

O28.1

Environmental impact assessment 2.0: genetic identification as a faster and cheaper method for marine environmental monitoring.

Laure Van den Bulcke^{1,2}, Annelies De Backer¹, Kris Hostens¹, Sara Maes¹, Jan Wittoeck¹, Sofie Derycke^{1,2}

¹Flamish Research Institute for Agriculture, Fisheries and Food, Belgium. ²Ghent University, Belgium

Abstract

Environmental impact assessments (EIAs) evaluate the quality status of the marine environment often by using biotic indices based on abundance and number of species, which are morphologically identified. This method is time-consuming, labor-intensive and demands specific taxonomic knowledge. Here, we evaluate DNA metabarcoding as a faster and more cost efficient method for impact monitoring of sand extraction in the North Sea. Samples were taken in nine reference stations without sand extraction activity, and in 15 impacted stations, with different levels of extraction intensity (low, medium and high). Samples were first identified morphologically, and afterwards blended to obtain bulk DNA for DNA metabarcoding. Although a high number of unique species were found for each method (17% and 58% for the genetic and morphological method, respectively), most of these were low abundant (less than 100 reads or 5 counts). Moreover, species number did not differ significantly between both methods: more species were observed in high and medium impacted samples compared to low and reference samples. Beta-diversity also showed a similar pattern: a high, medium and low-reference sample cluster could be discerned, regardless of the method used. The quality status was assessed using the BEQI (Benthos Ecosystem Quality Index), where the overall Ecological Quality Ratio (EQR) is calculated relative to the observed variation in the reference samples. Again, the same trend was discerned for both methods: higher EQR values for low and medium impacted locations compared to high impact locations. Furthermore, we calculated that genetic processing of the samples was 45% faster and 27% cheaper compared to morphological processing. This study indicates the potential of DNA metabarcoding for EIAs in the North Sea.

Keywords

Environmental Impact Assessment, COI Metabarcoding, Macrobenthos, North Sea