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A good environmental status assessment procedure for benthic habitats: weighing and integrating alternative approaches

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Criteria and indicators related to the assessment of benthic habitats are included in descriptor 1, 4 and 6 of the Marine Strategy Framework Directive (MSFD). Therefore, an appropriate, integrative assessment procedure for this habitat type shall contribute to an integrated assessment of the marine status. An assessment procedure for determining the good environmental status (GES) of benthic habitats requires the attention of the following topics: (1) the selection and integration of complementary indicator tools to assess the structure and function of the benthic ecosystem (indicator approach), (2) a habitat assignment of the area (habitat approach), (3) reference or target conditions for the different benthic parameters (reference approach) (Figure 1). For all these aspects, different approaches exist, of which the reference and indicator selection approaches have been largely discussed in the literature. The aspect of the habitat approach is sometimes neglected, but is essential in determining the GES conditions per habitat type, due to the difference in structure and function per habitat type. An objective assessment of target conditions is a challenge in areas lacking pristine sites, and areas of which historic data are not available. The integration of the outcomes out of the diverse set of benthic indicators could be tackled by means of a confidence decision diagram. Therefore, the relation between different habitats, reference settings and indicator approaches on the GES assessment of benthic habitats was investigated in this study and illustrated with analyses based on a large benthic dataset of the Belgian Part of the North Sea (1977-2009).

The exploration of the benthic assessment procedure with a large dataset, characterised by a good spatial and temporal coverage of the data within the area, resulted in the following conclusions regarding the used approaches for habitat, reference and indicator settings:

Both habitat approaches (classical community analysis or habitat suitability maps) seem to be appropriate, because they lead to rather similar EcoQ output, especially within well distinguished habitat types. However, neither technique is ideal. Therefore, future fine-tuning to cross-reference both approaches has to lead to good habitat maps, which have the major advantage that they form a quick tool for classifying the habitat type of samples on a wider scale. A major advantage of using the classic community analysis is the fact that it is possible to discriminate the habitat characteristics *sensu strictu*.

In areas lacking 'pristine' conditions, appropriate reference values can be obtained by using a dataset of the area with a good spatial and temporal coverage of the data, thereby avoiding data originating from highly impacted areas. This study shows that these data do not necessarily have to be from a 'historic' period, because such historical data could suffer from difference in methodology and global change effects. From this reference data set, maximum reference values should not be used since they could represent outlier values within the dataset.

The benthic indicators used in this study performed in rather the same way. Some of them were less stringent or susceptible to different reference settings. The use of different indicators with different properties (parameters, algorithms) is valuable because it indicates the weaknesses and strengths of the different indicators in a local region and leads to a better insight in the reaction of the benthic habitat to changes over time.

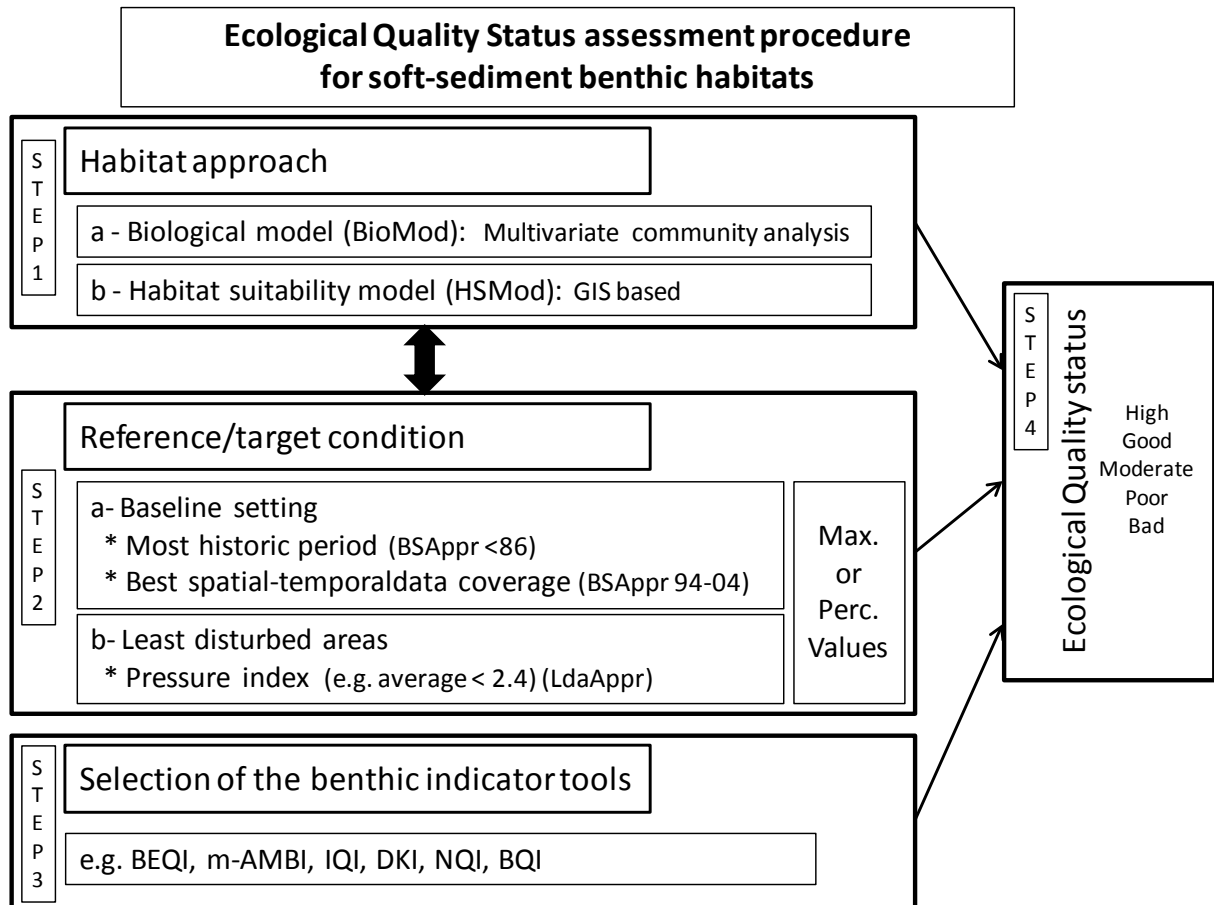


Figure 1. Flowchart of the ecological quality status assessment procedure for soft-sediment benthic habitats and their relationship.

Keywords: benthic habitats, indicators, targets, integrative assessment procedure

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