



Baltic Marine Environment Protection Commission

Working Group on the State of the Environment and Nature
Conservation

STATE & CONSERVATION
13-2020

Online, 5-9 October 2020

Document title	Proceeding towards a Climate Change Fact Sheet
Code	4J-10
Category	INF
Agenda Item	4J – Progress of relevant HELCOM expert groups and projects
Submission date	28.9.2020
Submitted by	Secretariat
Reference	Outcome of EN CLIME 6-2020

Background

The HELCOM-Baltic Earth Expert Network on Climate Change (EN CLIME) is preparing a Climate Change Fact Sheet which will contain concise information on climate change effects on 40 parameters varying from parameters directly affected by climate change, e.g. sea temperature, to those indirectly affected by climate change, e.g. benthic habitats.

Key messages containing information among other things on what is already happening, what is expected to happen and policy relevance for each parameter have been drafted by the author teams and will be finalized for peer review by 6 October.

After two rounds of peer review, the key messages of each parameter will be submitted to State and Conservation for consideration and approval. The intersessional meeting of State and Conservation for approval of all key messages will be held online on 15 February 2021. After approval by State and Conservation, the key messages will be submitted for approval by HELCOM 42-2021, to be held on 17-18 March 2021.

The final report for the Climate Change Fact sheet will be prepared mainly during autumn 2020 and a meeting on the final report will be organized on 29 October among the lead authors/main contributors.

The outcome of the last meeting of EN CLIME, held online on 22-23 September (EN CLIME 6-2020) is attached to this document.

Action requested

The Meeting is invited to take note of the information.



Outcome of the sixth meeting of HELCOM – Baltic Earth Expert Network on Climate Change (EN CLIME 6-2020)

Introduction

0.1 The Sixth Meeting of the HELCOM/Baltic Earth Expert Network on Climate Change (EN CLIME 6-2020), was held as an online meeting on 22-23 September 2020.

0.2 The Meeting was attended by experts from both HELCOM and Baltic Earth, as well as participants representing JWG Bird, Klaipeda University and Pro Mare and Observers from European Aquaculture Producers, Baltic operational oceanographic system, and Stockholm University Baltic Sea Center. The List of participants is contained in **Annex 1**.

0.3 The Meeting was co-chaired by Mr. Markus Meier and Mr. Jonas Pålsson, Co-Chairs of the Expert Network. Ms. Petra Kääriä and Ms. Jana Wolf, HELCOM Secretariat, acted as secretaries of the Meeting.

0.4 The aim of the Meeting was to review all key messages for the Climate Change Fact Sheet parameters and endorse them to be submitted to peer review.

Agenda Item 0 Election of co-Chair

0.1 The Meeting elected Mr. Jonas Pålsson, Swedish Agency for Marine and Water Management, as Co-Chair of the expert network.

Agenda Item 1 Adoption of the Agenda

1.1 The Meeting adopted the Agenda as contained in document 1-2-Rev.1.

Agenda Item 2 Information by the Chairs, Secretariat and Contracting Parties

2.1 The Meeting took note of the following information on the peer review process as presented by Co-Chair Markus Meier: both co-Chairs will carry out the internal review of all the parameters and three people have responded positively about carrying out the external peer review. The main intention of the peer review process is to make sure that the content across the key messages of different parameters is consistent and homogeneous. There will be at least one round of peer review and the second one will be carried out if relevant, according to the agreed timetable (Annex 2).

2.2 The Meeting reviewed the status of the key messages for the Climate Change Fact Sheet and the author lists (document 2-1-Rev.4), as presented by the Secretariat, and took note of the information that the updated version of the Co-author list can be found at the top of each of the key messages and that the author lists in the document will be checked and revised accordingly by the Secretariat. The Meeting took note of the timetable and deadlines for the key messages (Annex 2) as presented by the Secretariat and noted the deadline of **6 October** for submission to peer review. The Meeting noted that topics without lead or a well-established draft, will be skipped by the end of the meeting, unless a good plan and a volunteer can be found to finalize the text by the 6 October deadline.

2.3 The Meeting considered the suggested modification on heading 2 for secondary parameters: “Where is **the potential response to climate change** seen first?” Is it already happening?” instead of the current

version: “Where is the change seen first? Is it already happening?”. The Meeting agreed on the following title: “**Where is the response to climate change seen?**”.

2.4 The Meeting highlighted that it should be stated in the key messages where the climate change effects can be seen most clearly.

2.5 The Meeting noted that HELCOM State and Conservation WG has invited EN CLIME to consider different names for primary and secondary parameters to avoid confusion with the MSFD primary and secondary criteria. The Meeting suggested the following new names for the parameters: direct and indirect, although it may be difficult to define and separate them clearly (as is already the issue with the terms primary and secondary). The Meeting invited the participants to provide suggestions for new parameter names to petra.kaaria@helcom.fi by 29 October.

Agenda Item 3 Finalization of key messages for the primary parameters

3.1 The Meeting welcomed presentations on key messages of the primary parameters by the team leads Mr. Christian Dieterich, Mr. Karol Kulinski, Mr. Jukka Käyhkö and Ms. Anna Rutgersson.

3.2 The Meeting agreed that Celsius will be used across all key messages as a unit of temperature and mLL¹ as unit for oxygen level.

3.3 The Meeting made following observations regarding the parameters under Team Sea Level and Wind Extremes, led by Mr. Christian Dieterich ([Presentation 1](#)):

Sea level and sea level extremes

- Confidence level regarding extremes unclear and needs to be checked with sediment transport parameter
- Discrepancy with two statements from BACC II: SLR in Baltic was slightly larger than global SLR than global SLR vs. 80% contribution -> dissensus in the literature should be shown clearly. Slightly larger SLR than global SLR was questioned -> this will be checked

Wind and wind extremes

- In the formulation ‘offshore wind and wave energy installations’ in the Policy relevance it was questioned whether wave energy is relevant in the Baltic. This needs to be backed by literature.
- The formulation ‘Knowledge of wind extremes in combination with ice events’ in the Policy relevance is too fuzzy and needs to be more precise (causal chain)
- The wind and wave fact sheets need to be harmonized for example + 1m/s wind leads to 5% more significant wave height

Waves and extreme events

- Confidence statements have been added on 22 September, since wind changes are mostly low confidence, low confidence was given also to waves due to the strong connection between these two
- Ice effect to be added both under wind and waves, melting ice increases wind speed corresponding to changes in wave height
- Success of decadal projections on waves was questioned, this will be checked
- Bothnian Bay has been mentioned in the text regarding wave energy facilities
- Bothnian Bay has been mentioned in the context of policy relevance regarding wave energy facilities

Sediment transportation

- Changes are foreseen after comparison between this parameter and secondary parameter ‘erosion, sedimentation and built structures’
- Coastal change rates are case study results not overall averages

- The sedimentation part of sediment transport system is missing (erosion and sedimentation go hand in hand) -> to be added as a knowledge gap

3.4 The Meeting made following observations regarding the parameters under Team Carbon and Nutrient Cycles, led by Mr. Karol Kulinski ([Presentation 2](#)):

Changes in carbonate chemistry (incl. air-sea exchange of CO₂) and acidification (*name was revised to accommodate acidification*)

- Merged with the secondary parameter acidification
- Cold nitrogen fixation was considered as an explanation for unexplained nitrogen source for production occurring after the spring bloom
- Important to explain matters in clear terms, e.g. alkalinity
- Highlight acidification more in the text (as relevance to stakeholders)

Riverine nutrient loads and atmospheric deposition

- Text requires further updating and shortening
- It was welcomed that Mr. Oleg Savchuk will take care of the finalization of the text

Pelagic habitats (secondary parameter)

- This parameter was skipped due to a missing lead

Oxygen concentration and hypoxia (secondary parameter)

- Sentence: “Projected warming and global mean sea level rise ...will intensify internal nutrient cycling” to be revised
- Sentence: “High (low) nutrient loads...” to be clarified
- Clarification regarding sentence: “Recently observed ... are higher than ever observed before”; total consumption in water column increased relatively more than in the sediment
- Information on hypoxia in the coastal zone is missing; has been deleted due to the word limit
- Solubility could be an important matter to mention in this context, for the future this is considered as important. The intention has been to include this in the first sentence, and it will be revised.
- Reference made to HELCOM Oxygen debt indicator

3.5 The Meeting made following observations regarding the parameters under Team Water Cycle, led by Mr. Jukka Käyhkö ([Presentation 3](#)):

Salinity and saltwater inflows

- Potential conflict between sentences regarding MBIs; second sentence “However, a potential tendency... will be skipped
- Include reference to Gröger et al.
- Add under knowledge gaps that not much is known about changes in salinity composition, large decadal variability
- Mixing in the ocean to be replaced with Baltic Sea; the conveyor belt system in the BS not well understood
- Regional or local changes? Modelling data shows that the north-south gradient has changed (North increasing, South: decreasing runoff). This will be included in the knowledge gaps.

Stratification and ocean circulation

- Matthias Gröger to be added to the list of contributors, possibly other relevant authors are also still lacking -> to be checked

- Not applicable to discuss extremes in this context
- Any references for studies indicating that summer stratification triggers cyanobacteria blooms? Stratification is a critical factor determining the intensity of a bloom in species level (e.g. Nodularia).
- Now there is strong focus on the Baltic Proper, however Kattegat should be considered as well, e.g. stratification very important in Kattegat
- No information on significant changes in halocline depth available
- Important to mention effects on the conveyor belt, e.g. in knowledge gaps
- Ocean circulation not addressed in the text

Precipitation and extreme events

- Terms such as ‘orography’ to be generalized
- High confidence regarding potential for extreme precipitation is considered to be correct

Run-off and extreme events

- Help on the formulations in the text by Markus Meier was welcomed
- Sentence “In the northern region, runoff is strongly linked with...” focus more on the physical process; will either be reformulated or skipped
- “60% decrease in the north and 40% increase in the south”; numbers seem distinctively large -> this will be reformulated without use of numbers
- First sentence under knowledge gaps to be clarified
- Interesting to see a different change in extremes vs. means, the different causes behind should be emphasized
- Importance to cross-check references was highlighted
- What is expected to happen to runoff extremes is missing, this will be scrutinized

3.6 The Meeting made following observations regarding the parameters under Energy Cycle, led by Ms. Anna Rutgerzon:

Temperature (air) and heatwaves

- The 3-8 K increase in the projections is the difference between the different RCPs, this will be clarified in the text, also addition on the by end of the century time scale
- Kelvin to be changed to Celsius

Temperature (sea) and heatwaves

- Description will be reformulated, and more links to other parameters will be provided (also secondary parameters)
- Information regarding knowledge gaps and policy relevance still to be added, contribution from Jonas Pålsson was welcomed
- information on deeper waters not included in the key messages, and will be added to knowledge gaps, importance of the link between deeper water temperature and benthic habitats mentioned, several timeseries on seafloor temperature do exist (publications will be sent to Christian Dieterich)

Large Scale Atmospheric Circulation

- Further work needed before finalization
- Division between mean and extremes not applicable in this context
- Policy relevance not applicable
- Add information about predictability to policy relevance
- Markus Meier agreed to find a replacement for the original author Claudia Frauen

Sea ice and extreme events

- Water temperature should be added as a linked parameter
- Separate between ice thickness and ice extent, confidence assessment for decreased ice extent to be added (under What is already happening)
- Comments will be provided by Markus Meier

Solar radiation and cloudiness

- Not much data available, the parameter is very uncertain, extremes not applicable in this context
- Text on Policy relevance needs to be expanded
- It was noted that the amount of solar radiation will not change significantly (irradiance vs. radiation), however this would be hard to add within the 100-word limit

3.7 The Meeting agreed that those key messages that still need further work will be amended by the Lead authors by **Monday 28 September** and will be sent to the Secretariat (petra.kaaria@helcom.fi) for final editorial comments **by 30 September** and will be finalized by **6 October** and submitted to peer review.

3.8 The Meeting welcomed that Co-Chair Mr. Jonas Pålsson has agreed to take on the task of harmonizing the content between parameters for the policy relevance part. All key messages will be reviewed by Mr. Pålsson by **28 September** after which he will provide the amended text to all lead authors for commenting until **2 October** and finalize the texts based on comments **by 6 October**.

Agenda Item 4 Finalization of key messages for the secondary parameters

4.1 The Meeting welcomed presentations on key messages of the secondary parameters by the team Leads or Co-authors Mr. Örjan Östman, Mr. Arturas Razinkovas-Baziukas, Ms. Anna Rutgersson, Mr. Kari Hyytiäinen, Ms. Meri Kallasvuo, Mr. Martyn Futter, Ms. Bärbel Müller-Karulis, Mr. Jukka Kähkö, Ms. Antonia Sandman, Mr. Jens Olsson, Mr. Volker Dierschke, Mr. Mart Jüssi, Mr. Ari Laine and Mr. Markku Viitasalo.

4.2 The Meeting agreed that “if” sentences are to be used more prominently for secondary parameters, e.g. if *this primary change* happens, it is expected that *this secondary change* will happen. The Meeting highlighted the need to clearly show which primary parameters the secondary parameter statements are based on.

4.3 The Meeting highlighted the need to take into account the primary parameter confidence level when assessing confidence levels for secondary parameters and agreed to show the assessment for all statements separately, e.g. sea level will rise (high confidence) and result in this and that for a secondary parameter (medium confidence).

4.4 The Meeting recalled that uncertainty has been agreed to be treated as defined by IPCC in the EN CLIME Fact Sheet work ([Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties](#)).

4.5 The Meeting encouraged the authors to show different scenarios in the key messages (e.g. BAU vs. BSAP scenario).

4.6 The Meeting noted that for secondary parameters it is hard to define time scales which could be same for all parameters and further noted that it would be worthwhile checking against the time scale used for future scenarios across secondary parameters.

4.7 The Meeting considered the links between different parameters and recalled that for secondary parameters links to primary parameters affecting the specific parameter have been asked to be defined and that it was clarified by EN CLIME 5-2020 that links to relevant secondary parameters can also be provided.

4.8 The Meeting agreed that links to relevant secondary parameters will also be added in the primary parameter texts.

4.9 The Meeting further agreed to include arrows next to the linked parameters: arrow to the right meaning that the parameter in question has effects on the linked parameter and arrow to the left meaning that the linked parameter has effects on the parameter in question.

4.10 The Meeting made following observations regarding the parameters under Team Services:

Ecosystem function

- Suggestion to make aspects related to nutrients more prominent in the key messages; what will happen if nutrient inputs are not reduced (e.g. oxygen condition, depleted bottoms, production)
- Different scenarios should be described if possible, noting however that the available research papers on ecosystem functioning are few, e.g. BSAP scenario will lead to improvement in hypoxic areas vs. BAU: no change or even increase in hypoxic areas
- Finetuning needed due to overlap with other parameters, need to check for discrepancies

Ecosystem services

- It was agreed that focus of the key messages will be on how cc will affect the ES supply
- It was suggested that the cumulative impact of each relevant secondary parameter would be considered
- The division of ES was considered, e.g. provisional, cultural, regulating and support services; improving vs. degrading
- It was noted that this parameter is heavily dependent on several other secondary parameter key messages
- Parallel ongoing activity within the BEAR project of Baltic Earth focusing on multiple drivers

Shipping

- Additional support on writing the key messages by Co-Chair Jonas Pålsson was welcomed
- Cc effects on harbours/ports will be added to the text and other drivers and knowledge gaps will be filled
- There is a clear link between shipping and sedimentation in harbors
- Possibly decreasing amount of future air traffic might lead to increasing amount of transport by shipping
- The need for good quality references, especially under headings 2 and 3 was highlighted
- The use of “if” sentences was encouraged to show uncertainty regarding different aspects
- The impact of shipping and fuel use efficiency as a response to digitalization and improved logistics was mentioned as well as the change towards using biofuel instead of fossil fuels
- Suggestion to extend the policy relevance section for this parameter in the expense of words used under knowledge gaps/other drivers
- Suggestion to include scrubber water aspects in the policy relevance, although not clearly a matter related to cc impacts
- It was highlighted that the focus of the key messages should be on the cc impacts on shipping

Tourism

- It was noted that distinguishing between cc impacts and other drivers is seen as problematic
- Artisanal fisheries (e.g. ice fishing tourism) as well as increase in bacterial (vibrio) contamination affecting quality of bathing waters will be taken into account in the text
- Level of confidence (medium) under other drivers was questioned due to the complexity of the issue and was changed to low
- Suggestion to reformulate “increasing frequency of storms” to take into account the uncertainty regarding the increase and be in line with the primary parameter text. The sentence was suggested to be reformulated by using the word ‘plan’ (plans for rising sea levels and increasing storms)
- Suggestion to include specific phenomena regarding how tourism is adapting to cc
- It was noted that domestic and international tourism has not been considered separately in the text

- Publications on tourism in the BS will be shared between the lead authors of Ecosystem services and Tourism
- it was noted that Baltic Sea in this respect is considered as the marine area + the drainage basin
- Until the end of the century has been used as time period regarding the future scenarios in this parameter

Fisheries

- The list of authors as shown in the presentation is the correct one to be used
- Suggestion to use “if” sentences regarding eutrophication, e.g. if nutrient reductions according to the BSAP will take place, this will result in xxx, if not then xxx
- More eutrophic conditions can be expected due to wintertime rainfall and increased runoff, leading most likely to more eutrophic waters in the coastal waters of the northern Baltic Sea areas (example from winter 2019)
- Importance to show references to statements where possible was highlighted
- It was highlighted that species favored by warming waters and eutrophication are hard to differentiate

Aquaculture

- Effects of rising sea temperature on farming of native warm water species, such as perch or pikeperch, was suggested to be added
- Regional differences in the Baltic Sea regarding rising sea temperature effects on e.g. rainbow trout farming were acknowledged (e.g. in the Gulf of Bothnia, warmer water temperatures might even be beneficial to rainbow trout)
- It was noted that on Baltic Sea level, climate change induced acidification is a less important factor affecting marine life than on the global ocean scale
- It was highlighted that according to recent research salinity changes in the Baltic Sea are very uncertain

Blue Carbon storage capacity

- A knowledge gap about carbon sequestration and its efficiency in the Baltic Sea area exists and the knowledge on the BS level is based on a few studies on the global scale. There is a need to state this clearly in the key messages.

4.11 The Meeting made following observations regarding the parameters under Team Health & Safety:

Nutrient concentrations and eutrophication ([Presentation 4](#))

- It was noted that the focus of the key messages has been on nutrient concentrations (not eutrophication)
- Delineation between text reg. algal blooms in this parameter vs. harmful algal blooms parameter (draft not available) was considered
- Information on the spatial differences in eutrophication across the Baltic Sea will be included

Harmful algal blooms

- No draft was available for the meeting to consider

Flooding ([Presentation 5](#))

- Suggestion to combine runoff and extreme events (primary) and this secondary parameter
- Overlap or possibility for synergies between Sea level (primary) key messages we pointed out
- Increasing flooding for certain regions to be included in the text (DE studies exist)

- Important to also mention if information is not available or if there are no significant effects
- Rivers vs. coastal floods: both were considered as important (e.g. river floods in Sweden highly relevant), for river floods long time records and projections available

Erosion, sedimentation and built structures ([Presentation 6](#))

- Overlap between the primary parameter sediment transportation was noted and the need to oversee that same facts are not repeated in both parameters
- It was suggested to turn sediment transportation into a more general description about regional patterns driven by climate environment (wind current and waves) and that this parameter would focus more to human structure, i.e. built structures, wind farms, coastal protection (hard vs. soft) etc.
- The title was suggested to be revised to: ‘Coastal protection and offshore structures’
- Wenyan Zhang and Jukka Käyhkö will coordinate the differentiation between the two parameters
- Discrepancy between the confidence level regarding sea level rise between the primary parameter and this secondary parameter
- It might be relevant to refer to nutrient loads also under the flooding parameter
- Co-authors were welcomed to join the finalization of the key messages
- Land cover and land use changes was suggested as possible parameter for future iterations

4.12 The Meeting made following observations regarding the parameters under Team Biota & Ecosystems:

Microbial community and processes

- No draft was available for the Meeting to consider

Benthic habitats ([Presentation 7](#))

- Nutrient loads are strong drivers of change for ecosystem functions in the BS area
- Reference made to Eva Ehrnsten 2020: increased primary production etc. warming water creates pelagic processes like amplification of microbial loop and stratified layer leading to decreasing sedimentation
- Projects SMARTSEA (GoB) and Future Mare Horizon 2020 working on relevant aspects for the key message
- Anoxic layer expanding closer to the surface causing problems such as inflow of anoxic water into the Northern Baltic Sea areas (GoB)
- Impact of heat waves or warm water periods on benthic communities important knowledge gaps; mass mortality of blue mussels in coastal areas seen as one consequence of warming

Pelagic habitats

- No draft was available for the Meeting to consider

Fish (coastal and migratory & pelagic and demersal)

- Oxygen concentration could be highlighted more in the text (especially for demersal fish)
- Overlap with the oxygen condition key messages will be sorted out
- Halocline shifting deeper should result in less oxygenated areas: this will be corrected
- Increased fish production related to nutrient loads would need to be harmonised with nutrient key messages or reference given between these two
- There is uncertainty regarding cc effects on salmon and more river specific species
- Cod is likely to be negatively affected due to oxygen depletion
- Salmon migration started much earlier this spring, possibly due to less ice cover in Swedish rivers
- Suggestion to use more if sentences in the text, increase coordination with other parameters and include effects under different scenarios.

- Link to benthic habitats was highlighted: if salinity was to decrease, dramatic changes are foreseen to benthic habitats as many species are living at the edge of their distribution range (e.g. Fucus and Zostera) and would disappear from many coastal areas having effects on coastal fish
- Markus Meier will coordinate with Örjan Östman regarding rephrasing of a specific part of the text

Waterbirds ([Presentation 8](#))

- Most of the waterbirds spend only a part of the year in the BS area, thus cc affects them also in other parts of the world
- Hunting of birds only allowed in Finland and Denmark and is focused on a few species, thus doesn't have a primary importance on the populations

Marine mammals

- Climate change will likely affect the body condition of seals negatively causing them to become more susceptible to be caught in fishing gear and thus the amount of seals lost in fishing gear is expected to increase (hidden effect of climate change)
- Decreasing sea ice will likely affect hunting of seals due to hunters having easier access to seals
- It is expected that the number of successfully breeding females will decrease or years will be skipped for breeding

Non-indigenous species

- List of references will be updated
- Another important aspect to consider in the text could be hull fouling

MPAs

- As several parameters have an effect on the MPAs, the next step is to take into account the outcome of all relevant secondary parameters. This will be carried out by the Leads by the agreed deadline.

4.13 The Meeting agreed that those key messages that still need further work will be amended by the Lead authors by Monday **28 September** and will be sent to the Secretariat (petra.kaaria@helcom.fi) for final editorial comments **by 30 September** and will be finalized **by 6 October**.

4.14 The Meeting welcomed that Co-Chair Mr. Jonas Pålsson has agreed to take on the task of harmonizing the content between parameters for the policy relevance part. All key messages will be reviewed by Mr. Pålsson **by 28 September** after which he will provide the amended text to all lead authors for commenting **until 2 October** and finalize the texts based on comments **by 6 October**.

Agenda Item 5 [Layout and content for the final report](#)

5.1 The Meeting took note of the draft layout for the EN CLIME Climate Change Fact Sheet (document 5-2), as presented by the Secretariat.

5.2 The Meeting noted that all relevant parameters will be listed in the report, also those for which key messages were not produced at this time.

5.3 The Meeting was of the view that the overall layout looks good and concise and supported the way of illustrating the confidence levels. The general approach of including a Sankey diagram was supported, however the Meeting raised concern regarding whether the graph will become too confusing once all parameters are added, in which case alternatives or division of parameters could be considered.

5.4 The Meeting noted that the icons will be used also in other HELCOM work and welcomed comments on them to petra.kaaria@helcom.fi **by 29 October 2020**.

5.5 The Meeting agreed that names of active authors will be presented on the first page of the report and other contributors (e.g. names of internal reviewers) in the end of the report (i.e. as annex).

5.6 The Meeting emphasized that draft text on introduction will need to be drafted carefully to gain the attention of a reader and will be drafted and made available before the next meeting on 29 October.

5.7 The Meeting considered the suggested map view for the final report containing two maps illustrating different scenarios, as well as information submitted for the map view (document 5-1-Rev.1). The Meeting agreed that a maximum of 8 text boxes/parameters can be shown on the map to retain clarity. The Meeting suggested the map view to be interactive if possible.

5.8 The Meeting agreed to use the RCP 2.6 and RCP 8.5 as basis for the two different map views and provide a clear statement in the text regarding the uncertainty and how the different scenarios are interpreted, e.g. that RCP 8.5 might not be the same as business as usual. The Meeting further suggested to use terms: 'Best case' and 'Worst case' to depict the different scenarios.

5.9 The Meeting considered the selection of parameters on the map view and agreed to develop a series of criteria such as:

- A) direct societal relevance/experience
- B) hotspot subregion in the Baltic
- C) distinct projections RCP2.6 and RCP8.5
- D) medium to high confidence
- E) characterizing for the Baltic

for inclusion.

5.10 The Meeting further agreed to include a statement to the text regarding the selection of different parameters on the map view.

5.11 The Meeting agreed to finalize the selection of criteria on the map view within a specific drafting group, which will convene shortly and provide a suggestion to the meeting to be held on 29 October. The Meeting welcomed that Co-Chair Markus Meier will approach the team leaders and welcomed the information that Mr. Arturas Razinkovas-Baziukas will join the work.

5.12 The Meeting took note that summary has already been submitted on the parameter 'Sea level and sea level extremes' and agreed that summaries for the rest of the parameters will be submitted by **26 October**.

5.13 The Meeting welcomed general comments on the layout to petra.kaaria@helcom.fi by **29 October 2020**.

5.14 The Meeting agreed on the following timetable for the work regarding the final report:

Task	Deadline
First draft text for introduction Details on map view Agreement in icons Text for overview/summary for each parameter New names for the primary & secondary parameters Colours for the final report	29 October
First draft text for summary and conclusions	18 January (EN CLIME 7)

Agenda Item 6 Future work

6.1 The Meeting noted that the time span between the start and finalization of the work on drafting the key messages was considered too long. The Meeting welcomed further feedback on the process in order to improve the work on preparing the Climate Change Fact Sheet for future iterations via e-mail to petra.kaaria@helcom.fi or anonymously via the [this document](#).

6.2 The Meeting appreciated the support to the work from HELCOM Secretariat.

6.3 The Meeting recalled that the drafting group on the map view will convene shortly and that Co-Chair Markus Meier will contact the lead authors regarding the meeting.

6.4 The Meeting agreed to organize an intersessional meeting including the lead authors/main contributors of EN CLIME on **29 October** at **13-16 CET** to consider matters related to the layout and contents of the final report.

6.5 The Meeting agreed to organize the next meeting of EN CLIME (EN CLIME 7-2020) on **18 January 2021** as an online meeting.

6.6 The Meeting agreed on the following topics to be discussed at EN CLIME 7:

- Open issues on the draft final report;
- Possible open issues with the key messages.

Agenda Item 7 Any other business

7.1 The Meeting took note of the information that links to the EN CLIME Climate Change Fact Sheet will be provided throughout all the different sections of the updated Baltic Sea Action Plan.

7.2 The Meeting took note of the information that national level considerations regarding the key messages are welcomed during the review process by HELCOM State and Conservation (meeting on 15 February 2020) and noted that the EN CLIME meetings are open to HELCOM observers.

Agenda Item 8 Outcome of the Meeting

8.1 The draft outcome of EN CLIME 6-2020 was adopted by correspondence. The outcome is available at the [EN CLIME 6-2020 Meeting Site](#), together with the documents and presentations considered by the Meeting.

Annex 1 List of participants

Representing	Name	Organization	E-mail
Co-Chairs			
Co-Chair	Markus Meier	Baltic Earth	markus.meier@io-warnemuende.de
Co-Chair	Jonas Pålsson	Swedish Agency for Marine and Water Management	jonas.palsson@havochvatten.se
Baltic Earth			
Baltic Earth	Karol Kuliński; lead - Carbon & Nutrient Cycles	Baltic Earth	kroll@iopan.pl
Baltic Earth	Anna Rutgersson; lead - Energy cycle, Shipping	Baltic Earth	anna.rutgersson@met.uu.se
Baltic Earth	Christian Dieterich; lead - Sea Level and Wind Extremes	Baltic Earth	christian.dieterich@smhi.se
Baltic Earth	Jukka Käyhkö; lead - Water cycle, Flooding, Erosion and sedimentation	University of Turku	jukka.kayhko@utu.fi
Baltic Earth	Kari Hyytiäinen; co-author tourism	University of Helsinki	kari.hyytiainen@helsinki.fi
Baltic Earth	Jürgen Holfort	Federal Maritime and Hydrographic Agency	Juergen.Holfort@bsh.de
Baltic Earth	Jani Särkkä	Finnish Meteorological Institute	Jani.Sarkka@fmi.fi
Baltic Earth	Marcus Reckermann	International Baltic Earth Secretariat	marcus.reckermann@hzg.de
HELCOM Contracting Parties			
Estonia	Urmas Lips	Tallinn University of Technology	Urmass.lips@taltech.ee
Finland	Meri Kallasvuo; lead fisheries	Natural Resources Institute Finland (Luke)	meri.kallasvuo@luke.fi
Finland	Mika Rantanen	Finnish Meteorological Institute	mika.rantanen@fmi.fi
Finland	Ari O. Laine	Metsähallitus Parks & Wildlife Finland	ari.laine@metsa.fi
Finland	Markku Viitasalo	SYKE	markku.viitasalo@syke.fi
Germany	Jan H. Reißmann	Federal Maritime and Hydrographic Agency (BSH)	jan.reissmann@bsh.de
Germany	Miriam Sollich	Federal Agency for Nature Conservation	miriam.sollich@bfn.de
Germany	Wenyan Zhang	Institute of Coastal Research, Helmholtz-Zentrum Geesthacht	wenyan.zhang@hzg.de
Latvia	Anda Ikauniece	Latvian Institute of Aquatic Ecology	anda.ikauniece@lhei.lv
Lithuania	Arturas Razinkovas-Baziukas; lead ecosystem services	Klaipėda University, Marine Research Institute	arturas.razinkovas-baziukas@ku.lt

Sweden	Bärbel Muller-Karulis; lead Nutrient concentrations and eutrophication		barbel.muller.karulis@su.se
Sweden	Antonia Sandman; lead benthic habitats	AquaBiota Water Research	antonia.sandman@aquabiota.se
Sweden	Örjan Östman lead Ecosystem function; co- lead Fish	Swedish University of Agricultural Sciences	orjan.ostman@slu.se
Sweden	Jens Olsson; co-lead Fish	Swedish University of Agricultural Sciences	jens.olsson@slu.se
Sweden	Mats Blomqvist	Hafok AB	mb@hafok.se
Sweden	Rahmat Naddafi	Swedish University of Agricultural Sciences	Rahmat.Naddafi@slu.se
Sweden	Martyn Futter	Swedish University of Agricultural Sciences	martyn.futter@slu.se
Sweden	Pia Andersson	SMHI	Pia.Andersson@smhi.se
Other organizations			
Other org.	Volker Dierschke lead - waterbirds	JWGBIRD	volker.dierschke@web.de
Other org.	Antanas Kontautas	Marine research institute, Klaipeda University	antanas.kontautas@ku.lt
Other org.	Mart Jussi	Pro Mare (non-profit consultancy)	mart.jussi@gmail.com
Observers			
Observer	Torben Wallach	Federation of European Aquaculture Producers	tw@musholm.com
Observer	Jun She	BOOS	js@dmi.dk
Observer	Oleg Savchuk	Stockholm University Baltic Sea Center	oleg.savchuk@su.se
HELCOM Secretariat			
Secretariat	Petra Kääriä	HELCOM	petra.kaaria@helcom.fi
Secretariat	Jana Wolf	HELCOM	jana.wolf@helcom.fi

Annex 2 Timetable for finalization of EN CLIME Climate Change Fact Sheet

Task	Deadline/Time period
Key messages of primary parameters ready	1 August
All key messages ready	31 August*
EN CLIME 6-2020 to approve the key messages for submission to peer review	22-23 September
Submission of key messages to peer review (2 weeks to incorporate possible changes by EN CLIME 6-2020)	6 October
Peer review the draft key messages (1 st round)	3 November (4 weeks; 6.10.-3.11)
Revise the key messages in light of peer review comments	17 November (2 weeks; 3.11-17.11)
Peer review for the draft key messages (2 nd round)	15 December (4 weeks; 17.11.-15.12.)
Finalize the key messages after the second peer review round	22 January (5 weeks; 15.12.-22.1) 2021
Submission of key messages for HELCOM State and Conservation approval	22 January* 2021
Approval by suggested intersessional State and Conservation meeting	15 February 2021
Submission of key messages for HELCOM approval	23 February 2021* (1 week; 15.2-23.2)
Possible adoption by HELCOM 42-2021	17-18 March 2021

**3-week document submission deadline*