

THE NIOO – APPROACH AS EVALUATION METHOD OF THE BENTHIC ECOLOGICAL QUALITY WITHIN THE WATER FRAMEWORK DIRECTIVE

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The EU Water Framework Directive (WFD) requires development of biological indicators and ecological classification for assessment of the ecological quality status of rivers, lakes, coastal and transitional waters. The NIOO – approach is developed to evaluate the ecological status of benthic invertebrates in coastal and transitional waters. This approach aims to be representative for the important structural and functional characteristics of coastal and estuarine ecosystems. The method uses a set of indicators that take into account the different scales of variability in coastal and transitional waters and evaluate the water body (ecosystem) as a whole and not by evaluating sampling station by sampling station. This approach evaluates the ecological status on three different levels (Escaravage *et al.*, 2004; Ysebaert and Herman, 2004). On the level of the whole ecosystem (e.g. a water body) one can evaluate if the benthic macrofauna fulfils the functional role one might expect given the current ecological circumstances. At this level also integration with other quality measures is most appropriate, and information on the water body can be summarised. On the subsequent level the distribution of habitats (habitat completeness, complexity and presence of certain eco-elements [e.g. mussel banks]) can be evaluated. Finally the biological quality of each distinguished habitat based on benthic macrofauna will be evaluated (within-habitat level), based on four indicators (biomass, density, species richness and species composition changes). These four indicators aim at providing a signal that is capable of showing significant changes/deviations from a certain defined reference state. The indicator results strongly depend on the sampling effort (sediment surface) that is deployed in a habitat and water body. Therefore, the reference values for the indicators were calculated per habitat from permutations executed over increased sampling surfaces. This allows estimating, for any given sampling surface, the reference value that can be expected. The expected reference values for each indicator, based on this randomisation, were determined for each ecological status boundary of the WFD. The ecological status for each indicator is finally determined by classifying the observed assessment value in the right ecological status class, based on their defined reference values. The NIOO – approach uses easily interpretable indicators that are evaluated separately. This allows a transparent assessment method and for any deviation of the overall ecological quality ratio from the reference condition the underlying responsible indicator can be easily traced back and evaluated individually. This tool is currently used by the Netherlands and Belgium to evaluate the ecological status of the benthos, following the requirements of the WFD.

References

Escaravage V., T. Ysebaert and P. Herman. 2004. Description of the maximal and good ecological potentials (MEP/GEP) for the benthic macrofauna for the European Water Framework Directive (WFD), the Westerschelde. NIOO-CEME Report 2004-04. 96p.

Ysebaert T. and P.M.J. Herman. 2004. The assessment of the ecological status of coastal and transitional waters based on benthic macroinvertebrates: classification and intercalibration within the Water Framework Directive. NIOO-CEME Report 2004-1.