

Quantification and characterization of riverine plastic litter outflow into the North Sea within the international TREASURE project

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Plastic pollution is ubiquitous in the environment and has been shown to have negative effects on aquatic organisms. The effects have a wide range from the entanglement of marine mammals to microplastic ingestion-led effects in other biota which can have cascading effects throughout the food web, ultimately resulting in polluted food items for human consumption. Moreover, rivers are known to be an important source of plastic litter which can accumulate both in estuarine and coastal areas, before being transported to the open sea. These hotspot areas can be vulnerable to extra pressure due to plastic accumulation and may need additional attention from local authorities and key stakeholders in terms of mitigation measures targeting litter. Within the project *Targeting the REduction of plASTic oUtlow into the nORth sEa* (TREASURE), an international research partnership funded by the European program of the Interreg North Sea, we aim to quantify and characterize the riverine plastic litter outflow into the North Sea to advise on suitable measures to reduce it. Under the TREASURE framework, researchers from the University of the Littoral Opal Coast (ULCO) and the Flanders Marine Institute (VLIZ) are joining expertise to apply the most effective technics and methodologies for plastic litter assessment. In the estuary of the River Yser, located around the area of Nieuwpoort (Belgium), plastic litter is going to be sampled at five different sampling sites ('Spaarbekken', Yser upstream, estuary downstream, marina area, estuary mouth). To account for litter variation over space and time, samples are going to be taken at four different zones (shoreline, water surface, water column, bottom sediment) and three different seasons (spring, summer, autumn/winter). Sampling methodologies are going to consist of using manta net, an aquatic drone, ferry box and Van Veen grab. To be able to compare riverine and marine litter samples, sampling will additionally take place at sea in front of the Nieuwpoort coast at an existing monitoring site from the LifeWatch Belgium monitoring project. Subsequently, the samples will be analyzed using Fourier transform infrared (FTIR) spectroscopy and fluorescence microscopy to identify the quantity of plastic particles and their polymer composition. Another important part of the international research collaboration within TREASURE is going to be a common data management plan that facilitates the standardization of data format and data consolidation, to compile one harmonized dataset for improved interoperability. Finally, the common dataset is going to be published on the European Marine Observation and Data Network (EMODnet) and therefore made available not only for the research community, but also for governance, society and business. The open access data can thus be used as basic information for cross-sectoral and integrated action plans at local level in Nieuwpoort, but also at global level. Moreover, the results of the TREASURE project will be fed to a hydrological model to estimate accumulation areas which can then be targeted for cost-efficient actions for litter removal.

Keywords

Plastic Pollution; Microplastics; Hydrology; Methods; Research Collaboration; Data Management