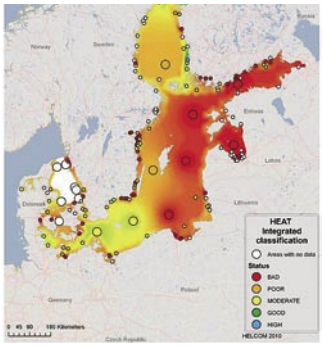
GRÜNE LIGA Netzwerk Ökologischer Bewegungen

Wetlands for Clear Water

Why Wetlands? – Background

Wetlands can be regarded as the **"kidneys of the landscape"** as they filter water and balance the water budget. In the context of river basin management for Baltic Sea tributaries, wetlands can play an important role in reducing diffuse nutrient inputs from agriculture. This is reflected in many water and marine protection policies, from the Water Framework Directive (WFD) to the HELCOM Baltic Sea Action Plan to – most recently – the EU Strategy for the Baltic Sea Region. But although wetland management is part of several policies, it is not sufficiently addressed on a strategic level, e.g. in the *Baltic River Basin Management Plans*. There is an urgent need for action and for strategic goals.



The whole Baltic Sea except the open Bothnian Bay and certain coastal areas in the Gulf of Bothnia were affected by eutrophication during 2003–2007 (HEAT: HELCOM Eutrophication Assessment Tool).

Eutrophication is, along with overfishing, the most severe environmental problem of the Baltic Sea. Baltic rivers carry large amounts of nutrients. *About 70% of the nitrogen inputs and 44% of the phosphorus inputs originate from diffuse sources*, mainly from agricultural lands. The resulting eutrophication of coastal and marine waters leads to algal blooms which deteriorate marine habitats through drastically decreased water transparency and oxygen depletion. The HELCOM Baltic Sea Action states the goal of **"a Baltic Sea unaffected by eutrophication"** and addresses the need for action in its programmatic "clear water" objective.
Throughout Europe, eutrophication of groundwater, rivers, lakes and coastal waters is a major environmental problem with an ecological, economical and sociocultural dimension.

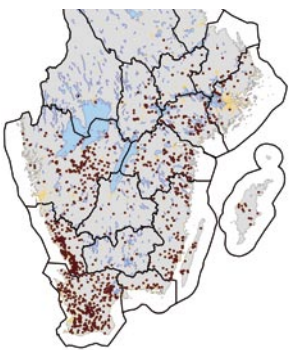
The conference **Wetlands for Clear Water** held by GRÜNE LIGA in Greifswald on 24th of March 2011 addressed the question *how wetland management can become operational for achieving the "clear water" objective* of the HELCOM Baltic Sea Action Plan, particularly in Germany, Poland and the Baltic countries. Presentations and conference documents are available on http://www.wrrl-info.de.

Constructed Wetlands in the Agricultural Landscape – Experiences from Sweden

Swedish experiences with wetlands in the agricultural landscape were presented by John Strand from the Rural Economic and Agricultural Society of Halland and the Wetlands Research Center of Halmstad University. In Sweden, the concept of using wetlands for nutrient reduction was introduced and put into practice in the early 1990s specifically to tackle eutrophication in a bay of the Skagerrak coast. After initial reservations in the farming community, a decade of positive experiences with the concept brought about a high acceptance for wetland restoration and creation. Among the key factors for the success of the concept were **sufficient funding opportunities along with long term management contracts, professional planning, consultation and communication as well as clear objectives** set by agricultural authorities.

A large number of created wetlands have been integrated in the agricultural landscape of Southern Sweden with the aim to reduce eutrophication in lakes and sea. The goal set by the Swedish Board of Agriculture was to create a total wetland area of 12,000 ha by 2010 with 200 kg N-reduction per ha and year. As of 2011, approximately 7,600 ha are realised.

Research on over a thousand wetlands constructed between 1996 and 2002 has shown that wetlands in the right location can retain up to 1,000 kg of nitrogen per ha wetland area and year. The average nutrient retention capacity, however, is less than 100 kg N per ha and year, which is only 50% of the goal stated by the Swedish Board for Agriculture. Retention depends on the flow. Samples must therefore be taken according to the water flow in order not to overestimate the retention effects. Wetlands function as nutrient traps as incoming water is purified by denitrification processes where nitrate is transformed into nitrogen gas and as phosphorus accumulates in the sediment. Additionally, constructed wetlands contribute to increased biodiversity, provide storage of water for irrigation or act as storage basins to reduce flooding. To be cost-effective, constructed wetlands need to be properly located.



Distribution of constructed wetlands (red) in Southern Sweden. Map: DAWA 2010, Swedish Board of Agriculture

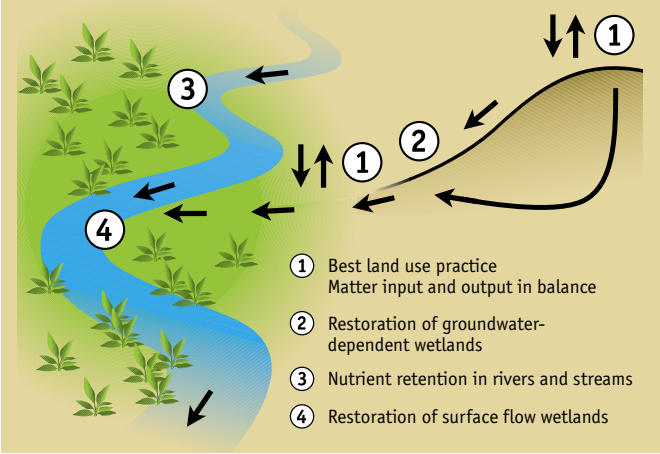
Wetlands for Clear Water

Wetland strategies in Germany

Wera Leujak from the Federal Environment Agency pointed out that wetlands can help in combating eutrophication, in particular nutrient losses from diffuse sources, but they should be regarded one of a number of possible measures and should not be seen as a substitute for combating eutrophication at source.

Based on extensive experience and research in the state of Schleswig-Holstein, Michael Trepel from the State Agency for Environment, Agriculture and Rural Areas and Kiel University made a clear case that **"wetland rehabilitation is a cost-effective strategy for reducing nutrient loads to the sea, if the measures are part of a wider nutrient management strategy"**. Maintaining and improving water quality is often a prerequisite for successful ecosystem restoration.

Ecohydrological management strategies with the aim to reduce nutrient losses within a catchment need a flow-path oriented management: Following an analysis of where nutrients come from, it is necessary to **reduce nutrients from important pathways first**. This can be achieved not only through the reduction of point and diffuse sources, but also through improved retention. There are four starting points for improving retention:



Source: Michael Trepel (adapted)

An analysis of nutrient retention through wetland restoration in the Upper Eider valley showed **significant reduction rates:** NO_3-N: -33,2%, total N: -30%; PO_4-P: -21,5%, total P: -15,4%. Experience from Schleswig-Holstein suggests a mean phosphorus retention in rivers and wetlands of 10 kg per hectare as a conservative estimate.

Cost-effectiveness of a large number of wetland restoration was calculated with WETTRANS, a flow-path-oriented model for calculating nitrogen retention (www.wettrans.org): Retention costs very often lie in the range of 5–10 or 10–20 Euro per kg N-removal, which can be far less costly than further investments in waste water treatment (estimated at 17–66 Euro per kg N-removal).

Since 2000, more than 139 projects were initiated and over 1,116 ha were rewetted in Schleswig-Holstein. A statewide analysis in Mecklenburg-Vorpommern showed that basins with a high proportion of lakes, wetlands and forests have low N-export rates, and that wetland conservation including buffer zones reduces nutrient loads.
Nevertheless, wetland restoration is not always straightforward concerning nutrient retention.

Research on carbon and phosphorus dynamics presented by Dominik Zak from Leibniz-Institute for Freshwater Ecology and Inland Fisheries in Berlin shows that when rewetted layers of highly degraded peat are most problematic in terms of phosphorus remobilization and release of dissolved organic carbon (DOC). In an example with a 30 cm layer of highly degraded peat, loss of mobile P was estimated at ~ 400 kg/ha over a period of 40 years. Therefore the removal of the topsoil with highly degraded peat is strongly recommended before rewetting because it significantly reduced such losses. This may substantially increase the costs of wetland restoration but also lead to better results in terms of biodiversity recovery. The deposition of removed topsoil needs careful consideration, one option is to fill drainage ditches.

Country reports from Poland and Lithuania

Poland

Prof. Lesław Wolejko from the Szczecin University presented examples of self rehabilitation of large wetlands in Western Poland. Restoration and self rehabilitation of large wetlands are possible at low cost and to be preferred over construction of new wetlands. The creation of artificial interest in marginal land through EU-CAP policy was identified as a key problem hampering further progress.

According to Patryk Chapinski from the Polish NGO Klub Przyrodnikow a large number of restoration projects have been realized by environmental NGOs. Compared to the situation in Germany there are still larger deficits in communication between farmers, environmental NGOs and the respective administrations.

Lithuania

Zenonas Gulbinas from Nature Heritage Fund referred to the new monograph "Lithuanian wetlands and their water protective importance" that was published in 2011. Presently, wetlands in Lithuania still occupy 16,373.8 km² or 25.09 % of the country's territory. Between 1955–1995, almost 50,000 ha of wetlands disappeared. In almost one hundred years of land reclamation in Lithuania, the total area of drained land has reached 3,021,400 ha (47% of the country's area) including 2,620,200 ha reclaimed by tile drainage. More than 1,200 ponds and water reservoirs have been built and 400 rivers have been dammed. Research has provided an estimate for restored wetland area needed on a national level and recommendations for selecting priority sites for restoration projects.

GRÜNE LIGA Conference Conclusions

1. Wetlands are indispensible for nutrient reduction in the Baltic Sea

Drainage, degradation and unadapted management of wetlands continue to cause significant harm to the Baltic Sea. More than 90% of all fens in the region were transformed into agricultural lands that emit large quantities of nutrients and CO_2.

Rewetting of fens is necessary to stop further peat mineralisation and to restore the important ecological function as nutrient filters in the long-term ("from source to sink"). In order to make targeted use of the nutrient retention capacity of wetlands, it is necessary to restore and reinstall *wetlands as functional units* throughout the landscape, as part of the farm infrastructure.

Cyanobacterial bloom (blue algae) in the Baltic Sea, summer 2010
Source: ESA - European Space Agency

2. Wetland measures need clear priorities

In general, first priority for wetland measures must be the protection of intact wetlands, followed by the restoration / rewetting of degraded wetlands along with adaptations in land use, and finally the creation of new wetlands.

3. Wetland strategies need a policy mix to be effective

Wetland strategies need a combination of policy instruments:

- command and control measures,
- correction of adverse economical incentives particularly in the Common Agricultural Policy (CAP),
- economic incentives (e.g. agri-environmental programs),
- planning instruments (particularly River Basin Management Plans)
- communication and information

4. Integrate wetlands strategies in River Basin Management Planning!

The insufficient inclusion of wetlands is a *major shortcoming* of the first River Basin Management Plans (RBMP's). Generally, the RBMPs only include such wetlands which are Natura 2000 sites. This practice has been criticized by environmental NGOs for a long time, and it is particularly unsuitable with respect to the nutrient retention capacity of wetlands. Secondly, no or very few explicit measures for wetlands are included in the plans, none of which specifically address nutrient reduction.

A better inclusion of wetlands in the RBMPs is therefore one of the most important requirements for the second planning cycle: **The second River Basin Management Plans have to integrate strategies to make wetlands operational for water and marine protection**. It should be kept in mind that wetland protection and rehabilitation are mentioned among the objectives in the recitals and in article 1 of the Water Framework Directive, and are specifically listed under the supplementary measures of Annex VI. Nutrient retention properties of wetlands can also play an important role in the implementation of the *Marine Strategy Framework Directive (MSFD)*.

5. Make use of the high cost-effectiveness of wetlands!

Evaluation of different wetland projects has shown that wetlands can be very cost-effective measures for nutrient reduction, which is highly relevant for the implementation of both WFD and MSFD. Calculations presented at the conference indicate that wetlands can be very cost-efficient in comparison with investments in urban wastewater infrastructure (in an example from Schleswig-Holstein, Germany).

The efficiency of wetlands is highly dependent on good planning, particularly regarding their location in the catchment. If planned wisely, wetlands are *more efficient in nutrient retention than buffer strips* as they provide higher retention capacity on a smaller area. Buffer strips on the other hand are crucial for ecosystem connectivity.

6. Factor in the wider environmental benefits of wetlands!

Estimates of benefits of wetland restoration should always take into account the *multiple environmental benefits* provided (climate, biodiversity, water balance). Moreover, the *social costs of continued drainage* of wetlands, particularly caused by CO_2 emissions, need to be quantified as a key factor in a wider cost-benefit analyses of wetland restoration or creation.
Planning should include a priorisation of measures in terms of multiple benefits.

7. Adapt and redesign agricultural policies for better wetland management!

The Common Agricultural Policy (CAP) of the EU provides both risks and opportunities for wetlands. However, negative incentives exacerbate the agricultural pressures on wetlands which by far outweigh positive elements of the agricultural policy. The current funding schemes of the CAP (area payments of the "first pillar") *create an artificial interest* in marginal lands. Wetland creation and adapted management should be *included in agri-environmental programs* of the member states (second pillar).

8. Learning from Sweden: Integrate wetlands in the agricultural landscape!

Experiences from Sweden illustrate the *key factors* for successful wetland strategies:

- strategic goals
- voluntary participation of farmers
- sufficient funding (creation and 20 year management contracts for farmers)
- professional consultation / planning
- wetland management in a catchment context / integrated in river basin management

9. Make use of existing "ecohydrological" planning and management tools!

Constructed wetlands in particular can have "end-of-pipe"- character and therefore need to be integrated into nutrient reduction strategies. With respect of the Baltic Sea nutrient retention in large drainage areas is more effective when the sites are close to the coastal area.

Dominik Zak: "Apart from uncertainties regarding the restoration time, we still need much more knowledge to answer the question: How many fens should be rewetted to mitigate the high non-point pollution of water courses?"

Restoration needs time. On the landscape level further research is needed to quantify the number and area of fens that must be rewetted in order to meet defined reduction objectives regarding the nutrient pollution from diffuse sources.

10. Support wetland strategies with economic instruments!

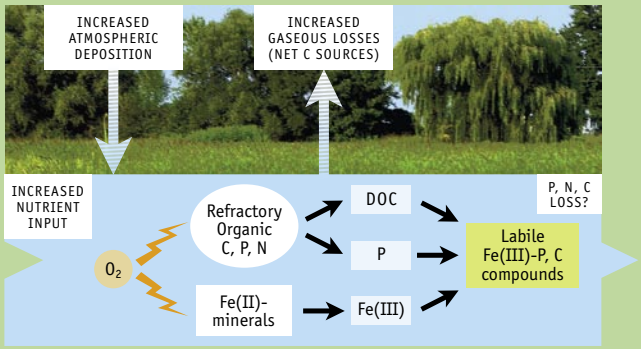
To address this issue in the planning process posing some questions might be supportive:

- Could a **peatland drainage fee** be an appropriate instrument to support wetland rehabilitation?
- Which new **funding instruments** could be useful?
- Does the concept of **Wetland Banking** provide an economic tool for the efficient allocation of wetlands and could wetland banking be integrated in agri-environmental programs?

11. Better wetland management needs communication and information

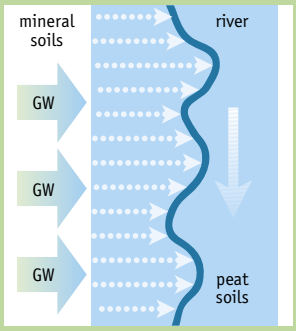
There is a great need to spread the wetland concept among those parties who are involved in farming, water management and environmental protection. In order to achieve better wetland management for nature and society in the Baltic Sea Region, it will be necessary to foster the dialogue between these stakeholders and to communicate the importance of wetlands. This might include a discussion on different levels and in different regions, transfer of information and good practice examples, excursions and presentation of model projects etc. Such processes can also assist administrations and decision makers and support the consultation and active involvement of all interested parties in policy and planning for better water and wetland management.

What is changed during the time of drainage?

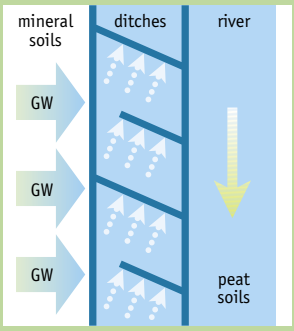


Peat loss & shrinkage (~ 10 – 20 mm/a)

Today nearly all "filters" are bypassed (< 90 %)



Natural fen acting as filter for groundwater (GW)



The loss of filter function due to fen drainage

Source: Dominik Zak (adapted)

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Coalition Clean Baltic

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