

## Seabased Measures in Baltic Sea Nutrient Management (SEABASED )



Programme Priority: P2 Sustainable use of common resources

Programme Specific Objective: 2.4. Reduced nutrients, hazardous substances and toxins inflow into the Baltic Sea

Sub-programme: Central Baltic

Duration: 01.03.2018 - 31.05.2021

Total funding: 2.660.550 EUR

ERDF funding: 1.995.413 EUR ERDF

### Project Summary:

Although nutrient load from land-based sources to the sea has been reduced significantly over the years, good ecological status has not been reached partly due to the large amount of internal loading from the bottom sediments. Moreover, fulfilling the nutrient reductions agreed in the HELCOM BSAP seems challenging for many countries such as Sweden and Finland. Therefore, both Finnish and Swedish governments have decided to include seabased measures in their Baltic Sea protection policy (MSFD and governmental programs). As local authorities are currently also lacking effective means to improve water quality in coastal and semi-enclosed sea areas where the traditional land-based measures are not sufficient, there is a growing demand for applying seabased measures. Scientists have proposed various seabased measures for the Baltic Sea. However, comprehensive information with regards impacts, costs, risks, applicability and financing of the different measures is currently lacking.

The project aims at reducing nutrients from the Baltic Sea and at improving water quality, especially in coastal areas, by piloting and developing seabased activities. As an added benefit, some of these measures enable nutrient recycling and circular economy.

The project will pilot several promising measures, such as 1) recycling nutrients from bottom sediments or nutrient-rich bottom waters for further use on land, 2) recycling nutrients on land in the form of fish such as stickleback, 3) applying various nutrient binding materials to sediments. Moreover, the project aims at facilitating an open, multi-disciplinary and cross-sector dialogue on benefits and risks of seabased measures and their applicability in Baltic Sea context.

As a result, the project will develop the concept of Marine Habitat Bank for local water quality improvement and ecosystem restoration measures; and Practical Guidelines on Seabased measures in the Baltic Sea.

## Map of Partners

## Partners

Lead Partner

### John Nurmisen Säätiö

Country: FI

[www.johnnurmisensaatio.fi](http://www.johnnurmisensaatio.fi) [1]

**Partner budget:** 737.055 EUR

**Amount of ERDF funding:** 552.791 EUR ERDF

Project Partners

### Varsinais-Suomen ELY-keskus

Country: FI

[www.ely-keskus.fi/varsinais-suomi](http://www.ely-keskus.fi/varsinais-suomi) [2]

**Partner budget:** 470.510 EUR

**Amount of ERDF funding:** 352.883 EUR ERDF

### Ålands fiskodlarförening r.f.

Country: FI

[www.fiskodlarna.ax](http://www.fiskodlarna.ax) [3]

**Partner budget:** 117.501 EUR

**Amount of ERDF funding:** 88.125 EUR ERDF

### Ålands Landskapsregering

Country: FI

[www.regeringen.ax](http://www.regeringen.ax) [4]

**Partner budget:** 359.985 EUR

**Amount of ERDF funding:** 269.989 EUR ERDF

### BWC Sweden Ekonomisk Förening

Country: SE

<http://www.balticworks.eu> [5]

**Partner budget:** 0 EUR

**Amount of ERDF funding:** 0 EUR ERDF

## **Stockholms Universitet**

**Country:** SE

<http://su.se/deep> [6]

**Partner budget:** 496.364 EUR

**Amount of ERDF funding:** 372.273 EUR ERDF

## **Länsstyrelsen Östergötland**

**Country:** SE

<http://www.lansstyrelsen.se/ostergotland/Sv/Pages/default.aspx> [7]

**Partner budget:** 479.136 EUR

**Amount of ERDF funding:** 359.352 EUR ERDF

Associated Partners

## **Ålands fiskare r.f.**

**Country:** FI

## **Lokalkraft Leader Åland**

**Country:** FI

## **Länsstyrelsen Stockholm Enheten för miljöanalys och miljöplanering**

**Country:** SE

## **TALLINNA TEHNIKAÜLIKOOL**

**Country:** EE

## **BWC Sweden Ekonomisk Förening**

**Country:** SE

## Results

### Expected results

### Achieved results

Project result in category - Reduction of nutrients, hazardous substances and toxins inflow into the Baltic

## SEABASED helped to improve the status of marine area by reducing nutrients from the seabed

Eutrophication is one of the most large-scale problems of the Baltic Sea. While the nutrient load from land-based sources has been cut significantly during past decades, nutrients that are stored in the seabed and are being released from the sediment back to the waterbody.

The SEABASED Project (2018-2021) examined and assessed measures that potentially improve the status of marine area by reducing this “internal load” of nutrients from the seabed. The project also strengthened cooperation and shared knowledge between scientific communities as well as among authorities, political decision makers and third sector actors of the region on the feasibility, risks, and sustainability of the different sea-based approaches in different scales and sea areas, as well as on their financial sustainability.

The project implemented the following small scale local pilots in Finland, Åland and Sweden:

- Marl application to phosphorus-rich bottom sediments in coastal bays in Sweden (Kyrkviken, Djuröfladen, Farstaviken) and Finland (Kolkka) (Ekeröth 2021). The pilots and its outcomes are presented in the [report](#) [8].
- Irrigation of two fields in Åland for two seasons, 2019 and 2020, with brackish, nutrient-rich near-bottom water from the strongly eutrophicated bays Kaldersfjärden and Ämnäsviken. The pilot's main goal was to evaluate this sea-based method for reducing nutrients in the marine environment and restore the coastal areas into better conditions while presenting a win-win solution for the farmers and the Baltic Sea. More information about approach, measurements and results in the report [Nutrients from Sea to Field](#) [9].
- Harvesting of stickleback was piloted in Sweden and Åland with the aim to uptake nutrients with the fish biomass, and, in addition, to develop techniques to efficiently harvest the abundant population of these small fish. The report for the stickleback harvesting can be accessed [here](#) [10]. [Short video](#) [11] about this pilot and lessons learnt.

In addition to stickleback harvesting, the construction of artificial reef structures and small- scale wetlands, “pike factories” aiming to improve the condition of coastal ecosystem in pilot bays to be more suitable for spawning and “nursery” of young generations of pike and other predatory fish which spawn in shallow sea bays. [Video](#) [12] presenting the aim of the artificial reefs.

- Removing the top layer of the sediment was planned but it was not possible to implement because

proposed prices were too high. Instead, the potential of sediment top-layer removal for phosphorus uptake and reducing the oxygen demand in the bottom was studied with incubation tests in laboratory scale. The [report](#) [13] is available here. The [study on the incubation of the sediment](#) [14].

The concept for aquatic compensations was designed, related to the renovation of the Water Act in Åland. More information in the final report [Nutrient compensation for aquatic coastal environment](#) [15] — legal, ecological and economic aspects in developing an offsetting concept.

The practical and scientific knowledge, including estimates on impacts and sustainability, risks, costs, and feasibility of available sea-based measures gained in the SEABASED and previous projects is compiled as in the [Practical Guidelines for Sea-based Measures](#) [16].

More information about the project results in the project website at [www.seabasedmeasures.eu](http://www.seabasedmeasures.eu) [17]

[List and links to the materials](#) [18] produced in the project.

Project page in database

[Seabased Measures in Baltic Sea Nutrient Management](#) [19]

At a glance

The SEABASED Project (2018-2021) examined and assessed measures that potentially improve the status of marine area by reducing this “internal load” of nutrients from the seabed.

#### Files



[Binding P with activated limestone Pilot Report 2021](#) [20]



[Potential for improving water quality in the Baltic Sea by sediment removal Project report](#) [21]



[Merisedimentin Inkubointikoe Seabased Tulosraportti](#) [22]



[Nutrient Compensation for Aquatic Coastal Environment 2020](#) [23]



[Practical Guidelines for sea-based measures 2021](#) [24]

#### Tags

[Water management](#) [25]

[Coastal management and maritime issues](#) [26]

[Waterways](#) [27]

[lakes and rivers](#) [28]

## Project Visibility

### Social media links

[Project website](#) [29]

[Lead Partner website with project information in three languages](#) [30]

[Lead Partner Facebook](#) [31]

[Newsletters](#) [32]

[Seabased YouTube videos](#) [33]

### Other media visibility

[Itämeren sisäiseen ravinnekuormitukseen ei ole ihmelääkettä \(2021\)](#) [34]

[Key conclusion from the SEABASED project: no silver bullet for reducing internal nutrient load \(2021\)](#) [35]

[Bräckt vatten kan hjälpa skörden under torra somrar \(2021\)](#) [36]

[Helikopterista levitetään tonneittain fosforia sitovaa kalkkikiveä – uutta menetelmää Itämeren elvyttämiseksi... \(2020\)](#) [37]

[Slut på blågrönalger? Helikopter spred kalksten ... i Nådendal i nytt projekt som ska rädda Östersjön från övergödning \(2020\)](#) [38]

[Muddring av havsbotten för dyrt – men sedimentexperimenten utanför Houtskär fortsätter \(2020\)](#) [39]

[Kalk är ännu inte ett alternativ på Åland \(2020\)](#) [40]

[Persistence needed in Baltic Sea protection \(2019\)](#) [41]

[Fosfor och kväve ur havet ska bli gödsel på vallarna \(2019\)](#) [42]

[Hållbart fiske bidrar till att rädda Östersjön \(2019\)](#) [43]

[Projektet Seabased ska minska övergödningen \(2018\)](#) [44]

[Seabased tutkii meren ravinnekuorman poistamista - Pilotointi alkaa Itämerellä \(2018\)](#) [45]

[Finding the right methods of fishing stickleback - Blog October 2020](#) [46]

[Stakeholders' views on sea-based measures: Need for long-term studies and pilots - Blog September 2020](#) [47]

[Gäddfabriker kan minimera eutrofieringens biverkningar - Blogg 2020](#) [48]

[Cornerstones for building a compensation concept - Blog 2020](#) [49]

[First trial with a new phosphorus sequestering agent in the Stockholm archipelago - Blog 2020](#) [50]

[Pike factories reduce the adverse effects of eutrophication - Blog 2020](#) [51]

[Sweet results after a salty summer - Blog 2020](#) [52]

## Project videos

<https://www.youtube.com/watch?v=hMGy2haOctI&list=PLTU9Imu-Oulcy-f0KfuSQTBFWMhXMJyxA&index=8>

[https://www.youtube.com/watch?v=\\_Q93qpfUN3E&list=PLTU9Imu-Oulcy-f0KfuSQTBFWMhXMJyxA&index=7](https://www.youtube.com/watch?v=_Q93qpfUN3E&list=PLTU9Imu-Oulcy-f0KfuSQTBFWMhXMJyxA&index=7)

<https://www.youtube.com/watch?v=Be0C14d9wUk&list=PLTU9Imu-Oulcy-f0KfuSQTBFWMhXMJyxA>

<https://www.youtube.com/watch?v=ADiM4rJ0Edo&list=PLTU9Imu-Oulcy-f0KfuSQTBFWMhXMJyxA&index=6>

<https://www.youtube.com/watch?v=ogOwVHtyZyU&list=PLTU9Imu-Oulcy-f0KfuSQTBFWMhXMJyxA&index=4>

<https://www.youtube.com/watch?v=lzqhzq8ROZk&list=PLTU9Imu-Oulcy-f0KfuSQTBFWMhXMJyxA&index=2>

<https://www.youtube.com/watch?v=nfs1WLoHGiy&list=PLTU9Imu-Oulcy-f0KfuSQTBFWMhXMJyxA&index=3>

Source URL:<https://database.centralbaltic.eu/printview/79>

## Links

[1] <http://www.johnnurmisenasaatio.fi> [2] <http://www.ely-keskus.fi/varsinais-suomi> [3] <http://www.fiskodlarna.ax> [4] <http://www.regeringen.ax> [5] <http://www.balticworks.eu> [6] <http://su.se/deep> [7] <http://www.lansstyrelsen.se/ostergotland/Sv/Pages/default.aspx> [8] [http://database.centralbaltic.eu/sites/default/files/SEABASED%20Binding%20P%20with%20activated%20limestone\\_Pilot%20Report%202021\\_1.pdf](http://database.centralbaltic.eu/sites/default/files/SEABASED%20Binding%20P%20with%20activated%20limestone_Pilot%20Report%202021_1.pdf) [9] <https://seabasedmeasures.eu/wp-content/uploads/2021/05/nutrients-from-sea-to-field-seabased-pilot-report.pdf> [10] <https://seabasedmeasures.eu/wp-content/uploads/2021/05/stickleback-fishing-seabased-pilot-report.pdf> [11] <https://www.youtube.com/watch?v=6cFUN8KJvSE> [12] <https://www.youtube.com/watch?v=Be0C14d9wUk> [13] [http://database.centralbaltic.eu/sites/default/files/Potential%20for%20improving%20water%20quality%20in%20the%20Baltic%20Sea%20by%20sediment%20removal%20SEABASED%20Project%20report\\_1.pdf](http://database.centralbaltic.eu/sites/default/files/Potential%20for%20improving%20water%20quality%20in%20the%20Baltic%20Sea%20by%20sediment%20removal%20SEABASED%20Project%20report_1.pdf) [14] [http://database.centralbaltic.eu/sites/default/files/Merisedimentin%20Inkubointikoe%20Seabased%20Tulosraportti\\_0.pdf](http://database.centralbaltic.eu/sites/default/files/Merisedimentin%20Inkubointikoe%20Seabased%20Tulosraportti_0.pdf) [15] [http://database.centralbaltic.eu/sites/default/files/Nutrient%20Compensation%20for%20Aquatic%20Coastal%20Environment%202020\\_0.pdf](http://database.centralbaltic.eu/sites/default/files/Nutrient%20Compensation%20for%20Aquatic%20Coastal%20Environment%202020_0.pdf) [16] [http://database.centralbaltic.eu/sites/default/files/Practical%20Guidelines%20for%20sea-based%20measures%202021\\_0.pdf](http://database.centralbaltic.eu/sites/default/files/Practical%20Guidelines%20for%20sea-based%20measures%202021_0.pdf) [17] <https://seabasedmeasures.eu/> [18] <https://seabasedmeasures.eu/facts-and-materials/papers-publications/> [19] <https://database.centralbaltic.eu/project/79> [20] [https://database.centralbaltic.eu/sites/default/files/SEABASED%20Binding%20P%20with%20activated%20limestone\\_Pilot%20Report%202021\\_1.pdf](https://database.centralbaltic.eu/sites/default/files/SEABASED%20Binding%20P%20with%20activated%20limestone_Pilot%20Report%202021_1.pdf) [21] [https://database.centralbaltic.eu/sites/default/files/Potential%20for%20improving%20water%20quality%20in%20the%20Baltic%20Sea%20by%20sediment%20removal%20SEABASED%20Project%20report\\_1.pdf](https://database.centralbaltic.eu/sites/default/files/Potential%20for%20improving%20water%20quality%20in%20the%20Baltic%20Sea%20by%20sediment%20removal%20SEABASED%20Project%20report_1.pdf) [22] [https://database.centralbaltic.eu/sites/default/files/Merisedimentin%20Inkubointikoe%20Seabased%20Tulosraportti\\_0.pdf](https://database.centralbaltic.eu/sites/default/files/Merisedimentin%20Inkubointikoe%20Seabased%20Tulosraportti_0.pdf) [23] [https://database.centralbaltic.eu/sites/default/files/Nutrient%20Compensation%20for%20Aquatic%20Coastal%20Environment%202020\\_0.pdf](https://database.centralbaltic.eu/sites/default/files/Nutrient%20Compensation%20for%20Aquatic%20Coastal%20Environment%202020_0.pdf) [24] [https://database.centralbaltic.eu/sites/default/files/Practical%20Guidelines%20for%20sea-based%20measures%202021\\_0.pdf](https://database.centralbaltic.eu/sites/default/files/Practical%20Guidelines%20for%20sea-based%20measures%202021_0.pdf) [25] <https://database.centralbaltic.eu/tags/water-management> [26] <https://database.centralbaltic.eu/tags/coastal-management-and-maritime-issues> [27] <https://database.centralbaltic.eu/tags/waterways> [28] <https://database.centralbaltic.eu/tags/lakes-and-rivers> [29] <https://seabasedmeasures.eu/> [30] <https://www.johnnurmisenasaatio.fi/en/clean-baltic-sea-projects/seabased-project/> [31] <https://www.facebook.com/johnnurmisenasaatio> [32] <https://us10.campaign-archive.com/home/> [33] <https://www.youtube.com/results> [34] <http://www.totalvene.fi/lue/uutinen/seabased-hanke> [35] <https://www.epressi.com/tiedotteet/ymparisto-ja-luonto/key-conclusion-from-the-seabased-project-no-silver-bullet-for-reducing-internal-nutrient-load.html> [36] <https://alandsradio.ax/gomorrn/bracket-vatten-kan-hjalpa-skorden-under-torra-somrar> [37] <https://www.hs.fi/kotimaa/art-2000006537934.html> [38] <https://svenska.yle.fi/artikel/2020/06/12/slut-pa-blagronalger-helikopter-spred-kalksten-i-kolkaviken-i-nadendal-i-nytt> [39] <https://svenska.yle.fi/artikel/2020/05/13/muddring-av-havsboten-for-dyrt-men-sedimentexperimenten-utanfor-houtskar> [40] <https://alandsradio.ax/nyheter/kalk-ar-annu-inte-alternativ-pa-aland> [41] <https://www.nib.int/who-we-are/news-and-media/articles/3299/persistence-needed-in-baltic-sea-protection> [42] <https://www.landsbygdensfolk.fi/nyheter/fosfor-och-kvaeve-ur-havet-ska-bli-goedsel-pa-vallarna> [43] <https://www.landsbygdensfolk.fi/nyheter/hallbart-fiske-bidrar-till-att-raedda-oestersjoen> [44] <https://alandsradio.ax/nyheter/projektet-seabased-ska-minska-overgodningen> [45] [https://www.tekniikkatalous.fi/kaiikki\\_uutiset/seabased-tutkii-meren-ravinnekuorman-poistamista-pilotointi-alkaa-itamerella-6730844](https://www.tekniikkatalous.fi/kaiikki_uutiset/seabased-tutkii-meren-ravinnekuorman-poistamista-pilotointi-alkaa-itamerella-6730844) [46] <https://seabasedmeasures.eu/blog/finding-the-right-methods-of-fishing-stickleback/> [47] <https://seabasedmeasures.eu/blog/stakeholders-views-on-sea-based-measures-need-for-long-term-studies-and-pilots/> [48] <https://johnnurmisenasaatio.fi/sv/gaddfabriker-kan-minimera-eutrofieringens-biverkningar/> [49] <https://seabasedmeasures.eu/blog/cornerstones-for-building-a-compensation-concept/> [50] <https://seabasedmeasures.eu/blog/first-trial-with-a-new-phosphorus-sequestering-agent-in-the-stockholm-archipelago/> [51] <https://seabasedmeasures.eu/blog/pike-factories-reduce-the-adverse-effects-of-eutrophication/> [52] <https://seabasedmeasures.eu/blog/sweet-results-after-a-salty-summer/>