EMODnet
European Marine Observation and Data Network

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Baltic Checkpoint

Report from first meeting of the Expert Panel

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Executive summary

An important component of the Baltic Sea Checkpoint Project, that started June 2015, is an evaluation process carried out by an Expert Panel consisting of nine experts representing different stakeholder communities.

The first meeting of the Baltic Sea Checkpoint Expert Panel took place in Copenhagen on the 8. November 2016. This report documents the outcome of the meeting.

The Baltic Sea Checkpoint consortium presented the progress of the work carried out during the projects initial 15 months focussing primarily on the Literature Survey, the first Data Adequacy Report and the Baltic Sea Checkpoint web-page.

The Experts were asked to evaluate the work in the individual challenges and replying to some predefined questions formulated by the project management. This evaluation together with the key elements from a lively discussion at the meeting is presented in Chapter 3 of this report.

Generally, the Experts expressed satisfaction with the work carried out, but also made comments and suggestions on the content of Challenges and the future work. All the recommendations from the experts are given in Chapter 5. The more general and cross-cutting are:

- DG-MARE should tailor the checkpoint Challenges to be regionally specific and outputs coordinated with RSCs and other stakeholders in order to avoid double work – can be done via stakeholder consultation before the launch of tender
- Baltic Sea Checkpoint should make a short report, where stakeholders for the different products are identified. Such a report should critically assess the information needs for different stakeholders and address if that type of stakeholder is likely to seek the information through Baltic Sea Checkpoint or through other information sources.
- Marine litter (including ghost nets and micro plastics) and drugs (and drug residues and metabolites) should be considered included in the study
- More focus should be on coastal zone products, e.g. the need for much higher resolution in bathymetry and sediment maps and benthic data such as macro algae and angiosperms.
- Sea level rise and acidification should have been included in the Climate Change Challenge

1. Introduction

The EMODnet Baltic Checkpoint project started in June 2015 with the aim to examine the current data collection, observation, surveying, sampling and data assembly programs in the Baltic Sea basin. Additionally it shall assess and demonstrate how they can fit into purpose in the 11 challenge areas in terms of data uncertainty, availability, accessibility and adequacy, and deliver the findings to stakeholders through an internet portal with dynamic mapping features and a stakeholder workshop.

An important part of the project is to include evaluation of the consortium's achievements with respect to high-level scientific standards and the relevance of the work package outputs both to the objectives of the whole project and to societal needs from a group of experts representing different stakeholder communities.

The panel is composed of nine members; four appointed by the EU Commission (DG–MARE):

- Neil Holdsworth (ICES)
- Joni Kaitaranta (HELCOM)
- Reine Johansson (Baltic Sea Advisory Council)
- Emilie Kærn (The offshore Wind Energy industry)

The consortium has appointed five experts:

- Wolfgang Fennel (IOW, Academia)
- Jacob Carstensen, (University of Aarhus, Academia and public)
- Fabio Ballini (Maritime Energy Research Group, Academia)
- Stephan Dick (BSH, Public)
- Ian Sehested Hansen, (DHI, Private)

The terms of Reference for the Expert Panel are given in Appendix 3.

2. First meeting of Expert Panel

The first meeting of the Baltic Sea Checkpoint Expert Panel took place 8. November 2016 in Copenhagen. The meeting was attended by eight out of the nine experts together with a representative from the EMODnet Project Office, and 10 representatives from the Project Consortium – see participant list in appendix 2.

An overview of the project work was presented with special emphasis on the literature survey and the first edition of the Data Adequacy Report (see meeting agenda in Appendix 1). The second half of the meeting concentrated on a detailed discussion of the eleven challenges – one by one.

At the end of the meeting it was agreed that the experts should evaluate the eleven challenges according the following plan:

Challenge	**Expert**
Windfarm Siting	Emilie Kærn, Fabio Ballini
Marine Protected Areas	Fabio Ballini, Joni Kaitaranta
Oil Platform Leaks	Ian Sehested, Stephan Dick
Climate change	Jacob Carstensen, Wolfgang Fennel
Coastal protection	Wolfgang Fennel
Fishery Management	Neil Holdsworth, Reine Johansson
Fishing Impacts	Neil Holdsworth, Reine Johansson
Eutrophication	Jacob Carstensen, Joni Kaitaranta
Riverine Inputs	Ian Sehested, Stephan Dick
Bathymetry	Stephan Dick, Ian Sehested
Alien Species	Reine Johansson

The experts were asked specifically to address the following questions as part of their evaluation:

1. Are the identified parameters relevant to address the task challenge?
    a. Are the parameters suitable?
    b. Too many – which ones are not relevant?
    c. Too few – which ones are missing?
2. Are all major data sources identified?
    a. If not – which ones are missing?
3. In your opinion what is considered the biggest problem in relation to data availability, accessibility, adequacy and accuracy in the Baltic Sea?
    a. Lack of observations (space and time)
    b. Visibility of data
    c. Formats
    d. Lack of open and free exchange/availability of data
    e. Quality
4. Are the challenges well represented in the Baltic Checkpoint webpage (www.emodnet-baltic.eu/home)?
    a. Suggestions for improvements
5. Proposals for improvements of the EMODnet data portals

3. Experts comments

3.1 General

The Baltic Sea Checkpoint is formulated as a demonstration project, but this means that products should be carefully selected to be relevant for the given challenge. If less relevant products are selected, the project will lose credibility. A recommendable strategy for selecting products should be “what is needed, rather than what is available”. If too many products are selected, there is a severe risk of information overflow.

The selection of products appeared limited by the call text of the tender. As a consequence, the selection of products may not always be optimal for a given challenge. Therefore, it is important to give feedback to DG MARE on why some products should be deselected and why some new products should be selected.

The products selected so far focus mainly on the open marine areas, relevant products for the coastal zone are generally overlooked. If this is intentional, then it should be stated explicitly. If not, more focus should be on coastal zone products, e.g. the need for much higher resolution in bathymetry, sediment maps, and benthic data such as macro algae and angiosperms.

The quality of the data products should be included as relevant information for the different data layers. No data product is better than the model and input data that were used. For those data products that do not have uncertainty estimates associated with them, it would be good to either seek to obtain this information or give a qualitative assessment.

It is understood that the portal of the BSCP is in the process of development. Therefore, no complaints about gaps and missing data shall be expressed. In general, however, it is suggested that the data-bases of the NEST Institute in Stockholm (the BED data system), and the data of the IOW in Rostock should be mentioned. It would be helpful to consider cooperation with these institutions.

Some variables are important for more than one of the challenges, and this could be indicated by referring to the other issues, e.g. sea water levels are relevant for climate change and for coastal protection.

The initial reaction is to say that the issues are very technical and some of the questions are difficult to answer. The evaluation is therefore based on the experience we have with working with a stakeholder body, providing advice on fisheries management in accordance with the EU Regulation 1380/2013, the so-called Basic Regulation. There are key considerations in Article 2 of this regulation:

- The Common Fisheries Policy (CFP) shall ensure that fishing and aquaculture activities are environmentally sustainable in the long-term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies.
- The CFP shall apply the precautionary approach to fisheries management, and shall aim to ensure that exploitation of living marine biological resources restores and maintains two populations of harvested species above levels, which can produce the maximum sustainable yield. In order to reach the objective of progressively restoring and maintaining populations of fish stocks above biomass levels capable of producing maximum sustainable yield, the maximum sustainable yield exploitation rate shall be achieved by 2015 where possible and, on a progressive, incremental basis at the latest by 2020 for all stocks.
- The CFP shall implement the ecosystem-based approach to fisheries management so as to ensure that negative impacts of fishing activities on the marine ecosystem are minimised, and shall

endeavour to ensure that aquaculture and fisheries activities avoid the degradation of the marine environment.

This means have the best available data and from the most reliable sources in order for the Baltic Sea Advisory Council (BSAC) to develop and provide informed, well-considered and professional advice.

3.2 Windfarm Siting

The relevance of the different products should be carefully scrutinized and those remaining should be motivated. Nutrients, chlorophyll-a (Chl-a) and oxygen may not be very relevant for environmental impact assessments, which consider changes in biological communities. It is, however, important that the products remain focused and do not spread too widely.

The report clearly assesses, analyses, and discusses the economic, environmental and social impact of offshore wind farms (OWF). However, the report lacks a dedicated section related to the economic and environmental analysis of OWF. The analysis should include: site specific considerations, environmental siting considerations, and economic and social impacts.

The EMODnet portal windfarm siting section is very well structured and the information is gathered in a user-friendly way. It is suggested to include a section with the EU initiatives and research projects that deal with OWF.

Furthermore, the following should be taken into consideration:

- Page 9. Please clarify the challenges and what the basis of selection was
- Please clarify, including an appropriate reference, the reason for using a rotor with the diameter of 90m (page 10). What is the benefit?
- Regarding the floating foundation (page 10): there are two types of floating foundations: TETHered and SEMI-submersile
- Page 14, first chapter: Please include reference, sources, and provide more info about the statement: "*translate into a capital cost advantage in the shorter structural towers*"
- Wind profiles. Have you considered using the *windandeconomy* tools?
- Maintenance date: It would advisable, if possible, to provide a model and more information on maintenance data
- In general, I would recommend including the source and references of the statements included in the report.
- The sentence: *Offshore Wind Farm (OWF) siting are to identify feasible offshore wind farm sites with balanced economic, environmental and social impacts and consequences.*
  Be aware of other players doing the same thing - for instance the Danish "Havmølleudvalg" who identifies the most feasible Danish offshore sites https://www.dr.dk/nyheder/politik/her-kan-kaempe-havmoeller-komme-til-staa
- The sentence: *The state-of-the-art wind farm siting normally applies an integrated approach which uses a large amount of marine data from different sectors as essential inputs.*
  True. In Denmark for instance we have the Agency for data (Styrelsen for data og effektivitet) That collects data from other agencys on this matter e.g. marine, energy agency etc.
- A general comment is that the NREL report is very outdated. 2007 is a very long time ago in the offshore wind industry. I would suggest to use the latest offshore parks as examples. e.g. Horns Rev 3, Borrsele, Kriegers Flak etc. They will most likely be built with 8-10 MW turbines and have a full capacity at between 400-700 MW
- I would also use the V164 or SWT-7.0-154 as examples instead of V90.

- The sentence: *The distance between each wind turbine must be at least seven times the rotor diameter.*
- A more qualified suggestion (after consulting industry experts) is in average 5 times rotor diameter in the rows and 7 times rotor diameter between the rows. For instance if we have a 6 MW turbine at the height of 150 m. then the distance to the next turbines would be 1050 m (150*7) and 750 m (150*5). Remember that this can vary and that each developer (at least in DK) has the freedom to choose the turbines they want and also the distance between them within a given area.
- The sentence: *All wind turbines in a row could be connected with a 7 Km connection cable to the offshore substation.* Why 7 km??
- *The sentence: There are four different types of foundations for offshore wind farms: Monopile, Gravity base, Tripod and Floating.* Five types when you include suction buckets + there is a variety of combinations between the five concepts. It should also be tripod/jackets and not only tripods.
- The sentence: *The application of Gravity base foundations is common between 1 m – 20 m. In a water depth range between 1 m – 30 m mostly Monopile foundations are used. Tripod foundations are a transition technology between shallow and deep water (20 m – 50 m). In water depths deeper than 50 m only floating foundations are going to be used.* I wouldn't use numbers, it's to specific, what about for instance the combined suction bucket/jacket foundation used by DONG, where should that be placed?.
- The sentence; *In the BSCP project, the floating foundation will not be a focus.* Remember the argumentation of why. I guess it is because the water is not that deep.
- The sentence: *the study will mainly focus on the site suitability study although extreme condition analysis will also carried out during the project period.* What does this mean? will there also be a site suitability study and an extreme condition analysis?
- Table 3.1. *Data usage in "Wind farm siting"* To me it looks very thorough and detailed. However, I have forwarded the table to DTU Wind Energy, who are better equipped to assess the table.
- **3.2.2 Biota data.** The sentence: *They may also decrease or destroy suitable habitat for benthic organisms that are prey for fish populations and reduced habitat may result in population declines of some fish species. This may introduce instability in local food web systems.* It is our belief, that offshore foundations (after having been installed have a positive impact on the ecosystem, and not negative as suggested in the text. See for instance http://ec.europa.eu/environment/integration/research/newsalert/pdf/45si11_en.pdf. The challenge is in the installation phase, where piling has a negative impact on especially mammals, see for instance: http://megavind.windpower.org/download/2732/megavind_strategy_no_4pdf (page 24)

3.3 Marine Protected Areas

Overall, the authors are congratulated on making very comprehensive overviews of available data related to Marine Protected Area (MPA) challenges. The study assesses in a proper and structured way the different available datasets intended for the BSCP project and their adequacy regarding the three MPCs. The parameters identified by the report are relevant and in line with the selected challenges. Due to time constrains perhaps the latest (published 18.10.2016) HELCOM MPA Ecological coherence report was not utilized and included in references: http://www.helcom.fi/Lists/Publications/BSEP148.pdf.

In this respect, marine litter (including ghost nets and micro plastics) and drugs (and drug residues and metabolites) are missing in the study as challenges. A further analyses and data collection is recommended.

In relation to the availability, accessibility, adequacy and accuracy of the Baltic Sea data:

- The resolution of ecological data – there are many species and habitats with limited data based on sporadic or historic information.

- Regarding availability, as stated, many of these datasets are only available in the local language, making it difficult to achieve a comparable Baltic-wide assessment. Also, there are differences in data resolution between the countries.

Information on supporting environmental parameters is quite comprehensive for this purpose. The HELCOM MPA database is potentially a good source for information on specific features of MPAs and was used here correctly, although the information filled in by Contracting Parties is partly lacking. Therefore, Contracting Parties should be encourage to report detailed info on EUNIS classes, management plans etc. to the database

It would be a benefit to include a section dedicated to the economic impact analysis of establishing the MPA. The analysis should include the potential benefits and costs associated with MPAs.

Regarding the EDMODnet Portal, this has been handled in a very good and structured way with reader-friendly layout. In this respect, it would also be recommend to list the several EU initiatives and research projects (related to data collection) and include these EU initiatives in the report.

3.4 Oil Platform Leaks

The authors of the Data Adequacy Report note that in the Baltic Sea there are almost no active offshore oil platforms. In addition, oil pipelines are rare in the Baltic Sea. However, because of the very heavy marine traffic in parts of the Baltic Sea, the risk of an oil leak from a ship is fairly high in comparison with other regional seas in Europe. As data needs and adequacy assessment for the “ship oil leak” and “oil platform leak” are quite similar the DAR covers both types of oil pollutions.

It is recommended that this should be also reflected in the title of the challenge, e.g. “Oil platform and ship oil leaks”.

For this challenge we see two types of users:

- intermediate users that have to forecast the oil drift
- end users that are tasked with oil spill combatting or assessing the environmental and social-economic impact of the oil leak.

The data needs of both types of users are quite different.

It is recommended that the different data needs of different user groups are highlighted in the report.

In the literature survey it is said that "the objective (of the challenge “oil platform leak”) is to check the preparedness of operational tools and existing Baltic Sea monitoring data for forecasting oil spill dispersion and estimating the likelihood that sensitive coastal habitats or species or tourist beaches will be affected. SMHI Seatrack Web and DMI operational oil drift model will be used to demonstrate the operational oil drift forecast and on-call service, and to show how a variety of marine data can be used in this forecast and service."

In this case, the user of the challenge is the organisation that has to forecasts the oil drift in case of an accident. It should be mentioned that oil spill drift prediction is a national task and that other oil spill prediction systems are available in other countries in the Baltic Sea area.

Selection of right parameters:

The selection of parameters depends very much on the type of user addressed by the objective. For an organisation in charge of oil drift forecasting, the right parameters are addressed, in principle. Some parameters like coastline, bathymetry and characteristics of simulated oil types may be regarded as internal information in the oil spill model while met-ocean data are needed as external forcing data. Other external information (mentioned in table 5.1) is needed as well, e.g. information on the time, location, amount of oil input, kind of release or source function. Providers for the task 'Issuing warning' in table 5.1 should be complemented by vessel captains, shipping companies or oil spill air surveillance.

Information on sensitive areas or human activities is more of interest for end users as organisation in charge of oil spill combatting. These users need further information on human activities (shipping routes, off shore areas). For these users also the oil spill drift and distribution would be an important input parameter.

The experts propose to ensure that air temperature and solar radiation are included, as these parameters affect the weathering process. Technically the water level parameter is probably not of importance for the activity, but it is an integrated model parameter from the numerical models.

It is recommended to secure that air temperature and solar radiation are included.

The authors specifies that "*very high –resolution (up to few hundred meters) weather-ocean-ice models"* are needed in coastal waters. This very high resolution for the met part is probably not a must.

Identified major data sources

Concerning oceanographic parameters, the present study focuses very much on CMEMS data. However, in the different countries around the Baltic Sea additional oceanographic forecast data are available, sometimes with higher resolution in national or coastal areas.

Problems in relation to data availability, accessibility, adequacy and accuracy

Concerning observations it is mentioned in the report that more wind and current observations are needed for validating the weather and ocean models. Another problem is that satellite figures and observations from airplanes are only seldom available.

On the other hand, the visibility and availability of met-ocean model data is good. Some problems concerning quality of the model data (e.g. interaction with ice and coastal phenomena) and needs for further development are mentioned in the report.

The authors mention that ice forecasting need further improvement. Furthermore, the experts note that the combination of ice and oil is a challenge for trajectory and weathering predictions.

It is recommended to further develop oil spill models and include ice-oil-water interaction.

Representation on the Checkpoint and EMODnet webpage

The objective is very well presented on the Baltic Checkpoint webpage. Examples of drift calculations are shown on the home page of Baltic Checkpoint webpage. However, it is not obvious (and not explained) why only a single application of one challenge (c) is presented between BSCP Literature Review and BSCP Data Adequacy Report.

For oil drift forecasting the most important input are met-ocean forecasts. These model forecasts are not available on the EMODnet webpage (but on the CMEMS portal).

However, the quality of the forecasting is not documented by comparison with trajectories and weathering of a real oil spill event, so the accuracy cannot be evaluated.

It is recommended to include documentation for the accuracy of the spill modelling at the EMODnet portal and BSCP web page.

3.5 Climate change

Sea level rise is not included as a data product under climate change, although it is one of the more visible effects of climate change. Although sea level rise is included under coastal protection, it should also be included under climate change.

The four phytoplankton species selected as product for climate change seems rather arbitrary. To my knowledge there is no clear evidence linking these species directly to climate change. Furthermore, these species are only prevalent in the northern Baltic Proper and Gulf of Finland, and consequently do not represent the Baltic Sea more generally. For example, with the exception of *Heterocapsa triquetra*, the three other species are uncommon in the western Baltic Sea. Finally, I was surprised to see that samples at depths of 910 m were reported for phytoplankton. This is twice the deepest point of the Baltic Sea (459m). The phytoplankton product is not relevant as a climate change product.

Acidification is another important aspect of climate change that is apparently overlooked. Large export of alkalinity from the catchment have so far curbed acidification effects in the Baltic Sea, but with an expected rise of pCO2 to about 1000 ppm at the end of the century acidification cannot be neglected.

The considered data set is basically a consistent choice of physical and biological variables. In particular, the sea temperature at the surface, the bottom, and vertical averaged temperature; sea surface salinity, internal energy, thermal and kinetic energy, as well as sea ice lateral coverage and mass are considered. Moreover, phytoplankton variables for selected species will be included.

Starting with the physical parameters describing the lateral ice content and the ice thickness, it is obvious that these parameters allow the construction of time series of the ice covered areas and of the amount of ice. With aid of these well-chosen parameters the response of ice coverage of the Baltic Sea to global warming can be documented.

Moreover, as obviously imported key variables, the temperatures of the sea surface layer and the bottom waters are included. Regarding the salinity, only the values in the surface layer is listed. Although the salinity in the bottom waters varies slower than in the surface layer, for the detection of climate changes such slowly changing variables may be useful. Moreover, the weak fluxes through the halocline are important for the maintenance of the general estuary circulation type of the Baltic Sea. Therefore the inclusion of salinity below the halocline should be considered as a handle to assess the vertical stability of the halocline. The isolating

effect of the halocline, which virtually traps the bottom waters in the central Baltic Sea, is related to the frequently occurring hypoxic and anoxic conditions in the deeper waters of the Baltic. These oxygen conditions are also closely related to the biogeochemistry processes which control nitrogen and phosphorous dynamics in the bottom waters. This suggests that oxygen measurements in the bottom water should also be included in the data base. Useful maps which show the lateral extent of anoxic areas in the bottom waters of the Baltic Sea from 1969 until now are freely available at the web site of the IOW (www.io-warnemuende.de/msr-2016-0100-de.html), and could be used, for example, by providing the corresponding links at the BSCP Portal. Since oxygen is also a key variable for the challenge on eutrophication, a cross-reference on pages of these challenges should be a convenient way to avoid a simple duplication of data sets under different issues.

Regarding the presentation of currents in the data base, there are some issues. In the Baltic Sea the mesoscale variability of the currents is rather high, while permanent currents do virtually not exist. There are no, in a straightforward manner directly observable steady currents. However, in the deep water of the central Baltic rather weak but quasi steady flows could be filtered out from longer time series. Very strong, but fluctuating currents can be found in the transition area between the Baltic Sea and Kattegat. Therefore a concentration on time series data from permanent stations seems to be a reasonable approach. The provision of time series of current measurements at selected key positions is a well addressed issue in the report. There are some times-series maintained for more than 20 years in the transition area between Baltic and Kattegat. A key station is located on the Darss Sill, which is run by the IOW on behalf of the BSH. This station is of particular importance to detect salt water inflows into the Baltic. The salt water inflows carry usually high oxygen concentrations which can potentially reach the deep waters in the central Baltic Sea where they may replace the anoxic waters. Data from the Darss Sill station should be accessible from the BSH and the IOW. Another fixed observation station is deployed in the central part of the Arkona Sea, which started to work in 2006 and measures meteorological variables, such as wind speed and direction, air pressure, air temperature and humidity above the sea surface, and hydrographic variables such as water temperature and salinity at the depth levels of 2 m, 5 m, 7 m, 16 m, 25 m, 33 m, 40 m, and 43 m. Detailed information on these observing system can be found at the website of the IOW, (http://www.io-warnemuende.de/marnet-en.html).

Regarding the consideration of thermal and kinetic energy there is the issue that such global measures could only be estimated by models, but not directly be observed. If this kind of information is readily available, then the portal may provide it. But if the provision of those data would imply additional efforts it should be ranked lower than the other issues.

With respect to the phytoplankton data, the report gives not a convincing argument why it is important to monitor and assess the variation of the mentioned three species. Given the discouraging problems to obtain the data from the scientists who are doing the measurements, which were indicated in the Data Adequacy Report on page 67, it seems to be advisable to reconsider whether these data are really of a high priority. Only regarding the cyanobacteria, mentioned is the *Nodularia spumigena*, there is an important environmental issue, public known as the Blue Green Algal Bloom, which may potentially worsen by global warming. These Blue Greens, which are considered to be Harmful Algal Blooms (HAB), spoil large parts of the Swedish and Finnish coasts, in some years also other beaches of the adjacent countries. They are a disaster for the tourism at the beaches in summertime. Since the extent of these blooms, which occur at scums at the sea surface, can well be detected by satellite imagery, it is possible to produce time series of maps of the lateral extent of these blooms, in a similar manner as the ice extend, and show how climate change affect this phenomenon.

As mentioned above is the expected rising sea relevance for climate change. This problem is however also addressed in the next challenge on coastal protection. Therefore a reference to data provided to the issue should sufficient to clarify that this point is not overlooked.

3.6 Coastal protection

The challenge coastal protection is reflected in the data portal by two pillars: the sea level changes and the erosion and sediment transport problems. Any sea level rise is a potential risk for coastal constructions, increased flooding, and enhanced erosion of beaches. The coasts of the Baltic Sea differs significantly in northern part, which is characterized by a bedrock type, and in south eastern part, which is typically strongly affected by transports of sand eroded from the sandy beaches and sediment transport parallel to the coast. Owing to the rise of the northern part of the Baltic Sea basin, both the relative and absolute sea-level changes are of interest. The observational data are available from many gauge stations around the Baltic and the land rise is well described by models. Thus, it appears that the main issues in this context are well addressed in the Data Adequacy Report. It remains the task of an inclusion of more stations, which are not yet available in the data base (stations from Poland and Lithuania are mentioned in the report).

The consideration of erosion and sediment transport the data portal is a rather difficult issue and is not yet described in the first version of the Data Adequacy Report. The involved processes dependent on sediment types, local coastal geometry and bathymetry, meteorological conditions, and wave climate in response to the wind. In other words, most of the needed process understanding is rather site-specific and specific studies are needed for planning of constructions and for risk assessment. However, as outlined in the report, some parameters could be useful for a first encounter of a local environmental study, such as data on the typical wave climate, estimates of underwater sediment volume in the active beach profile, calculated closure depths combined with empirical formulas, e.g. the inverse Bruun Rule. These problems are to be addressed in the second part of the Data Adequacy Report.

3.7 Fishery Management

Are the identified parameters relevant to address the task in the challenge?

All the relevant parameters are well represented both in the literature and data adequacy reports. The authors are also satisfied with this, and agree that it gives a comprehensive picture of what's needed. Report writing has come from ICES data and information sources.

Editorial notes:

- PGCCDBS is referred to but this is now known as PGDATA http://ices.dk/community/groups/Pages/PGDATA.aspx
- Table 8.1 needs some explanation.

Are all major data sources identified?

Yes, although there is a heavy reference to finding the data in the various working group and advice reports for the Baltic fisheries. It should be noted that there are underlying data portals that, although aimed at stock assessment, are housing relevant data for this challenge (in an easy to download and digestible format) – namely the 'stock assessment graphs' system at ICES http://standardgraphs.ices.dk where information on catches and discards are presented. This is the "official" data that's being produced and worked with in "our" world of fisheries management

The biggest problem in relation to data availability, accessibility, adequacy and accuracy in the Baltic Sea?
The two issues most relevant are visibility of data, and data quality. Specifically, for discards there are challenges in really estimating the true discard rate based on the data available and the quality of the data. For protected species bycatch, the data are held in different systems and not easy to bring together, although ICES is working with the WGBYC group on this.

Visibility, availability and quality of fisheries data are not a problem. The accumulated discard data in the report (Landing Obligation in the Baltic from 2015 only) is flagged as adequate in the report. Recreational catch data is pointed out as in need of focus, but it has come inside the ICES assessment upon request from the Commission. The issue of bycatch data is mentioned as well as consideration as to how to improve this. We need to encourage Member States to deal with this.

Are the challenges well represented in the Baltic Checkpoint webpage (www.emodnet-baltic.eu/home)

The challenges are well presented on the webpage

Proposals for improvements of the EMODnet data portals?
Specifically for the Baltic portal the map viewer showing fisheries is confusing as it doesn't match management area of each stock esp. for cod in the Eastern Baltic – needs to be labelled better, as does the assessment year. Couldn't get to metadata for source information. However, overall much better than information shown in EMODnet Human activities.

EMODnet should be available as a source of information only, not as a tool to be used in connection with policy or decision making.

3.8 Fishing Impacts

Are the identified parameters relevant to address the task in the challenge?
The parameters are adequate, well considered and in line with the work under DGENV, ICES and HELCOM (Baltic Boost).

The scope should be broadened from fishery impact to consider and include other impacts besides fisheries, e.g. energy and pipelines, gravel extraction, windmill construction, recreation and tourism. So the scope is too narrow. Could this section be merged with other human uses of the environment, thereby giving a broader picture?

Editorial notes:

- Table 9.2 needs some more explanation.
- Table 9.3 VMS is updated annually, more so now it is to be used in Fisheries and Ecosystem overviews.
- For 2016 ICES made the outputs for gear types by year/quarter on request from OSPAR, but there was no request from HELCOM so these were not made for the Baltic Sea region.

Are all major data sources identified?

The data sources seem to be becoming available as time goes on. E.g. BENTHIS project, as well as ICES and HELCOM.

The biggest problem in relation to data availability, accessibility, adequacy and accuracy in the Baltic Sea?
As reflected in the report, and in the discussion at the expert panel – the biggest issues is access to the highly detailed data (VMS coupled with vessel logbook). This is restricted under the DCF 199/2008 to both protect commercial information and the identification of individual vessels/persons. This puts some restrictions on what can be provided from the control authorities to end users, and restricts the kind of outputs that end users, such as ICES, can provide publically. This also means that every use of the data has to be agreed in advance and additional uses need to be requested to each data provider formally.

The author of the chapter has stated that the current level of provision is adequate. It should be pointed out that fishing patterns and seasons have changed considerably over time e.g. not fishing over the entire year or over the entire Baltic.

Are the challenges well represented in the Baltic Checkpoint webpage (www.emodnet-baltic.eu/home)
The challenges are well presented on the webpage.

Proposals for improvements of the EMODnet data portals?
EMODnet should be available as source of information only, not as a tool to be used in connection with policy or decision-making.

3.9 Eutrophication

Generally, the authors have succeeded in fulfilling the tasks outlined in the tender. Especially the evaluation of monitoring network is very welcomed outcome. It should be noted that correct term for COMBINE database is “HELCOM COMBINE”, not “HELCOM/ICES COMBINE” database. ICES are contracted by HELCOM to host HELCOM COMBINE database.

The eutrophication products seem constrained by the present set of HELCOM core indicators. There are many more relevant eutrophication products in addition to those listed, particularly the more biological responses of macro-vegetation and benthic fauna. It would also be recommendable that the products were available for the coastal zone, since eutrophication effects can be even more pronounced in coastal ecosystems affected by large nutrient inputs from land.

For some of the products minimum requirements on the number of observations (>15 obs) are imposed. Although this restricted has been suggested by HELCOM, Baltic Checkpoint should not necessarily imply the same restriction. It is better to associate the product with an uncertainty, as has been done for other products.

There are considerable challenges in data quality even despite the existing standards and guidelines that have been regionally agreed. Therefore use of quality assured databases for assessments is essential. Problems occur when data from heterogeneous sources are pooled together for assessment purposes. It should be noted that data in EMODnet chemistry consists of not only national monitoring data but it is heterogeneous collection of various datasets from projects etc. This as such is a valuable exercise to put in place for the sake of accessing all marine data that is produced. However, care should be taken when taking

all data from EMODnet and using that to make status-based assessments (HEAT tool as was used here). For example, a phytoplankton bloom cruise, which have been carried out e.g. in Finland, can "hunt" algal blooms and measure only high concentrations of chl-a on purpose. If this kind of data, which is not based on agreed monitoring stations and monitoring scheme, is used for chl-a assessment the assessment results are incorrect. This can happen if one just extracts all data from EMODnet and uses that to make the assessment.

The challenge is well presented at the Baltic Sea Checkpoint webpage.

A suggestion for improvement could be: It was mentioned in the meeting that eutrophication assessment exercise is a duplication of work with HELCOM but as it is defined in the tender, then this feedback should be directed to DG MARE defining call of tender for EMODnet checkpoints. Also the checkpoint Challenges should be tailored to be regionally specific and outputs coordinated with RSCs and other stakeholders in order to avoid double work.

3.10 Riverine Inputs

The objective of challenge 9 'River Input' is to map the extent and quality of publicly available data sources for discharge, nutrient load, sediment and salmon for rivers with discharge to the Baltic Sea, and make this data available in a data service for the blue economy. The river inputs are important 'boundary data' for other challenges as Eutrophication, Fishery Management etc. Is not obvious to the experts, why these boundary data are treated different from other boundary or forcing data, e.g. direct loads (from cities and industry), atmospheric inputs or forcing. Furthermore, the experts wondered why salmon is included in the parameter list, and why only this fish species.

Selection of parameters to address the task in the challenge

The selection of parameters covers the most important inputs. However, the experts do not see many applications where river temperature at one position of the river mouth is important.

On the other side, other important inputs on chemical substances, pollutants, radioactive substances etc. are not covered by the report (yet).

It is recommended to clarify if also inputs of pollutants (heavy metals, chemicals, radionuclides) are included in the scope of work.

Regarding the sediment parameter it is understood that this relates more to fines than to bed transport of more coarse material, since it is mentioned in connection to visibility depth. If the purpose is to provide input to the challenge Coastal Protection the bed load transport needs to be included.

It is recommended to clarify if the sediment load of coarse sediment is included in the scope of work.

It is said that the First Data Adequacy Report concentrates on River temperature, Discharge and Nutrients. Nutrient observation data can be obtained from HELCOM and EEA, but only for a selection of monitoring stations. Most important or best available data for the estimation of (total) nutrient loads into the Baltic Sea are data from the eHYPE model which have some known biases.

It is recommended that not only total nutrient loads but also information on organic and inorganic components are provided. This more detailed information is needed for some applications.

Identified major data sources

The authors identified the most important or major data sources. It should be mentioned, that Real Time runoff data are also available directly at national agencies and on the BOOS and CMEMS portal.

Problems in relation to data availability, accessibility, adequacy and accuracy

Major problems in relation to data availability are the data gaps concerning observations in the south eastern part of the Baltic Sea. Data availability should be improved mainly in Poland, Russia, Lithuania and Finland (denser coverage). At many placed also the sampling frequency could be improved, mainly concerning measurements of nutrients and SPM/sediment concentrations.
Furthermore, there is a need that measurements of different parameters are made at the same positions in the river mouths.

Visibility and representation on the Checkpoint and EMODnet webpage

There are a few web pages for visualising and downloading of river inputs (e.g. Hype website: http://hypeweb.smhi.se/). However, in general the web representation for river load data is not very good. On the EMODnet portal and BSCP web page river inputs are not yet presented.

It is recommended to include river input data in the EMODnet portal and BSCP web page.

In addition to the suggested products, the export of organic carbon should also be considered. The increasing export of dissolved organic carbon in northern parts of the Baltic Sea is one of the reasons for declining Secchi depths over time.

3.11 Bathymetry

Selection of parameters to address the task in the challenge

For bathymetry the relevant parameter is the seabed level in a consistent datum reference and the coastline location. The issue related to the datum reference is not addressed in Data Adequacy Report.

Furthermore, the coastline dataset is not addressed including its quality requirements. The quality requirements for regional and local assessments are typically more strict than the resolution requirement for the depth in the gridded data sets. The coastline data set also changing over time due to projects etc.

It is recommended to include the datum issue for bed levels and also the coastline data set in the Data Adequacy Report.

Identified major data sources

The Data Adequacy Report lists the major present data sources known to the experts.

A new set of bathymetry data for the coastal areas are presently under development, based on satellite data. This method is likely to become a cost efficient method for water depths up to about 10m or more in the near future.

Problems in relation to data availability, accessibility, adequacy and accuracy

The main problems are mentioned in the report which are related to quite old or missing information in parts of the Baltic Sea as well as national restrictions concerning provision of bathymetry data. The requirement to resolution and quality of bathymetry data is listed in Table 12.1 of the Data Adequacy Report. The experts assess the provide requirements as appropriate.

Representation on the Checkpoint and EMODnet webpage

The objective is well presented on the Baltic Checkpoint webpage, and data are available at present as well, including also coastlines. Some functionalities seems not to work (e.g. Retrieve Depth)
Information is also presented on the BSHC Web page (including metadata) and on the web page of EMODnet bathymetry.

3.12 Alien Species

There are too many taxonomic parameters. There is a need to go from sorting, describing and labelling to an analysis of detection, elimination and prevention.

Data sources seem to be adequate – there is nothing else for the time being.

Data availability - again accessible from existing portal.

Challenges seem to be presented in a good way.

EMODnet should be available as source on information only, not as a tool to be used in connection with policy or decision making. A brief look at the portal shows the need to get a clear picture of distribution, spread of AIS, especially in coastal areas and lagoons. What about some predictability maps with areas likely to be affected?

4. Summary

The nine members of the Expert Panel undertook a comprehensive review of the work done during the first 15 months of the Baltic Sea Checkpoint, based on primarily the Data Adequacy Report and the discussions during the meeting of the Expert Panel at 8. November 2016; but also the literature Survey Report and the Baltic Sea Checkpoint webpage.

Each challenge is evaluated by two experts and therefore there may in some of the evaluations be slightly contradicting statements reflecting that the experts may have different views.

The Expert Panel have generally given a positive evaluation of the work and achievements of the project but have also given many suggestions and recommendations for future work in the eleven selected challenges. The project consortium are very pleased with the many constructive suggestions for thing to be taken into account in the remaining part of the project. They have, however, also to point out (as it was also done at the meeting) that some of the suggested actions are beyond the scope of project as outlined in the contract between EMODnet and the Baltic Sea Checkpoint consortium. Therefore some of the recommendation, as presented in Chapter 5, are therefore for EMODnet to consider in future activities.

At the meeting the Experts raised some important issues:

- Important that EU – all DG's – in the future signal in call's for projects and tenders that data shall be delivered to EMODnet and Copernicus portals instead of creating project specific data portals.
- Important that the challenges cooperated and coordinate in order to avoid duplication of efforts since they are interlinked/overlap.
- EMODnet should recognise the existence of HELCOM, which is a well-functioning organisation with a lot of data and expertise.
- DG-MARE should have had some stakeholder consultation before launching the Checkpoint call in order to tailor the challenges to the regional conditions.
- Coastal data are very important but not so visible in the challenges work
- It would be interesting to have an analysis of the stakeholders who really uses the data in the individual challenges
- Who are the users of the checkpoint results?

5. Recommendations

It is recommended that:

- DG-MARE should tailor the checkpoint Challenges to be regionally specific and outputs coordinated with RSCs and other stakeholders in order to avoid double work – can be done via stakeholder consultation before the launch of tender
- Baltic Sea Checkpoint should make a short report, where stakeholders for the different products are identified. Such a report should critically assess the information needs for different stakeholders and address if that type of stakeholder is likely to seek the information through Baltic Sea Checkpoint or through other information sources.
- strategy for selecting products should be "what is needed, rather than what is available"
- marine litter (including ghost nets and micro plastics) and drugs (and drug residues and metabolites) should be considered included in the study
- the Challenges shall work closer together to avoid overlaps
- more focus should be on coastal zone products, e.g. the need for much higher resolution in bathymetry and sediment maps and benthic data such as macro algae and angiosperms.
- quality of the data products should be included as relevant information for the different data layers
- Under the windfarm siting to:
    - Page 9. Please clarify the challenges and what the basis of selection was
    - Please clarify, including an appropriate reference, the reason for using a rotor with the diameter of 90m (page 10). What is the benefit?
    - Regarding the floating foundation (page 10): there are two types of floating foundations: TETHered and SEMI-submersible
    - Page 14, first chapter: Please include reference and sources and provide more info about this statement: translate into a capital cost advantage in the shorter structural towers
    - Wind profiles. Have you considered using the windandeconomy tools?
    - Maintenance date: It would advisable, if possible, to provide a model and more information on maintenance data
    - In general, I would recommend to include the source and references of the statements included in the report.
- further analyses and data collection to be carried out in Marine Protected Area Challenge
- it would be an added value to include a section dedicated to the economic impact analysis of establishing the Marine Protected Area. The analysis should include the potential benefits and costs associated with Marine Protected Areas.
- to list the several EU initiatives and research projects (related to Marine Protected Area data collection) and include these EU initiatives in the report
- both "Oil Platform leak" and "Ship Oil Leak" shall be reflected in the title of Challenge 3, e.g. "Oil platform and ship oil leaks".
- the different data needs of different user groups are highlighted in the report
- air temperature and solar radiation are included in the Oil Spill Challenge
- develop oil spill models are developed further and ice-oil-water interaction is included
- documentation for the accuracy of the oil spill modelling should be included at the EMODnet portal and BSCP web page
- Sea level rise and acidification is included in the Climate Change Challenge
- the fishery impact scope should be broadened to consider and include other impacts besides fisheries. E.g. energy and pipelines, gravel extraction, windmill construction, sports and tourism

- it would be useful to investigate to merge the ecosystem impact with other uses of the Baltic
- the products were available for the coastal zone, since eutrophication effects can be even more pronounced in coastal ecosystems affected by large nutrient inputs from land.
- clarification of inputs of pollutants (heavy metals, chemicals, radionuclides) and sediments should also be included in the scope of work of the Riverine Input Challenge
- not only total nutrient loads but also information on organic and inorganic components are provided. This more detailed information is needed for some applications
- river input data shall be included in the EMODnet portal and BSCP web page
- datum issue for bed levels and also the coastline data set is included in the Data Adequacy Report

Appendix 1 Agenda for Expert meeting

08.30-09.00	People meet, *breakfast available*
09.00-09.10	Welcome and introduction DMI
09.15-09.30	Introduction to the EMODnet Checkpoint concept Belén Martín-Míguez
09.30-09.50	Introduction to Baltic Sea Checkpoint Jun She
09.50-10.10	Introduction to Baltic Sea Checkpoint webpage Marco Alba
10.10-10.30	*Coffee break*
10.30-10.50	Literature Survey Erik Buch
10.50-11.30	The 1st Data Adequacy Report Jun She
11.30-12.30	Discussion and questions from experts and stakeholders. Moderator: Jun She
12.30-13.30	Lunch

Afternoon: Baltic Sea Expert Panel closed door meeting (only for Expert panel members and project participants)

13.30-14.00	Wrap-up of mornings discussion Jun She
14.00-15:30	Evaluation, questions and inputs from Experts
15.30-16:00	*Coffee break*
16.00-17.30	Writing of Preliminary Report by Experts
17.30-18.00	Final discussion
18.00	Closure

Appendix 2 Participants list

Emilie Kærn	Expert
Fabio Ballini	Expert
Ian Sehested	Expert
Jacob Carstensen	Expert
Joni Kaitaranta	Expert
Neil Holdworth	Expert
Sally Clink	Expert
Reine Johansson	Expert
Stephan Dick	Expert
Wolfgang Fennel	Expert
Belén Martín-Míguez	Representative from EMODnet Project Office
Jun She	Project coordinator
Erik Buch	Project participant
Marco Alba	Project participant
Margit Eero	Project participant
Åsa Johnsen	Project participant
Darius Daunys	Project participant
Grete Dinesen	Project participant
Ole Eigaard	Project participant
Pekka Alenius	Project participant
Sergej Olinin	Project participant

Appendix 3 Terms of Reference

Terms of Reference for
Baltic Sea Checkpoint Expert Panel

Baltic Sea Checkpoint (BSCP, http://www.emodnet-baltic.eu/Home) is a project funded by The Executive Agency for Small and Medium-sized Enterprises (EASME) of European Commission. The purpose of the checkpoints is to audit the value of marine data services to solve particular commercial and policy challenges with the development of the Blue Economy. With increasing number of public marine data sources available, principally through initiatives such as EMODNET and Copernicus it is timely both to (a) support users in finding the right data products to solve their particular challenges and (b) examine how existing data services should be improved; including the content they offer and the way the service is delivered.

As part of the project there shall be established an Advisory Expert Panel to meet twice during the 3 year project. A Panel of nine experts (4 appointed by EU DG Mare and 5 by the project consortium) are established to:

1. Evaluate project progress primarily via the literature survey report and two Data Adequacy Reports. First delivered at month 15 and the second at month 33 after the Project start in June 2015.
2. Participate at two Expert Panel meetings organized by the Project and meet with Project partners;
3. Write a Panel Report after each Expert Panel meeting within one month after these meetings with the support of EuroGOOS (expert panel coordinator)
4. Agree to publish the Panel Reports on the Project Web pages

The two Expert Panel meetings will be organized by the BSCP project, the travel and accommodation cost, as well as daily allowance of the panel members, in relation to the meetings, will be covered by the project.