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Marmoni Biodiversity Assessment Tool

This web based application has been developed by MARMONI project team. All questions and comments are welcome to address: georg.martin@ut.ee

Background and idea behind the Tool

MSFD requires assessment of marine waters on the basis of 11 Descriptors of Good Environmental Status. Descriptors are subdivided into Criteria and Indicators defined in the COMMISSION DECISION document. To be able to perform indicator based assessment COMM DEC indicators are subdivided into operational indicators which are measurable utilizing actual monitoring data and information. There is no direct mechanism described in any Guidance documents for aggregation of the assessment results from one hierarchical level to another.

Different software based decision support systems exist supporting implementation of directives and other assessment needs. In the Baltic Sea applications as HEAT, BEAT, CHASE have been developed by HELCOM to help integrate indicator based information in assessment process (HELCOM 2006, 2009a, 2009b, 2010, 2014). These tools enable to aggregate information on different hierarchical levels using some predefined conditions and rules. E.g. first version of HEAT tool (Helcom Eutrophication Assessment Tool) was developed using assessment rules and principles of EU Water Framework Directive ("One out-all out" principle, classification result presented in five quality classes).

Indicator based assessment schemes have been applied also on the global scale for assessing properties and condition of different features of world ocean. One of the recent examples is Ocean Health Index published in Nature (Halpern et al. 2013) and supported by extensive web information (<http://www.oceanhealthindex.org/>).

Our aim was to develop simple, transparent and easy to use Tool aggregating indicator information according to requirements of MSFD. This tool is meant as decision support system enabling aggregation of information from many different indicators used to assess marine biodiversity. It is based solely on COMM DEC hierarchical system of Criteria and Indicators. Compared with other existing similar systems our Tool is developed to be able to use any kind of indicators together with such sources of information as expert judgment.

How it works?

There are actually two levels of calculation built in the Tool. First level is Indicator level. Tool enables to utilize different types of indicators and information and the calculation is performed according to the type of indicator used (for explanation see Indicators section). Result here is the indicator level assessment of reaching GES. If GES is reached for particular indicator the **score 100** is attributed to this indicator. If GES is not reached **score 0** is attributed to this indicator. Next level is aggregation of indicator assessment results. This is carried out by calculating mean of individual indicator scores within aggregation unit. Calculation is performed stepwise for each hierarchical level (COMM DEC indicator, COMM DEC criteria, Descriptor).

What does it show?

It is important to understand what is the final assessment score and how to interpret this. Final assessment score is 100 when all indicators used in the assessment have reached GES. Score is 0 when none of indicators have reached GES. On the pie chart You will see assessment score of the Descriptor (number in the centre of the pie chart) and graphical presentation of the scores on criteria level (full sector is equal score of 100). Under the pie chart You will see information on the number of the indicators used in this calculation by criteria. On the last screen "Detailed assessment results" you can find scores and uncertainty estimate for each hierarchical level (criteria, indicator).

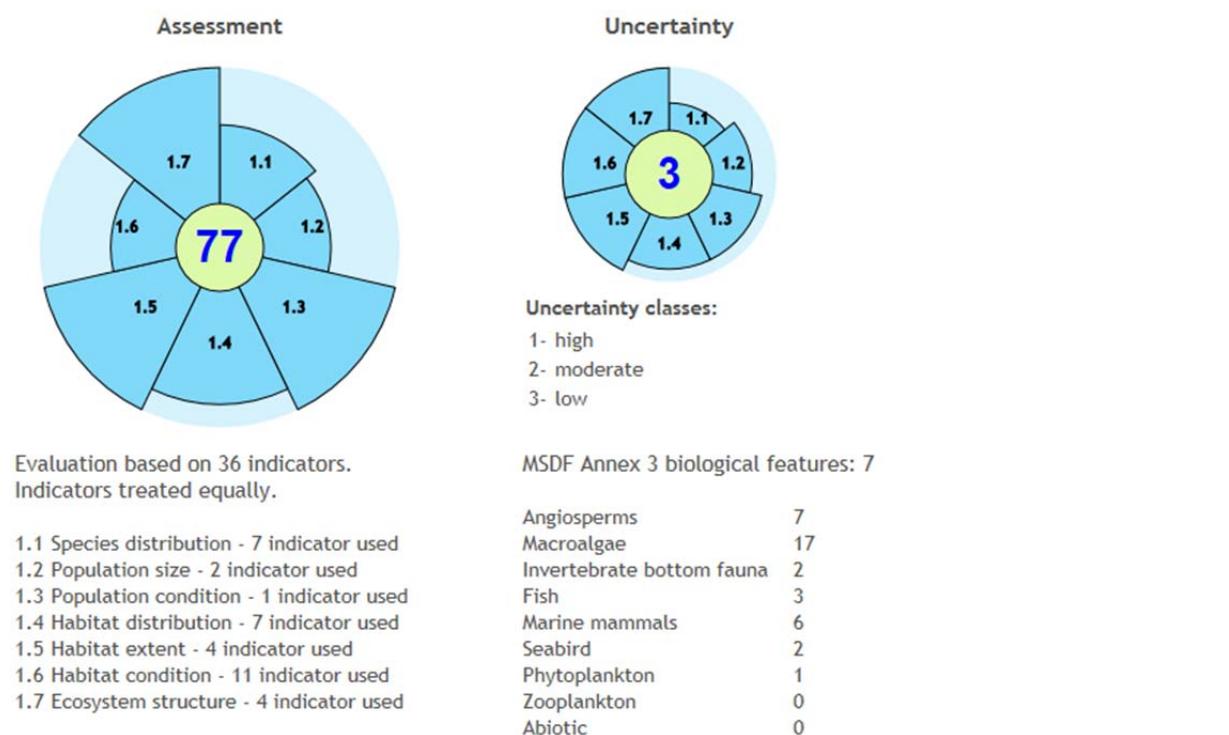


Figure – Example of assessment results.

Information You will get from the Tool:

- How far are You from achieving GES for all Your indicators/criteria within Descriptor 1?
- How many operational indicators you have in Your assessment for different COMM DEC criteria and Indicators?

- Which biological features are covered by Your Indicators for assessment unit?
- What is uncertainty level of Your assessment for each Criteria and COMM DEC Indicator?

How to use the Tool?

Step 1. Register. You have to register Your working group. You will get the password what You can later share with other members of Your working group. There is no limitation to the number of Working groups nor for the size of the group.

Step 2. Create Your project. You can create as many projects as You want. All these projects will be visible to Your working group members.

Step 3. Create Your assessment unit. This can be e.g. bay, sea area, national marine waters etc. You will be performing assessment for this geographical area.

Step 4. Insert Your Indicators. Every member of the working group can insert their indicator information independently. It is possible to work with one project/assessment unit independently and simultaneously by several working group members. All changes will be saved automatically.

Step 5. Move to assessment result screen with choosing either using the indicator weighting or treating all indicators equally.

Step 6. Move to detailed results screen. You can create pdf or printout of Your results here.

You can move back from any screen using Back button. Do not use back function of Your internet browser.

Indicators

Before entering the indicator values You have to specify indicator name, attribute this indicator to one of the COMM DEC indicators (selection from the drop list), and attribute indicator to one or several of the biological groups (Based on MSFD Annex 3 biological features).

Tool has an option to assess (calculate) the reaching or not reaching GES on indicator level based on indicator value and other indicator properties. Tool enables to use different types of indicators. Determination of GES can be done through using Reference Conditions with Acceptable Deviation (fixed value or percentage), trend, interval, fixed GES level or expert judgment. In each case You have to enter all needed properties (e.g. if You use indicator where GES is determined through Reference Condition and Acceptable deviation You have to enter these values in the form, if You use trend based indicator You have to enter the trend direction and relevant GES description, if You use GES definition in interval You are asked to insert the values of this interval etc.).

You have an option to use **weighting** of indicators. This means that if You wish, You can give Your indicators different weight in the calculation. This can be done by giving Your Indicator different weight scores (1,2 or 3). Actually it means that if You chose weight score 2 Your indicator will be duplicated in the calculation, if 3 Your indicator will be triplicated in the calculation.

Later in calculations you can choose to use the weighting or not.

Later in Your calculations you can deactivate/reactivate any of Your indicators. This might be useful if You wish to analyze the effect of one or several of Your indicators on the final score.

Uncertainty

Separate procedure is performed to estimate uncertainty of Your assessment. This is done through estimating of uncertainty of four different elements: spatial uncertainty, temporal uncertainty, uncertainty associated with measurement of Your indicator and uncertainty associated with defining GES level. Each of these uncertainty elements is evaluated to belong to one of three classes and later on each level of aggregation median is calculated and presented on each level in the same way as assessment score.

Literature.

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