculture. The polluter pays and producer responsibility principle should be advertised more.

In the discussion the first question was how one could dry the biomass material. Oehmke explained, that they often pre-dry it in a hall, so they just let it dry naturally. If you harvest in winter, the plants will only contain 20 % water, so the process is even quicker. There is still a lot of discussion going on about which plants to subsidize. Typha – cattail – for example is fire-resistant and could therefore be used as insulation material.

Also, there are some undeniable difficulties with the use of biomass for the production of energy. First of all, heating plants are expensive. Secondly, by burning the biomass one loses their nutrients.

In Denmark buffer strips were already implemented once, but because that happened everywhere – even in flat areas where they were not supposed to be – it went wrong. Due to this, the public opinion in Denmark concerning buffer zones is a little prejudiced.

Nevertheless biogas production is a possibility. One could take the protein out and burn it for biogas production to gain a higher value. Typha for example, contains quite a lot of protein.

A point that everyone agreed on in the end: we have to look for synergies and we have to do it on a larger scale. That is why more support is needed. Publishing guidelines where all the knowledge is combined and structures would not only raise awareness, but could also help small companies that have already started working with paludiculture and even started producing machines for this particular harvest.

www.greifswaldmoor.de

www.paludiculture.com (machinery)

www.moorwissen.de/en/paludikultur.php

Title Photo: River Odense project site, Frank Bondgaard, SEGES