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### There is no quick fix

Life is dependent on oxygen, also in the sea. However, a major threat to coastal ecosystems around the world is the increasing occurrence of hypoxia (low oxygen concentration) and anoxia (no oxygen), which is usually linked to areas of eutrophication. The hypoxic dead zones in the open Baltic Sea cover up to 70.000 km<sup>2</sup> and recently the problem of seasonal hypoxia in shallower, near-shore areas has also been highlighted. Although major efforts have been directed towards reducing nutrient loading to the Baltic Sea, particularly in terms of better wastewater treatment, recovery has been very slow. Therefore politicians are tempted to look for faster & cheaper ways to fix the problem.

Artificial bottom-water oxygenation has been suggested as an engineering method to combat eutrophication. The rationale is that oxygenation potentially could halt the eutrophication that currently is sustained by recycling of nitrogen and phosphorus from the sediments. Nutrients have accumulated over decades of excessive input of nutrients from land and under hypoxic conditions more phosphate is released from the sediments. This may fuel even stronger algal blooms and perpetuate

the problems of eutrophication and hypoxia in a vicious circle.

Although it may be tempting to invest in mixing/bubbling operations instead of tackling, for example, the politically sensitive agricultural sector, these operations should not be viewed as a viable option. There are currently trials in both Sweden and Finland where oxygenated surface water is pumped down to the bottom in closed embayments in an attempt to increase the oxygen concentration in the deep water and consequently stop the efflux of phosphate out of the sediments. Although these trials are relatively large-scale, they are still minuscule in relation to the size of operations that would be required to achieve even a small amount of mixing/oxygenation at a larger, ecosystem-wide scale, not even to mention oxygenating the giant anoxic dead zone in the open Baltic Sea. Initial results from these trials also show that the pumping has not had any effect on the oxygen concentration near the bottom and thus the desired effects have not been achieved. Nevertheless, the companies providing the technology for the pumping are eager to sell these methods as a 'quick fix' to the politicians.

Rigorous analyses of the ecosystem-wide ecological and economical consequences are an absolute prerequisite before any large-scale mixing projects are started and no such analyses have so far been undertaken. The Baltic Sea is a fine-tuned system and the main worry is that we simply do not know what the consequences of large-scale mixing/bubbling would be. Mixing has the potential to disrupt the vertical salinity stratification, which is an integral part of the circulation patterns in the Baltic, nutrient dynamics in the water column, and a key factor determining the distribution of species. For example cod reproduction is dependent on the very fine balance between enough salt and enough oxygen in the water. It is also likely that the technical installations required for large-scale oxygenation are simply technically impossible or too expensive to build.

The Baltic Sea needs a range of different actions to combat eutrophication, but mixing/bubbling is not a solution to this very large-scale problem. Bubbling might work in small lakes, but they are completely different from the Baltic Sea. Globally there are no examples of mixing/bubbling being successful in combating eutrophication. It has repeatedly been shown that the only sustainable solution to the eutrophication of the Baltic is to reduce nutrient loading from land.

Only scientifically sound methods should be considered, especially if they are likely to use resources from the slower, but more sustainable methods. If all the money is spent on bubbling, instead of working on long-term solutions for reducing nutrient loads from land, then the day the pumps are switched off, the nutrients are still entering the system and we will soon be back to square one. If the system then relapses into hypoxia, the pulse of phosphate out of the sediments could be even greater, further worsening the situation. Therefore, bubbling is not 'fixing' anything, it just postpones the problem.

The importance of healthy seafloor ecosystems, with plenty of invertebrate fauna crawling in the sediments and providing food for fish and birds, has recently been acknowledged at higher political levels. The target of the EU Marine Strategy Framework Directive is to reach good environmental status of all European marine and coastal waters by 2020. In Annex 1 of the MSFD (Qualitative descriptors for determining good environmental status) there are two points that are particularly important from this point of view:

(5) *'Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters'.*

(6) *'Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected'.*

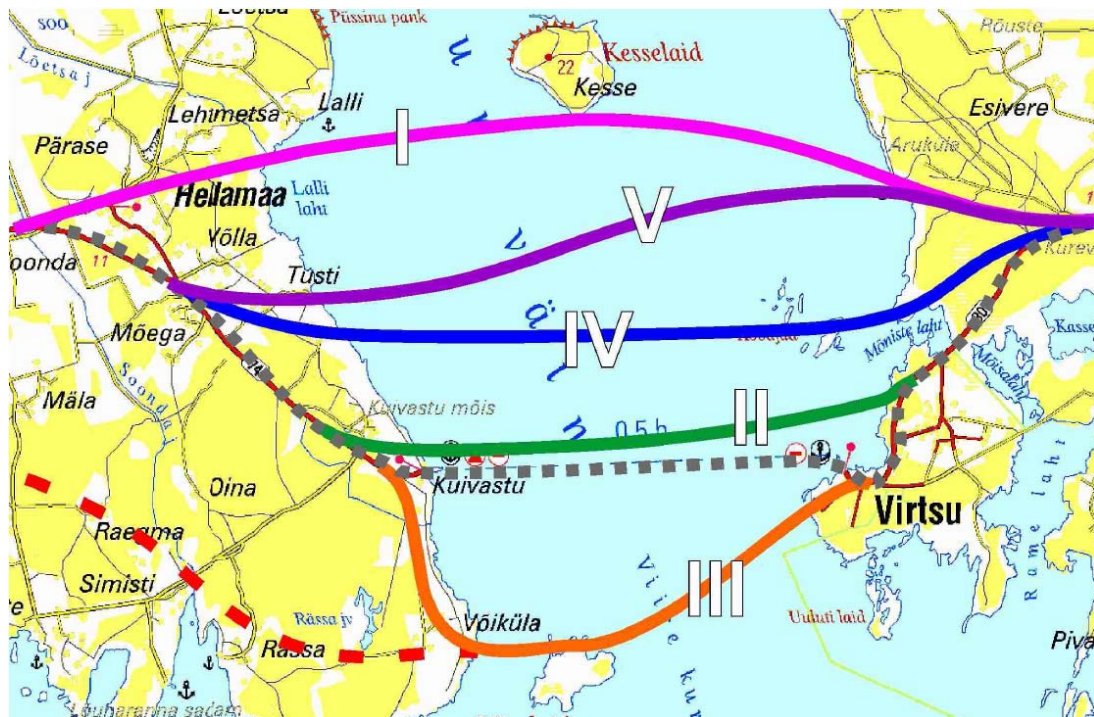
Although the timetable for reaching good environmental status is relatively tight (10 years from now), this status can only be achieved through management actions based on the ecosystem-based approach, which means that one cannot just change one thing without consideration of the other components of the ecosystem.

This is very much in line with the priorities of CCB, where reductions of nutrient runoff from land – at all levels from individual homes to industrial farms and sewage treatment plants in major cities – is a main objective throughout most of the work. It has taken decades of nutrient loading from land to get the Baltic Sea into its current poor state and it will take at least as long to get it healthy again, but it is worth the wait and there are no shortcuts!

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## Fixed linked project in Estonia

The fixed link project in Estonia has raised the interest of many. And not only in Estonia but also around the Baltic. For those who do not know the meaning of the fixed link project, then this is a plan of connecting mainland Estonia with the island of Saaremaa. Actually, the plan is to build a bridge or a tunnel to the island Muhu. This is an island between Saaremaa and mainland Estonia that already has a fixed connection with Saaremaa. This link is also a big concern for the environmentalists but this is a subject of another article.



Before continuing with the fixed link project it is good to know the background of this. One could say that it has been a long dream to connect Saaremaa with mainland Estonia and in 1896, the construction of a dam between the islands Saaremaa and Muhu started it all. Although at that time connection of the Muhu island and the continent seemed impossible due to the cost of the project.

A century went by and in April 1997, the country governor of Saare County of that time, Mr Jüri Saar, gave out an order. According to that, a committee was

established to "compile a conceptual design of scientific and feasibility research required for the fixed link." The objective of the established working group was not to decide whether the fixed link will be established or not but to carry out various background surveys and provide information to the public for considering the positive and negative sides of the plan. For example, geological and environmental protection surveys were conducted and the possible utility lines were suggested. Foreign experts from Finland and Norway participated in the discussions of the fixed link.

The results of a public opinion poll conducted in the spring of 2002 showed that 85% of the inhabitants of Saare County support the establishment of the fixed link, 9% were against it. From among the total Estonian inhabitants, 66% are in favour of the fixed link and 13% are against the idea.

In 2003, the Government of the Republic established an expert committee whose task was to draft the necessary activities for working through the problems connected to the establishment of the Saaremaa fixed link. At the beginning of this year, the Ministry of Economic Affairs and Communications entered into contract with a Danish company Ramboll Danmark A/S. Pursuant to the contract, the company will carry out a financial activities' analysis and feasibility studies of the environmental impact of the project on Saaremaa fixed link.

By today the strategic environmental impact assessment of the project has been carried out and has also been made available for the wider public. Several studies are part of this assessment. For example sediment, underwater archeological, fish, mammal, vegetation, traffic and other studies. All together 16 studies are available on the official webpage of the project.

The assessment state that no significant effects are foreseen as a result of the project and most of the little impact that is foreseen is estimated to come during construction phase. Currently there are several alternatives to the project (bridge, tunnel, improving ferry connection or status quo) and looking at the material one does get the feeling that building the bridge is the preferred option of the developer. After all, man has always conceived construction as a sign of economic wealth and of course a bridge would be a great symbol. For example the bridge connecting

Denmark and Sweden or the Golden Gate Bridge in San Francisco. Fortunately environmental watchdogs are doing their job and the published assessment materials have received thorough inspection by the Council of Estonian Environmental Organisations (Council). According to their response the conclusions made in the assessment are misleading. They have brought out several points with many explanations but the following two, I believe, are the more important ones worth mentioning:

1. According to the assessment, none of the alternatives pose a significant impact to the values protected under Natura 2000;
2. The main impacts to marine mammals are likely to be during the construction phase.

The Council has replied to these statements as follows:

1. In the assessment it is stated that the best alternative for causing minimal effect on Natura 2000 sites is the tunnel, then ferry connection and the last option would be building the bridge. Natura 2000 sites will be affected but mitigation measures can be used. Also, building the bridge will cause sediment movement which can cause negative affects to marine life and water quality. With the tunnel option water quality degradation is not a problem. A minus for the bridge is also endangering underwater habitats.
2. Studies have not been carried out to find out whether seals swim under bridges or not. It is however known that amphibians avoid these areas. This gives reason to believe that the bridge might become a migration obstacle for the seals. If this is the case, then seals will avoid this route

and one migration route will be destroyed. This can only be restored by demolition of the bridge.

According to this, the Council has suggested continuing work two alternatives (the tunnel and improvement of ferry connection) and abandoning the bridge alternative. Whether this will be the case is yet to be seen! However the reality seems

to be slightly different. Both the bridge and the tunnel options are very expensive and in the near future it is not likely that any development will actually take place. This is supported by knowledge that Estonia needs to deal with its energy questions an alternative fuel or source for electricity generation and plans of building their own nuclear power plant seem even more far-fetched. At least, what Estonia lacks in real options, they make up with ambition.

Sources:

<http://www.eko.org.ee/planeeringud/index.php?leht=4&id=72>

<http://www.mkm.ee/9347/>

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*Estonian Green Movement*

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### **The Rurik Räka-project: educating summer-holiday Finns about Baltic Sea biodiversity**



The Finnish Society for Nature and Environment toured the Finnish coastline from Lovisa in the east to Mariehamn on the Åland islands in the west during the summer of 2010. Rurik Räka, or Rurik the Shrimp, is the project mascot who takes children on a tour of the Baltic Sea that is hidden beneath the waves.

The project was first launched in 2008 and it was then that the first Rurik-booklet was

created. The booklet is printed on waterproof paper, which is meant to encourage children to take the booklet with them when they go exploring in the shallows. The booklet is sectioned according to the different algal zonations that are clearly visible along the Finnish coastline. Different animals, plants and algae typical for each zone are presented. Information that is presented can be what

an animal eat, where it prefers to live and some fun facts about it.

During the tour this summer, two people drove along from summer event to summer event pitching a tent and presenting aquaria with live Baltic Sea inhabitants. One of the aquaria showed what the sea looks like at a depth of 20 meters with beds of blue mussels and bottom dwelling fish. Another aquarium showed a soft bottom in a sheltered and shallow bay with a lot of vegetation, shrimps and small fish. The most important part of the exhibition was to allow children to explore the sea with all their senses. For this purpose there were also tasks that the children could try. One task involved sticking your hand into buckets and trying to identify different species of algae and plants with only the sense of touch. In another big bucket the children could sieve through marine sand and find animals hidden in the sediment. After a few days in the sun, this bucket also demonstrated what an anoxic bottom smells like...

Adults visiting the tent had a chance to discuss current Baltic Sea issues and get information brochures. Many Finns enjoy

spending all of every summer out at sea or by the sea in their summer cottages. Maybe the most shocking experience during the tour was the realization of how little these people actually know about the biodiversity below the surface. "Oh a blue mussel and bladderwrack, I've never seen one of those before" was a depressingly common comment. This only underlines how important awareness raising campaigns still are!

The Rurik Råka tour had some 2 000 visitors (both children and adults) and attracted media attention. Every visiting child got a Rurik-booklet to take home and encourage explorations by their own cottage. Since the tour finished, there has been an interest in the Rurik-material and we are currently planning a tour to schools to spread the booklets even further. This project could easily be adapted to any area of the Baltic Sea to spread information and awareness of Baltic Sea biodiversity and the skills to explore the sea on your own.

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## **Improvement of the ecological state of water resources of the Western Bug river with introduction of sustainable farming**

Lviv municipal non-governmental organization "Ecoterra", in Ukraine, implements the project "Improvement of the ecological state of water resources of the Western Bug river, with introduction of sustainable farming".

The Western Bug is one of the trans-border water arteries of Lviv region carrying its water to the Baltic Sea. It is the second largest water artery in the Lviv region, and the number of rivers that feed this water

artery is 3213. The Western Bug basin embraces 4 districts of the Lviv region: Zolochiv, Busk, Kamyanka-Busk and Social Districts.

Big and medium companies, small farmers and private plot owners are engaged in agricultural production in the region. The big companies producing agricultural products have mighty equipment and are oriented on intensive technologies which cause degradation of soils. In addition,

chemical agents are being washed out into surface waters.

One way to improve the ecological state of the environment in the Western Bug river basin is the introduction of sustainable farming, of which the main element is organic farming.

During 2010-2011, the NGO “Ecoterra” implements a project aimed at improvement of the ecological state and preservation of ecosystems in the Western Bug river basin. It is carried out by formation of public opinion for the necessity to introduce sustainable farming in the region.

In the course of the project, a brochure named “The main issues about organic farming” has been prepared and published.



The brochure contains brief information concerning main requirements for organic farming, systems of plant protection, prophylactics of plants diseases, practical examples of growing some vegetable

crops. Enumeration of plant protection means and of fertilizers allowed for application in organic farming according to the Regulation (EU) № 834/2007 is presented in the brochure as a separate chapter. A short enumeration of biological agents of Ukrainian production which are included into the Main Register of allowed plant protection means, and which may be certified by the European Union for application in organic farms, is also presented. The information presented in the brochure is important and necessary both for producers and for the governmental organizations.

Within the project meetings with specialists of Oblast Department of agro-industrial development of Lviv Oblast State Administration were carried out. Measures to be included into the program “About awarding the status of specialized raw materials zones and organization of organic agricultural production in Lviv oblast for the period till 2015 to stimulate the development of organic farming in the Oblast” were discussed.

In order to discuss the Program of “Ecoterra” a seminar on the topic “Introduction of organic farming in the Western Bug river basin” was held. The seminar took place on the basis of Zolochiv district administration with participation of farmers, owners of individual plots, producers of biological agents, specialists of certifying organizations, representatives of Oblast and District Departments of agro-industrial development. Altogether 48 people, of whom 21 are farmers, participated in the seminar.

Part from the seminar, ecological lessons in six secondary schools of Zolochiv and Busk districts were held. The general number of pupils present at the ecological lessons were 450. The theme of the ecological lessons was: Negative influence of phosphate washing agents and

agrochemicals on water resources of the Western Bug river. The poster entitled “Does the Western Bug have a future” and the brochure “Water resources of the Western Bug : without the threat to the life of future generations” were distributed.

Information about the project was presented at the regional meeting in the Department of water resources “Lviv Oblvodhosp”, local radio and during a press conference.

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