Minutes of the

11th Meeting
of the Baltic Earth
Science Steering Group

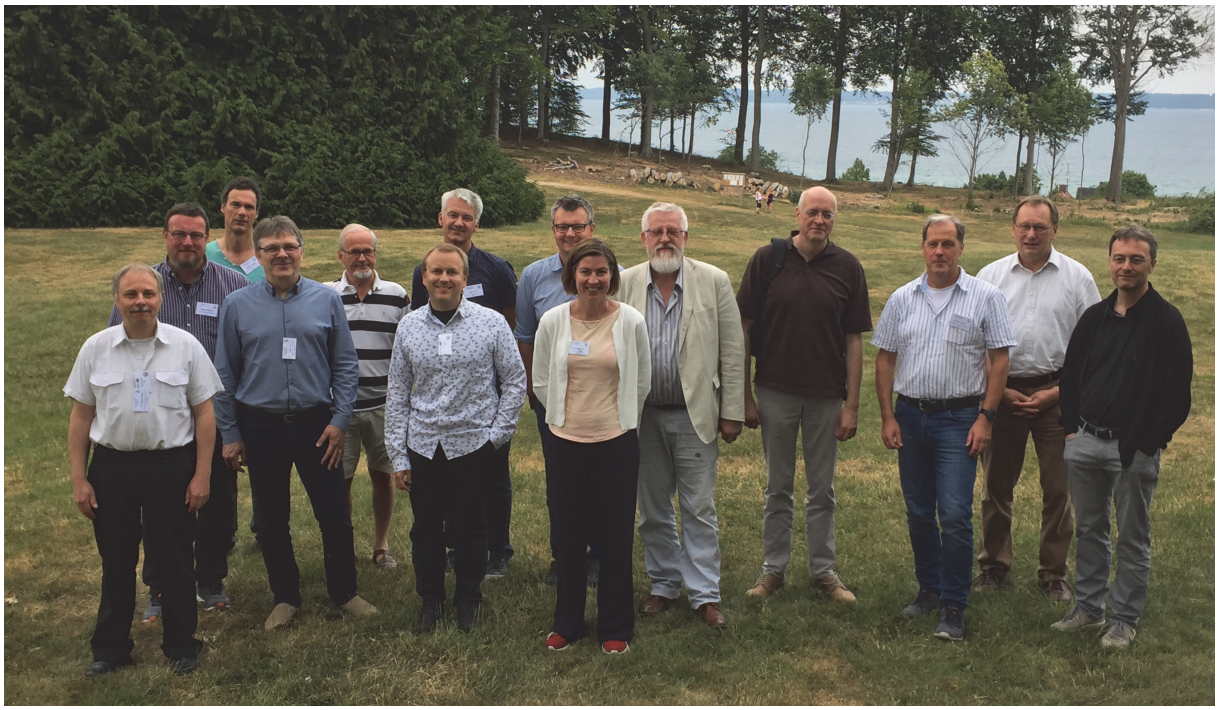
held at

Konventum
Helsingør, Denmark

10 June 2018

Edited by

Marcus Reckermann



Participants (Baltic Earth SSG and SAB members) at the 11th Baltic Earth Science Steering Group meeting (left to right):

Markus Meier (SSG), Martin Stendel (SSG), Matthias Gröger (SSG), Urmas Lips (Guest), Anders Omstedt (SAB), Lauri Laakso (SSG, substituting Jari Haapala), Gregor Rehder (SSG), Karol Kulinski (SSG), Anna Rutgersson (SSG), Tarmo Soomere (SSG), Fritz Köster (SAB), Andreas Lehmann (SSG), Hans-Jörg Isemer (SAB), Ralf Weisse (SSG). Behind the camera: Marcus Reckermann (SSG).

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Summary of Decisions and Action Items

Decision 1: Baltic Earth Assessment Reports (BEARs) will be produced (for details see Item xxx of these minutes)

Decision 2: A BACC II report will be one of the BEAR reports, with special attention to the specific needs of HELCOM in producing their Report Cards (for details see Item x xx of these minutes)

Decision 3: A BEAR author workshop will be attached to the Baltic Earth Workshop on Multiple Drivers in Tallinn, 28 November 2018, 13:00-17:00.

Action Item 1: Markus Meier (MM), Marcus Reckermann (MR) together with the Workshop Committee of the BE Workshop on Multiple Drivers, to define topics, prepare a draft programme and identify and invite experts to the workshop.

Action Item 2: Sergey Zhuravlev, Valery Vuglinski with MR and MM to prepare a Baltic Earth Workshop on Hydrology in St. Petersburg, in late 2019.

Action Item 3: MM and MR to prepare a draft Info E-mail to be sent to potential BEAR authors, after the summer break

Action Item 4: MM and MR to prepare and fix date and location of the envisaged BEAR Author Workshop; this is attached to the BE Multiple Drivers Workshop in Tallinn, 28 November 2018, 13:00-17:00.

Action Item 5: MM and MR to investigate publication options for the BEARs

Introduction

The 11th Baltic Earth Science Steering Group Meeting is a short half-day meeting, attached to the 2nd Baltic Earth Conference. Local host is Martin Stendel of DMI. The meeting takes place at the "Konventum" which is the conference venue. The Baltic Earth Senior Advisory Board is also invited to this meeting. The main topic is the organisation of Baltic Earth Assessment Reports and, connected with this, BACC III and a HELCOM collaboration.

There was a brief introduction to the meeting by the local host, Martin Stendel, and the BESSG chairperson, Markus Meier. Urmas Lips of the Tallinn University of Technology, was present as guest. He also serves as co-chair of the HELCOM Working Group of State and Conservation. Jari Haapala was at this meeting substituted by Lauri Laakso of the Finnish Meteorological Institute.

TOP 1: Organizational Issues

1.1 Approval of the agenda

The agenda was approved.

1.2 Approval of the previous 10th Baltic Earth SSG meeting minutes

The previous meeting minutes were approved.

1.3 Review of previous 10th Baltic Earth SSG meeting action items

The following action items of the previous meeting were discussed:

Action Item 2: Markus Meier (MM), Marcus Reckermann (MR) together with the BE WG on Multiple Drivers, Urmas Lips and representatives of BONUS and HELCOM and all BESSG members to prepare a Workshop on "Multiple drivers of the regional Earth system"; in particular define topics and identify experts to invite to the workshop. *In preparation; the date (26-27 November 2018) and place (University of Tallinn) are fixed, and a workshop committee has been installed (www.baltic.earth/multipledrivers2018), also see section 2.2 of these minutes.*

Action Item 3: MR to investigate possibilities for Baltic Earth involvement in Future Earth, and together with MM, act towards this. *Pending*

Action Item 4: MM and MR to prepare a decision on the preparation of a BACC II successor under the umbrella of Baltic Earth. *Finalized, see section 3 of these minutes*

Action Item 5: Gregor Rehder and members of WG 2 to recruit people for this subject, and in the medium-term to organize a Workshop on "Biogeochemical land-sea interlinkages in the Baltic Sea region". *Pending*

Action Item 6: Corinna Schrum and members of WG on Regional Seas to prepare and coordinate possible future collaborations with research groups in the North Sea and other regional seas, under the umbrella of Baltic Earth. *Pending*

Action Item 7: MR to approach possible partners in the different countries to initialize and promote the translation and country-specific regionalization of a BACC II summary booklet; prepare the publication by selecting photos. *In work in several countries*

Action Item 8: MR to approach all BESSG members to prepare a list of available databases in the Baltic Sea region on the different disciplines; including which data (which parameter) are available at which resolution, for which period, at which institution under which conditions; with the respective weblinks and contact person. *In work, needs to be intensified by directly contacting databases*

Action Item 9: Sergey Zhuravlev, Valery Vuglinski with support of MR and MM to organize an International Baltic Earth Workshop on hydrological modelling in the Baltic Sea basin, in connection with the celebrations for the 100th Birthday of the State Hydrological Institute, St. Petersburg, Russia. *In work, will be a topic at the next BESSG meeting.*

1.4 Membership issues:

BESSG memberships

Benjamin Smith retires from his BESSG membership as he will take on the appointment as Director of Research for the Hawkesbury Institute of the Environment in Sydney, Australia. This is acknowledged with much regret, as Ben had been an important contributor to both BACC books, and the Baltic Earth Science Plan 2017. Ben´s profound expertise and his calm and convincing way of communicating will leave a gap, which will not be easy to fill. The BESSG and BESAB wish him all the best for his future endeavours.

Urmas Lips was suggested by Markus Meier as new member of the BESSG. Urmas is professor and head of Department of Marine Systems at Tallinn University of Technology. He is internationally involved in HELCOM, BOOS and EuroGOOS. One of his research interest involves the interplay between meteorological and hydrophysical processes on the one hand, and biological and biogeochemical processes on the other hand.

BEWG memberships

Tarmo Soomere (Tallinn University of Technology, Estonia) and **Christian Dieterich** (Swedish Meteorological and Hydrological Institute) join the WG on Sea level and coastal erosion.

TOP 2: Upcoming Baltic Earth and related Events

2.1 4th Baltic Earth Summer School, Askö, Sweden, 20 - 27 August 2018

For the fourth time, this summer school will take place on Askö in the Swedish archipelago. The School is open to undergraduate (preferable) and graduate students in marine sciences and associated fields and will focus on past and future changes in climate of the Baltic Sea region. See http://www.baltic.earth/summerschool2018

2.2 Baltic Earth Workshop on Multiple Drivers, 26-27 November 2018

A workshop around Baltic Earth Grand Challenge 6 will take place in Tallinn, Estonia, 26-27 November, with Urmas Lips as local host. The workshop will bring together experts in the different drivers to discuss achievements and prospects in research on the inter-dependencies between the different natural and man-made drivers, with the aim to assess the state of knowledge and develop strategies to alleviate detrimental effects on the environment. The workshop will be organized in collaboration with BONUS, HELCOM and ICES. A goal of this workshop is to elaborate particular topics for further research and find a writing team for a White Paper or similar, on the topic of “Multiple Drivers” and their interactions in the face of climate change. This “white paper” is intended to be the BEAR of Grand Challenge 6 “Multiple Drivers”.

A workshop committee has been installed, with representatives of HELCOM (Jannica Hadlin), BONUS (Andris Andrusaitis) and ICES (Anne Christine Brusendorff). A dedicated website is online (https://www.baltic.earth/multipledrivers2018/) and further actions will involve a web or telephone meeting of the workshop committee, after the summer break.

The workshop was discussed vividly. It was noted that this is a challenging endeavor with many open questions. Decision makers and environmental managers will be interested stakeholders, and it will be important to communicate the state of knowledge and intentions of the workshop in a good way. Questions from these stakeholders will be welcome. Also it was mooted that the issue of multiple drivers acting on the environment resamples to a certain extent the problem of identifying a particular disease from a clinical picture in medicine; i.e. identifying the multiple drivers leading to a particular disease. Hence, it may be worthwhile also to approach clinical experts regarding this question. Also it was mentioned that the concept of detection and attribution is a core question in this scope, and associated experts (e.g. Hans von Storch) should also be involved.

Action Item 1: Markus Meier (MM), Marcus Reckermann (MR) together with the Workshop Committee of the BE Workshop on Multiple Drivers, to define topics, prepare a draft programme and identify and invite experts to the workshop.

2.3 Baltic Earth Workshop on Hydrology, St. Petersburg, Russia (tbd)

It is intended to have a Baltic Earth Workshop on Hydology associated with the 100yr birthday celebrations at the State Hydrological Institute in St. Petersburg. More details will be discussed with Sergey Zhuravlov and Valery Vuglinski; if possible at the next BESSG meeting, envisaged to be in Tallinn at the end of November 2018.

Action Item 2: Sergey Zhuravlev, Valery Vuglinski with MR and MM to prepare a Baltic Earth Workshop on Hydrology in St. Petersburg, in late 2019.

TOP 3: Future Baltic Earth assessment activities

3.1 Baltic Earth Assessment Reports (BEARs)

Markus Meier presented the idea of Baltic Earth Assessment Reports (BEARs). It takes up previous discussions in the PostBALTEX and Baltic Earth SSGs. It is suggested to produce comprehensive assessment reports for the Grand Challenge topics, to be published as a series of peer reviewed papers in the frame of a special issue. The authorship and responsibility would lie with the GC working groups.

These peer-reviewed papers would serve as final reports for the Grand Challenges of the first phase of Baltic Earth. At the end of the process, there would be an appraisal of the Grand Challenges, followed by suggestions for an update of the Grand Challenges (termination, extension, new topics).

It is suggested to produce assessment reports for the Baltic Earth Grand Challenges, plus additional selected topics:

a. Salinity dynamics of the Baltic Sea (BE-GC1)
b. Land-sea interlinkages in the Baltic Sea region (BE-GC2)
c. Natural hazards and extreme events in the Baltic Sea region (BE-GC3)
d. Sea level dynamics and coastal erosion in the Baltic Sea region (BE-GC4)
e. Regional variability of water and energy exchanges in the Baltic Sea region (BE-GC5)
f. Multiple drivers for Earth system changes in the Baltic Sea region (BE-GC6)
g. Coupled regional Earth system Modelling in the Baltic Sea region (BE topic)
h. Climate change and impacts in the Baltic Sea region (BACC III)

i. New climate observation systems

A special case is the report on "Climate change and impacts in the Baltic Sea region", which represents what generally is expected to be BACC III. This however, would largely follow the format of the other BEARs, i.e. not a full book format, but a comprehensive assessment of new information on the subject since BACC II. HELCOM will be closely collaborating and will use the information for their own "Report Cards" which are a comprehensive, easy to summary of facts for stakeholders.

The presentation by MM on this topic is based on the document, which is attached in Annex 1.

The topic was discussed vividly and there was a general agreement that these reports would be a good "product" of Baltic Earth. Mostly, the discussion revolved around the HELCOM connection and in how far the envisaged BACC III report would have to be tuned to satisfy HELCOM requirements. For the preparation of their report cards, HELCOM envisages a group of experts, termed EN Clime (HELCOM Expert Network on Climate Change). A participation of Baltic Earth in this group was very much endorsed by the BESSG and BESAB. It was suggested that the BEAR lead authors could act as Baltic Earth representatives in this group. Still, it was recommended to leave the formulation of the dedicated report cards to HELCOM, and to make clear that Baltic Earth contributes in the form of the BACC II BEAR report, which assembles the new knowledge since BACC II, but that HELCOM is responsible to draw from that material and BACC II for their report cards. The Baltic Earth experts will be of course available for a scrutiny of the assembled report cards for scientific validity and soundness.

The time line for the BEAR reports will largely follow that of the BACC III BEAR, which means that the process is to start in late 2018 and end by the end of 2020. A detailed time line and writing instructions will be discussed and formulated after the summer break and fixed and communicated at the BEAR Autor meeting in Tallinn, 28 November 2018.

Decision 1: Baltic Earth Assessment Reports (BEARs) will be produced
Decision 2: A BACC II report will be one of the BEAR reports, with special attention to the specific needs of HELCOM in producing their Report Cards
Decision 3: A BEAR author workshop will be attached to the Baltic Earth Workshop on Multiple Drivers in Tallinn, on 28 November 2018, 13:00-17:00.

Action Item 3: MM and MR to prepare a draft Info E-mail to be sent to potential BEAR authors, before the summer break
Action Item 4: MM and MR to prepare and fix date and location of the envisaged BEAR Author Workshop
Action Item 5: MM and MR to investigate publication options for the BEARs.

TOP 4: Miscellaneous

BESSG Meeting #12 will take place in combination with the Workshop on Multiple Drivers in Tallinn, 28 November 2018, 9:00-12:00.

Annex 1

Discussion paper on
Assessing the state of science behind the Baltic Earth Grand Challenges
By H. E. M. Meier, M. Reckermann
with input by Jannica Haldin (HELCOM)

Rationale

This short paper should stimulate the discussion and prepare a decision concerning further activities regarding possible successor projects to BACC II. It takes up previous discussions in the PostBALTEX and Baltic Earth SSGs. In fact, the general idea goes back to the PostBALTEX report 2012, which was compiled by the PostBALTEX group, co-chaired by Anna Rutgersson and Andreas Lehmann. The following are citations from that report (Report by the Working Group on POSTBALTEX concerning the Continuation of BALTEX after 2012)

"Grand Challenges (GCs) are … suggested as research focus areas for periods of about 3-4 years, with a continuous process within NB [New BALTEX, now Baltic Earth] to identify and develop new GCs."

*"Available and future **assessments of existing research** shall be used to identify research gaps and questions on a regular basis and to define GC for Baltic Sea regional Earth system research over the course of 3-4 years. Research challenges will be periodically identified and defined actively within NB by the SSG using assessment projects, and will be an important issue for NB conferences. Working groups will be formed for each GC in which research gaps will be analyzed and strategies for the research will be outlined. Furthermore, the working groups should actively monitor and assess the progress of the corresponding GC."*

Baltic Earth Assessment Reports ("BEAR")

Hence, we suggest to produce comprehensive assessment reports for the Grand Challenge topics, to be published as a series of peer reviewed papers in the frame of a special issue. The authorship and responsibility would lie with the GC working groups. Authorships could of course be expanded to other experts, but the logical initial step would be that the respective WGs are responsible for the assessment report, or review paper. These peer-reviewed papers would serve as final reports for the Grand Challenges of the first phase of Baltic Earth. At the end of the process, there would be an appraisal of the Grand Challenges, followed by suggestions for an update of the Grand Challenges (termination, extension, new topics).

We suggest to produce assessment reports for the following Grand Challenges, resp. Baltic Earth topics:

a. Salinity dynamics of the Baltic Sea (BE-GC1)
b. Land-sea interlinkages in the Baltic Sea region (BE-GC2)
c. Natural hazards and extreme events in the Baltic Sea region (BE-GC3)
d. Sea level dynamics and coastal erosion in the Baltic Sea region (BE-GC4)
e. Regional variability of water and energy exchanges in the Baltic Sea region (BE-GC5)
f. Multiple drivers for Earth system changes in the Baltic Sea region (BE-GC6)
g. Coupled regional Earth system Modelling in the Baltic Sea region (BE topic)
h. Climate change and impacts in the Baltic Sea region (BACC III)
i. New climate observation systems

(list to be discussed and subject to modification)

Organization and Structure

We suggest that each assessment report could be represented/written/coordinated by the respective Working groups and comprise of approximately 20 pages (as a very rough estimate), i.e. not more than a comprehensive review paper. One responsible lead author should be responsible for the overall consistency of the report. She/he can gather contributing authors, like in BACC. That means the group of lead authors for the whole collections of reports would reflect the number of individual reports.

A common structure is suggested for all reports, as far as feasible. Sub-headings should be pre-defined, such as “Background”, “Summary” und “Knowledge gaps”, “Past, present and future”, “Impacts”, “Stakeholder relevance”, etc. This shall be discussed.

The chapters should be written in an easy to read, good and critical scientific style. Following the BACC example, only “legitimate” literature is to be used (peer reviewed papers, books, institute reports, theses, i.e. research funded by public money). No potentially biased sources, e.g. reports by enterprises like energy or insurance providers or NGOs, should be used.

A scientific committee (consisting of the lead authors) should overlook and make sure the consistency and the absence of contradicting statements between the assessment reports.

Authors will be advised to follow the basic BACC principles: Describe the current state of knowledge, clearly state where the knowledge is weak or missing, or where contradicting information is in the literature. Personal views and own scientific opinions and beliefs should be taken back as much as possible in favor of an objective overview over the current published state of knowledge. Author workshops should be organized which bring the authors of the different GCs together to present and discuss the contents of the respective chapters, and to avoid too much overlap and contradicting statements.

The publication format is to be discussed.

Special case:

Baltic Earth Assessment of Climate Change (“BACC III”)

Rationale

The question of a successor to BACC and BACC II has been floating around since some time. BACC II was published in 2015, and we would expect it to still reflect the current state of research for most parts.

HELCOM which had been a major stakeholder in the previous BACC reports, has recently approached Baltic Earth on collaborating in an updated Baltic Sea Action Plan, to be updated by 2021, which shall include and synthesize the latest knowledge on the effects of climate change for the Baltic Sea region.

BACC and BACC II have shown that the BALTEX and Baltic Earth communities have a strong, maybe the best currently available expertise for climate change issues in the Baltic Sea region. For this reason, HELCOM has in the past collaborated with BALTEX/Baltic Earth in this respect. HELCOM has stated that they have been advised by their contracting partners to collaborate with Baltic Earth in the climate change issue, and we think that it is strongly advisable for Baltic Earth to share its expertise in this respect.

https://portal.helcom.fi/meetings/STATE%20-%20CONSERVATION%208-2018-500/MeetingDocuments/8J-1%20Review%20of%20the%20work%20of%20State%20and%20Conservation.pdf

HELCOM expectations

HELCOM needs sound scientific expertise to integrate climate change aspects in the updated Baltic Sea Action Plan, presumably to be published in 2021. The main output format that HELCOM envisages is that of so-called "report cards", taking reference in the MCCIP report cards (Marine Climate Change Impact Partnership), published since some years in the U.K. These report cards summarize the currently available knowledge on marine climate change impacts in U.K waters in a comprehensive form on a few pages (the 2013 report had 12 pages). They represent a summary of background assessment reports on specific topics, and thus contain similar information as the BACC "summary of summaries", or the IPCC "Summary for policymakers".

http://www.mccip.org.uk/impacts-report-cards/full-report-cards/2013/

http://www.mccip.org.uk/impacts-report-cards/full-report-cards/2013/english-version/

Taking these report cards as a general template, HELCOM wishes to summarize the climate change information in the Baltic Sea region, taking into account the basic scientific principles that the consensus view is documented, but also indicating where the scientists does not agree. This is in line with the BACC principles. Also, confidence levels, depending on the amount of evidence available and the level of scientific consensus, should be given, as far as possible. This had not been done in BACC before.

Upon request, Jannica Haldin (HELCOM) has specified the intended content and format and listed the topics that HELCOM would be interested that they are treated as part of BACC III (see table below):

> *"As mentioned in the document endorsed by HELCOM State and Conservation, the intention for HELCOM is to produce a **Baltic Sea Climate Change Report Card**, including a **confidence estimate**, synthesizing the latest climate change science to assist decision-makers in their understanding of what changes have already taken place, and what may occur in the future, thus providing a clear pathway from science to regulators and policymakers.*
>
> *To account for that scientific advisors to political processes evaluate and digest scientific information, it is crucial to have high-quality science with **complete background information** and **transparent presentation of e.g. modeling processes, protocols for scenario simulations and assessments** developed by **independent review groups** are needed. To support this and to provide the highest possible standards of transparency, the report cards would be accompanied by **associated reports providing more in depth information** on the process and background behind the work. **The fully-citable report cards and associated reports** would draw on the best of **regional and international science, utilizing already available results and information**.*
>
> *The report card information for each of the topics below (synthesized down to one or two sentences/topic) would be prepared and collated through the HELCOM Expert Network on Climate Change (EN CLIME), which could possibly be a joint network with Baltic Earth. The idea is to get a consensus approach for each of the topics on the main questions of what has happened and what we expect will happen.*
>
> *Furthermore, for the topics stated in the table below, the following information is requested:*
>
> *1. What is happening?*
> *2. Why is it happening?*
> *3. What are the direct consequences?*
> *4. What is expected to happen in the future?*

5. What can be done about it? Especially focusing on avoidance, alleviation, adjustment and adaptation.
6. What is already being done about it?
7. Where are the gaps?
8. How does it affect the policy landscape?
9. What does it mean with regards to e.g. MPA planning or MSP?

Some of these questions are clearly scientific in nature where as others stray into policy and management."

The potential role of Baltic Earth

The specifications by HELCOM on content largely reflect the scope of BACC and BACC II; with some additional aspects, which may be outside of Baltic Earth expertise. We suggest the following role of Baltic Earth in this process:

1. In the respective BEAR reports on the Baltic Earth Grand Challenges, the current climate change related information, among other, will be treated as far as possible. Any useful information could be extracted for the HELCOM purposes.
2. An update of BACC II climate change information, which is not treated in sufficient depth in the GC reports, could be complied by a group of experts in the different fields. Possibly, this group might be recruited from former BACC lead and contributing authors.
3. Where there is no new information available, BACC II can serve as background material for the HELCOM purposes.
4. The current up-to date climate change information elaborated in the cases above, can be compiled as a report belonging to the GC-collection of papers proposed above, providing the background from the climate change relevant information for the HELCOM climate change report cards and updated BSAP in fields in which Baltic Earth has the expertise. In general, this work could be characterized as an update to BACC II.

Tentative time frame

Following the tentative temporal requirements for HELCOM, a start of the projects in the end of 2018 and a termination in the beginning of 2021 is envisaged. As far as possible, any new IPCC 6 findings (to be published in 2020) should be included. In particular, authorships, responsibilities and report structures could be fixed by the end of 2018 (with an author workshop around that time). A first draft of the reports could be delivered by the end of 2019, which would then go to external reviews. Revised reports could be then available by the end of 2020.

Tentative list of topics HELCOM is interested to have treated in an updated BSAP

Ecosystem aspects	
Environment (abiotic)	***Biotic***
Temperature (air)	Plankton
Temperature (sea)	Benthos
Air-sea flux of heat and water	Fish
Atlantic Heat Conveyor (AHC)	Seabirds
Sea ice	Marine mammals
Salinity	Pelagic biotopes
Stratification	Benthic biotopes
Air-sea exchange of CO2	Coastal biotopes
Acidification	Non-indigenous species
Sea level	
Seabed	
Weather	
Storms and waves	
Erosion	
Large scale marine processes (spring bloom, spring/fall circulation, biological carbon pump etc)	
Oxygen	
Antropogenic Aspects	
Safety	***Economic and social***
Nutrient enrichment	Shipping
Harmful algal blooms (HABs)	Tourism
Pollution	Built structures
Flooding	Fisheries
Human health	Aquaculture
Pathogenes	
Virus like particles (VLPs)	
Ecosystem services	

Draft
Marcus Reckermann, 10 July 2018
Markus Meier, 26 July 2018

Final draft
Marcus Reckermann, 14 August 2018

Approved by BESSG
31 August 2018