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European Biodiversity Partnership

New Approaches in Determining the Impacts of Chemical Pollution to Protect the Biodiversity of the Baltic Sea

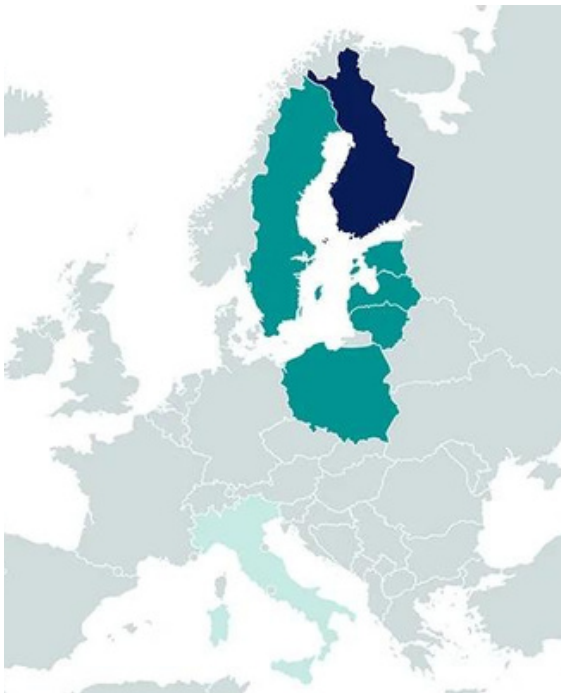
Detect2Protect

Newsletter No. 1

WELCOME

The impact of chemical contaminants on biodiversity has received considerably less attention compared to the other recognised drivers such as habitat loss, climate change, overexploitation, and invasive species. The Detect2Protect (D2P) project will tackle the issue by applying state-of-the-art research methodologies in the determination of biodiversity by eDNA methods and biological effects of contaminants on organisms in different marine regions of the Baltic Sea. Our dedicated international research team is set out to give a considerable boost to this important field of Baltic Sea research and acquire new knowledge on the threats of chemical contamination on our sensitive marine ecosystem.

Kari Lehtonen - coordinator (Syke)
on behalf of D2P partners



www.biodiversa.eu/2023/04/19/detect2protect/

PARTNERS OF THE PROJECT

- **Marine and Freshwater Solutions, Finnish Environment Institute, Helsinki, Finland (SYKE)**
- **Department of Marine Systems, Tallinn University of Technology, Tallinn, Estonia (TalTech)**
- **Laboratory of Ecotoxicology, Nature Research Centre, Vilnius, Lithuania (NRC)**
- **Institute of Oceanology, Polish Academy of Sciences, Sopot, Poland (IO PAN)**
- **Marine Monitoring, Latvian Institute of Aquatic Ecology, Agency of Daugavpils University, Riga, Latvia (LHEI)**
- **Department of Biological and Environmental Sciences, University of Gothenburg, Gothenburg, Sweden (BIOENV)**
- **Environmental Science, Stockholm University, Stockholm, Sweden (SU)**
- Department of Life and Environmental Sciences, Marche Polytechnic University, Ancona, Italy (UNIVPM) - subcontractor
- eDNA laboratory, SeAnalytics AB, Bohus-Björkö, Sweden (SEANALYTICS AB) - subcontractor

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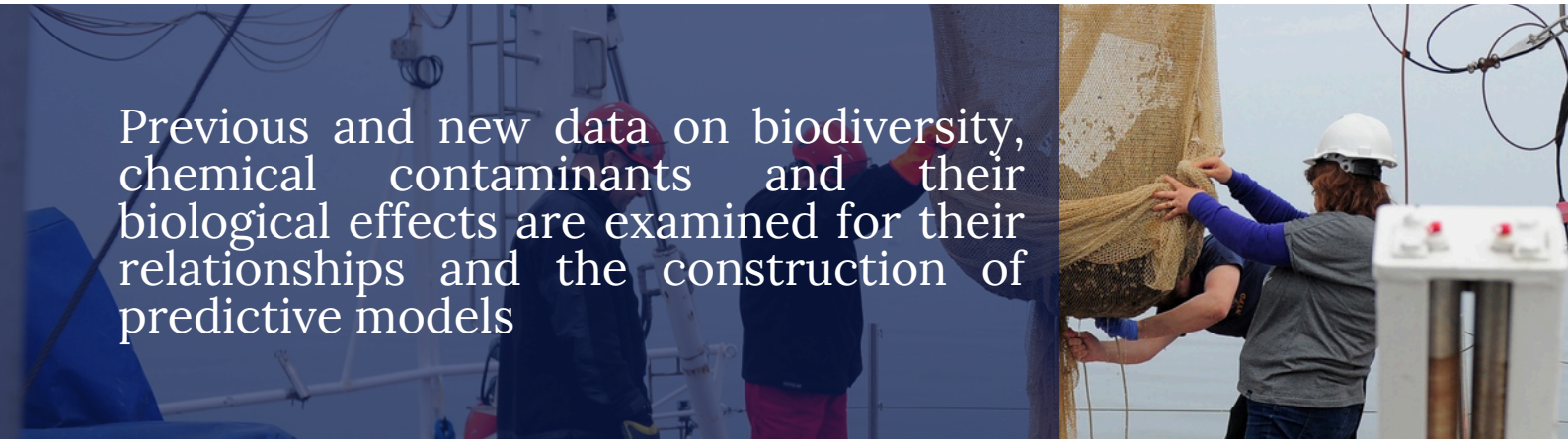
AIMS

- improved understanding of environmental pollution and changes in biodiversity and ecological status
- methodological advances in biological effect assessments to prevent adverse effects on biodiversity
- developing effect-based methods (EBM) based on early warning monitoring strategies with links to the health and biodiversity of marine ecosystems
- strengthened interactions at regional and European level in the field of impact assessment of marine pollution

MAIN ACTIVITIES



Previous and new data on biodiversity, chemical contaminants and their biological effects are examined for their relationships and the construction of predictive models

FIELD STUDIES

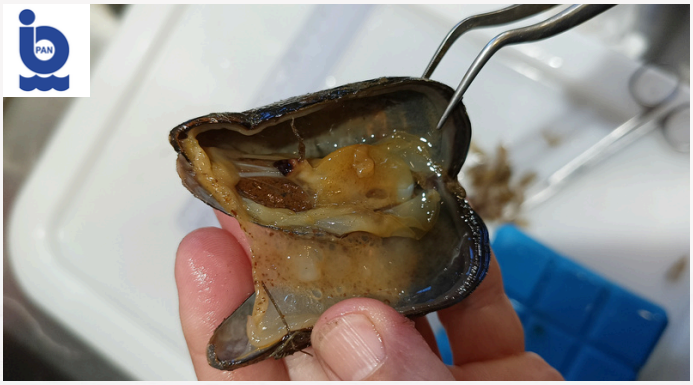
New data collected from field sites in coastal areas of Poland, Latvia, Lithuania, Estonia, Sweden and Finland, comparing polluted and reference sites. An extensive battery of EBM planned to be used to link the exposure to effects at different biological levels representing species from the target sites.

In October 2023, fieldwork was conducted in the Gulf of Finland using TalTech's research vessel Salme, resulting in the collection of numerous sediment and *Macoma balthica* from the Tallinn and Narva bays. Additionally, in January 2024, amphipods *Monoporeia affinis* were collected from several offshore sampling stations in the Gulf of Finland for embryo malformation and molecular analyses.

During the summer and spring 2023 cruises, sampling of flounder and cod along the Lithuanian Baltic Sea shore was conducted at two locations: the oil terminal, representing a contaminated site, and a reference site near Nida city.Various biomarkers will be assessed in the flounder and cod specimens, ranging from morphometric characteristics to geno- and cytotoxicity evaluations.

In November 2023, in Latvian Institute of Aquatic Ecology two research areas were selected: one near the river and close to the port in the capital and the other in the eastern part of the Gulf of Riga. Sediments and biota such as amphipods *Monoporeia affinis*, isopods *Saduria entomon*, clams *Macoma balthica* and worms were collected for chemical and molceular analyses.

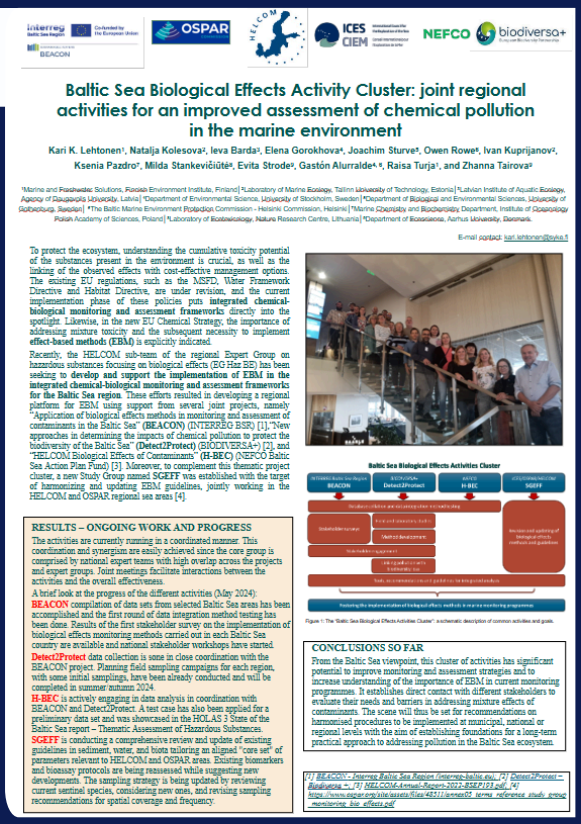
During the autumn 2023 and spring 2024 samples of biota such as mussels *Mytilus trossulus*, clams *Macoma balthica*, shrimps *Crangon crangon*, sediments and eDNA for biodiversity assessment were collected from reference and polluted sites in the Gulf of Gdansk, southern Baltic Sea.



In January 2023, despite the extremely windy and cold conditions, team from Stockholm University pulled off a successful sampling campaign in the Bothnian Sea and the Baltic Proper. Amphipod Monoporeia affinis and sediment samples were collected thanks to the incredible teamwork and determination.

Beyond the basic research activities, the project places significant emphasis on engaging stakeholders and disseminating information related to the integration of EBM into marine monitoring programs.

SETAC Europe 34th Annual Meeting (Seville, Spain)



Baltic Sea Biological Effects Activity Cluster: joint regional activities for an improved assessment of chemical pollution in the marine environment

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To protect the ecosystem, understanding the cumulative toxicity potential of the substances present in the environment is crucial, as well as the linking of the observed effects with cost-effective management options. The existing EU regulations, such as the MSFD, Water Framework Directive and Habitat Directive, are under revision, and the current implementation phase of these policies puts **integrated chemical-biological monitoring and assessment frameworks** directly into the spotlight. Likewise, in the new EU Chemical Strategy, the importance of addressing mixture toxicity and the subsequent necessity to implement **effect-based methods (EBM)** is explicitly indicated.

Recently, the HELCOM sub-team of the regional Expert Group on hazardous substances focusing on biological effects (EG Haz BE) has been seeking to **develop and support the implementation of EBM in the integrated chemical-biological monitoring and** assessment **frameworks for the Baltic Sea region**. These efforts resulted in developing a regional platform for EBM using support from several joint projects, namely "Application of biological effects methods in monitoring and assessment of contaminants in the Baltic Sea" **(BEACON)** (INTERREG BSR) [1], "New approaches in determining the impacts of chemical pollution to protect the biodiversity of the Baltic Sea" **(Detect2Protect)** (BIODIVERSA+) [2], and "HELCOM Biological Effects of Contaminants" **(H-BEC)** (NEFCO Baltic Sea Action Plan Fund) [3]. Moreover, to complement this thematic project cluster, a new Study Group named **SGEFF** was established with the target of harmonizing and updating EBM guidelines, jointly working in the HELCOM and OSPAR regional sea areas [4].

Baltic Sea Biological Effects Activities Cluster

Figure 1: The "Baltic Sea Biological Effects Activities Cluster": a schematic description of common activities and goals.

RESULTS – ONGOING WORK AND PROGRESS

The activities are currently running in a coordinated manner. This coordination and synergism are easily achieved since the core group is comprised by national expert teams with high overlap across the projects and expert groups. Joint meetings facilitate interactions between the activities and the overall effectiveness.

A brief look at the progress of the different activities (May 2024):

BEACON compilation of data sets from selected Baltic Sea areas has been accomplished and the first round of data integration method testing has been done. Results of the first stakeholder survey on the implementation of biological effects monitoring methods carried out in each Baltic Sea country are available and national stakeholder workshops have started.

Detect2Protect data collection is done in close coordination with the BEACON project. Planning field sampling campaigns for each region, with some initial samplings, have been already conducted and will be completed in summer/autumn 2024.

H-BEC is actively engaging in data analysis in coordination with BEACON and Detect2Protect. A test case has also been applied for a preliminary data set and was showcased in the HOLAS 3 State of the Baltic Sea report – Thematic Assessment of Hazardous Substances.

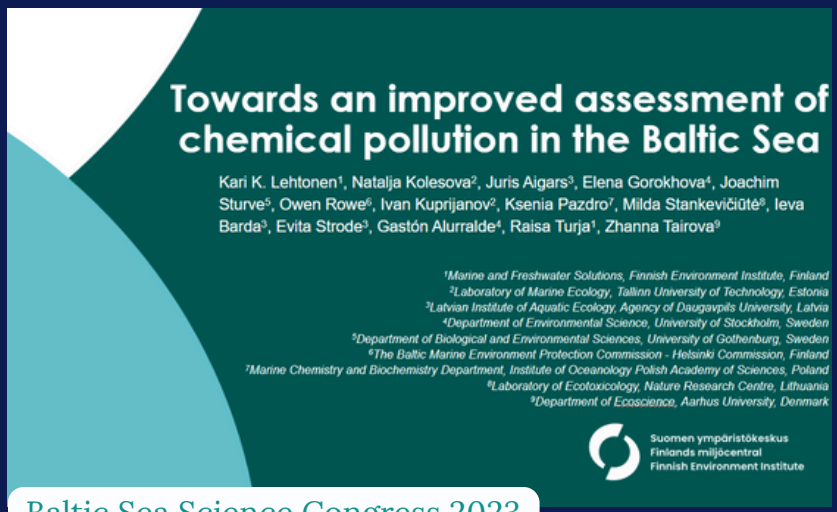
SGEFF is conducting a comprehensive review and update of existing guidelines in sediment, water, and biota tailoring an aligned "core set" of parameters relevant to HELCOM and OSPAR areas. Existing biomarkers and bioassay protocols are being reassessed while suggesting new developments. The sampling strategy is being updated by reviewing current sentinel species, considering new ones, and revising sampling recommendations for spatial coverage and frequency.

CONCLUSIONS SO FAR

From the Baltic Sea viewpoint, this cluster of activities has significant potential to improve monitoring and assessment strategies and to increase understanding of the importance of EBM in current monitoring programmes. It establishes direct contact with different stakeholders to evaluate their needs and barriers in addressing mixture effects of contaminants. The scene will thus be set for recommendations on harmonised procedures to be implemented at municipal, national or regional levels with the aim of establishing foundations for a long-term practical approach to addressing pollution in the Baltic Sea ecosystem.

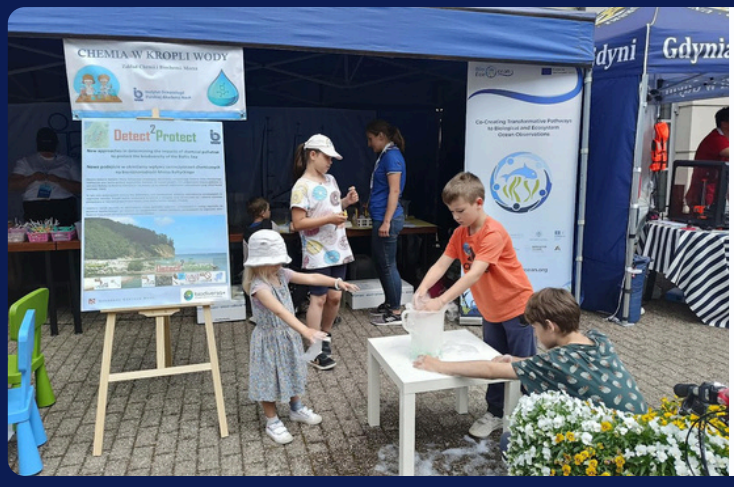
[1] BEACON - Interreg Baltic Sea Region (interreg-baltic.eu); [2] Detect2Protect – Biodiversa +; [3] HELCOM-Annual-Report-2022-BSEP183.pdf; [4] https://www.ospar.org/site/assets/files/48211/annex02_terms_reference_study_group_monitoring_bio_effects.pdf

Baltic Sea Science Congress 2023 (Helsinki, Finland)



Educational workshops in Liepāja, Latvia

In Liepāja, April 27 in 2024, at the Science and Education Innovation Center (ZIIC), the small nature cognitive research ship "AkvaLab Liepāja" was opened. Science enthusiasts and families with children were invited to open-air workshops about protected marine areas, ecotoxicological studies and alien species.

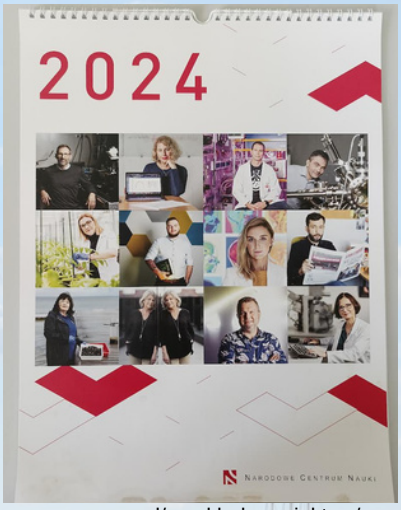


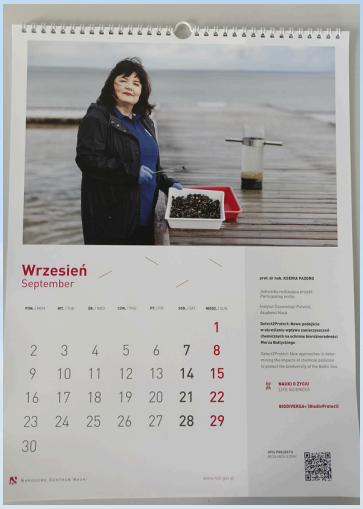
Ocean of changes in Sopot, Poland

In Sopot, June 17 in 2024, at the Institute of the Polish Academy of Science, a poster was presented as part of a science picnic. The audience learned how chemical pollution affects marine organisms and how important it is to change the approach in the protection of the Baltic Sea, which focuses on the effect-based methods (EMB).

PROMOTION

As part of the 2024 edition of the calendar of National Research Center of Poland, the profile of Professor Ksenia Pazdro from the Institute of Oceanology of the Polish Academy of Science and the main goals of the D2P project were presented.



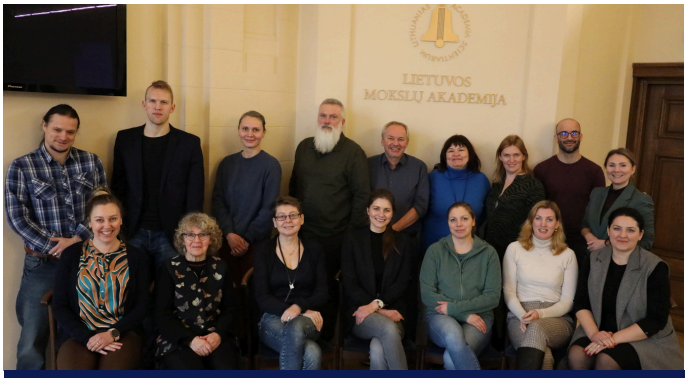


www.ncn.gov.pl/przyklady-projektow/pazdro

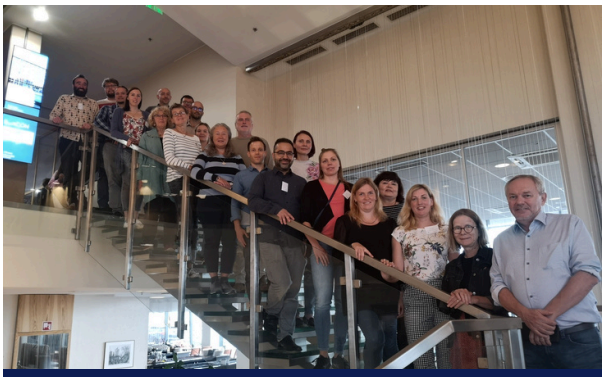
MEETINGS

During the D2P project kick-off meeting in Vilnius, Lithuania, implementation of the project tasks was presented and discussed. The WP leaders made overview of so far activities and showed future plans within different work packages. The assembly gathered more than 20 participants representing all partner institutions from Lithuania, Latvia, Estonia, Finland, Sweden and Poland.
The D2P project kick-off meetings in Tallinn and Riga were held in the frame of “Baltic Sea Biological Effects Cluster Activities” Meeting.

Riga, Latvia (2024)



Vilnius, Lithuania (2023)



Tallinn, Estonia (2023)

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