Baltic Sea Region
Programme 2007–2013

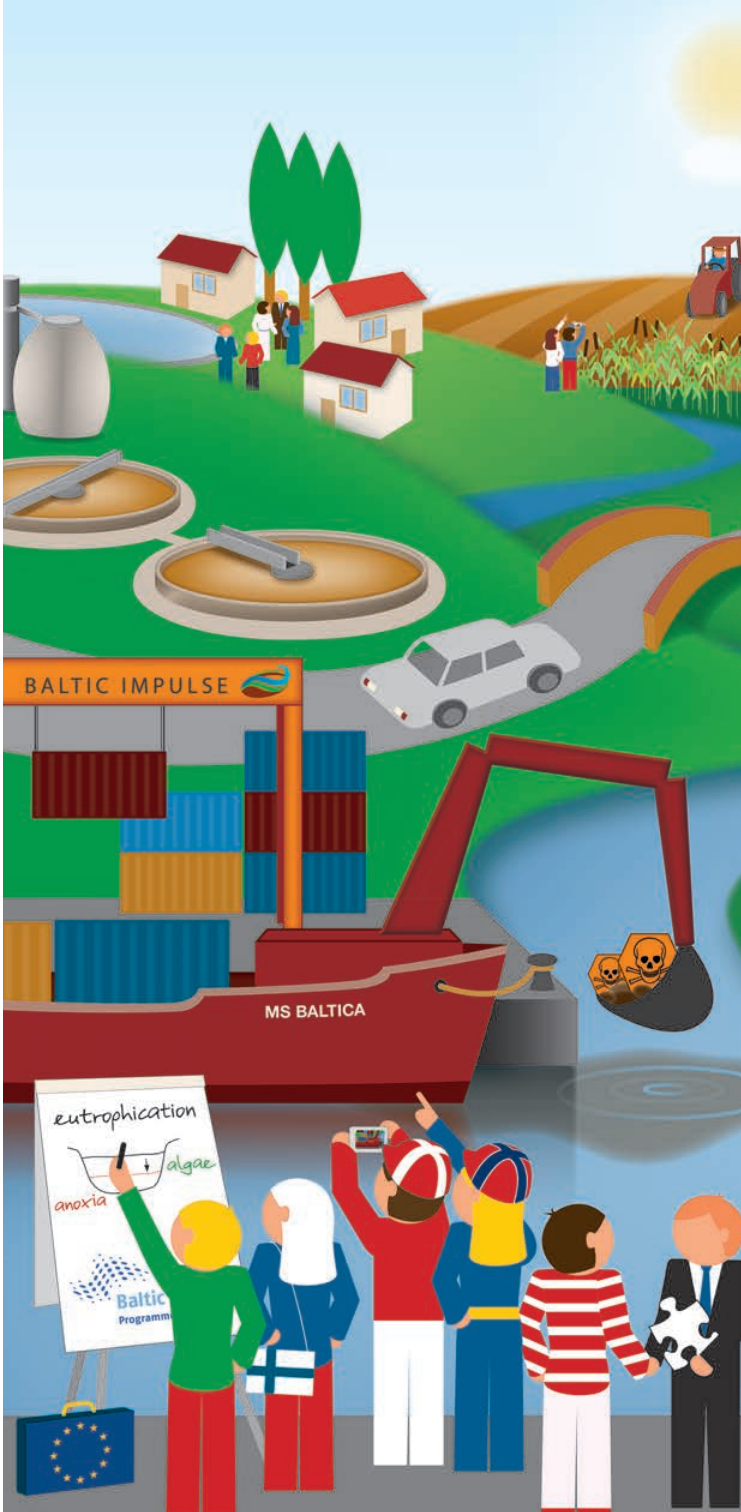
BALTIC IMPULSE – saving the Baltic Sea waters

Nine stories from projects tackeling eutrophication and hazardous substances

European Union

eu.baltic.net

Contents



Contributions to a better Baltic Sea water quality

Cooperation between countries and between multiple stakeholders are the key to saving the Baltic Sea from irreversible damage due to natural and man-made threats. This is particularly true for pollution by nutrients (eutrophication) and hazardous substances – both from the cities and the countryside. The guidelines and goals for cooperation have been set in the EU Strategy for the Baltic Sea Region and in the Baltic Sea Action Plan provided by HELCOM. The BSR Programme supports these goals by financing transnational projects that work towards the success of the whole region, with environmental issues as one of the priorities.

The environmental projects part-financed within the Baltic Sea Region Programme 2007-2013, formed a project cluster called Baltic Impulse. Baltic Impulse gathered together fifteen partners representing nine projects. An important part of the cluster work was to understand each other's achievements in depth. Partners then identified synergies between the projects, highlighted the bridging elements and identified gaps. Finally, they synthesised the findings and gained more visibility for the projects' results in general.

The cluster represents projects that have concentrated on waste water management (PURE, Presto), river basin management plans (Waterpraxis), contaminated sediments (SMOCS), hazardous substances (COHIBA) and agri-environmental issues (Baltic Compass, Baltic Manure, Baltic Deal, and Beras Implementation).

This brochure highlights typical challenges to regional development in the BSR and steps towards their resolution by telling some example stories from each of the projects.

Baltic Impulse cluster partners
and the Joint Technical
Secretariat team

Reducing nutrient and chemical pollution from cities

A substantial amount of the overall pollution to the Baltic Sea comes from cities – some of it from more than 500 kilometres away from the seashore. Pollution does not only come from factories, but also from regular households, from ports and many other places. Even though improvements have been made in emission control, good practice is not in place everywhere and innovative solutions are still in demand. We are presenting some selected problems dealt with in the projects of the Baltic Impulse cluster.

How to manage sludge from waste water treatment

"We've come a long way in water purification," says Jacek Skarbek, president of the Waste Water and Water Treatment Infrastructure Company of Gdansk. As a teenager back in the late 1980s he used to go to the beach near a Fishermen's village north of Gdynia with his friends. "Sometimes we couldn't go swimming because of microbes in the water or because of a thick green layer of algae," Jacek remembers.

Today, the majority of households around the Baltic Sea are connected to the waste water drainage system and many out of more than 3000 waste water treatment plants around the Baltic have been modernised. With treated waste water, most countries currently stay below the maximum phosphate concentration as defined in EU Directives. This is why the water looks much cleaner near Gdynia nowadays. Yet the overall water quality of the Baltic Sea remains a challenge.

Better waste water treatment increases sludge amounts

"We must halve the maximum allowable phosphate concentrations in treated waste water to 0.5 milligrams per litre if we want to reach a good environmental status by 2021," stresses Hannamaria Yliruusi from the Union of the Baltic Sea Cities. However, better phosphate removal from waste water creates more sewage sludge. And sludge is difficult and expensive to dispose of. Hannamaria, as an environmental manager and civil engineer, was eager to find solutions to this problem when she took over the coordination for the Project on Urban Reduction of Eutrophication (PURE) and met Jacek.

Jacek explains the dimensions of sludge production in Gdansk. The facility treats waste water generated by about 500,000 people and this produces more than 44,000 tons of sludge per year. That means 120 tons of dry solids every single day. Spreading untreated sewage sludge on agricultural fields is now forbidden in Poland. Some dried sludge can be used for soil improvement of contaminated areas, but Jacek would need almost 5000 hectares of contaminated land every year. "That's absolutely impossible", he says.

Baltic Sea beach near Gdynia.

Sludge will turn from waste to resource

To cope with the sludge problem, the first step was to build an in-

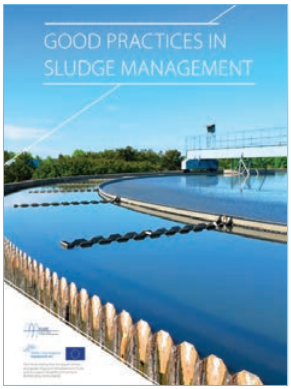
Gdansk Waste Water Treatment Plant © GIWK

cineration plant for burning sludge and generating energy. "This way, we kill bacteria and reduce the volume, but we still need to do something with the remaining ashes." One way would be to pay companies to use the ashes for road construction. But Jacek found a better solution during a PURE project visit to Lübeck. Some colleagues store the ashes to sell it to farmers as fertiliser, because phosphate mining deposits are gradually running out. "As soon as we have a profitable technique to process sludge ashes into fertiliser, sewage sludge will become a valuable resource," Jacek concludes.

But selling ashes from incineration is only one aspect of sludge handling that Hannamaria has collected together with Jacek and other representatives of wastewater treatment plants, municipalities and environmental authorities. She is convinced of the success of the project: "We want to be stricter than EU Directives, so we need voluntary actions at the grassroots levels. Many municipalities and companies are ready to join. A transnational initiative like PURE was the only option to get them started, and that's what we did."

Did you know...

... by 2021, we need to reduce the annual phosphate input to the Baltic by more than 15,000 tons per year according to the Baltic Sea Action Plan. This requires to reduce phosphate concentrations in treated sewage water below 0.5 milligram per litre instead of 1 milligram per litre as laid down in EU legislation. Within three years, the PURE project reduced the phosphorous load by more than 300 tons per year by improving waste water treatment in Gdansk, Riga, Brest and Jurmala and other cities in the Baltic Sea catchment area. The follow-up project PRESTO aims at a reduction of another 500 tons per year by 2014 through investments in waste water treatment plants specifically in Belarus.



The book Good practices in sludge management was published in English, German, Latvian, Polish and Russian
www.purebalticsea.eu/index.php/pure:materials

Conclusions:

Transnational knowledge exchange is crucial to implementing efficient treatment investments. In the future, both national and EU funds need to be allocated to capacity development and further reduce phosphorous loads, particularly in the Eastern parts of the Baltic Sea.

Good ways to deal with contaminated mud

Did you know that some chemicals are harmful enough to change an animals' sex? One of them is called tributyltin (TBT): It turns female snails into male ones. TBT also affects fish and possibly also humans. TBT is without doubt a hazardous substance. It was widespread in ship paints, because it keeps mussels from growing on ship hulls, until it was banned EU-wide in 2008.

Harbour dredging produces harmful sediments

Grazyna Sapota, assistant professor for ecotoxicology at the Maritime Institute in Gdańsk has measured quite high concentrations of TBT in the port of Gdynia: "TBT is a serious problem to the Gdynia port authority." Whenever the harbour channel has to be deepened, the question is: What to do with all the dredged material? Dumping the contaminated sediments into the sea is not allowed anywhere in the Baltic Sea. The only legal option in Poland is to store the sludge in sealed basins on land. But that's extremely costly.

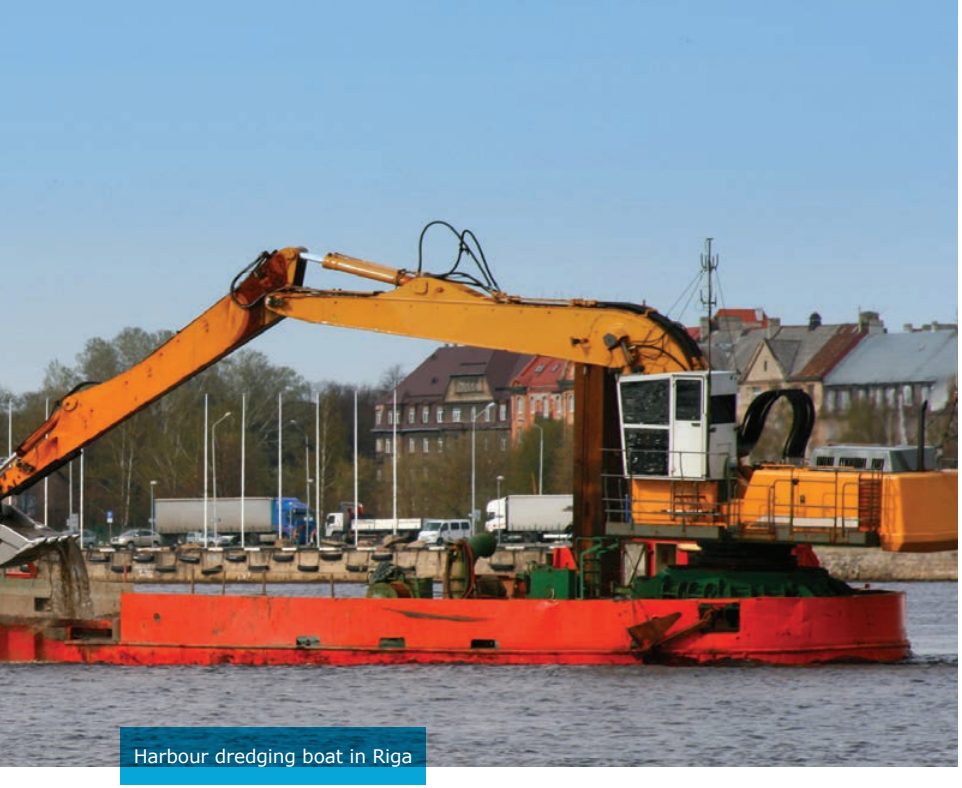
During a BSR Programme conference in Hamburg in 2007, Grazyna met a colleague from Luleå Technical University who told her about a new technology he called sediment stabilisation. The Swedish scientist was involved in preparations for a project about sustainable use of contaminated sediments (SMOCS). Grazyna spotted a great opportunity to work on a solution to the problem back in Poland. She convinced the Gdynia Port Authority to also join a transnational project for the first time.

Environmentally friendly handling techniques exist

Within the project, the Hamburg based ecotoxicologist Wolfgang Ahlf seeks to develop guidelines for the handling of contaminated sediments. Solidification is one of several options to handle contaminated harbour sludge described in the guidelines. By mixing contaminated sludge into concrete the right way, TBT is stored on a long-term basis in constructions

Did you know...

... how we determine if water or sediment is dangerous or not? Until recently, we measured individual substance concentrations and used threshold values to decide. But often individual substance concentrations were below the threshold, while the combined effect of several substances was still harmful. In modern management of hazardous substances, we therefore measure how microbes, plants and animals survive, grow or reproduce when exposed to contaminated water or sediment potentially containing several different substances. We call this approach bioscreening.



Harbour dredging boat in Riga

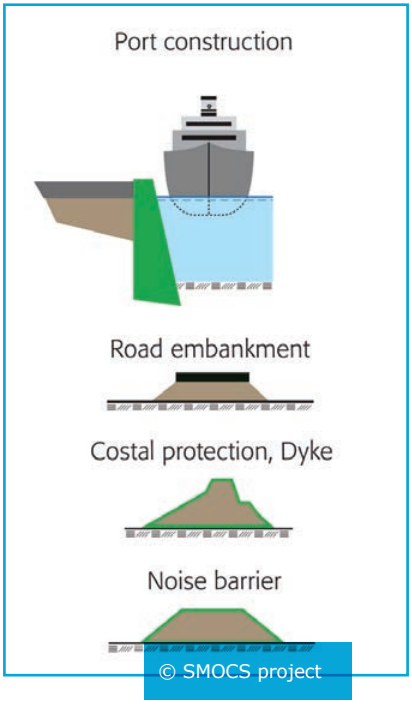
such as harbour banks, quays and parking lots, without any risk for the environment.

Wolfgang is proud of the joint result: "The guidelines use very high standards for sustainable management, because they meet the strict recommendations of HELCOM'S Baltic Sea Action Plan." Grazyna and her colleagues from the Gdynia Port Authority are now using the guidelines to push for new national regulations that allow the authorities to use the stabilisation technique for management of dredged harbour sediments.

Legal frameworks need improvement

And the guidelines will not only help Polish authorities: "Even years after its ban, you can find high concentrations of TBT in all harbour sediments near shipyards. So, in essence, all port authorities around the Baltic are facing similar challenges with their harbour sludge and can use the guidelines to find solutions."

Wolfgang stresses that SMOCS was extremely valuable: "The project gave the experts the opportunity to build bridges between different worlds: between biologists and engineers, between people from east and west and between researchers and authorities."



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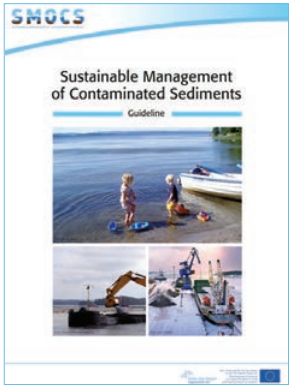


Guidelines on sustainable management of contaminated sediments
http://smocs.eu

What to do about harmful chemicals

Tributyltin (TBT) was banned from use when scientists revealed that it is highly toxic (see previous chapter). However, TBT is not the only problematic substance that has been shown to affect the hormone system of wildlife is octylphenol. Just like TBT, octylphenols are artificial substances. But, unlike TBT, octylphenol has not been banned from use, because it is much younger.

"We already measure octylphenols everywhere: in the mud at the bottom of the Baltic Sea, in mussels and even in the liver of Baltic fish", says limnologist Jukka Mehtonen from the Finnish Environment Institute. Scientists are not sure about specific effects of octylphenols on Baltic Sea wildlife, but researchers in the UK found effects on the reproductive organs in fish from rivers. "That's why we must be very cautious about this group of substances," Jukka warns.

New harmful chemicals need attention

Octylphenol was listed as one of the eleven most hazardous substances in the Baltic Sea Action Plan (BSAP) in 2007 - out of precaution. When the BSAP was written, scientists didn't even know exactly where octylphenol in the Baltic came from. Not even mentioning measures to control octylphenol emissions. And it is difficult to find out.

Octylphenol is a typical hazardous substance, Jukka explains: "You can't see it, you can't taste it, and you can't smell it – even when you know it's there." In the COHIBA project, scientists, authorities and industrial companies brought together a lot of scattered data from all over the Baltic Sea Region, reviewed a lot of literature and did modelling in order to really understand the sources of octylphenol and its effects.

Thorough analyses across borders are needed for management

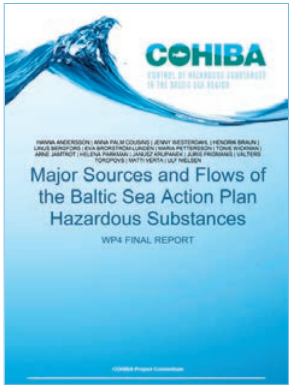
The experts did not only look at octylphenol and TBT but also mer-

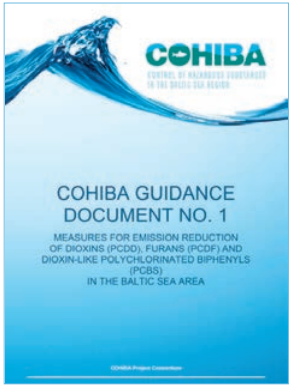
cury, cadmium, endosulfans and several other harmful chemicals. "Today, thanks to the COHIBA project, we don't only know where the most dangerous substances in the Baltic Sea come from, we also know how to measure them jointly, how to best get rid of them, and which authorities and industrial operators to involve", says Mikhail Durkin of the HELCOM Secretariat." Jukka stresses: "In order to reduce the threats by dangerous chemicals, each country around the Baltic Sea now needs to develop its own strategy to reduce emissions."

But why do you need a transnational project then? Jukka explains: "We had to get together to discuss, compare results and adapt methods in order to find the best available options for everyone around the Baltic." The methods to analyse hazardous substances are difficult. "If each country had prepared the same documents separately," Jukka explains, "the results would not be comparable at all. The management could not possibly be effective without such transnational work."

Countries need to implement management

For octylphenole, the COHIBA project established that octylphenole comes mainly from everyday goods. In particular it comes away from car tyres and is then washed through the soil to the rivers and to the sea. As you cannot apply technical solutions such as filters to prevent its emission, COHIBA recommends replacing octylphenol in products by less dangerous substances and ban its use altogether. For TBT it took many years to achieve a total ban. Jukka concludes: "If we want to achieve the goals set out in the BSAP by 2021, we need to be faster with octylphenol".





http://www.cohiba-project.net/publications/en_GB/publications/

Conclusions:

Bioscreening as a new technique should be implemented in monitoring of hazardous substances consistently all over the BSR. More funding for monitoring will be needed to implement such new valid methods.

Involving the public in solving water quality problems

The city of Łódź experienced a drinking water problem after 30 years of taking water from the nearby Sulejów reservoir. From the late 1990s, immense mats of algae were found on the shores every summer, sometimes connected with toxic blue-green algae. In 2004, the city had to change its water supply from the reservoir to groundwater. The city of Tomaszow Mazowiecki, however, draws its drinking water from this same reservoir but has to invest a lot to purify it with chlorine oxide.

Alexandra Ziemińska-Stolarska and other scientists from the Faculty of Process and Environmental Engineering at Łódź Technical University have been observing the decrease in water quality for years: "We knew the reasons for the extensive growth of algae: more and more nutrients enter through untreated waste waters from nearby weekend dachas and permanent houses which have been built in the last 15 years." The group of scientists decided to help improve the situation in 2008 when they joined the Waterpraxis project.

Not all households are yet connected to waste water systems

The researchers consulted the mayors of the neighbouring municipalities to find out how to help. While some of the municipalities had already allocated funding for improved sewage treatment, they identified one white spot on the map: Zarzecin in Mniszkow municipality. The goal for the pilot project became clear: to prepare an investment plan for improving sewage treatment in the municipality.

Inspired by similar planning processes carried out in other pilot areas of the Waterpraxis project, they set up a plan that involved engineers, local authorities as well as the local public. The reason for public involvement was simple: The municipality needed the financial support of the local people in order to build the connections to all

Did you know...

... that all EU member states have been working to reach a good ecological status in all lakes, rivers, coastal and even ground waters in Europe since 2000? The common quality standards and environmental targets for the management of freshwater and coastal water bodies are set by the EU Water Framework Directive (WFD). In order to reach the good ecological status, water management authorities have been preparing River Basin Management Plans and Programmes of Measures.

households. However, by Polish law you cannot force people to connect their houses to the sewage system. So householders needed to be persuaded to contribute.

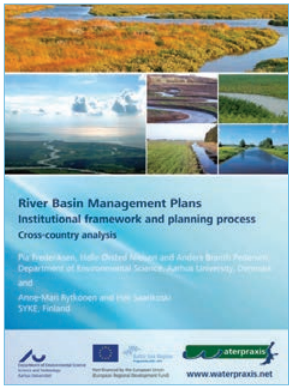
Involving citizens can help close the gaps

An engineering company outlined the first proposal for pipelines and a pumping station. Alexandra then organised two public meetings in 2011 with local residents. The scientists showed their analyses and the engineering company demonstrated where the sewage pipes would be placed. More than 120 residents joined the meeting and brought forward questions and concerns. In the end, concerns were allayed and almost all of the locals agreed to connect their houses to the sewage system. Alexandra looks back: "It is not common in Poland that authorities involve the general public in planning processes. But in our project we did, and it worked out. People appreciated that we actually wanted to help them. I'm glad we approached the project in this way."

In early 2012, the investment plan was finalised and presented at the Waterpraxis project's final seminar in Vilnius. After the end of the project the municipality was able to allocate funding by mid 2013 and in 2014 the sewage pipelines and pumps will be built. And even though the Baltic Sea is 400 kilometres away, it too will also profit. From the Sulejów reservoir the cleaner water will flow through Pilica river into Vistula river, which then pours into the Baltic.

Did you know...

... that water management authorities are obliged to involve municipalities, private companies, non-governmental organisations and other citizens in river basin planning and management? However, the Member States may decide when and how citizens are represented. A study carried out in the WATERPRAXIS project showed, that in BSR countries involvement opportunities have been restricted mainly to information and consultation, such as open information events and public hearings. Access to more active involvement, e.g. regional cooperation groups, was mostly limited to a few stakeholder representatives.



http://goo.gl/3o3L4l

Conclusions:

Without the commitment of citizens to the realisation of proposed management measures no significant improvements in water status can be achieved. It is therefore essential to motivate citizens to participate in water management by using multiple communication channels and focusing on local concerns and conditions.

Reducing nutrient pollution from the countryside

Nutrients entering the Baltic Sea waters from the countryside originate, to a large extent, in agriculture. In contrast to point sources, the management of diffuse sources is very difficult. In distinct places such as factories or households, we can apply filters, treatment or other technical solutions to retain nutrients – and this has been done successfully over the past decades. For the management of large areas such as agricultural fields, however, we need to find different solutions.

People around the Baltic Sea are increasingly aware of the strong effects that agriculture can exert on water quality in lakes and rivers, and even the sea. Many want to improve the situation. However, there are no agricultural measures to improve the ecological state that would suit everyone. Different circumstances need different approaches, and the exchange of experience across the region can help to bring the right measures to the right places.

© Compass project

Making agriculture more environmentally friendly

Did you know that grass sown in autumn reduces nutrient leakage to waters and eventually to the sea? The grass roots stabilise the soil and prevent it from being washed away by rain, wind or melting snow. This is one of the agri-environmental measures widely used in the Baltic Sea region countries. Such measures are designed to protect the environment on farmlands. Some of the measures are regulated by law and farmers have to implement them. Others are voluntary and national governments provide compensation to farmers for additional costs and missed income when farmers introduce these measures.

Agri-environmental measures can make a real difference

Numerous measures are known. Yet, they are currently not applied around the Baltic Sea Region because each BSR country has been developing agri-environmental support schemes differently. However, the Baltic COMPASS project reported that it is possible to improve the situation and revise the

existing support scheme: introduce new measures or strengthen the implementation of those already adopted. Ola Palm from JTI, the Swedish Institute of Agricultural and Environmental Engineering, shares: "If the measures are successfully implemented all over the region, this will make a real difference for the Baltic Sea."

The project partners identified 25 important agri-environmental measures that reduce nutrient leakage. Further, they analysed the status quo: are, and if so, how are these 25 measures currently implemented in the project countries? Ola explains: "Administrative frameworks in the countries are built up differently and sometimes it is hard to understand why some countries give prioritisation to some measures. It also means that the outcome of using agri-environmental measures in the BSR countries will be different." Furthermore, implementation of the regulated measures differs. While in some countries, all the measures are fully implemented in national law, in other countries, some are missing, or control is not so strict.

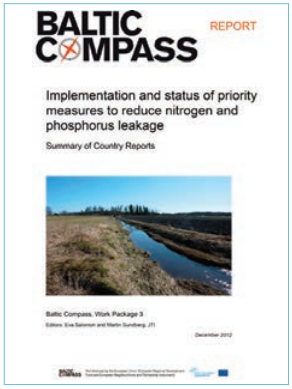
Watch "Farming for sustainable futures - a Baltic Tale"
http://goo.gl/v3tY0j

Agri-environmental measures need more support

One measure already mentioned is keeping grass on fields all year round. Another is the construction of wetlands. Large ponds with reed beds are designed and constructed to catch nutrients, e.g. nitrogen and phosphorus, and other pollutants from water running off the fields. Constructed wetlands have additional benefits such as improved biodiversity, water storage capacity, resource recovery and irrigation opportunities. Even though it is an effective measure to retain nutrients from the farmlands, it is only implemented in a few countries such as Estonia, Finland and Sweden. Other countries are still hesitant. Why? The reasons are the high investment costs, the reduction of arable land and the lack of awareness of the benefits.

This overview of agri-environmental measures and the status of their implementation help agricultural authorities, firstly, to understand why certain prioritisation is made and secondly what the results of this prioritisation are. Using it, they can revise existing regulations and support schemes.

This catalogue of 25 agri-environmental measures is also a helpful tool for agricultural advisory organisations. They can easily figure out the most efficient measures for their countries that have not yet been implemented and can give advice to farmers. When precious nutrients for plants are not lost in the water, both agriculture and the environment, benefit.



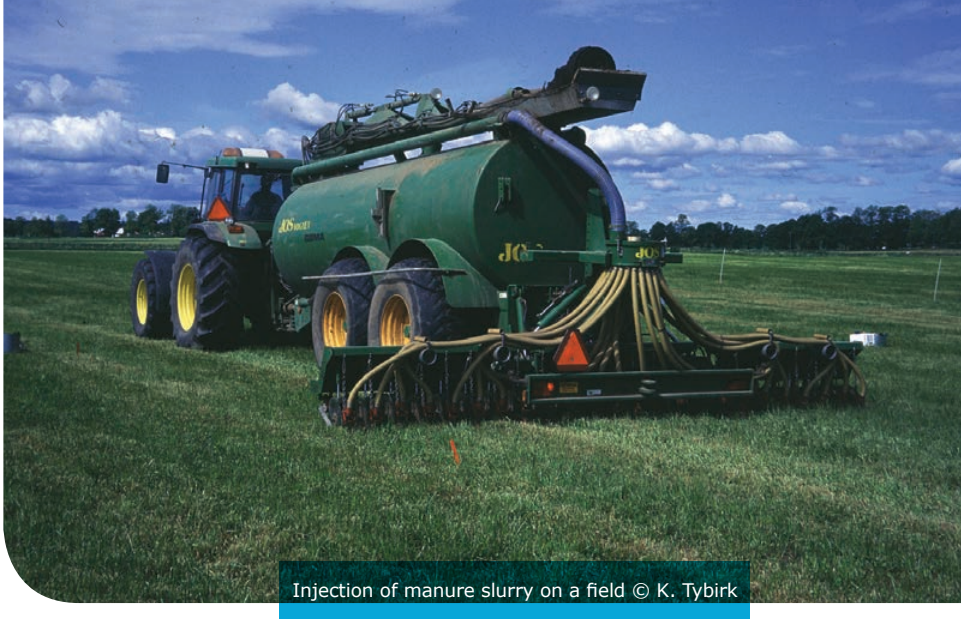
Read more in the summary of country reports on "Implementation and status of priority measures to reduce nitrogen and phosphorus leakage."
http://goo.gl/xfvQGS

Conclusions:

Agri-environmental measures should be supported, among them:

1. Vegetative cover in autumn and winter on arable land
2. Reducing soil tillage and postponing tillage actions from autumn to spring
3. Adapting the amounts of chemical and organic fertilisers applied
4. Adopting feeding of livestock
5. Constructed wetlands for nutrient reduction/retention
6. Buffer zones along water areas and erosion-sensitive field areas
7. Promotion of biogas production from manure and correct management of the digestate

Re-recognising manure as a fertiliser



Injection of manure slurry on a field © K. Tybirk

Have you ever been cycling in the countryside in spring? You see beautiful scenery of lush, green trees, flocks of birds returning to their breeding grounds, farmers' fields being prepared for the growing season. You spot lilies of the valley, smell the fresh scent of early flowers and … manure. Yes, manure can be used as a natural fertiliser which provides nutrients for crops. However, if manure is not stored properly or when too much manure is applied on fields at unsuitable times, it results in nutrient leakages into soil and water. As a consequence these extra nutrients cause eutrophication in the Baltic Sea.

Animals and crops are disintegrated

How do excessive nutrients from manure appear? More manure is now produced on farms as there is a growing demand for meat in all Baltic Sea region countries – and for export. Experts in all Baltic Sea Region countries "for consumption" call it intensification of agriculture. Unfortunately, it does not mean that there is also more manure for local greenery, vegetable and fruits. Johanna Logrén, from MTT Agrifood Research Finland clarifies: "Crop production and livestock production have become disintegrated. Farmers specialise and select only one type of farming."

Knud Tybirk during an expert field visit in Estonia © S. Luostarinen

Crop farmers rather use mineral fertilisers which are easier and more precise to use. Animal farmers use manure on their fields to produce silage. But in areas with a lot of animal farms, the field area may not be sufficiently large for all manure. In such cases, there is a rising risk, that farmers apply more manure than plants can take up. As a result, manure nutrients are not recycled as fertilisers as they should, but washed out to the waterways. That is why we need technologies and new solutions to make it easier and more profitable to use manure nutrients where they are needed.

The partners in the Baltic Manure project interviewed around 30 farmers from the Baltic Sea region and analysed which manure han-

Did you know…

… that manure contains renewable energy (biogas) that can be used for vehicles or combined heat and power production? By using the manure resources in an optimal way, farmers can reduce nutrient losses to air and water and agriculture can reduce the green house gas emissions significantly. In addition, these environmental benefits contribute to create jobs and economic development in the region.

dling technologies (e.g. manure storage and spreading) were used by them. The case study farms were of different size: ranging from 400 to 30,000 livestock units (cattle, pig, or poultry). The partners produced an overview of traditional and innovative economically viable technologies for handling and processing manure in an environmentally and user-friendly way.

Manure creates food

An obvious solution would be to bring manure from an animal farm in one region to a crop farm in another. However, that is not so easy! Manure contains a lot of water and the percentage of actual nutrients (phosphorous and nitrogen) is small. It is very expensive to transport this fertiliser and thus it is mostly used locally. Another solution is to increase storage capacity for slurry on farms to allow manure to be stored until it is needed for crops. This is particularly important for dairy farms which, in some countries, have an average storage capacity of only 6 months. In addition, farmers should have covered storage facilities in order to reduce gaseous emissions (ammonia, greenhouse gases). Even though it sounds simple, not all the farms have introduced it. Johanna gives an example: "From almost 30 farmers, which participated in the interviews, only half had covered storage capacities."

Solid fraction of manure after separation process © JTI

Another solution is mechanical separation of manure into liquid and solid fractions. The farmer gets more options for fertilising with manure or he or she can export the phosphorus-rich solid fraction to another farm that needs phosphorus. And this is a win-win solution.

The report presents different options for environmentally friendly and economically profitable handling of manure, from animal feeding to field application. Knud Tybirk from the Danish Agro Business Park states: "Farms can use the best of the available techniques: store manure and take nutrients to fields with proper technology when crops need fertilisers."

Read more in the knowledge report "Manure handling techniques on case study farms in the Baltic Sea Region"
http://goo.gl/V4Ey4H

Conclusions:

Farmers, advisers, researchers, policymakers and industry must all together take responsibility and co-operate for a more environmentally friendly end-use of manure, for example:

- free or low cost skilled advisory service for manure management in each country,
- use mandatory planning tools for crop fertilisation in the advisory service,
- control that legislation is followed by the national authorities,
- use planning tools for crop fertilisation,
- support the use of reliable verified technologies on the market.

Harvest of catch crops © E. Falk

Bringing good farming practice to fields and stables

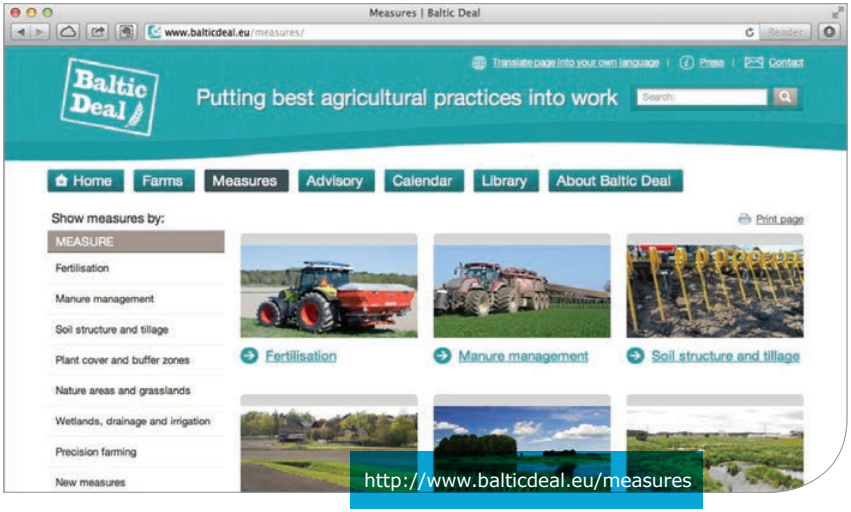
Surrounded by the Baltic Sea, farmers on the island of Bornholm earn their living mainly by raising cattle, sheep and pigs. The soils are fertile and there is a tradition for growing grain, grass and maize for producing milk for the local dairy, and pigs for the local slaughterhouse. This is why a lot of manure accumulates. As an island separated from the mainland, Bornholm provides the perfect testing grounds to bring innovative agricultural methods, such as those within the Baltic Manure and Baltic Compass projects, to the fields.

As part of the Baltic Deal project, pig farmers Karsten Westh and Flemming Jensen both took the initiative to test a machine which separates animal manure into a solid and liquid parts. The idea was to make manure handling easier and possibly profitable. Elisabeth Falk from the local farmers' association closely followed the testing.

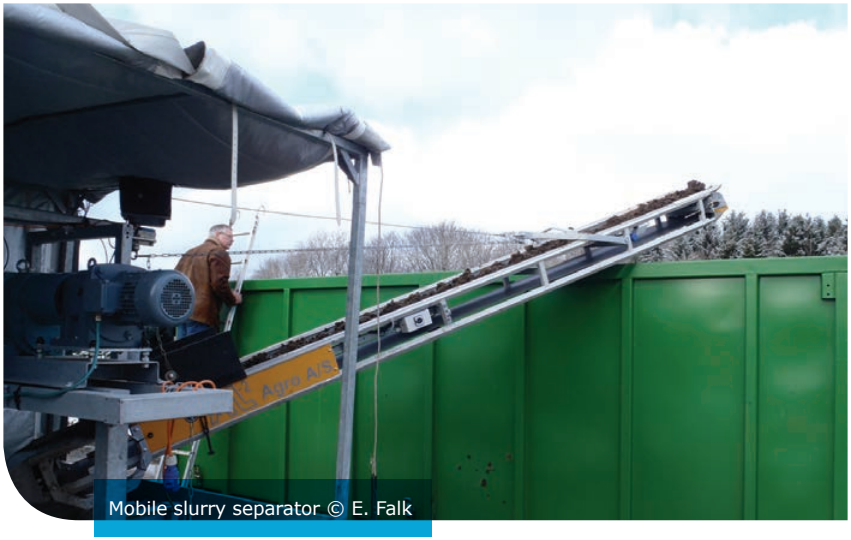
Win-win solutions for farmers and environment

As a local agricultural advisor, it is her task to carry out environmental impact assessments for each new measure before it can be approved by the local authority: "The farmers' engagement was rewarded with great success," she says. Liquid slurry is high quality fertiliser with less smell for little money. And solid manure yields much more biogas while even replacing maize silage. After these tests, other farmers took over the method and even more are getting ready to do so as well. Elisabeth Falk concludes: "For Bornholm island, the mobile slurry separation proved to be a win-win solution: reduce nutrient loads to the sea while giving the local biogas plant a benefit."

However, another test within Baltic Deal failed. National regulations recently made catch crop



http://www.balticdeal.eu/measures


Mobile slurry separator © E. Falk

cultivation obligatory for all Danish farmers. Catch crops are plants that are sown after the autumn harvest to take up the nitrogen left on the fields from the main crop fertilisation. The idea is to avoid nutrients and soil getting washed out by autumn and winter rains and snow. The purpose of the test was to find out if the cash crops could be used for biogas production at the local biogas plant. Against this background, the advisory service convinced some farmers to run a test series for suitable catch crops. Even though the farmers were not sure that this would be successful on their soil, some of them tested horseradish, Italian ryegrass and clover grass. The result was a small harvest – but too small to cover the costs of sowing and harvesting. This test indicated that the catch crop technique may not be suitable for Bornholm's special soils and climate. Elisabeth concludes: "Farmers need to have ownership of their activities. It doesn't make sense if we force them into action that doesn't fit their land."

Helping countries to find good solutions

Elizabeth's colleague Irene Wiborg of the Knowledge Centre for Agriculture puts the pilot activities in a broader context: "Reducing nutrient leakages is a great challenge to all farmers around the Baltic." The Water Framework Directive, she says, requires that nutrient emissions are reduced in many areas. "All countries struggle in finding good solutions. It's rare that farmers get a chance like in Baltic Deal to develop solutions together and it shows that farmers do take responsibility for impacts of food production on the environment."

Watch agricultural training movies on *youtube.com/user/BalticDealmovies*

Watch a movie about the mobile slurry separator test: *http://goo.gl/lI9w7m*

Conclusions:

- Farming and the environment are often regarded as a contradiction – but keeping resources on the field benefits both farmers and the environment. Farmers can therefore be keepers of a good environment.
- Good agricultural practice is when you nurse the plants and the nutrients don't run off the land – this is what policies need to support.
- Farmers need knowledge input and inspiration rather than regulation.

Rethinking agriculture as nutrient cycles

Alfons Wiesler-Trapp carefully pulls a plant out of the soil and points to the roots: "This lupin replaces mineral fertiliser on our farm, because down here bacteria like to grow which can capture nitrogen from the air." Together with his wife Susanne and three other families, he runs a model farm for Ecological Recycling Agriculture (ERA) within the BERAS Implementation project. "ERA is just what we need in times of tough conditions for farming through globalised markets", points out Wijnand Koker, agricultural adviser from Järna in Sweden.

© Domäne Fredeburg, photo: D. Antonio

The great majority of farms in the Baltic Sea Catchment area are under enormous pressure to produce at extremely low prices, which causes farmers to apply ever increasing amounts of mineral fertiliser to enhance the harvest. But: "If the intensity of fertiliser application and food production in the south and east keep increasing towards high levels like in Sweden, Finland, Denmark or Germany, the existing serious environmental situation of the Baltic Sea will deteriorate extremely", says Dr. Karin Stein-Bachinger, senior scientist at the German Leibniz Centre for Agricultural Landscape Research, with great concern.

Integrating crops and animals

ERA provides a fundamentally different approach to current agricultural practice that fits with both the environment and men. While organic farming, as defined by EU Bio standards, requires farmers not to use pesticides and not to use mineral nitrogen fertiliser, ERA goes a step further. Based on local and renewable resources, animal husbandry is adapted to the farm's own fodder production which maintains nutrients in cycles on the farms: from a plant in the field to food in the stable to manure of the cow and back to the plant in the field. Domäne Fredeburg is a good example of this recycling agriculture.

Alfons cultivates 18 fields of about 6.5 hectares each plus some 50 hectares of grassland. Planned for a period of eight years, he grows a sophisticated sequence of different crops on each of the fields. This crop rotation is laid out to produce enough fodder for 30 dairy cows and 60 pigs plus cereals and vegetables to sell. After the lupine harvest, he sows spelt that can grow without fertiliser during the next spring and summer. The year after spelt, he applies some manure before growing vegetables. Hereafter, in autumn, he sows winter rye with clover-grass undersown in the following spring. The clover-grass will be utilised in the following two years. It retains nitrogen from the air and serves as fodder for the farm animals. Throughout eight

Did you know...

..that ERA can reduce more than 50 % of the nitrogen surplus and causes no phosphorus surplus compared to conventional farming! ERA means agricultural practice in line with EU bio standards plus at least 30% of legumes in the crop production, a balanced field/animal ratio of 0.5-1 livestock units/ha (a livestock unit equals one cow of 500 kg), at least 80% self-sufficiency with respect to fodder and effective nutrient recycling within the farm and between farm cooperations.

Alfons Wiesner-Trapp in a field of Lupins, which make nitrogen fertiliser unnecessary © S. Trapp/ Domäne Fredeburg

years, he also grows wheat, rye, potatoes and other typical crops of the region.

"Our crop rotation is a careful selection of the right plants, sowing and harvesting them at the right time to build up and use up the nutrients in the ground in a balanced manner," Alfons explains. After twenty years on the farm, the organic farmer concludes: "Our ERA farming approach is economically a great success." While a German farm of a similar size could not even feed one family, more than 25 people earn their living at Domäne Fredeburg. The key to this success is food processing facilities and a shop right on the farm - this generates higher income.

Inspiring farmers to become nutrient managers

BERAS Implementation builds up on a previous project during which Wijnand and his mentor Prof. Artur Granstedt investigated and developed ERA from all around the BSR. Now, in the implementation project, they have established a BSR wide network of BERAS Implementation Centres preferably on ERA farms that serve as learning centres and hopefully inspire other farms to convert. Connected to that network are farmers who are in the conversion process from either EU organic or conventional farming to ERA. Wijnand and Karin, together with other experts, have condensed the knowledge into a series of training materials to be used in agricultural schools, universities and BICs. "We welcome anyone interested in learning about Ecological Recycling Agriculture on our farm near Lübeck", Susanne concludes. "We believe that targeted training and farm visits will be the best way to spread ERA quickly during the next few years."

Guidelines for Ecological Recycling Agriculture (Vol. 1-4). The books are available at *http://www.beras.eu*

Conclusions:

- Agricultural policy on national and EU level should promote a systemic shift to Ecological Recycling Agriculture (ERA).
- Farmers, farming advisors, scientists, ministries and the food sector should build and extend ERA networks for more transfer of experience.
- Universities and professional schools should further qualify farmers and advisors in ERA and carry out ERA oriented applied research.
- Every person can support the shift, e.g. by eating local, organic and seasonal products, more vegetables and less meat.

Interview with Monika Stankiewicz, Executive Secretary of HELCOM

Monika Stankiewicz has been the Executive Secretary of Helsinki Commission (HELCOM) since February 2012. HELCOM is a cooperation of the governments of all Baltic Sea countries and the EU has been working since 1974 to implement the international Convention on the Protection of the Marine Environment of the Baltic Sea Area.

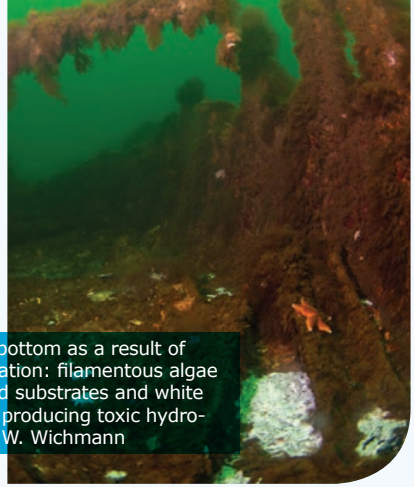
Which role did the water quality of the Baltic Sea play for the launch of the Helsinki Convention in 1974?

The awareness of the alarming state of the Baltic Sea environment gained momentum in the 1960s. The semi-enclosed, brackish and shallow sea area is particularly vulnerable to pollution and, during the industrial era, its environmental condition had steadily deteriorated. So the water quality and the undesirable consequences of eutrophication were key reasons for calling up the Diplomatic conference in March 1974 in Helsinki, for signing the first Helsinki Convention by all the coastal states.

Can you give us an example of how transnational projects practically help in the managing of the Baltic Sea?

There are, of course, many. I could mention the PURE Project (Project on Urban Reduction of Eutrophication). PURE established a successful network of wastewater treatment experts and published the Book of Good Practices in Sludge Management, the first of its kind in the Baltic Sea Region. Better handling of sludge plays a key role in reducing harmful nutrients within urban wastewater treatment.

All the numerous major outcomes of COHIBA on cost effective management and reduction of discharges, emissions and losses of hazardous substances, are ready for application at the national level. Baltic COMPASS was, for instance, very active in realising the ‚Greener Agriculture for a Bluer Baltic Sea Conference, taking place again in August 2013. All of these achievements, enabled by BSR Programme funding, have been fed into HELCOM work.



A disturbed sea bottom as a result of strong eutrophication: filamentous algae overgrowing hard substrates and white sulphur bacteria producing toxic hydrogen sulphide. © W. Wichmann

Forty years of cooperation to protect the Baltic Sea is a long time – how far have we come in terms of water quality?

There is still great phosphorus reduction potential in urban waste water treatment, but an even greater challenge is within the diffuse sources, such as agricultural runoff and scattered settlements. As per nitrogen, emissions and discharges can be drastically reduced through further application of stricter regulations in nutrient-intensive agricultural areas (e.g. Nitrate Vulnerable Zones); by introducing efficient fertilisation practices and manure handling; as well as by addressing emissions from combustion, road and maritime transport.

A healthy Baltic Sea: sea grass and mussels grow abundantly on the bottom. © W. Wichmann

What do you like about working transnationally? What do you find most challenging?

I feel privileged to possess such a viewpoint to regional policies and latest science in an exciting, international setting. HELCOM is also a link between regional and global developments, often setting things into greater perspectives as well as learning lessons from the grassroots level. It is very rewarding and inspiring for me to work with many dedicated individuals and experts who contribute to the progress and do more than is required from them, as they believe we can jointly make a difference.

And I feel that overall environmental issues are also more and more recognised outside our own networks, including by different sectors. After all, the majority of the measures to protect the marine environment is to be implemented by the sectors and local stakeholders, without whom the success will not be possible.

Did you know...

... that the Baltic Sea Action Plan (BSAP) is considered a model example for transnational programmes to manage marine environments? It is the first of its kind not only on EU level but even worldwide. The BSAP strives for the Good Environmental Status of the Baltic Sea by 2021, a concept that is wider than just water quality. The HELCOM Baltic Sea Action Plan is based on the ecosystem approach and broad stakeholder participation - a pilot project for European seas.

The BSAP addresses four priority areas: eutrophication, hazardous substances, biodiversity and nature protection as well as environmentally friendly maritime activities.

The BSAP sets out a number of threshold values specific to the Baltic Sea, some of which are stricter than related EU legislation. The Baltic Sea Action Plan should be considered as a key guiding political document for any human activity that involves or affects the Baltic Sea.

Cluster cooperation – wrapping it up

This brochure has shown many dimensions of the major challenges in water quality management of the Baltic Sea - eutrophication and hazardous substances. Regional stakeholders have acknowledged that single projects produced valuable and unbiased results, but each project in its own field. The bigger picture was missing. The Baltic Impulse cluster has become a driving force that brought together environmentally oriented projects, which addressed these challenges.

Men and women working for authorities, for scientific institutions, for companies, for NGOs have shared their knowledge about ecology, water and waste water management, farming, engineering and many other fields that are integral part of regional development in the Baltic Sea Region. They have worked across borders, not just national borders but also academic, institutional, sectoral or lingual, and created synergies, that are essential for the benefit for the Baltic Sea.

The final conclusion arising from the work with the cluster partners in Baltic Impulse is that saving the Baltic Sea waters can't be done by treating only the symptoms in the future. We need to look at the bigger picture: How are we using the resources we have? Which solutions can we provide - subsidies, technologies, capacity building, participation of local citizens, etc. And how should we use them to prevent damage of nutrients and harmful substances flushed into the Baltic Sea? We need sustainable resource management across all sectors.

Detailed conclusions are to be published in autumn 2013 in a synthesis report, available in *www.helcom.fi/projects*.

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waterpraxis

www.waterpraxis.net

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