

THE MONITORING AND ASSESSMENT OF THE QUALITY ELEMENT BENTHOS AT THE BELGIAN COAST FOR THE WATER FRAMEWORK DIRECTIVE

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The Water Framework Directive (2000/60/EG) aims to achieve a good ecological and chemical quality status for all water types by 2015. The quality status of a water body can be determined based on the evaluation of biological, chemical and hydro-morphological quality elements. The evaluation of those quality elements is based on the integration of well defined biological quality criteria. Each of these criteria supports a classification (bad, poor, moderate, good and high) aiming at measuring the 'health' of the system compared to reference conditions. Article 8 of the WFD describes the need for monitoring programmes for the quality elements in their waters. These aspects were outlined for the quality element macro-invertebrates (benthos) in the Belgian coastal zone (<1 nautical mile) in this study. The entire Belgian coast covers only one water body, which is, however, divided into three zones for the assessment: (1) a western zone, from the French border to Middelkerke, including the Yzer estuary; (2) a central zone, from Middelkerke to De Haan, including the harbour of Oostende; and (3) an eastern zone, from De Haan towards the Schelde Estuary, including the harbours of Blankenberge and Zeebrugge. The evaluation tool for macro-invertebrates is the Benthic Ecosystem Quality Index (BEQI) (Van Hoey *et al.*, 2007; Ysebaert *et al.*, submit.), which aims at providing a signal that is capable of showing significant deviations from a defined reference state at three levels: 1: ecosystem; 2: habitat; 3: community. An important aspect within the BEQI is the use of the habitat approach, which presumed that there is a habitat typology within the water body. The habitat typology for the Belgian coast includes three types: (1) *Abra alba* habitat (muddy fine sand), (2) *Nephtys cirrosa* habitat (well sorted medium sand), (3) *Macoma balthica* habitat (mud) (Van Hoey *et al.*, 2004).

The monitoring strategy for the quality element benthos at our Belgian coast is randomly stratified, resulting in nine sampling locations within the 1 mile zone of the coast and covering the most important habitats in each zone. At those sampling locations, 15 Van Veen samples were randomly taken within an area of 0.6 km². This monitoring program started in autumn 2007 and continued in 2008, with a few adaptations to improve the coverage of each habitat in each zone with enough samples to fulfil the required assessment precision of the BEQI evaluation tool.

The reference conditions for the benthos at the Belgian coast were defined based on all available data (ILVO, UGent) and the period 1994–2004 was selected as reference period, because it shows the best temporal and spatial variability in benthos sampling points within the Belgian Coastal zone (< 6 nautical mile). This data could be linked to the three main habitat types, based on a detailed community analysis. Consequently,

enough samples were available for each habitat type to determine the reference boundary values needed in the BEQI evaluation tool.

Based on the monitoring data of 2007 and the defined reference conditions, an assessment of the quality element benthos for the Belgian coast was made. The BEQI score at level 1 is set on 0.6 (moderate/good), based on expert judgement, whereas BEQI level 2 is not included in the assessment of the Belgian Coast. The overall score at level 3 of the BEQI for the benthos at the Belgian coast, by averaging the scores per habitat (*Abra alba*: 0.61; *Macoma balthica*: 0.53; *Nephtys cirrosa*: 0.75) over the three zones, is 0.63, which means a good status. However, the ecological status of the benthos along the Belgian coast is not 'good' everywhere; the *Macoma balthica* habitat in zone 3 for example showed a moderate status. By combination of the different levels, the EQR score for the Belgian coast is 0.62, which means a good status for the Belgian coast for the quality element benthos, but some parameters show significant changes compared to the reference state.

References

- Ysebaert T., G. Van Hoey, P. Herman, F. Twisk, W. Bonne, J. van Buuren and W. van Loon. (subm.). Application of the Benthic Ecosystem Quality Index to the Dutch and Belgian coastal and transitional waters. *Marine Pollution Bulletin*.
- Van Hoey G., S. Degraer and M. Vincx. 2004. Macrobenthic community structure of soft-bottom sediments at the Belgian Continental Shelf. *Estuarine, Coastal and Shelf Science* 59:599-613.
- Van Hoey G., J. Drent, T. Ysebaert and P. Herman. 2007. The Benthic Ecosystem Quality index (BEQI), intercalibration and assessment of Dutch Coastal and Transitional Waters for the Water Framework Directive. NIOO rapport 2007-02.