



# briefing

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## Outcomes of BONUS Blue Baltic call: Widespread impact on Baltic Sea management action

The 'BONUS call 2015: Blue Baltic' of over EUR 32 million in volume, engaged 720 people across implementation of 12 projects funded in years 2017–2020. The projects generated substantial impact on science, society, policy, innovation and management of the Baltic Sea region. The research partners from 68 institutes of all eight EU member states around the Baltic Sea (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden), facilitated Baltic-wide research integration both within and beyond the call. Also, the eligibility criterion for a group of themes stated that at least 25 % of BONUS funding was reserved for industrial partners, which resulted in a surge of 19 new SME partners in projects.

■ To date, the Blue Baltic projects have published 198 scientific papers, out of which nearly 60 % as open access. Almost half of papers are featuring authors from at least 2 different BONUS participating states. Furthermore, over 70 suggestions have been made to shape Baltic policy and management measures. Projects have engaged in nearly 700 events where project results have been widely disseminated, including 61 popular science contributions. The projects have supported 79 doctoral studies, 11 theses and 67 PostDoc positions over the course of their implementation. The gender balance has been well aligned with the overall BONUS approach as almost half of all scientific staff have been women.

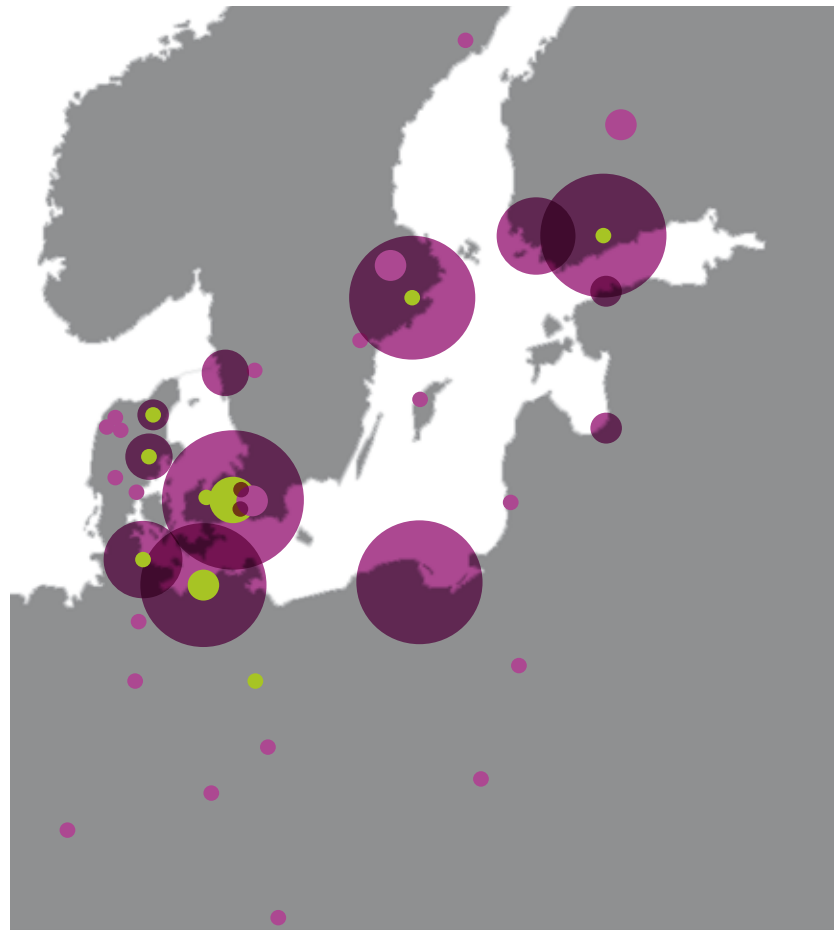
### Broad array of performance statistics data collected from BONUS projects

Since opening the first project call in 2012, the BONUS Secretariat has continuously collected performance statistics data as part of the projects' periodic reporting. These statistics comprise 19 categories on the projects' contributions to regulatory management, development and implementation of policy, stakeholder engagement, cross-border research integration, links to academia, and public dissemination, resulting in an extensive database: a unique information source for evaluating the impact of research carried out by the BONUS projects.

**BONUS, THE JOINT BALTIC SEA RESEARCH AND DEVELOPMENT PROGRAMME (2011–2020)**, produces knowledge and eco-technological advances to support development and implementation of regulations, policies and management practices specifically tailored for the Baltic Sea region. It issues calls for competitive proposals and funds projects of high excellence and relevance based on the BONUS strategic research agenda [www.bonusportal.org/sra](http://www.bonusportal.org/sra).

The map shows geographical locations of the Baltic Sea-wide network of 12 Blue Baltic projects, involving 68 different project partner institutes in all eight EU member state countries of the Baltic Sea region. Not shown on the map are 6 partners from Belgium, Canada, Norway, the UK and the USA.

- Coordination of project
- Project partner



## KEY RESULTS OF 'BONUS CALL 2015: BLUE BALTIC' PROJECTS

### BONUS BALTHEALTH: Baltic Sea multilevel health impacts on key species of anthropogenic Hazardous Substances

Rune Dietz, Aarhus University, Denmark  
<https://projects.au.dk/bonusbalthealth/>

■ BONUS BALTHEALTH has advanced our scientific understanding of the contaminant loads, disease patterns as well as the effects the adverse halogenated substances along the food webs and developed comprehensive modelling framework dedicated to identify and evaluate population and ecosystem-level health impacts.

### BONUS BASMATI: Baltic Sea maritime spatial planning for sustainable ecosystem services

Henning Sten Hansen, Aalborg University, Denmark  
<https://bonusbasmati.eu/>

■ BONUS BASMATI has addressed some of the main challenges in maritime spatial planning: How to apply an ecosystem-based approach, how to establish stakeholder involvement, and how to provide access to common tools to identify appropriate locations for new maritime activities without harming the marine ecosystems or creating conflicts with existing uses. All methods and tools developed during BONUS BASMATI are made freely available and can support maritime spatial planners in various steps of the planning process.

### BONUS BLUEWEBS: Blue growth boundaries in novel Baltic food webs

Laura Uusitalo, Finnish Environment Institute  
[www.syke.fi/bonusbluewebs](http://www.syke.fi/bonusbluewebs)

■ The Baltic Sea food web and ecosystem has always been changing, and the change will probably be even faster in the future. This will lead to novel abiotic and biotic ecological conditions, with possible consequences to the optimal management strategy of the system. Based on the results, a series of overarching conclusions were drawn regarding the likely future management characteristics of the Baltic Sea ecosystem, as outlined in the BONUS BLUEWEBS Policy Brief.

### BONUS FLAVOPHAGE: Bacteriophage based technology for pathogen control in aquaculture

Mathias Middelboe, University of Copenhagen, Denmark  
<https://bonus-flavophage.org/>

■ The project developed the novel strategies for disease control in trout aquaculture. Flavobacteria pathogens cause major losses in trout aquaculture. Application of bacteriophages can reduce abundance and biofilm formation of the fish pathogenic Flavobacteria, and the bacteriophages can be delivered to the fish by coating onto dry feed. Resistance to bacteriophages is associated with loss of virulence in Flavobacteria, further emphasizing the potential of using bacteriophages for disease control in trout aquaculture.

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## **BONUS INTEGRAL: Integrated carbon and trace gas monitoring for the Baltic Sea**

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Gregor Rehder, Leibniz Institute for Baltic Sea Research Warnemünde, Germany  
[www.io-warnemuende.de/integral-home.html](http://www.io-warnemuende.de/integral-home.html)

■ A network of carbon system observations in the Baltic Sea has been established and homogenized, and is now part of the European ICOS RI (Integrated Carbon Observation System), or designated as ICOS component in the near future. The integrated analysis allows for a new quantitative assessment of eutrophication, and the development of an indicator for acidification. Baseline measurements for the Baltic Sea emission of the major greenhouse gases (carbon dioxide, methane, and nitrous oxide) have been established.

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## **BONUS MICROPOLL: Multilevel assessment of microplastics and associated pollutants in the Baltic Sea**

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Sonja Oberbeckmann, Leibniz Institute for Baltic Sea Research Warnemünde, Germany  
[www.io-warnemuende.de/micropoll-home.html](http://www.io-warnemuende.de/micropoll-home.html)

■ Baltic beaches are significantly polluted with large microplastics, e.g. industrial pellets and cigarette butts, and monitoring strategies were suggested. Sanitary sewer overflows were identified as one major source for small microplastics in the Baltic Sea. Marine plastic pollution will not be diminished by microbial degradation, but via environmental education, management measures, and technical improvements.

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## **BONUS OPTIMUS: Optimisation of mussel mitigation cultures for fish feed in the Baltic Sea**

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Jens Kjerulf Petersen, National Institute of Aquatic Resources, Technical University of Denmark  
[www.bonus-optimus.eu](http://www.bonus-optimus.eu)

■ Research of BONUS OPTIMUS is summarized in the Policy Guidelines for implementation of mussel cultivation as a mitigation measure for coastal eutrophication in the Western Baltic Sea. This document represents the most comprehensive, up-to-date summary of mitigation mussel cultivation in the western Baltic.

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## **BONUS RETURN: Reducing emissions by turning nutrients and carbon into benefits**

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Karina Barquet, Stockholm Environment Institute, Sweden  
[www.bonusreturn.eu](http://www.bonusreturn.eu)

■ BONUS RETURN has been exploring how ecotechnologies can turn nutrients and carbon from being environmental problems, into benefits— by closing nutrient loops and promoting circularity. The project highlights evidence on circular innovations for reducing eutrophication in the Baltic Sea.

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## **Projects with central focus on innovation:**

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### **BONUS CLEANAQ: Innovative removal of N, P and organic matter in effluents from recirculating aquaculture system**

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Per Bovbjerg Pedersen, National Institute of Aquatic Resources, Technical University of Denmark  
[www.bonus-cleanaq.eu](http://www.bonus-cleanaq.eu)

■ End-Of-Pipe water treatment methods from recirculating aquaculture systems were investigated: denitrification potential of woodchip bioreactors at different salinities, combined removal of P and N with organic flocculants and woodchip bioreactors as well as electrochemical water treatment

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### **BONUS CLEANWATER: Eco-technological solutions to remove micro-pollutants and micro-plastic from contaminated water**

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Kai Bester, Aarhus University, Denmark  
[www.swedenwaterresearch.se/en/projekt/bonus-cleanwater](http://www.swedenwaterresearch.se/en/projekt/bonus-cleanwater)

■ BONUS CLEANWATER has gained new critical knowledge on how ecotechnologies can be used for removing organic micro-pollutants and microplastics from wastewater in order to reduce the inputs into the Baltic Sea.

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### **BONUS ECOMAP: Baltic Sea environmental assessments by opto-acoustic remote sensing, mapping, and monitoring**

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Jens Schneider von Deimling, Christian-Albrechts-Universität zu Kiel, Germany  
[www.bonus-ecomap.eu](http://www.bonus-ecomap.eu)

■ The research and development highlight that it is worth the effort to dig deep into both, optical and acoustical remote sensing technology as well as to integrate modern artificial intelligence for a significantly improved submarine habitat mapping and understanding. The extensive habitat case studies are valuable for academia, authorities, and industry.

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### **BONUS SEAMOUNT: New innovative underwater vehicles for studying submarine groundwater discharge and associated nutrient fluxes**

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Rudolf Bannasch, EvoLogics GmbH, Germany  
<http://seamount.eu/>

■ Submarine groundwater discharge (SGD) may locally affect the ecological status of coastal waters. New and previously known SGD sites were investigated, and a digital information platform was developed for easy overview and access to monitoring data from innovative techniques including Autonomous Underwater Vehicles (AUVs) and near real-time monitoring sensors.

## IMPACT OF THE BONUS BLUE BALTIC PROJECTS ON MANAGEMENT, POLICY AND SOCIETY

■ The 12 BONUS Blue Baltic projects contributed more than 70 times to the development and implementation of 'fit-to-purpose' regulations, policies and management practices aimed at safeguarding the sustainable use of Baltic Sea ecosystem's goods and services (Table 1) and engaged nearly 500 times with stakeholders through 55 events organized and participation in over 400 stakeholder committees.

**Table 1. Contribution of the BONUS Blue Baltic projects to policy and management regulation in the Baltic Sea region and the total percental share on the more than 70 events reported by the projects (completeness of numbers relies on reporting). Detailed information obtainable from the BONUS Secretariat upon request.**

	A. Contributing to EU strategies and directives for the BS	B. Providing management and policy recommendations	C. Updating / developing indicators and descriptors for Baltic Sea Good Environmental Status	D. Closing the gap between science and management, and enhancing Baltic Sea ecosystem approach to management
%	11	44	12	33
BALTHEALTH		✓	✓	✓
BASMATI		✓		✓
BLUEWEBS	✓		✓	
FLAVOPHAGE				
INTEGRAL	✓	✓	✓	✓
MICROPOLL		✓	✓	✓
OPTIMUS	✓	✓	✓	✓
RETURN		✓		✓
CLEANAQ				✓
CLEANWATER	✓	✓		✓
ECOMAP	✓	✓	✓	✓
SEAMOUNT	✓			

### Examples:

- A.** BONUS BLUEWEBS was chosen as flagship project of the EU Strategy for the Baltic Sea Region (EUSBSR) Policy Area Bioeconomy, representing a significant support to the macro-regional policy as well as progress towards the EUSBSR goals.
- B.** Recommendations for improvement of policy and management action included e.g. "Handbook: Process, Methods and Tools for Stakeholder Involvement in MSP" (BONUS BASMATI) and "Policy guidelines for implementation of mussel cultivation as a mitigation measure for coastal eutrophication in the Western Baltic Sea" (BONUS OPTIMUS).
- C.** Multiple projects impacted the development of HELCOM core indicators and implementation of MSFD descriptors, e.g. BONUS BALTHEALTH contributed to identification

of core indicators for Baltic Sea marine mammals; BONUS INTEGRAL was among projects proposing the adoption of carbon system parameters as candidate indicator for acidification to HELCOM; BONUS BLUEWEBS contributed to identification of suitable MSFD Descriptor 4 – food webs – indicators for status assessment; BONUS MICROPOLL contributed to the German working group on the implementation of MSFD Descriptor 10 – marine litter.

- D.** BONUS BASMATI, BLUEWEBS, CLEANWATER, INTEGRAL and RETURN shaped their policy recommendations as policy briefs, e.g. CLEANWATER addressed the possibilities to remove micropollutants from wastewater targeting the HELCOM Working Group on reduction of Pressures from the Baltic sea Catchment area; RETURN presented eco-technologies for decreasing the nutrient run-off and facilitating nutrient circulation in the test areas. All the Policy briefs are available [www.bonusportal.org/policybriefs](http://www.bonusportal.org/policybriefs)

## WIDE-REACHING COLLABORATION AND DISSEMINATION ACTION

### Collaboration beyond project calls and BONUS participating states:

■ The Blue Baltic projects have established tight links of cooperation with researchers outside the Baltic Sea region. The cooperation has been realized with joint participation in EU funded projects (CLIMEFISH by BLUEWEBS, JERICO-NEXT by INTEGRAL, AQUAVITAE by OPTIMUS), COST actions (ERB Facility by BALTHEALTH), other European joint calls (WHEATHER-MIC and BASEMAN as JPI Oceans call by MICROPOLL). At least 70 links to non-Baltic research groups from within and outside the EU were established, including researchers from Canada, Israel, New Zealand, Turkey and in most frequently the USA.

### Broad dissemination of project results:

■ The Blue Baltic projects engaged in nearly 700 events of dissemination of the research results to broad public, including ca. 230 interviews to media, 61 popular science papers, and 65 multi-media products such as *The Baltic: A Sea of Opportunity* by BONUS RETURN and *Blue mussel farming for improving water quality in the Baltic Sea* by BONUS OPTIMUS.

### More information: [www.bonusportal.org/bb](http://www.bonusportal.org/bb)

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