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<b>Document title</b>	Outcome of the second HELCOM BalticBOOST workshop on the HOLAS II hazardous substance assessment
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## Outcome of the second HELCOM BalticBOOST workshop on the HOLAS II hazardous substance assessment

### Background

The Project for Developing the Second Holistic Assessment of Ecosystem Health in the Baltic Sea (HOLAS II) started in 2014 and will continue until June 2018. The project will produce an update of the overall environmental status of the Baltic Sea and evaluate progress in relation to the goals of the Baltic Sea Action Plan (BSAP). The outcome of the project will be developed so that it can also be used in reporting under the EU Marine Strategy Framework Directive (MSFD). The assessment of environmental status will be indicator based and make use of assessment tools to integrate the results.

HELCOM BalticBOOST is an EU co-financed project that runs from September 2015 to December 2016. The BalticBOOST project includes the task to develop a tool for integrated assessment of chemical status to be used in the HOLAS II project in work package 2.1. The project is also tasked with developing the data-arrangements for HELCOM hazardous substance core indicators in the work package 2.2. The development of the tool is guided through two HELCOM workshops with participation of experts from HELCOM Contracting Parties.

### Workshop

BalticBOOST work package 2.1 develops the integrated assessment tool for hazardous substances. Guidance to the tool development is provided by the HELCOM State and Conservation Working group, the HOLAS II core team, the HELCOM expert network on hazardous substances, and through expertise from Contracting Parties through two HELCOM BalticBOOST workshops, this workshop being the second one. Based on previous guidance a set of test outputs and test cases have been carried out by BalticBOOST to support development of the tool for use in HOLAS II and the results of the test will be evaluated at the workshop ([Outcome of HELCOM BalticBOOST HZ WS 1-2016](#), [Outcome of STATE & CONSERVATION 6-2016](#), [Outcome of HOLAS II 5-2016](#), [Outcome of EN-HZ 2-2016](#)). The tests take into consideration the evolving European Commission Decision on GES criteria.

The workshop was held on 13-14 September 2016 at the premises of NIVA Denmark Water Research, Ørestads Boulevard 73, Copenhagen, Denmark.

The workshop evaluated the development of the Hazardous substances assessment tool and provided feedback on the assessment of hazardous substances to be carried out as part of the HELCOM HOLAS II project.

More specifically, the workshop:

- Evaluated the findings of the so called five test outputs as defined during BalticBOOST HZ WS 1-2016;
- Detailed the needed remaining steps to operationalize the hazardous substance assessment tool.
- Considered outputs from the tool and how to include information on uncertainty and confidence in the assessment.

The agenda of the Meeting is contained in **Annex 1**.

The Meeting was attended by representatives of Denmark, Estonia, Finland, Germany, Lithuania, Poland, Sweden and BalticBOOST project partners. The list of Workshop Participants is contained in **Annex 2**.

The workshop was chaired by BalticBOOST WP 2.1 Lead Partner Jesper Andersen, NIVA Denmark. Lena Avellan, HELCOM Secretariat, acted as secretary to the workshop.

Meeting documents and presentations are available at the [meeting site](#) in the HELCOM Meeting Portal.

## Workshop outline as part of HOLAS II

1. The Chair welcomed the workshop participants, and outlined the aim of the workshop as developing a proposal and recommendations on how to finalize the development of the integration tool as a part in the development of the hazardous substance assessment of the 2nd HELCOM holistic assessment that is carried out through the HOLAS II project.
2. The Secretariat presented how the project is related to ongoing assessment work in HELCOM, in particular how the project deliverables are linked to the time table of the HOLAS II project (Presentation 1) and the development of core indicators and assessment systems (Presentation 2).
3. The Secretariat presented the guidance, developed by the first BalticBOOST workshop, on the testing to support an agreement on the assessment methodology to be used for hazardous substances in HOLAS II (Document 1).
4. The workshop recalled that the issue of whether the environmental status integration should use thresholds related both to the protection goal of human health and secondary poisoning has been raised on several occasions but not yet concluded. Technically the implementation of a final agreement on this issue in the tool is straight forward.

## Presentation of the hazardous substance integration tool (CHASE)

5. The BalticBOOST WP 2.1 lead partner NIVA Denmark presented the integrated hazardous substance assessment tool (CHASE) that has been developed as an R-code (CHASE 3.0) (Presentation 3).
6. The CHASE R-code can be downloaded from [GitHub](#), and if a user would like to test the tool without using the R programme there is also an option of using the interphase in [ShinyApps](#) using either the provided text-file with test data or using an own text-file with data. BalticBOOST WP 2.1 lead partner NIVA Denmark (CJM@niva-danmark.dk) can be approached if there is a need for guidance on the use of the application.
7. The workshop noted that the CHASE tool cannot accept 'raw' data with several observed values for the same substance within an assessment unit. A single average value for each substance within an assessment unit is required and this step needs to be done in the pre-processing of the data that is fed into the tool.
8. The BalticBOOST WP 2.1 lead partner presented the current integration method of the bio-effect compartment (Presentation 4).
9. The workshop was of the opinion that for the bio-effects compartment the integration should not be calculated using the Chemical Score, i.e. the same equation as for the compartments for concentration of contaminants in biota, sediment and water, and that the test (described in Presentation 4) where the compartment will be calculated using the same equations as in the biodiversity assessment tool as a weighted average is needed to conclude on the best approach of calculate the compartment and report on the results. It was considered important that a signal from any of the bio-effect indicators is not masked by noise or non-responses from other indicators.
10. It was noted that Germany has a study reservation in place on the use of the bio-effect compartment and bio-effect indicators in HOLAS II.
11. The BalticBOOST WP 2.1 lead partner presented the confidence calculation method to be applied in CHASE (Presentation 5), noting that criteria to assign confidence were developed for HOLAS I, and that these could be used as guidance.
12. The workshop discussed how confidence is assessed in the national WFD assessments. The specific methods applied were not known to workshop participants, however it was generally believed that the

OOAO approach is applied and if several substances fail or if the concentration causing the fail is clearly exceeding the threshold value, together with adequate coverage of monitoring data in space and time, then the confidence of the assessment is considered to be high. If direct monitoring data is missing, i.e. the assessment is based on extrapolation from a neighbouring area, or if the coverage is inadequate in space and time, the confidence is considered low.

13. The confidence rating of CHASE takes the number of matrices for which there are data available into account, giving a higher confidence the more matrices that are included. However, the selection of the GES boundaries for the core indicators have taken into account which matrix is most relevant for each substance, and for some substances the three matrices are not equally relevant due to the chemical properties of the substance.

#### *Recommendations from the workshop*

14. The workshop recommended countries to test and familiarize themselves with how the CHASE tool works. This could either be done through the [ShinyApps](#), using either the provided test data set can be used or a national data set, or by downloading the R script from [GitHub](#).
15. The workshop recommended that the CHASE tool should be fed with indicator result values based on the upper 95<sup>th</sup> confidence limit instead of an average, as this would make the assessment more robust. If the 'OSPAR MIME R-script' is applied to the HELCOM core indicators as the indicator assessment protocol, it was noted that the upper 95<sup>th</sup> confidence limit value is considered to provide the representative value of a station, and that both the upper 95<sup>th</sup> confidence limit values and average values are calculated through the script and are thus available to be fed into the tool. The [assessment method](#) and [test results for the HELCOM area](#) are available online.
16. The workshop recommends that BalticBOOST WP 2.1 lead partner completes a test for the bio-effect compartment using the weighted average approach.
17. The workshop recommends that the BalticBOOST WP 2.1 lead partner update the confidence criteria from 2010, and that the confidence score for thresholds should be the same for all commonly agreed GES boundaries. The workshop further recommends that it should be tested how the confidence will be affected by the lack of one component or element.

## Evaluation of results from the BalticBOOST WP 2.1 test outputs and case studies

18. The Secretariat presented the results of the 'test output 1' based on the collated information received through the data call for national WFD second cycle chemical status assessments related to priority substances, and ecological status assessments related to River Basin Specific Pollutants (RBSP) (Document 2).
19. The workshop noted that there is a significant variation among countries in the number of substances included in the assessment and the matrix in which the substance has been sampled. Furthermore the assessment method varied between countries. Due to the incoherence among the national assessments it is thus not possible to directly compile a regionally coherent assessment for the Baltic Sea coastal waterbodies based on the WFD second cycle chemical status assessment results.
20. The workshop considered it important for HELCOM purposes to develop regionally coherent assessments that allow for comparison of status across different areas. This need is considered to be different from that of the national needs relating to the WFD assessments, where the assessment need is to drive local implementation of measures if a substance is found to exceed its threshold.
21. The workshop discussed different ways of presenting results, and considered that one option for HOLAS II to include the WFD second cycle chemical status assessment would be to include the information in

table format as a summary of substances failing to reach good chemical status per sub-basin and describe in how many of the waterbodies per sub-basin they fail.

22. BalticBOOST WP 2.1 lead partner presented test cases where CHASE was applied (Document 3, Presentation 6). The test case was for the coastal area made in the Estonian Gulf of Finland using the assessment details, and three open sea areas Kiel Bay, Arkona Bay, Eastern Gotland basin.
23. The workshop recognized that if a waterbody is assessed both using the national WFD assessment method and the CHASE tool, then this may potentially result in two different status assessments of the same waterbody. This may have implications in legal implementation processes that should be considered further.
24. The test case of Estonian Gulf of Finland showed that when the same indicators were used in coastal waterbodies, the application of the one-out-all-out (OOAO) approach or the CHASE approach resulted in the same overall assessment outcome. The CHASE approach had the advantage that it allowed for a quantitative instead of only a binary comparison between areas. When different sets of indicators ('all available', 'core indicators only', 'core indicators plus three additional substances') were included in the CHASE assessment of an area, then the overall assessment result differed.
25. It was noted that in the Estonian test case the substances that fail are also core indicators, and when all available WFD indicators are assessed using the CHASE approach a lower score is indicated than when only the core indicators are included in the assessment. A test case where substances that are not core indicators also fail to achieve their threshold would be helpful to further consider the effect on the assessment outcome when different sets of indicators are included in a CHASE assessment.
26. Radionuclides were included and excluded in the three offshore test areas, and for most cases this did not have any significant effect on the result, only in one instance did the assessment of the water compartment change significantly when radionuclides were excluded.
27. The workshop discussed what substances could be included in the CHASE assessment of 'all available indicators'. It was noted that (in addition to the core indicators, priority substances, agreed three additional substances (HCB, DDE, Cu)) it is not expected that many more substances would be available, especially in the offshore assessment units. However, it may be the case that data is available from matrices other than those agreed to be used in HELCOM for example in a core indicator in some areas. However it is not clear which threshold values to use for the matrices that are not defined to be used for the substances through the GES-boundary for HELCOM core indicators.
28. The workshop discussed the comparability of the assessments results between assessment units if different sets of indicators are used. It was concluded that the comparability will be impaired if different sets of indicators are used, and that this is applicable both to a CHASE and an OOAO assessment method.
29. The workshop discussed how to develop a minimum-requirement list to indicate when a CHASE assessment can be done for an assessment unit ('assessment unit' as specified in the HELCOM Monitoring and Assessment Strategy 2013). A starting point for the list is proposed to be the list of substances to be monitored as a minimum requirement under the COMBINE programme. The workshop was of the opinion that it is important that the list includes substances that regularly fail to reach their threshold value. The list could be a subset of the core indicators. Identifying the number of substances to be included on the minimum requirement list can be done using the results of HOLAS I. A list is to be proposed by BalticBOOST WP 2.1 lead partner.
30. The workshop noted that if a CHASE assessment is done using only core indicators and their GES boundaries, then the water-compartment is likely to be empty in many assessment units. The BalticBOOST WP 2.1 lead partner informed that it is not clear what effect an empty compartment would have on the assessment, however it is anticipated that a lower confidence would be assigned. It was noted that it might be possible to rank the matrices according to relevance for each substance, so that the confidence would not be lowered if a 'non-relevant matrix' is missing.

31. The workshop recalled that in HOLAS I the worst status was noted in the deep basin sediments, and that concentrations of several different metals were the driving cause for the status.
32. The availability of data is a critical question for the confidence of the CHASE assessment. In open sea areas often only a single station is available. The robustness of the assessment result might not be sufficient if the station is only monitored once in the assessment period, however these stations are often sampled more regularly in the monitoring programmes and in such cases the robustness would be less of a problem.
33. The workshop noted that Poland has submitted data on hazardous substances for coastal and offshore waters for the years 2011-2015 to the COMBINE database and WFD data from 2011-2014, and that WFD data for 2015 will be submitted to ICES by October 2016. Furthermore Poland will submit the WFD second cycle assessment details to the HELCOM Secretariat by 23 September. Finland is working to submit back-logged data on hazardous substances to COMBINE in the framework of the regular reporting by 1 September 2016.
34. The workshop noted that BalticBOOST WP 2.1 will develop a proposal on the hazardous substance assessment approach for HOLAS II to State and Conservation 5-2016 based on the recommendations from the workshop and an update of Document 3 with more test cases and that the State and Conservation Working Group will provide further intersessional guidance to the project based on workshop outcome.

#### *Recommendations from the workshop*

35. To improve the decision base the workshop furthermore recommended that additional coastal test cases should be made before the end of September by the BalticBOOST WP 2.1. Poland will submit the needed WFD assessment details by 23 September, based on which a test should be made. Lithuania will provide average concentration values in addition to the information already delivered to be used for the test. German tests will be made based on the delivered assessment details. Danish data sets will be used to develop a coastal example. Clear disclaimers are to be added to all the presented test tables stating that the results are tests and not to be considered as assessments.
36. The workshop recommends that if the WFD second cycle assessment results in the coastal area are used in HOLAS II they are not shown in the same map as CHASE assessments of the offshore area as the results are not comparable. It was furthermore proposed that if the WFD second cycle assessment results are used in HOLAS II, then the matrices used in the monitoring should be indicated as this differs between countries and affects the comparability of the results across national borders.
37. The workshop recommends completing the regional compilation of the WFD second cycle assessment results, by including the assessment results for the countries from which they are still missing.
38. The workshop recommends that HELCOM should make an assessment of the hazardous substance assessment for the whole HELCOM area that allows for comparison of status between the coastal- and the offshore area, i.e. using the same assessment method in the entire area, noting the draft of the revised EU commission decision on GES proposes that also the EU MSFD covers the both the coastal and the offshore areas.
39. The workshop therefore recommends that the CHASE tool is applied for both the coastal and the offshore assessment units. The workshop discussed the possibility to use 'all available data', (implying core indicators, priority substances, the three agreed additional substances (HCB, DDE, Cu) as well as other available monitoring data). The workshop supported in principle this approach, however recognizing that currently the agreement is to use data reported to COMBINE and extracted for the core indicators for the HOLAS II assessment and that inclusion of data from other sources needs to be agreed and technically solved. Furthermore an agreement will be needed for the additional threshold values to be used.
40. The workshop recommends that a minimum list of core indicators and relevant matrices per assessment unit should be established and that the CHASE assessment is only applied for those assessment units

where the minimum requirements are met. Such minimum requirements will be proposed by BalticBOOST project and included in the submission of proposed hazardous substance assessment approach for HOLAS II to State and Conservation 5-2016.

41. The workshop recommends that the list of substances included in a CHASE assessment are clearly indicated, since the result of the CHASE assessment will be affected by the substances included.
42. The workshop recommends that in cases where values below the Limit of Quantification are encountered in the assessment data, then half of the nominal value should be used. The approach is in accordance with 2009/90/EC. For substances, such as dioxins, where a sum is used the LOQ is so high that half the LOQ is above the EQS and in such cases 0 should be used in the assessment calculations.
43. The workshop recommends the BalticBOOST WP 2.1 lead partner to carry out a test of calculating the bio-effect compartment using the same classification scale as in the biodiversity tool. Based on the test outputs it should be considered how the bio-effect compartment and indicators should be included in the assessment.
44. The workshop recommends HELCOM to strive in the future for the use of same indicators and matrices between assessment units, to ensure comparability of results.

## Presentation of the progress on developing a hazardous substance assessment system through a HELCOM workspace

45. The BalticBOOST WP 2.2. lead partner ICES presented the development of a hazardous substance assessment system based on the COMBINE data that will allow for automation of some steps in the assessment process, and allow for a clear documentation of the data used in the assessment (Presentation 7).
46. The [Widget](#) that allows viewing data currently available in COMBINE when extracted using the core indicator extraction table has been updated based on the latest available extraction table.
47. The workshop noted that indicator data extraction table and the assessment protocols (MIME R-script) will be discussed at the upcoming online meeting of the Expert Network of Hazardous Substance on 23 September.

## Considerations on the visual outputs of the tool

48. The workshop discussed the importance of the visualization of the hazardous substances assessment results in HOLAS II. The workshop was of the opinion that it is important to provide information on which substances contribute the most to the CHASE integrated contamination score in the respective assessment units and that it could e.g. be appropriate to provide a ranking of the substances based on their contamination ratio for each assessment unit.
49. Furthermore the meeting noted that it would be relevant to show both the integrated- and the indicator specific status assessments in the final HOLAS II assessment and that it would be helpful if the chemical status sections of HOLAS II would follow the same visual identity as the other sections of the assessment report.

## Annex 1. Agenda of the workshop

Tentative schedule	Topic
<i>Tuesday 13 September</i>	
10:00 – 12:20	<p>Arrival and words of welcome</p> <p>Workshop outline and way forward of the HOLAS II hazardous substance assessment</p> <p>Background to the five test outputs and test cases of BalticBOOST WP 2.1</p> <p>Presentation of the R-based tool (CHASE 3.0)</p>
12:30 – 13:30	<i>Lunch break</i>
13:30 – 18:00	Evaluation of results from the BalticBOOST WP 2.1 test outputs and case studies
18:00	<i>End of day one</i>
<i>Wednesday 14 September</i>	
9:00 – 12:00	<p>Evaluation of results from the BalticBOOST WP 2.1 test outputs and case studies</p> <p>Presentation of the progress on developing a hazardous substance assessment system through a HELCOM workspace</p> <p>Considerations on the visual outputs of the tool</p>
12:00	<i>End of the workshop</i>



## Baltic Marine Environment Protection Commission

Outcome of the second HELCOM BalticBOOST workshop on the HOLAS II hazardous substance assessment

Copenhagen, Denmark, 13-14 September 2016



### Annex 2. List of participants

Representing		Organisation	E-mail
<b>Chair</b>			
BalticBOOST WP 2.1 Lead partner	Jesper Andersen	NIVA Denmark Water Research	jha@niva-danmark.dk
<b>Contracting Parties</b>			
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