

Advantages and disadvantages of automation: a comparison of traditional, optical and acoustic techniques for zooplankton monitoring in shallow coastal and estuarine systems

Kris Hostens¹, Jonas Mortelmans², Klaas Deneudt², Lies Vansteenbrugge¹ and Erika Vandenberghe³

¹ Institute for Agricultural and Fisheries Research (ILVO), Animal Sciences Unit, Aquatic Environment and Quality, Bio-environmental Research Group, Ankerstraat 1, 8400 Oostende, Belgium

² Flanders Marine Institute (VLIZ), InnovOcean site, Wandelaarkaai 7, B-8400 Oostende, Belgium

Abundance and diversity of zooplankton are used to determine the ecological quality of marine water bodies. However, to adequately document zooplankton responses to environmental factors, an efficient and adequate monitoring is required, preferably at a high spatial-temporal resolution. As part of the EU LifeWatch marine observatory program, a standardized zooplankton sampling survey has been set up for the Belgian part of the North Sea since 2012. The main monitoring tools included are a Zooplankton Scanner (ZooScan) in combination with a Video Plankton Recorder (VPR). For the current study, we used the Zooscan to re-analyse a number of WP2 net samples that were previously analysed by means of a traditional binocular microscope. We discuss the main differences and the optimal pre-treatment of the samples, e.g. regarding problems with sediment, phytoplankton and subsampling. Differences in taxonomic accuracy, but also in cost and time allocation, are compared to what is needed for example to calculate good environmental status indicators. We show how better image training sets increase the accuracy of the Zooscan. Secondly, we will compare the results of the Zooscan with those of a VPR. The difficulties and technical challenges of using this video sampling technique in a highly dynamic and turbid environment are discussed in detail. Thirdly, we explored the use of an acoustic remote sensing technique in the adjacent Westerschelde estuary, which proved to be quite challenging when using in shallow, turbid coastal areas.

Keywords: Zooscan, Video Plankton Recorder, WP2 net, remote sensing, automation, taxonomic accuracy

Contact author: Kris Hostens, ILVO, kris.hostens@ilvo.vlaanderen.be