

BALSAM PROJECT / FINAL REPORT

# Improving the Coordination in the Monitoring of the Baltic Marine Environment





photo: Ulrika Björkman

## Environmental Monitoring in the Baltic Sea

Coordinated environmental monitoring has for long been carried out in the Baltic Sea. Environmental monitoring in general has a major scientific role by revealing long-term trends that can lead to new knowledge and understanding, while also serving as an essential basis for environmental planning and policy follow-up.

The HELCOM Monitoring and Assessment Strategy (2013) lays out the monitoring and assessment system for the Baltic. The Strategy can be used in evaluating whether visions, goals and objectives for the Baltic Sea marine environment are being met and that monitoring is scientifically sound, well-coordinated, optimized and cost-effective.

Monitoring is needed to provide the data required for Baltic-wide indicator-based assessment activities, reflecting the status of the marine environment and human-induced pressures. The HELCOM Monitoring and Assessment Strategy takes into account the MSFD monitoring requirements.

### HELCOM MONITORING MANUAL

Another vital tool, developed with the support of BALSAM, the online HELCOM Monitoring Manual<sup>1</sup> (2014), presents information on current marine environmental monitoring in the Baltic. The Manual is linked to the core indicators developed to evaluate the progress being made towards Good Environmental Status (GES) in the Baltic Sea. The Manual shows that the level of regional coordination in monitoring currently varies between topics, and it is the ambition to develop HELCOM coordinated monitoring for all programmes.

The monitoring is done by countries in accordance to their national monitoring programmes. In order for data to be comparable for regional assessments, coordination and common guidelines for sampling and data management are important on a regional level. Regional coordination is also becoming increasingly important due to the needs arising from the HELCOM Baltic Sea Action Plan (BSAP) and the EU Marine Strategy Framework Directive (MSFD) that require holistic assessments and regular monitoring of the state of the sea.

### MANY FORMER MANUALS TO BUILD ON

In the Baltic Sea, hydrography, nutrients, hazardous substances, radioactive compounds, phytoplankton and zoobenthos have been monitored regularly since the 1980s and 1990s through specific HELCOM programmes. The monitoring of zooplankton, phytobenthos and coastal fish

has been conducted on a voluntary basis. Seal monitoring has been coordinated by the HELCOM SEAL ad hoc expert group. There are manuals and guidelines that describe the methods to carry out HELCOM monitoring, which include the COMBINE

programme, Pollution Load Compilation (PLC) and Monitoring of radioactive substances (MORS). The COMBINE manual (Cooperative Monitoring in the Baltic Marine Environment Manual) defines the contributions made by all HELCOM countries – all

nine Baltic coastal states– and regulates all methods used for monitoring biological parameters, hazardous substances, hydrography and nutrients. The aim is to update these guidelines in 2015–2016 to better respond to policy needs.

| Monitoring components         | Mandatory | Voluntary | Pollution Load Compilation<br>(air and water) | MORS<br>Guidelines | Other<br>coordination | Revised strategy/<br>New Programme |
|-------------------------------|-----------|-----------|---|--------------------|-----------------------|------------------------------------|
| <b>Biological</b>             |           |           |   |                    |                       |                                    |
| Chlorophyll a / phytoplankton | •         |           |   |                    |                       | •                                  |
| Zoobenthos                    | •         |           |   |                    |                       | •                                  |
| Zooplankton                   |           | •         |   |                    |                       | •                                  |
| Phytobenthos                  |           | •         |   |                    |                       | •                                  |
| Birds                         |           |           |   |                    |                       | •                                  |
| Mammals                       |           |           |   |                    | HELCOM SEAL           | •                                  |
| Fish                          |           | •         |   |                    |                       | •                                  |
| Non-indigenous species        |           |           |   |                    |                       | •                                  |
| <b>Hazardous substances</b>   |           |           |   |                    |                       |                                    |
| PAH                           |           |           | •   |                    |                       | •                                  |
| Metals                        | •         |           | •   |                    |                       | •                                  |
| Organotins                    |           | •         |   |                    |                       | •                                  |
| POPs                          | •         |           | •   |                    |                       | •                                  |
| Biological effects            |           | •         |   |                    |                       | •                                  |
| <b>Hydrography</b>            | •         |           | •   |                    |                       | •                                  |
| <b>Marine Litter</b>          |           |           |   |                    |                       | •                                  |
| <b>Nutrients</b>              | •         |           | •   |                    |                       | •                                  |
| <b>Radioactive</b>            |           |           |   | •                  |                       | •                                  |
| <b>Underwater noise</b>       |           |           |   |                    |                       | •                                  |

**Table 1.** Environmental components, which will be monitored according to the HELCOM Monitoring Strategy. Currently some components are monitored on a mandatory or voluntary basis under the COMBINE programme, PLC or MORS. Marine litter, underwater noise and seabirds have not yet been included in coordinated monitoring under HELCOM and the aim is to include these components in future coordinated monitoring.



photo: HELCOM



photo: HELCOM

## WHAT IS BALSAM?

While certain components of the Baltic marine environment have a long tradition in regular monitoring under HELCOM, gaps in coordinated monitoring have previously been identified and the aim of the EU co-financed Baltic Sea Pilot project (BALSAM) was to address some of these gaps by focusing on the monitoring of seals and seabirds, non-indigenous species, benthic habitats and coordinated use of research vessels.

BALSAM contributed to the development of the on-line HELCOM Monitoring Manual as well as the on-going revision of HELCOM monitoring guidelines by preparing guidelines for the regional monitoring of seals, seabirds and benthic habitats for the Baltic, and by testing the monitoring methodology for non-indigenous species in ports. BALSAM also prepared databases for seal monitoring

data and a web platform for sharing information on monitoring research vessels.

The project has been successful in providing policy relevant results for gaps identified for the consideration of the HELCOM working groups and in bringing in external scientific expertise from 18 institutions around the Baltic Sea. The work has been closely linked to the HELCOM framework by being coordinated by the HELCOM Secretariat and by being supervised by the HELCOM working groups.

## COORDINATED MONITORING FOR COORDINATED POLICIES

The Baltic Sea is the second largest brackish sea on Earth with many unique qualities relating to salinity, depth, water flow and biodiversity. It has been evident for years that

the balance of the Baltic Sea ecosystem is severely threatened by human-induced factors, such as eutrophication and pollution, hunting and overfishing. The deterioration of the marine environment led to the signing of the first Helsinki Convention in 1974 and the second in 1992 and to the adoption of the Baltic Sea Action Plan in 2007. HELCOM has also committed to the ecosystem approach as early as in the Ministerial Declaration in 2003.

The EU Birds and Habitats Directives, the Water Framework Directive, the Common Fisheries Policy and Data Collection Regulation all oblige the Contracting Parties of the Helsinki Convention that are also EU Member States, to monitor and report on some aspects of the marine environment. The EU Marine Strategy Framework Directive (MSFD) is, however, the first EU legislative instrument to focus on the protection of the marine biodiversity by using the ecosystem approach to the management of





photo: Mats Westerborn



photo: Annica Långnabb



photo: OCEANA Carlos Minguell

human activities. The MSFD provides legally-binding requirements for countries to take the necessary measures to achieve or maintain Good Environmental Status (GES) by 2020. For this purpose, EU Member States must regularly, every six years, assess the environmental status, define GES, and set environmental targets for their seas.

### GROWING NEED FOR REGIONAL COORDINATION

According to the MSFD, countries are also required to establish and implement regionally coordinated monitoring programmes for the ongoing assessment of the environmental status of their marine waters. Regional coordination can ensure that comparable sampling, analysis and data processing methodology are being used by the countries within a marine region. This coordination can be achieved effectively through Regional Sea Commissions such as HELCOM.

There are also several international legal instruments requiring monitoring of non-indigenous species and/or invasive alien species. The latest legally binding act is the EU regulation on invasive alien species (2015), which requires monitoring and eradication of invasive species.

### INTERNATIONAL REQUIREMENTS FOR SHIPPING

Another driver of monitoring non-indigenous species in the Baltic has been the preparations for the implementation of the 2004 IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention). Ships will be required to implement ballast water management measures specified in the Convention in international journeys, but vessels on certain routes can, based on a risk assessment, be exempted from the application of measures. The BWM Convention requires countries to individually or

jointly monitor the effects of ballast water management in their waters. HELCOM and OSPAR developed a port sampling protocol in 2013 for non-indigenous species, which covers all taxonomic groups. A standard methodology is included for providing comparable and reliable data for the risk assessments used by the national administrations for granting, or declining, exemption applications from the ship-owners.

### ROLE OF BALSAM

BALSAM collected information on current environmental monitoring in the Baltic to the HELCOM Monitoring Manual and carried out a preliminary assessment of gaps in monitoring against different MSFD descriptors and indicators. By focusing on certain gaps that were identified before, BALSAM was able to produce common guidelines and databases for monitoring and proposals on how coordinated monitoring could be improved in the future.

# Marine Biodiversity

## Improved coordination for marine biodiversity monitoring

Although certain components of the Baltic marine biodiversity have for long been reg-

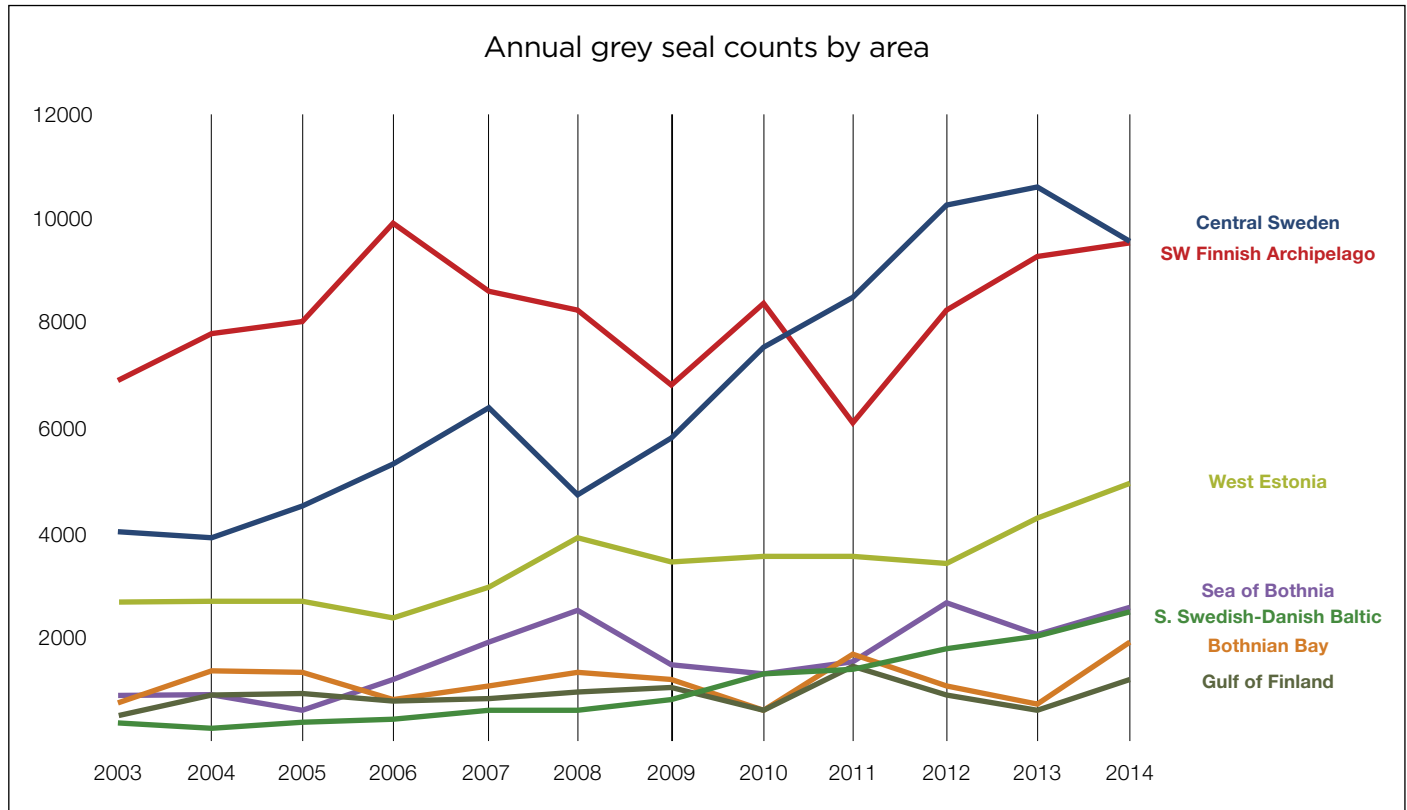
ularly monitored within the HELCOM framework, gaps in coordinated monitoring have been identified especially for seabirds, non-indigenous species and benthic habitat distribution, for which coordinated monitoring has been lacking. Moreover, the monitoring of seals has been coordinated by the HELCOM ad hoc SEAL group, but common monitoring guidelines and a common data-

base to host the data have been missing. These gaps in monitoring of the Baltic Sea have been addressed by the BALSAM project. Possible synergies for fisheries and environmental monitoring were also studied in collaboration with the International Council for the Exploration of the Sea (ICES).



photo: Anders Galatius

Figure 1. The numbers of grey seals in the Baltic are increasing.



## SEALS

As seals are very mobile species, seal monitoring has been integrated and coordinated by the HELCOM SEAL expert group since 2006 by using management units, which all have international ranges. The abundance and distribution of the three seal species native to the Baltic Sea – grey seal, harbour seal and ringed seal – are monitored at their haul-out locations from air, land and

ships in Denmark, Sweden, Germany, Estonia and Finland. Data on hunted, by-caught and stranded seals is also being collected with stakeholder support and used for assessing the health of the seal populations.

The SEAL group plans surveys among the concerned nations and the data is analysed and interpreted annually in the expert group meetings. Under the BALSAM project, this coordination has been enhanced by setting

up a common seal abundance database<sup>2</sup>, by preparing a distribution database, and with the adoption of the common guidelines for seal monitoring methods in the Baltic.

With the current methodology, absolute abundances cannot be estimated for any of the species. Studies to address this gap need to be performed in the future.

<sup>2</sup> <http://helcom.fi/baltic-sea-trends/data-maps/biodiversity/seals/>



photo: Ainars Aunis

## SEABIRDS

Most Baltic countries are monitoring breeding birds, although the work has not been actively coordinated in a regional level or within HELCOM, and therefore it has been considered a gap.

### DIVERSITY BETWEEN COUNTRIES

The number of breeding marine bird species (i.e. number of species monitored) dif-

fers between the countries. Countries with suitable cliffs for nesting colonies or many islets such as Finland, Sweden, Denmark and Estonia have far more breeding species than the countries having mostly sandy beaches like Latvia, Lithuania, Poland and Germany. Some of the monitoring efforts are species specific and often restricted to particular sites or protected areas. The temporal resolution of the monitoring of breeding birds varies from annually to every third year by most countries depending on species. A few coastal countries have state fi-

nanced monitoring programmes in place, while elsewhere the monitoring of marine birds is carried out by volunteers or on a project basis.

### MONITORING WINTERING BIRDS

All countries are also monitoring wintering birds, but the counting methods, timeframe and type of financing varies greatly among them. Most countries run coastal counts as volunteer programmes. The most val-

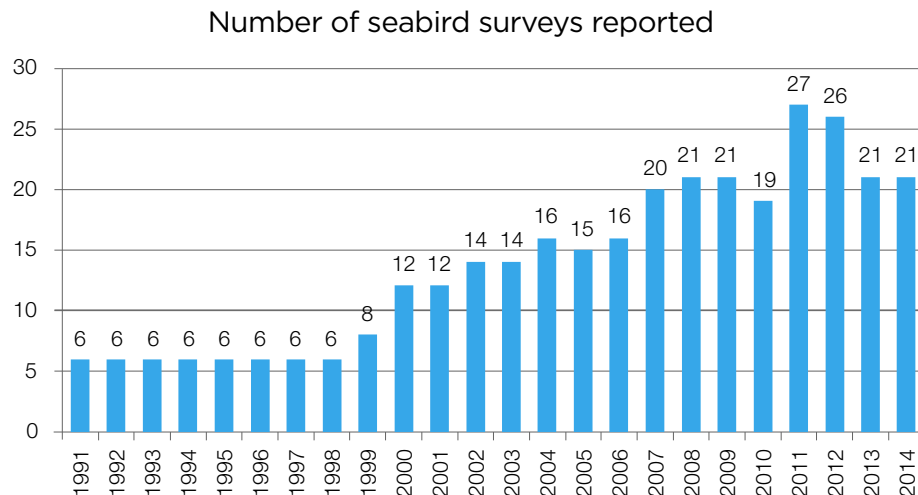


id starting point for Baltic-wide data series would be 1991, when coastline of the former Soviet Union became freely accessible to bird counters. Prior to 1991, these parts of the Baltic coast have very sparse data. Offshore monitoring in the winter time lacks coordination and is geographically not representative. Because of the very uneven survey coverage across the Baltic region, assessments of some species, such as long-tailed duck or common scoter, are not possible with the current monitoring.

BALSAM has improved the basis for coordinated seabird monitoring in the Baltic by establishing a network of seabird experts, by compiling a metadatabase of seabird monitoring since 1991 and by developing common guidelines for coordinated monitoring, especially for wintering birds. BALSAM has also established an overview of existing and available environmental variables that will be important for future spatial modelling of bird abundances and distributions. The majority of such data are available from the EU-based “MyOcean” platform, providing easy access to modelled surface covering data on variables such as water temperature, salinity, sea current velocity and speed as well as ice coverage.

## NON-INDIGENOUS SPECIES

Most of the information concerning non-indigenous species (NIS) is currently obtained through routine monitoring programmes in the Baltic Sea, both offshore and coastal, traditionally coordinated regionally within the HELCOM COMBINE monitoring programme. However, HELCOM monitoring does not



**Figure 2.** The annual number of seabird surveys has increased according to the metadatabase.

specifically target NIS and thus does not cover all habitats and areas that NIS may occupy, leaving considerable gaps in the observations. Such gaps have been the focus of BALSAM work in NIS monitoring.

## PORT MONITORING SHOULD INCREASE

The most common pathway for non-indigenous species to the Baltic Sea are vessels via ballast waters and as ships' biofouling, alongside migration via inland waterways. Consequently, to observe new introductions and spread of such species from vessels, routine monitoring should be complemented with monitoring in port areas.

BALSAM has further developed the HELCOM-OSPAR port sampling protocol by arranging a workshop on port sampling methodology as well as by testing the protocol in Estonia, Latvia and Poland. With this new information, the online joint HELCOM-OSPAR Risk Assessment Tool has been updated and improved.

Moreover, collaborating with international ICES experts, BALSAM prepared a joint paper on global monitoring needs of NIS to fulfil the requirements of the present legal requirements. This work has revealed gaps in present monitoring programmes and produced suggestions on how to improve the monitoring in the Baltic Sea.

## BENTHIC HABITATS

When referring to the benthic, or sea bottom environment, it is important to distinguish between the benthic species and benthic habitats. A total of 531 benthic macrophyte species and 1,898 benthic invertebrate species exist in the Baltic Sea (HELCOM, 2012a, 2012b). Additionally, 328 underwater biotopes including both common and rare Baltic biotopes are listed in the HELCOM Underwater Biotope and habitat classification system (HELCOM 2013).

So far, benthic species and communities have mainly been used in the assessment and monitoring of the Baltic Sea marine environment as indicators of eutrophication, reflecting either the change in trophic conditions (change in abundance) or change in environmental setting (change in water transparency or oxygen conditions) through the HELCOM COMBINE programme (zoobenthos and phytobenthos). However, the state of benthic biodiversity has not yet been specifically targeted by the previous and current monitoring programmes and therefore, a large part of information required for the implementation of the MSFD or the Habitats Directive is not available. To properly assess the state of benthic biodiversity, seabed habitat distribution and extent should be assessed according to MSFD.

### MONITORING GAPS REMAIN

There is very little data on the distribution, pattern and extent of habitat-forming communities currently available, whereas data from station or transect-



photo: HELCOM

based monitoring of specific species has been carried out in all Baltic Sea countries for decades. The latter cannot be directly used for assessing extent and distribution of benthic biotopes and habitats, as the current monitoring is primarily designed to monitor changes in the community structure over time at specific locations. Periodically mapping the bathymetry and distribution of geological substrates is included in monitoring/

inventory programmes in all Baltic Sea countries that can be used for modelling the distribution, pattern and extent of benthic landscapes. These data do not contain information on the associated benthic communities and therefore accurate benthic biotope distribution maps have so far been difficult to produce. Also, there are no commonly agreed monitoring methods or guidelines in place that target the extent and



quality of benthic habitats in the Baltic Sea, which has been identified as a gap in HELCOM.

### NEW METHODS AND TECHNIQUES

BALSAM studied benthic habitat monitoring methods and programmes useful for the BSAP and EU MSFD to be applied throughout the Baltic Sea. This included

both assessing the usefulness of monitoring methods, which are operational today, as well as proposing new methods where found more accurate.

The cost-effectiveness of various methods was also compared and analyzed. For characterizing benthic communities, BALSAM found the new "drop-video" technique in combination with traditional methods (grab sampling, SCUBA diving) to be a promising,

cost-effective solution at least for certain habitats, and proposes it for standardisation and use in the Baltic Sea region. BALSAM elaborated a set of recommendations for monitoring techniques using the new methods in a monitoring manual, which will be presented to HELCOM working groups for further action, and could offer a solution to monitor benthic habitat distribution and extent in the future.





## POSSIBILITIES FOR INTEGRATED FISHERIES AND ENVIRONMENTAL SURVEYS

The coastal areas of the Baltic are monitored more frequently and at a higher spatial resolution than the offshore areas. There also appears to be a gradient shift in sampling intensity from lower in the North towards higher in the south according to the HELCOM monitoring overview. If the monitoring scale or frequency should increase to meet the assessment demands, the existing fish surveys could offer an opportunity.

The existing fish surveys operate in specific seasons and specific areas and the trawl surveys sample stations across the southern Baltic. A crucial need in the MSFD is to consider a range of specific habitats and the trawl surveys, by definition, only cover "fishable habitat" that is occupied by the commercial offshore species. Therefore any adaption of the surveys would need to consider the addition of extra stations to reflect the diversity of habitats,

and probably the addition of different sampling techniques. The acoustic surveys in the autumn cover a wider area, including the northern Baltic, but only stop to carry out pelagic sampling of acoustic targets.

Fish surveys are currently funded to monitor the state of the fish community. As they are now designed, they could not be easily converted for process monitoring but could be considered as an opportunity for potential additional data collection (e.g. marine litter, chlorophyll, nutrients, abundance of various other organisms, marine mammals, zooplankton etc). Whilst these possibilities are apparent, they come with many associated challenges in adapting the existing surveys.

### HELCOM-ICES WORK PLAN

As an outcome of BALSAM, HELCOM and ICES have developed an action plan with recommendations to address the potential in integrated surveys in the future, through for example, arranging a high-level workshop and creating a time and space scale variation matrix, which could be used to provide guidelines

about for which survey activities the sampling in time and space can be reduced, and for which it should be increased. Novel use of recreational boats or commercial fishing vessels could also aid in covering monitoring in the areas where additional sampling is considered as needed.

## MORE COORDINATED USE OF MONITORING RESEARCH VESSELS

Currently there are 14 large (>20m) research vessels in the Baltic that are used for marine environmental monitoring and can be accessible for research teams or individual experts from other countries. A number of smaller vessels or boats also exist that are used for local environmental monitoring in different countries. There are also vessels used for fish surveys (trawl and/or acoustic surveys) and hydrographic surveys (working for or at maritime administrations).

Regional coordination of monitoring activities and sharing of information, including



**Table 2.** There are currently 14 research vessels in the Baltic that are over 20m in length and that can be accessible for research teams/experts from other countries.

| Country   | Vessel                                   | Type / research field                            | Length (m) | Crew / scientists | Built / renovated               | Available for chartering |
|-----------|--|--|------------|-------------------|---------------------------------|--------------------------|
| Denmark   | AURORA                                   | Research vessel / biology, geology               | 28         | 4 / 10            | 2014                            | Yes                      |
| Estonia   | SALME                                    | Research vessel / oceanography, biology, geology | 31         | 6 / 12            | 1974 / 2009                     | Yes                      |
| Finland   | ARANDA                                   | Multipurpose research vessel                     | 59         | 12 / 25           | 1989                            | Yes (limited)            |
|           | GEOMARI                                  | Research vessel (catamaran) / seafloor mapping   | 20         | 3 / 3             | 2003                            | No                       |
|           | MUIKKU                                   | Research vessel                                  | 28         | 5 / 10            | 1969                            | Yes                      |
| Germany   | ELISABETH MANN-BORGESE                   | Multipurpose research vessel                     | 56         | 11 / 12           | 1987 / 2011                     | Yes / No                 |
|           | ALKOR                                    | Research vessel                                  | 54         | 11 / 12           | 1990                            | Yes / No                 |
|           | STRELASUND                               | Multipurpose vessel                              | 32         | 3 / 4             | 2002                            | No                       |
|           | HAITHABU                                 | Multipurpose vessel                              | 39         | 3 / 4             | 2014                            | No                       |
| Latvia    | no regional vessel                       |  |            |                   |                                 |                          |
| Lithuania | DARIUS                                   | Fishing vessel / fishery                         | 23         | 6 / 4             | 1993                            | No                       |
|           | VĖJUNAS                                  | Low draft multipurpose research vessel           | 24         | 5 / 12            | 2012                            | No                       |
|           | MINTIS                                   | Multipurpose research vessel                     | 38         | 6 / 12            | 2014                            | Yes                      |
| Poland    | BALTICA                                  | Research vessel / fishery, hydrology             | 41         | 11 / 11           | 1993                            | Yes                      |
| Russia    | info missing for regional vessels (>20m) |  |            |                   |                                 |                          |
| Sweden    | SKAGERAK                                 | Fishery research vessel                          | 38         | 6 / 22            | 1968 (will be replaced in 2015) | Yes                      |

on monitoring cruises, is reflected as a vital task in the HELCOM Monitoring Manual and the HELCOM Monitoring and Assessment Strategy in the frames of coordinated Baltic Sea environmental monitoring programme. It is also stated that in order to improve the information flow, the HELCOM website should be further developed.

### ONLINE HUB FOR RESEARCH CRUISES

BALSAM has developed an on-line information sharing platform<sup>3</sup> for planned and completed cruises as well as actual positions of research vessels, including basic data and reports. The aim of the platform is to enhance international cooperation in the

use of research vessels in the Baltic Sea for monitoring activities. The shared use of these vessels could enable a better monitoring coverage in space and time for the Baltic marine environment and better use of resources. The HELCOM countries will be encouraged to make use of the tool.

<sup>3</sup> <http://helcom.fi/action-areas/monitoring-and-assessment/research-vessels/>

The online platform is at the HELCOM web page and is designed to be a one-stop-shop of Baltic research vessels linking to various web services, providing up-to-date information on:

- **General details:** Basic information on research vessels, contacts and cruise reports
- **Past cruises:** SeaDataNet Cruise Summary Reports
- **Current position:** MaritimeTraffic.com service to display current location of research vessel. Service description was ordered to enable fleet view of all Baltic Sea research vessels
- **Planned cruises:** Web page was developed to display planned cruises based on information made available by vessel operators using distributed system (hosted by Tallinn University of Technology)

BALSAM also investigated how to facilitate the applications to join an international monitoring cruise in the Baltic Sea. A study was made to analyze the current application procedure for research permits. Experience shows that the requirements for the submission of applications vary from 6 months to 1 month. Too long or bureaucratic process of granting permits significantly complicates the planning of trans-border research projects and it is necessary to consider shortening and unifying the terms for submission. BALSAM has proposed to revise the HELCOM Recommendation 12/1 "Procedures for granting permits for monitoring and research activities in the territorial

waters and exclusive economic zones, fishing zones or continental shelves".

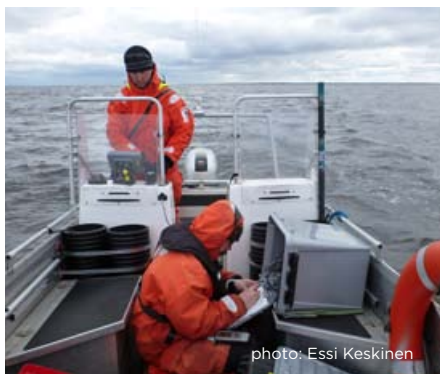
## BETTER USE OF AUTONOMOUS DEVICES

HELCOM Monitoring and Assessment Strategy (2013) urges Contracting Parties to use autonomous devices for Baltic Sea environmental monitoring. Ferryboxes have been included in the coordinated monitoring programme already for more than 10 years.

Tests are carried out for using autonomous profilers, drifters and gliders for monitoring of off-shore areas. In order to be cost-efficient the development and maintenance of such devices could be arranged on a shared basis. In addition, the use of autonomous devices, which could drift into the EEZ and territorial waters of neighbouring countries, requires to adopt a regional regulation of such observations and availability of collected data. BALSAM project has developed a draft HELCOM recommendation on "Proce-



**Figure 3.** An example of a live map of the location of research vessels on the information sharing platform.



dures for notifying about autonomous monitoring devices in the Baltic Sea”.

## IMPROVING DATA FLOWS AND DATA INFRASTRUCTURE

Optimal use of the data from environmental monitoring requires effective data flow. All aspects need to be considered, from the collection and availability to the quality control, processing, and publication of data products to ensure that the data is consistent and comparable for indicators and assessments.

The ICES Data Centre hosts the database for the HELCOM COMBINE data for the Baltic Sea. The COMBINE monitoring data can be downloaded from the ICES Oceanographic database. Monitoring data can also be visualized and downloaded in the ICES EcoSystemData map service and from the HELCOM map service. During BALSAM, it was found that not all data are reported to HELCOM have been reported to ICES and to the COMBINE database by the

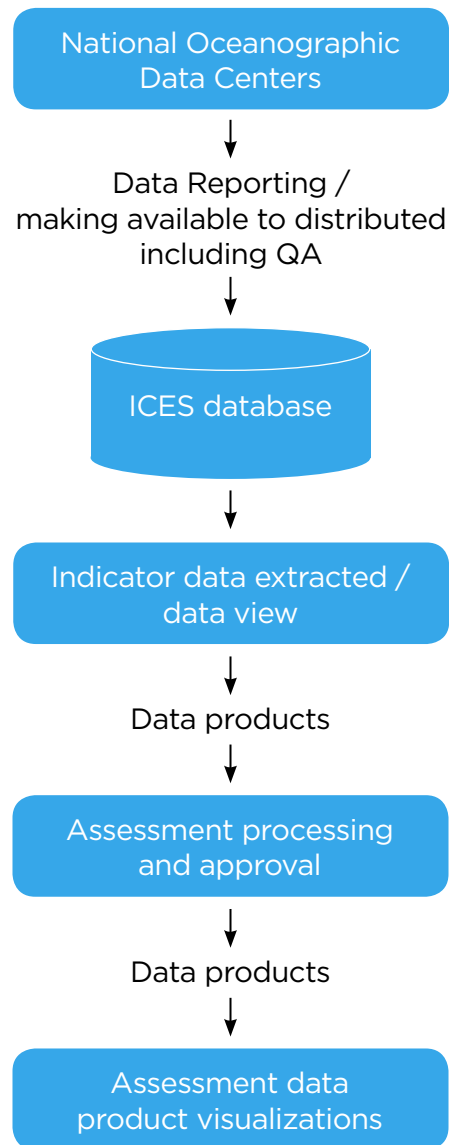
countries, and therefore not all data can be made easily available and viewable online.

To improve data management and infrastructure in the Baltic, BALSAM investigated data requirements to support HELCOM core indicators and future HELCOM assessments, such as the HOLAS II project, which will finalize a second holistic assessment of the state of the Baltic Sea by mid-2018, and developed a work plan together with ICES to tackle these data needs and to provide proposals on how the regional data flows, data management and databases could be improved by ICES, HELCOM Secretariat and HELCOM countries in the future.

Key recommendations from the work plan include:

- identifying gaps in data in the ICES database and submitting a new data call to complete missing data;
- developing data management guidelines for HELCOM countries;
- improving labelling of data in the database to make it more searchable;
- increasing flexibility of data formats, e.g. ODV, and accepting data via web services from SDN/EMODnet to be incorporated to ICES database;
- modifying the reporting format to ensure that data reported fits future assessment needs and core indicators;
- developing harmonized regional product data views.

**Figure 4.** Data flow from the Contracting Parties to indicators and assessments.



# Key Outcomes and Proposals

Table 3. All HELCOM BALSAM technical reports and deliverables can be downloaded from the BALSAM website: [www.helcom.fi](http://www.helcom.fi)

| BALSAM Deliverable   | Aim  | Results / Outcomes  | Recommendations / Way forward   |
|--|--|---|---|
| <b>HELCOM Monitoring Manual</b>  | To catalogue environmental monitoring in the Baltic  | The Monitoring Manual is available online and shows that for some components coordinated monitoring is taking place, e.g. through the COMBINE programme, and for some only national monitoring efforts exist. | The Monitoring Manual will be updated annually in the HELCOM State&Conservation meetings. New guidelines will be developed for those components that are currently not coordinated.                         |
| <b>Work Plan to improve data management and infrastructure in the Baltic</b> | To identify data needs for indicators and assessments and to propose solutions to smoothen data flows        | The work plan lists action points to improve data management and data infrastructure in the Baltic. The work plan also looks into synergies between environmental and fisheries monitoring.                   | The work plan will be presented to the HELCOM State&Conservation for further action and implementation  |
| <b>Guidelines for seabird monitoring</b>                                     | To propose common guidelines for the monitoring of wintering seabirds in the Baltic to improve coordination. | The monitoring methods/ guidelines will be presented to the HELCOM State&Conservation for adoption.   | The coordination in seabird monitoring, especially for wintering birds, could be much improved. HELCOM is joining forces with the JWG Bird group, which could improve further coordination in bird surveys. |
| <b>Metadatabase of seabird monitoring</b>                                    | To catalogue information on seabird monitoring in the Baltic since 1991.                                     | The metadatabase is available in access format and gives a good overview of the monitoring carried out in different countries.  | The metadatabase can be used as a start to build up a seabird monitoring database for the Baltic, which could further support data flows for indicators and assessments.                                    |
| <b>Guidelines for seal monitoring</b>  | To develop coordinated guidelines for seal abundance monitoring in the Baltic.                               | The monitoring guidelines were adopted by HELCOM State&Conservation and will be used in future monitoring.  | The guidelines/monitoring methods should be kept updated in the annual HELCOM SEAL meetings.  |
| <b>Databases for seal abundance data</b>                                     | To establish for the first time a seal abundance database for the Baltic.                                    | The abundance databases will be available on the HELCOM website in excel format.  | The abundance databases should be kept up-to-date and improved to better suit the needs of core indicators and assessments in the annual HELCOM SEAL meetings.  |
| <b>Seal distribution data</b>  | Seal distribution databases  | Seal distribution database and maps have been prepared and are available on the HELCOM website.   | The distribution data can give useful background information for the assessment of seals and should be updated in annual HELCOM SEAL meetings.  |



| BALSAM Deliverable  | Aim  | Results / Outcomes   | Recommendations / Way forward   |
|---|--|--|---|
| <b>Manual for benthic habitat monitoring in the Baltic</b>  | To propose monitoring methods and guidelines for benthic habitat distribution monitoring in the Baltic.  | The manual suggests a combination of drop video and grab sampling as the method for monitoring of benthic habitats.  | The manual/guidelines will be discussed in the HELCOM State&Conservation.   |
| <b>Decision-support tool for target NIS species(BWMC)</b>   | To improve the decision support tool on non-indigenous species introductions via ballast water.  | The harmonized criteria for defining target species for decision support tool for exemption applications of the BWM Convention was tested through five species initially proposed as target species. | The tool is ready to allow administrations and ship owners to quickly identify routes that may qualify for exemptions to the application of ballast water management for ships under the Ballast Water Management Convention (regulation B-3) and those that are unlikely to.                   |
| <b>NIS port surveys in Latvia, Poland and Estonia</b>   | To test the sampling protocol of non-indigenous species in ports as contained in the Joint HELCOM/OSPAR Harmonized Procedure on Exemptions under the Ballast Water Management Convention | Monitoring methods have been tested in Estonia, Poland and Latvia in the summer 2014.  | The present coordinated COMBINE and coastal fish monitoring should be complemented with a regular shallow hard bottom fauna and flora monitoring and port monitoring in ports having the most intensive international ship traffic to obtain the required data on non-indigenous species (NIS). |
| <b>Recommendation 12/1 - revision</b>   | Scheme for enhanced cooperation streamlining the administrative issues related to international monitoring cruises formalized through e.g. a HELCOM Recommendation                       | Study report on permit application practices in the Baltic; Revised HELCOM Recommendation 12/1; Chapter for coordination of off-shore monitoring activities (e.g. research vessels)                  | Consult with relevant HELCOM working groups and contracting parties in order to adopt the revised Recommendation 12/1 in 2016   |
| <b>Draft recommendation on “Procedures for notifying about autonomous monitoring devices in the Baltic Sea”</b> | Development of a system for joint service of autonomous devices and moored instruments (drifters, buoys, fixed platforms, hydrophones etc) for marine monitoring in the off-shore areas. | A proposal is developed to regulate the application and joint service of autonomous devices for the Baltic Sea monitoring.   | Start consultations with relevant HELCOM working groups and contracting parties in order to adopt a new recommendation in 2017  |
| <b>Platform to improve co-ordinated use of research vessels</b>   | To facilitate information exchange in regards to research vessels that can be used for monitoring in the Baltic, planned cruises etc.  | A website platform was created on the HELCOM website, which shows the actual positions of research vessels, information on planned cruises and cruise reports etc.                                   | It should be discussed in State&Conservation how the vessels could be used in a more cost-effective manner and how further coordination could be achieved.  |



photo: Mats Westerborn

## HELCOM BALSAM

HELCOM BALSAM (2013-2015) is an EU co-financed Baltic Sea pilot project: "Testing new concepts for integrated environmental monitoring of the Baltic Sea" with a budget of 0.46 M€. The project aim was to enhance the capacity of the Baltic Sea

Member States to develop their marine monitoring programmes.

BALSAM is one of the three Pilot Projects called "New Knowledge Projects". Sharing results and best practices with the other

two pilot projects in the North Sea and Celtic Sea (JMP NS/CS) and the Mediterranean and Black Sea (IRIS-SES) can support interregional coherence when developing proposals for integrated monitoring.

**HELCOM** (Baltic Marine Environment Protection Commission - Helsinki Commission) is the governing body of the Convention on the Protection of the Marine Environment of the Baltic Sea Area. The 10 Contracting Parties are Denmark, Estonia, the European Union, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. The Baltic Sea Action Plan (BSAP) is the joint strategy for improvement

of the state of the marine environment for HELCOM Contracting Parties. In 2010, at the HELCOM Moscow Ministerial Declaration, it was decided to establish, for those HELCOM Contracting Parties being also EU-Member States, the role of HELCOM as the co-ordinating platform for the regional implementation of the EU Marine Strategy Framework Directive (EU MSFD) in the Baltic Sea.

## BALSAM PARTNER ORGANISATIONS:

HELCOM Secretariat

Aquabiota Water Research (ABWR AB), Sweden

Baltic Environment Forum Latvia (BEF LV), Latvia

Estonian Fund for Nature (ELF), Estonia

Estonian Marine Institute (EMI), Estonia

Bundesamt für Seeschifffahrt und Hydrographie (BSH), Germany

Finnish Environment Institute (SYKE), Finland

Finnish Game and Fisheries Research Institute (FGFRI), Finland

Instytut Meteorologii i Gospodarki Wodnej  
– Państwowy Instytut Badawczy (IMGW-PIB), Poland

Klaipeda University (KUCORPI), Lithuania

Latvian Fund for Nature (LFN), Latvia

Latvian Institute of Aquatic Ecology (LIAE), Latvia

Leibniz Institute for Baltic Sea Research Warnemünde (IOW), Germany

Swedish Meteorological and Hydrological Institute (SMHI), Sweden

Swedish Museum of Natural History (SMNH), Sweden

Tallinn University of Technology (TUT), Estonia

University of Gdansk (UG), Poland

WWF Suomi, Finland

Aarhus University (AU), Denmark

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EU DG Environment

JMP NS/CS and IRIS-SES New Knowledge projects

Life + MARMONI

Roshydromet

State Oceanographic Institute (SOI)

Thünen Institute of Baltic Sea Fisheries (TI-OF)

Russian Fund Lenobpriroda (RFL)

Brockmann Consult



**[www.helcom.fi](http://www.helcom.fi)**



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