Why sampling season and location matter for monitoring micro and mesoplastics on the beach

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Abstract

Despite the rapidly growing dataset on microplastic contamination in beach environments, the understanding of the influencing factors behind pollution patterns remains poor. Our study seeks to address this gap by examining microplastic pollution across 11 marine beaches in Latvia (northeastern Europe). The study area is in a climate that is dominated by four seasons and in the region influenced by the Gulf of Riga and the Baltic Sea. The beaches, analysed from autumn 2022 to summer 2023, were chosen based on prior research (Dimante-Deimantovica et al. 2023).

We collected samples in autumn, winter, spring and summer from three 100 m long distinct transects at each beach location, covering the water edge line (closest to the sea), in front of vegetation or bluffs (farthest from the sea) and the middle-line – midway between water line and vegetation line. This approach allowed to observe significant seasonal variations in microplastic abundance, with the winter and autumn periods showing higher levels of pollution compared to the spring and summer. Moreover, the plastic particles were not distributed evenly among all three transects and in some cases vegetation acted as a barrier leading to microplastic accumulation. Our study highlights the importance of physical processes like hydrodynamics and the need for all-season sampling to accurately assess pollution levels and establish national microplastic monitoring programmes.

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