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Background

This document presents a detailed work plan and an early progress report of THEME 1: Baltic Sea pressure and impact indices (BSPI/BSII) of the HELCOM-coordinated project TAPAS (“Assistance in the preparation of a regionally coordinated assessment for the Baltic Sea region (Art. 8 and Art. 17 MSFD) and establishing links to WISE-Marine”). The HELCOM TAPAS project is co-funded by European Union and its partners in the HELCOM Contracting Parties are Finnish Environment Institute (SYKE), ICES, NIVA Denmark, University of Tartu (Estonian Marine Institute, EMI) and SEI Tallinn. The Theme 1 partners are SYKE and NIVA DK.

HELCOM TAPAS will contribute to the project to develop the Second Holistic Assessment of Ecosystem Health in the Baltic Sea (HOLAS II, 2014-2018) aimed at giving an update of the overall environmental status of and pressures on the Baltic Sea, and evaluating progress in relation to the goals of the HELCOM Baltic Sea Action Plan. The assessment will be developed so that it can be used in the 2018 reporting under the EU Marine Strategy Framework Directive (MSFD) by those Contracting Parties of the Helsinki Convention that are also EU Member States.

Theme 1 has the objective of further developing the HELCOM Baltic Sea Pressure and Impact Indices (BSPI/BSII) that were initially presented in the initial holistic assessment in 2010 (HOLAS I), and also to align the index with the requirements of the MSFD. The development of the indices is to be guided by two HELCOM workshops with participation of experts from HELCOM Contracting Parties and by the HOLAS II core team. The first BalticBOOST workshop on the pressure and impact index was held 28-29 January 2016 in Helsinki and resulted in numerous recommendations to the project that will be considered in the development ([Outcome of the HELCOM TAPAS Workshop on the HOLAS II Pressure and Impact Index](#)). The further development of the indices will also be addressed at HOLAS II 5-2016 (26-28 April 2016).

Action requested

The Meeting is invited to take note of the project work plan and early progress of the Baltic Sea pressure and impact index.

Work plan and report on early progress of the HELCOM TAPAS Theme 1 (Pressure and impact indices)

Summary of the background and objectives

HELCOM TAPAS Theme 1 has the objective of further development of the HELCOM Baltic Sea Pressure and Impact Indices (BSPI/BSII) that were initially presented in the initial holistic assessment in 2010 (HOLAS I). The method description of BSPI and the BSII are given in HELCOM BSEP 122¹ and BSEP 125² as well as in Korpinen et al. (2012)³. The concepts were subsequently further developed for the eastern parts of the North Sea by the HARMONY project, which has developed a HARMONY Pressure & Impact Mapper software (Andersen & Stock 2013)⁴.

The impact index (BSII) is based on georeferenced data layers of anthropogenic pressures, human activities and ecosystem components, and on weight scores which estimate the potential impact of each assessed pressure on specific ecosystem components. The weight scores combine the pressure and ecosystem component layers and are as such a sensitivity score for each specific combination of ecosystem components and pressure. In the HELCOM initial holistic assessment published in 2010 (BSEP 122), the weight scores were produced by expert judgement by a limited number of experts. In HARMONY, the scores were based on more developed and detailed questionnaires directed to a larger group of experts. The pressure index (BSPI) assesses the anthropogenic pressures/human activities in the defined assessment units without including ecosystem components. It however still includes a weighting component in order to grade the effect of the pressures on the ecosystem in a generalized perspective.

The assessment of pressures and human activities in the second HELCOM holistic assessment will build on the further development of the existing BSPI and BSII. With respect to methodological development, the meeting HOLAS II 3-2015 identified the need to improve the impact weight scores, and in relation to this investigate the possibility of using information from peer-reviewed publications in combination with expert judgement. Expert judgement has been shown to help models when the available evidence is very limited, of mixed quality, or only indirectly relevant (O'Hagan 2012⁵). This will be done under this theme by developing and carrying out an online survey among experts and combining its results with published impact studies. In addition, the impact of different pressures will be more accurately represented when temporal aspects are taken into account in data selection (e.g. if impacts are valid only certain seasons) and weight scores (e.g. if impacts are occasional, periodic, or permanent). Also spatial extent is further considered by including stronger scientific basis for spatial impact gradients. In addition, ways of including uncertainty estimates or probability distributions (see O'Hagan 2012) into the obtained impact scores will be explored. The indices will also be able to visualize spatial distributions of human activities.

The newly developed improvements to the indices will be tested by the project and reported as a deliverable. The running of the indices will be done by the HARMONY pressure and impact mapper, a software tool which HELCOM as a partner of the HARMONY project is allowed to use for assessment purposes (Andersen & Stock 2013).

The data layers on pressures and human activities will be updated and improved by relevant HELCOM Working Groups and ongoing HELCOM activities outside this project. The ecosystem components data layers will be improved through Theme 2 (see below).

¹ <http://www.helcom.fi/Lists/Publications/BSEP122.pdf>

² <http://www.helcom.fi/Lists/Publications/BSEP125.pdf>

³ Samuli Korpinen, S., Meski, L., Andersen JH., Laamanen, M. 2010. Human pressures and their potential impact on the Baltic Sea ecosystem, *Ecological Indicators* 15(1):105-114.

⁴ Andersen, J.H. & Stock, A. (eds.), Mannerla, M., Heinänen, S. & M. Vinther, M. 2013. Human uses, pressures and impacts in the eastern North Sea. Aarhus University, DCE –Danish Centre for Environment and Energy. 136pp. Technical Report from DCE –Danish Centre for Environment and Energy No. 18. <http://www.dmu.dk/Pub/TR18.pdf>

⁵ O'Hagan, A. 2012. Probabilistic uncertainty specification: Overview, elaboration techniques and their application to a mechanistic model of carbon flux. *Environmental Modelling & Software* 36:35-48.

Two workshops will be organized as part of the project. The first workshop was held on 28-29 January 2016 (HELCOM TAPAS Pressure Index WS 1-2016). This workshop focused on identifying pressure and human activity data layers to be included in the analyses, ways forward to further develop the impact weight scoring, and how to incorporate spatial and temporal aspects for the relevant pressures. The second workshop is tentatively planned to be held in September 2016 and will discuss the results of test runs that will be carried out by the TAPAS projects.

Work plan of the HELCOM TAPAS Theme 1

Theme 1 work plan is built on the seven tasks given in the project application. The tasks, expected deliverables, main responsible partners and additional notes are given in the Table 1.

Table 1. HELCOM TAPAS Theme 1 work plan			
TAPAS Theme 1 tasks (from the application) <i>Additions from the 1st workshop (HELCOM TAPAS Pressure Index WS 1-2016)</i>	Deliverables	Main responsible + dead lines	Notes
Task 1) Workshop 1 with participation of national experts to: (1.1) Identify and agree on the data sets of pressures, human activities and ecosystem components to be used in the BSPI and BSII assessments based on initial consideration by HOLAS II core team and on the plans and progress of THEME 2 of the project; (1.2) Identify requirements to improve the BSPI and BSPII, including the impact weight scores and spatial and temporal aspects of pressures and impacts.	Workshop #1 outcome + documents.	SYKE The WS was held on 27-28 January 2016 in HELCOM Secretariat.	WS Outcome is available through the HELCOM Meeting Portal .
Task 2) Produce Baltic Sea impact weight scores for specific ecosystem components, including to (2.1) develop and carry out an online survey addressing experts in all Contracting Parties, <i>include questions about forms of spatial gradients from pressure sources</i> . (2.2) to include information from peer-reviewed publications, <i>use the LIACAT tool as necessary</i> , and (2.3) to test the inclusion of uncertainties/probabilities to the weight scores.	2.1 Online survey: Document and presentation to WS #1 (plan) and WS #2 (results). 2.2 Impacts from studies: Document to WS #2. 2.3 Uncertainties: document to WS #2	2.1: NIVA DK [early June] 2.2: SYKE [May] 2.3: SYKE [June]	Link to BOOST WP 3.1 (and 3.2). Joint documents/papers are possible. SYKE and IOW contribution from BOOST will be significant.
Task 3) Technical development of the BSPI and BSII indices to include consideration of temporal and spatial aspects of the pressures and impacts. <i>The spatial gradients will be tested based on literature survey and the online survey. Temporal aspects will be tested by taking seasonal effects into account and considering temporary impacts.</i>	Document and presentation to WS #2.	SYKE [May-August]	Depends partially on the replies to the online survey (the spatial gradient functions).
Task 4) Carry out a test application of the indices and evaluate the outcome based on the most recent available data sets in HELCOM. <i>Tests will be carried out by real data, preferably using the fresh HOLAS II data layers.</i>	Document and presentation to WS #2.	SYKE [June-September]	Starting with the HELCOM data and continuing with the national data (from the call).
Task 5) Workshop 2 with participation of national experts to: (5.1) Present the test results at a workshop with representation of experts from Contracting Parties and (5.2) Fine-tune the approach based on guidance from the workshop.	Workshop #2 outcome + documents.	SYKE [October]	
Task 6) A report on how the impact weight scores have been derived and a data base with the results of the surveys (expert survey and literature survey).	Document + presentation to WS #2. A section in the final report.	SYKE [Draft available in November]	Link to the BOOST WP3.1 + 3.2
Task 7) A protocol for application of the BSPI/ BSII together with the test results, including a step-wise guidance how to calculate the indices.	Document to HOD. Final report to HELCOM BSEP.	SYKE [Draft available in November]	