

Benthic macroinvertebrate indicators for the sediment quality triad assessment of the Scheldt Estuary

**Kristine De Schamphelaere^{1,2}, Johnny Teuchies², Tom Ysebaert^{3,2}, Lieven Bervoets²,
Patrick Meire¹ - Ronny Blust²**

¹ ECOBE, Department of Biology, University of Antwerp, Universiteitsplein 1, 2610 Wilrijk, Belgium

Phone: +0032-(0)-32652758

² Department of Biology, University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium

E-mail:

Kristine.Deschamphelaere@uantwerpen.be

³IMARES, Wageningen UR? PO Box 77, 4400 AB Yerseke, the Netherlands

Introduction: Benthic macroinvertebrates are one of the biological quality elements in the assessment of the ecological status in framework of the European Water Framework Directive. Over the last decennium several benthic indices for the ecological quality assessment of coastal and estuarine systems have been proposed and evaluated for their soundness and robustness [1]. In framework of the development of a quality triad assessment method for brackish and saline sediments in Flanders, comprising of a chemical, ecotoxicological and biological component, indices based on the benthic macrofaunal community were reviewed for their suitability as biological component in the triad assessment. Specifically for the evaluation of sediments of the Scheldt estuary, two benthic indicators are tested for their suitability. (*Kristine De Schamphelaere, University of Antwerp*).

Methods: In a first phase a literature inventory of existing benthic indices for the biological sediment assessment of estuarine systems was carried out. Two indices were indicated as suitable for the biological assessment of Scheldt estuarine sediments; The M-AMBI [2] ('Multivariate AMBI') and the Buckland Arithmetic Occurrence Intactness Index [3]. To test the applicability of the two indices, an extensive sampling campaign was carried out in September-October 2017, along 4 different intertidal sites in the oligo- and mesohaline zones of the Scheldt estuary. The sites are characterized by differences in richness and density of the benthic macrofauna. In the ecotope "middle high intertidal" of each of the 4 sampling sites, 30 core samples were randomly taken for analysis of the benthic macrofauna. Extra sediment samples were taken for analysis of the sediment characteristics (nutrients, organic matter, bulk density and grain size) and for analysis of concentrations of chemical pollutants. The benthic organisms were determined to species level.

Results: Preliminary results show differences in species richness for the 4 intertidal areas: 9, 14, 3 and 14 taxa of benthic macrofauna were found in the 4

respective sites. Fig. 1 shows preliminary results of the biological assessment using the M-AMBI index for a first pilot study carried out at 8 sampling areas in the Scheldt estuary, among which 4 intertidal areas. The dataset of the extensive intertidal sediment sampling campaign was recently completed, and the full analysis of the results will be finalized by the end of December 2018.

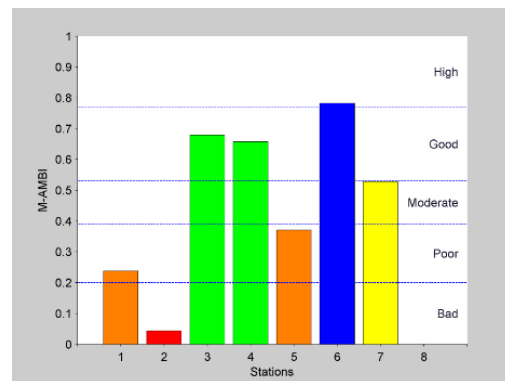


Fig. 1: Results of the M-AMBI index for 8 intertidal and subtidal locations along the Scheldt estuary.

Discussion: The dataset of the sampling campaign will provide the input for application and evaluation of the M-AMBI and Occurrence Intactness Index for the biological sediment assessment of the intertidal areas along the Scheldt estuary, and for a multivariate analysis to assess the contribution of the different sediment characteristics to differences in benthic macrofaunal density and richness.

References: [1] Pinto et al. (2009) *Ecological Indicators* 9:1-25 ; [2] Bald, J. et al. (2005) *Marine Pollution Bulletin* 50: 1508-1522; [3] Buckland, S.T. et al. (2005) *Philosophical Transactions of the Royal Society B* 360: 243-254.