



2021 Vereinte Nationen Dekade
2030 der Meeresforschung
für nachhaltige Entwicklung

Deutsche Hydrographische Gesellschaft, Lübeck 23/06/2026

A Healthy Ocean with All: Transdisciplinary Approaches to Restoring the Baltic Sea

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Nuri Max Steinmann



Toste Tanhua



Holger Watter



Ute Wilhelmsen



Nadja Ziebarth

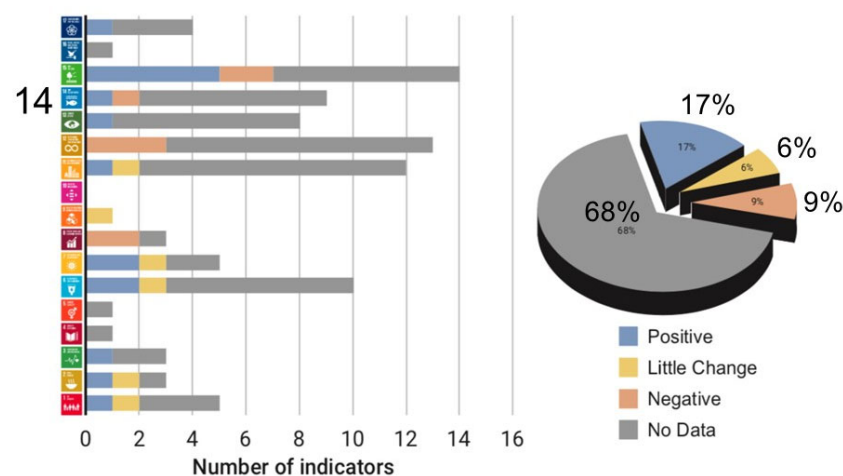
Why an improved Ocean Observing System?



Greater knowledge based on continuous ocean observations will be needed to better understand climate change & variability, and ocean, weather and environmental hazards.



Figure 1. SDG Tree



Overview of the SDGs progress – UN Environment 2019

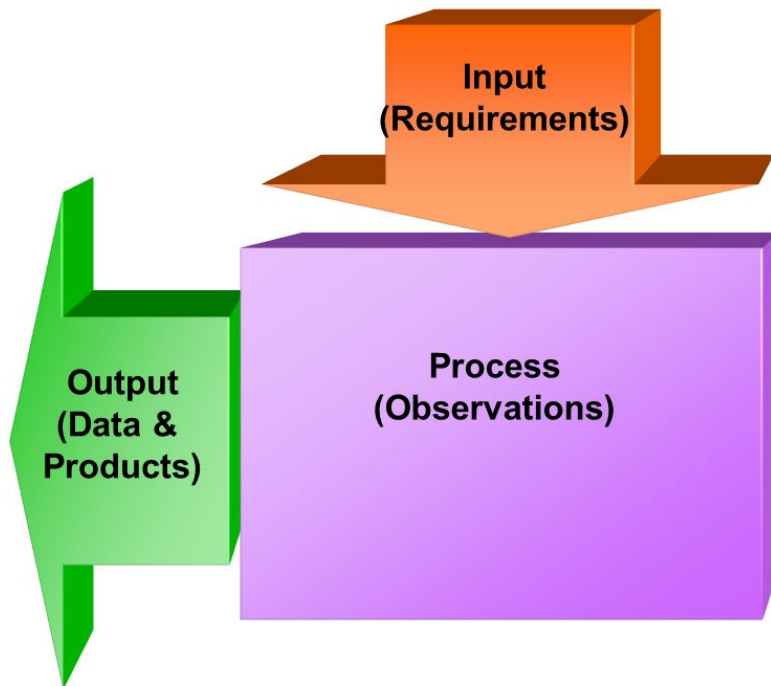
The Framework for Ocean Observing has transformed ocean observing the last decade



Verbande Nationen Dekade
2021-2030
für nachhaltige Entwicklung

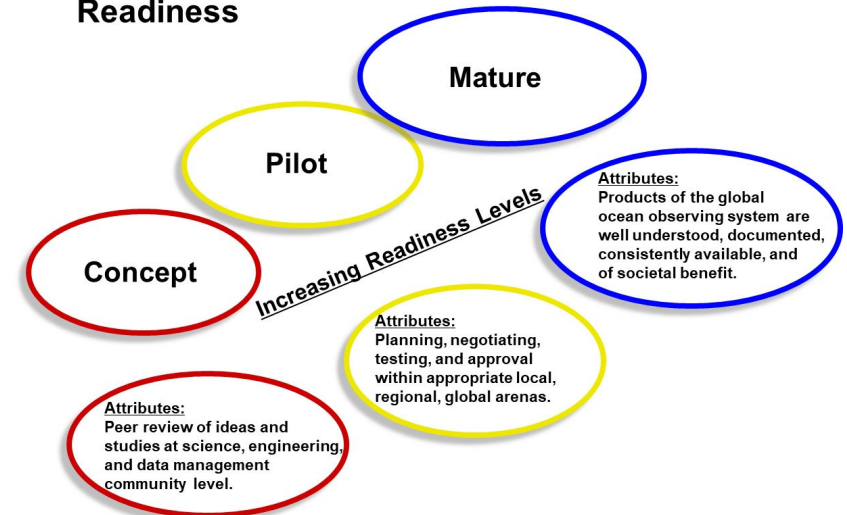
Framework for Ocean Observing

A simple system



Towards sustained system: requirements, observations, data management

Readiness





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Why sustained ocean observing?

Increasing demand for an improved evidence and information base for:

- Policy
- Sustainable development
- Environmental management
- Safety, industry, defence

Ocean information is essential to supporting evidence-based decisions on the pathway to sustainable development.



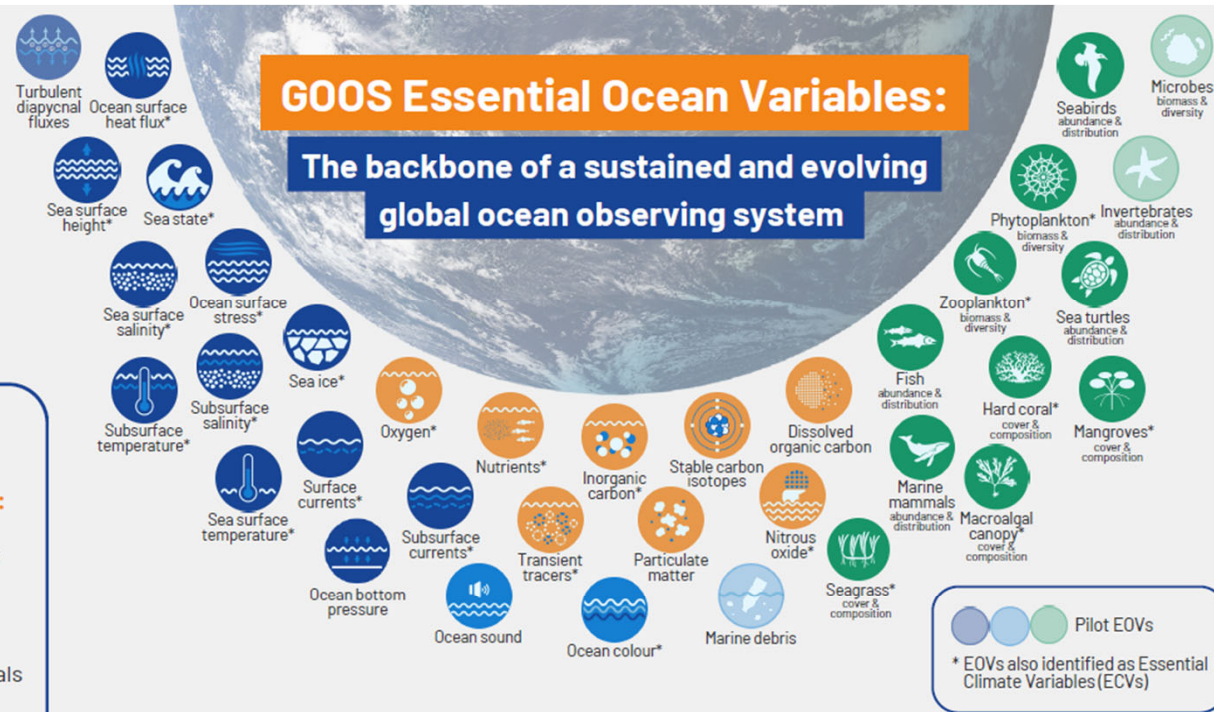
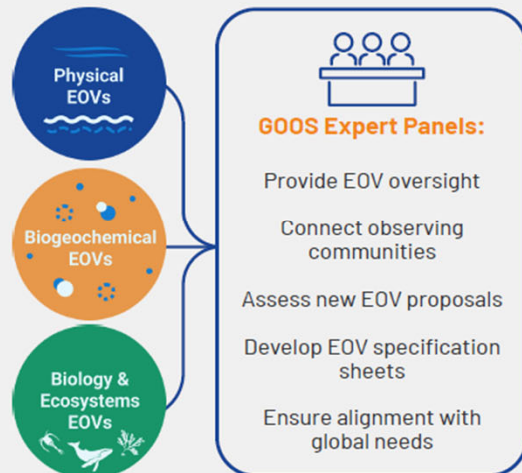
Essential Ocean Variables (EOVs)



WHY OBSERVE THE OCEAN?

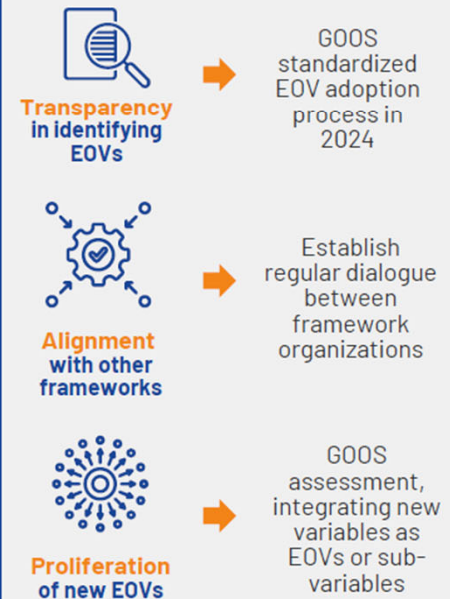
To predict and understand the ocean's role in climate, food security, and extreme events, we rely on sustained ocean observations.

Essential Ocean Variables (EOVs) are the minimum set of variables needed to assess ocean state and variability.



A decade on, the EOV framework must evolve to balance its core function with emerging societal needs and global policies.

CHALLENGES & RECOMMENDATIONS



State of the Baltic Sea: Increasing impacts from climate change and biodiversity degradation

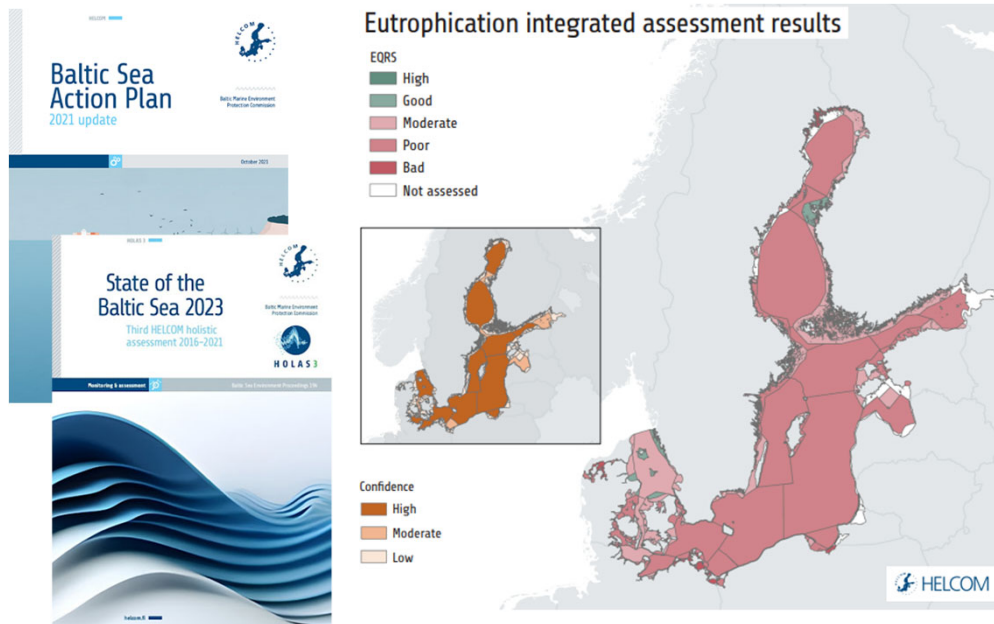


Figure 4.3. Summary of assessment results from the assessment of eutrophication. Source: HELCOM 2023b.

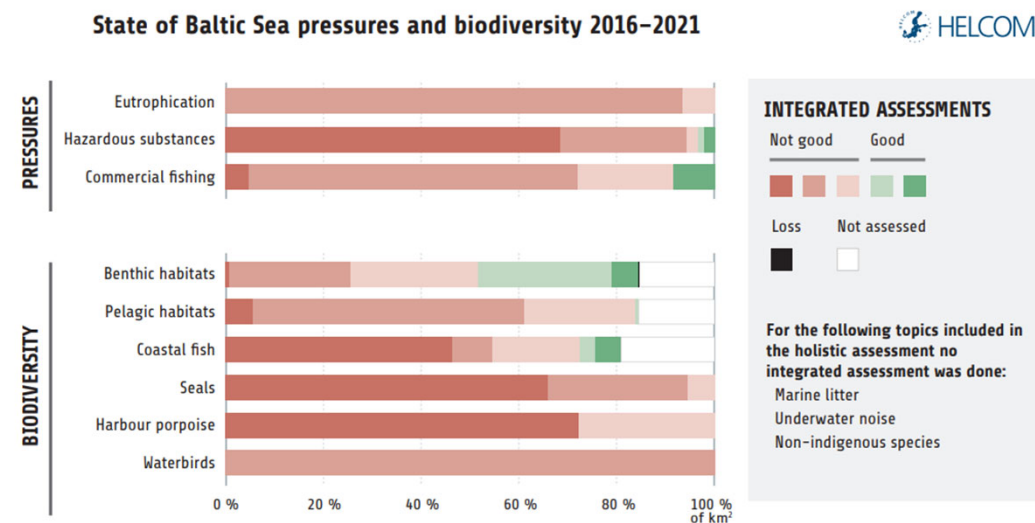


Figure ES1. Summary of the integrated assessment results of pressures and status for the Baltic Sea showing the proportion of the Baltic Sea in the different assessment status categories (based on square kilometres). Integrated assessment results are shown in five categories with three representing degrees of poor status and two representing degrees of good status, as shown in more detail in the different chapters of the report.

- Little to no improvement of the Baltic Sea environment occurred during the assessment period.
- Actions are needed both to stop current negative trends and to protect and restore ecosystems.

National Sustainability Strategy 2025 & National Water Strategy 2023 - Ocean?

Shaping transformation together fairly (7 TT Areas)



V. Sustainable agricultural and food systems

Abbildung 10: Für TT 5 besonders relevante SDGs



VI. Pollution-free environment

Abbildung 11: Für TT 6 besonders relevante SDGs



National Ocean Strategy was planned to be released for the 1st National Ocean Conference, May 2025 - strategy is still pending, status open -

Baltic Sea Protection Action Plan 2030 by Schleswig Holstein - APOS 2030



- Effective marine protected areas (12.5%)
- Active measures to improve biodiversity in the Baltic Sea
- Effective protected area management and educational work
- **Reduction of nutrient inputs**
 - Implementation of the Municipal Waste Water Directive
 - Implementation of the Fertilizer Ordinance 2020
 - Water protection advice for agriculture
 - Target agreements with agriculture
 - Substance retention in agriculture
- Recovery of contaminated sites and waste
- Involvement of all stakeholders

Transdisciplinary Projects in the Baltic Sea: SustainMare

This DAM mission focuses on regions in the North and Baltic Seas.

Eutrophication, fisheries, shipping, pollution (including plastics, other flotsam and chemicals), tourism, energy production, mining of mineral resources, dredging and sedimentation, coastal protection measures and other direct economic pressures.

- Seven collaborative projects
- 28 research institutions
- aim to identify options for action for the sustainable use of marine resources and ecosystem services and to promote good environmental status in marine systems.

To achieve this, a transdisciplinary and interdisciplinary approach and close dialogue with stakeholders are required.

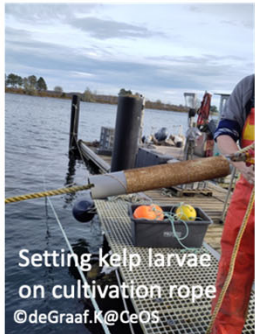


Transdisciplinary Projects in the Baltic Sea: SpaCeParti (SustainMare)

SpaCeParti: Coastal Fishery, Biodiversity, **S**patial Use and **C**limate Change: A **P**articipative Approach to navigate the Western Baltic Sea into a Sustainable Future

Duration: 12/21– 11/24 + 12/24–11/27

Experimental sugar kelp cultivation with Fishers:



- diversify income sources for coastal fishermen in winter
- building new networks between fishery and private businesses
- monitoring, if local improvement of marine ecosystem occurs
- testing possibilities for educational programs (schools, university)



Transdisciplinary Projects in the Baltic Sea: Climate-friendly Offshore Production of Algae Biomass (CLiPA)

CLiPA investigates cultivating the Bladderwreck (*Fucus vesiculosus*) on wind turbine foundation structures in the Baltic Sea in the **Living Lab Eckernförder Bucht 2030**

Goals:

- improving of air quality
- biomass production and extraction of valuable components for cosmetics

Partners: Kiel University (CAU), University of Rostock, GEOMAR

Duration: 2023-2026

Contact: Prof. Dr. Ulf Karsten, University of Rostock: ulf.karsten@uni-rostock.de and Prof. Dr. Katrin Rehdanz, Kiel University: rehdanz@economics.uni-kiel.de



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Transdisciplinary Projects in the Baltic Sea: Assessment of the effect of novel Harmful Algal Bloom (HAB) species in the Baltic Sea (HABBAL)

Harmful algae blooms (HABs) threaten biodiversity, ecosystem services, and human health in the **Baltic Sea**.

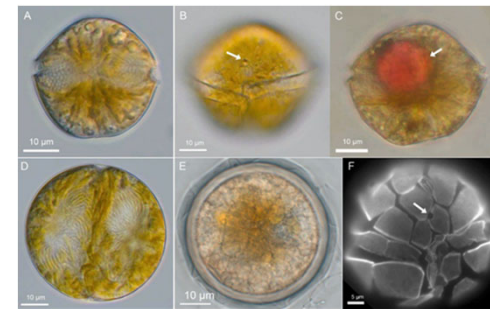
HABBAL Phase II connects biologists, chemists, social scientists, and local stakeholders to better assess distribution, toxicity, and ecotoxicological thresholds, with the aim of risk management strategies.

→ **One outcome:** Design of warning, decision & information system for tourists and swimmers

Partners: AWI, HIFMB, UFZ, IMF, IOW, CeOS, Sea Ranger

Duration: 08/2024 - 07/2027

Contact: Dr. Sylke Wohlrab, AWI: Sylke.Wohlrab@awi.de, Dr. Bernd Krock, AWI: Bernd.Krock@awi.de,
Dr. Christian Wagner-Ahlf, Kiel University: cwagnerahlf@kms.uni-kiel.de (Information system)



Alexandrium pseudogonyaulax (Photo: Urban Tillmann)



Transdisciplinary Projects in the Baltic Sea: Ocean Change 2025 by Arved Fuchs



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Route der Expedition 2025 (Bildquelle: NIBE)

Sponsors: GMT, Briese Research, NIBE, GLYNT, SubCTech, Santiano

Partners: IOW, GEOMAR, AWI, DWD, ODK, Ocean Summit, Nepada Wildlife ...

A Healthy Ocean with All - A Call to Action: Leave no one behind in the Ocean Decade!



A key aspect of the UN Ocean Decade is to deliver towards the UN's stated ambition **'to leave no one behind'**.

This is **a call to action** for:

- trans- & inter-disciplinary training,
- knowledge & skill transfer, and
- multifaceted ocean literacy measures



© ESA / Copernicus Sentinel-Data, 19. July 2025, Rügen / Stralsund / Greifswalder Bodden, Baltic Sea

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Dr. Ulrike Heine - kontaktstelle@ozeandekade.de



BALTIC VENTURES PROGRAM

SCALING MARITIME INNOVATION

Deutsch-Dänisches Programm für maritime StartUps und junge KMU

Mit dem Baltic Ventures Program bringen wir maritime Innovationen aus Deutschland und Dänemark zusammen. Wir verbinden StartUps, KMU und Forschungseinrichtungen mit exklusivem Zugang zu Daten, Testfeldern, Hard und Software Support sowie starken grenzüberschreitenden Netzwerken. Mit unserer Maritime StartUp Growth Academy, den Peer Learning Sessions, dem Fømi – Festival of Maritime Innovation und der engen Zusammenarbeit mit maritimen KMU schaffen wir ein einzigartiges Umfeld, in dem maritime StartUps schneller testen, smarter entwickeln und gezielt wachsen können. Gemeinsam gestalten wir einen der dynamischsten maritimen Innovationsräume Europas.

Ziel: Stärkung von Innovationskraft und Marktzugang durch grenzüberschreitende Zusammenarbeit zwischen Deutschland und Dänemark, mit Fokus auf konkrete Umsetzung und Transfer in die Praxis.

Dauer: bis 31.07.2028

Interreg



Kofinanziert von
der Europäischen Union
Medfinansieret af
Den Europæiske Union

Deutschland – Danmark



Baltic Ventures Program (BVP)

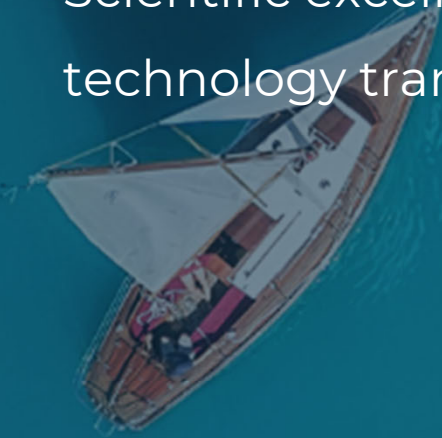
Maritime Daten & Testplattformen

GEOMAR contributes the following:

- Access to datasets, data products, and networks
- Technology transfer from research and tested technologies
- Scientifically validated results and publications
- Co-creation workshops, test runs, and pilots
Expert support

Role of GEOMAR

Scientific excellence partner, expertise in data infrastructure, co-creation, technology transfer



OCEAN ACTORS
THAT **NEED**
SOLUTIONS



TECHNOLOGY



Input

DATA SOLUTIONS



Output

EXPERT SUPPORT



Operations

ENGAGEMENT



Impact

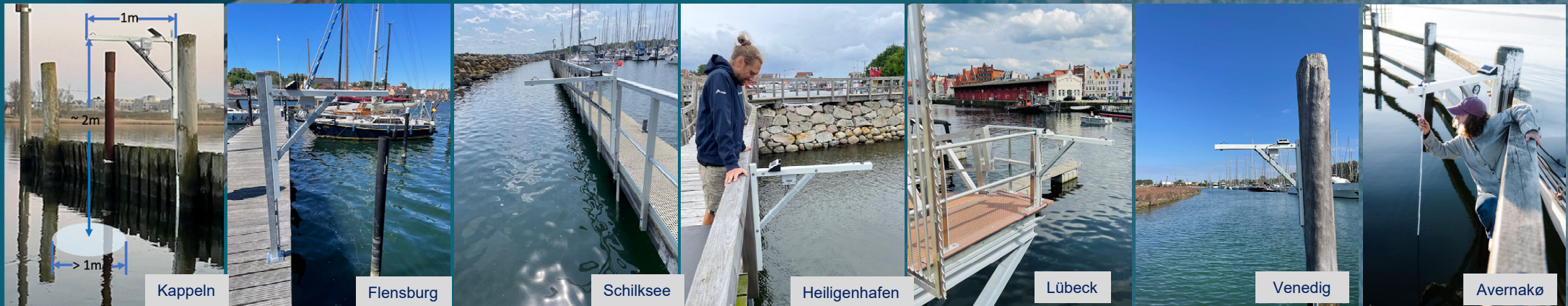


ENABLE
FIT-FOR-PURPOSE
COMMUNITY SOLUTIONS

TURN DATA
INTO REAL-WORLD
SOLUTIONS

TEST PLATTFORMEN

Marina Daten für Betreiber und Gemeinschaften



Ultraschall Sensor
(Wasser Stand)

Temp.
sensor

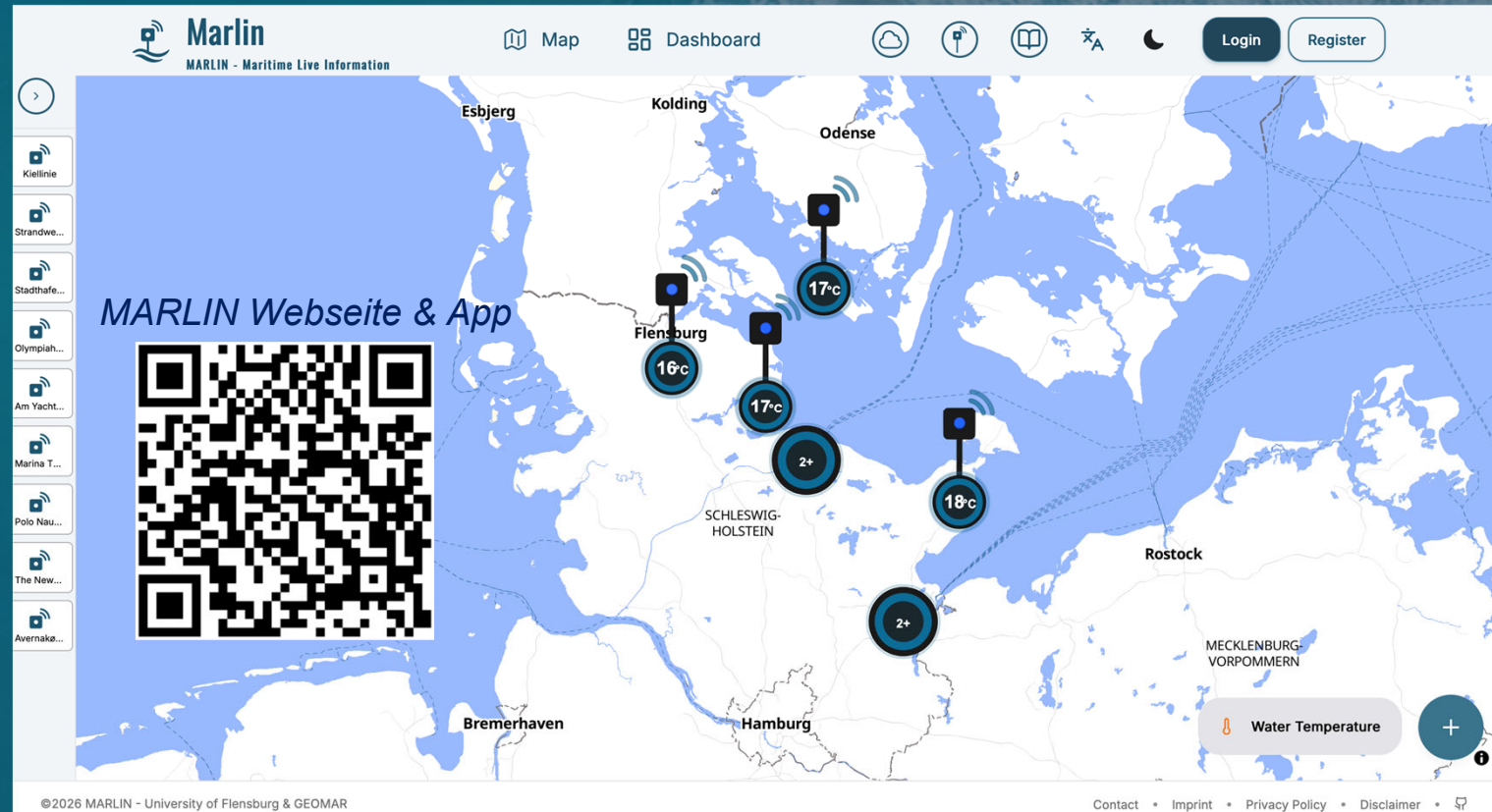
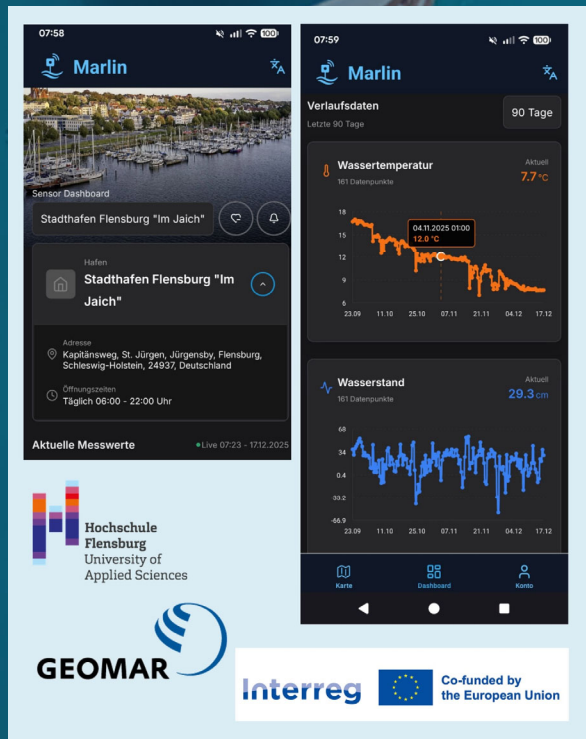
Solarzelle
n

Live-Daten aus der Marina

- Wasserstand +Wellenhöhe
- Wassertemp.
- Luftparameter (an 2 Standorten)

START-UP “MARLIN”

Marina Daten für Betreiber und Gemeinschaften



REsilience of COastal Vital Ecosystems through innovative management solutions in the Danish-German border Region



- Funded by **Interreg Deutschland-Danmark**,  fostering collaborations between Southern Denmark and Schleswig-Holstein

Interreg



Deutschland – Danmark

- **Project partners:** GEOMAR (lead partner, Prof. Dr. Anja Engel), Department of Biology, University of Southern Denmark (SDU), Mærsk Mc-Kinney Møller Institut (MMMI; SDU), Mads Clausen Institute (MCI, SDU), Center for Ocean and Society (CeOS, CAU Kiel), Center for Landdistriktsforskning (CLF, SDU)

Picture: Isabell Schlangen, SDU

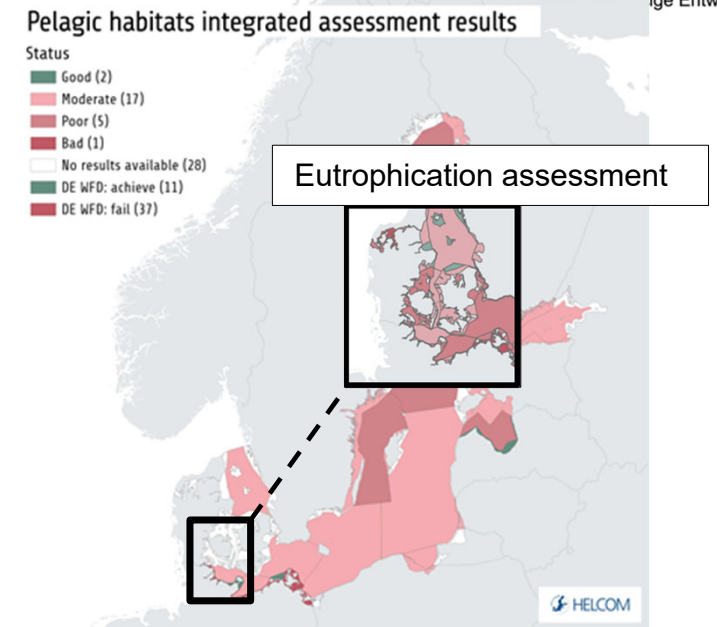


Towards a holistic assessment in the SW Baltic Sea



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- ✓ **Joint holistic monitoring and assesment** of biogeochemical dynamics in the region (for instance, combine data from different sources for phytoplankton species composition)
- ✓ Development of **new environmental sensors** (for e.g. nutrients, pigments)
- ✓ Investigation of **social acceptance of measures**
- ✓ Prerequisites for a **Digital Twin** of the region to test, monitor and visualize new improvement measures



Source: Helcom Holistic Assessment, 2023

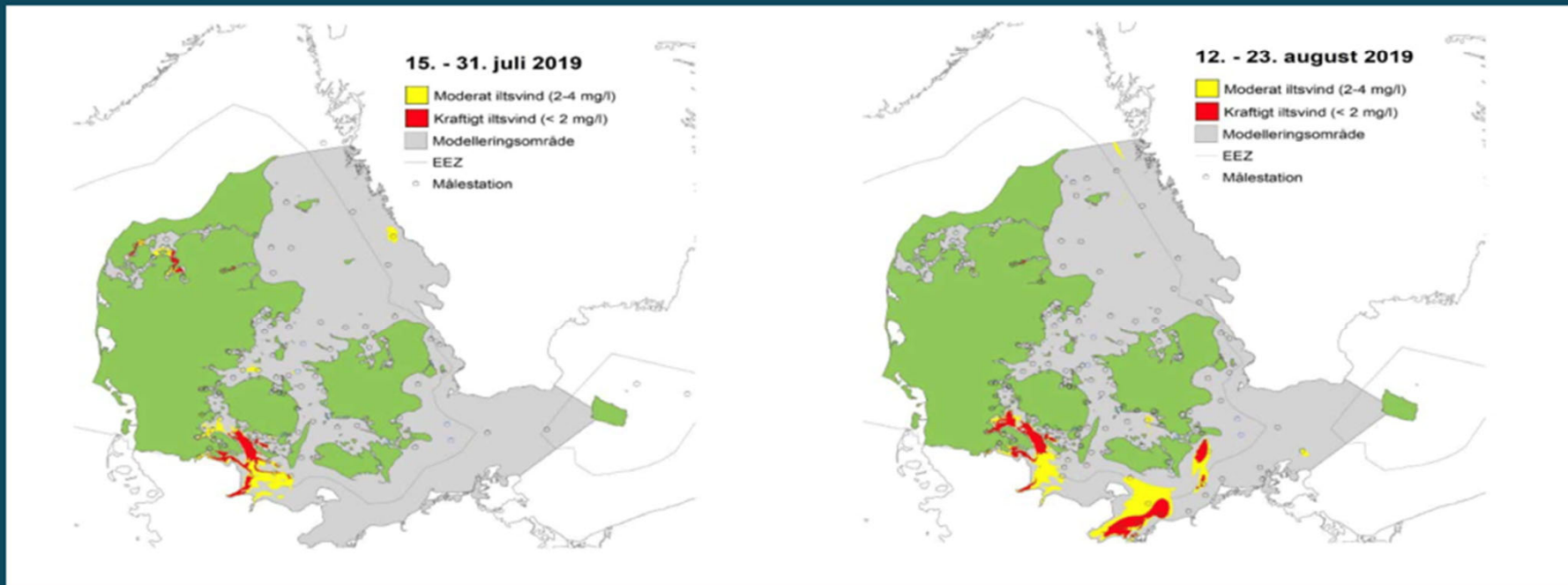
Sail4Oxygen

a citizen Science approach

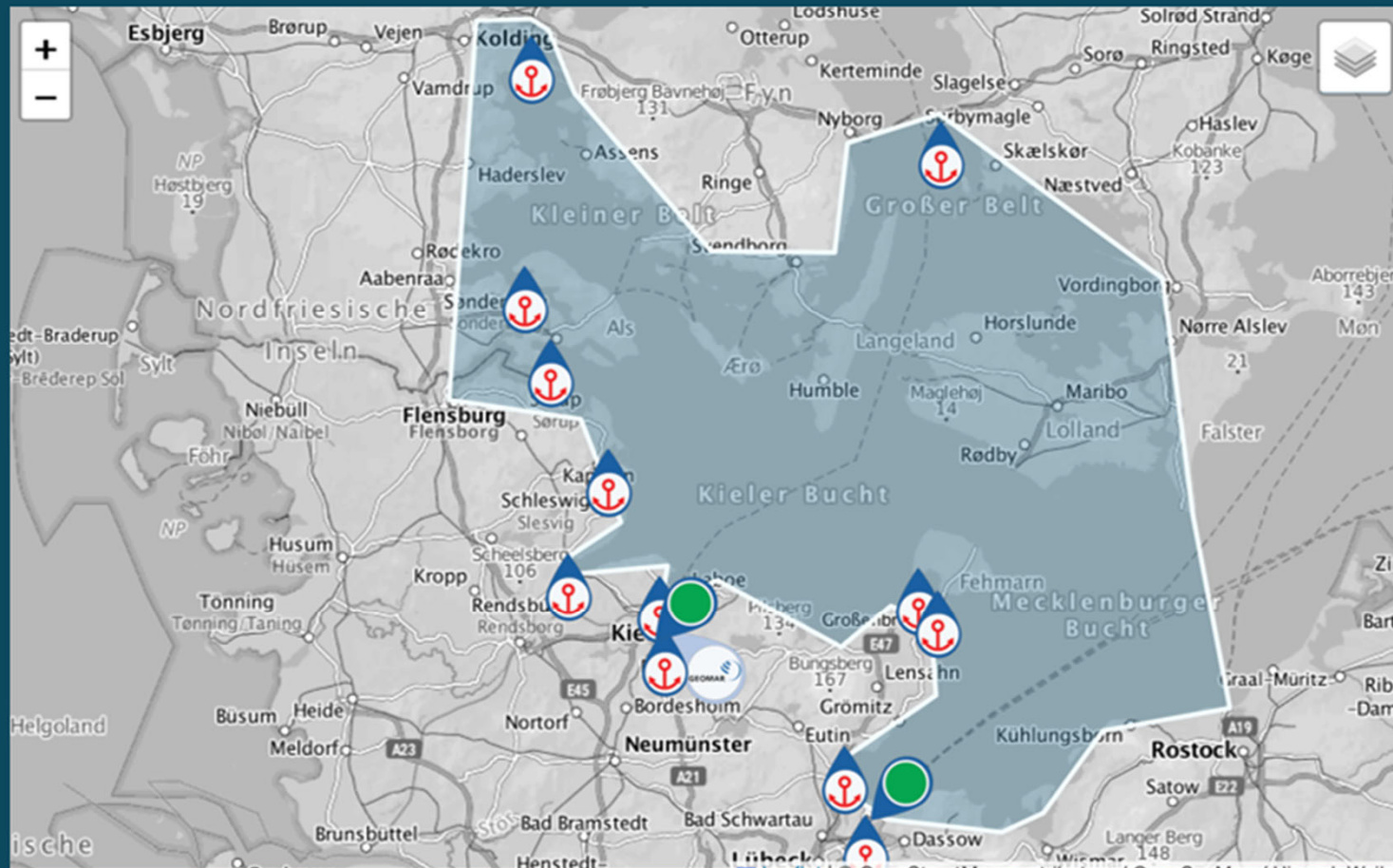
Seglerinnen und Segler auf Forschungsfahrt
in der Ostsee

The Baltic

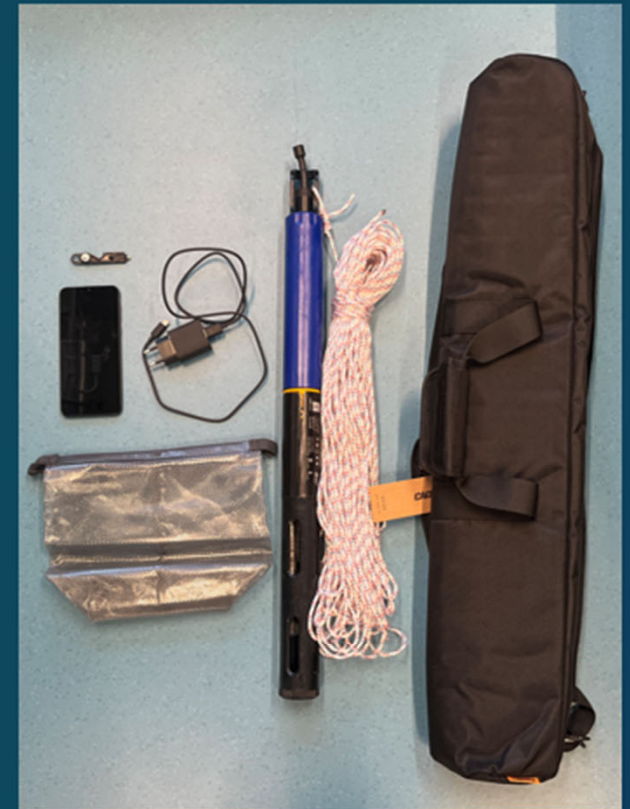
- High nutrient loads lead to strong algal blooms in the Baltic
- Decomposing organic material consume oxygen
- The strong stratification prevents re-oxygenation



Messgebiet



Sonden



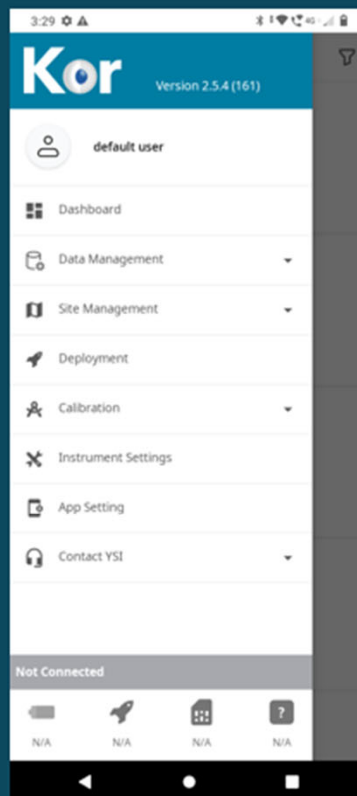
Messen

- Sonde einschalten
- Messung Starten
- Sonde auf Grund sinken lassen
 - Ca 2 Meter pro Sekunde
- Sonde aufholen
- Messungen herunterladen
- Messung abschicken

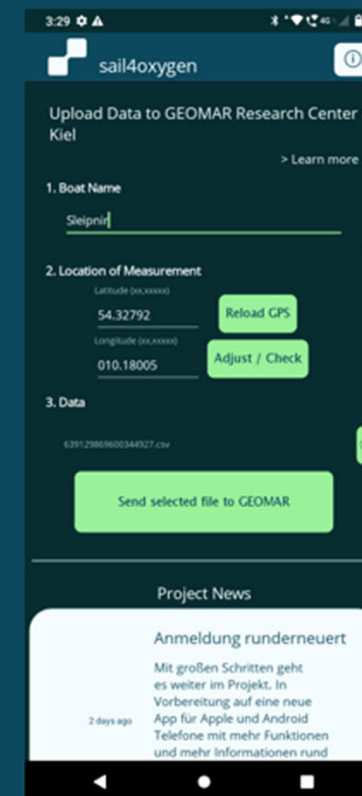


Apps

- Kor App



- Sail4Oxygen App



Beluga-Portal

- <https://beluga.geomar.de/sail4oxygen>
- Alle Messungen werden angezeigt
- Eigene Messung auswählen und anschauen



 sail4oxygen

