

Plastic waste in the Belgian coastal waters: where and how much?

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In recent years, the numerous reports about the Great Pacific Garbage Patch have raised the concern about marine litter. Some types of marine debris, notably plastics, are known to degrade very slowly and as a consequence they remain in the marine environment for a long time. This waste affects the marine ecosystem in several ways, e.g. by entanglement of wildlife or ingestion of plastics by seabirds. Another issue is that, due to the impact of currents, waves and UV radiation, larger parts of plastic debris eventually break down to smaller parts known as microplastics.

In a unique research effort through the Belspo-sponsored AS-MADE project, we monitored marine litter in the Belgian coastal ecosystem in three environmental compartments: the beach, the sea surface and seafloor. Macro debris was monitored at four different types of beach (natural or touristic, prone to sedimentation or erosion) on a 100m stretch of the beach (according to an OSPAR protocol). Microplastics in the upper (top 6 to 9 cm) sand layer were collected with a shovel or sediment core. For the sea surface, floating macro debris was collected with a neuston net, by dragging it for 1km stretches from the RV Zeeleeuw at different locations. Microplastics were analysed in two samples of 10 l seawater collected at different sites in coastal waters. Finally, macro debris was collected on the seafloor using a beam trawl, while microplastics were extracted from sediment samples, collected with a Van Veen grab.

On the beaches, the quantity of macroplastics found ranged from 0.6kg.km^{-1} to more than 5kg.km^{-1} . In terms of number of objects found, industrial pellets were very abundant at some sites, i.e. up to 93% of all collected beach plastic. On the sea surface, approximately 5 to 8.5 plastic objects were found per sampled km (i.e. on average $3,333\text{ items.km}^{-2}$). The sea floor monitoring revealed the presence of roughly 1,700 to 6,500 items per km^2 . Expressed in mass units, this amounts to 1.1kg.km^{-2} on the sea surface and 0.75kg.km^{-2} on the sea floor.

Concerning microplastics, we observed approximately 23kg.km^{-2} in the sediment of beaches and the seafloor and 7kg.km^{-2} in the water column.

In conclusion, this first monitoring exercise of macro- and microplastics in Belgian coastal waters revealed that macroplastics are mainly found on the beach. In terms of total plastic mass in the water column and in the seafloor sediment, microplastics represent a much larger quantity of plastic than the macro debris. Hence, these microplastics should not be neglected in the environmental health assessment of the Belgian North Sea ecosystem.