

Microplastic accumulation on sandy beaches in Vietnam: influence of beach morphodynamics and management practices

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Microplastics are omnipresent, raising significant concerns in marine environments. This study investigates how different beach morphodynamics and local management practices (i.e., tourism and beach cleaning) can affect microplastic pollution in sandy beach sediments in Vietnam by comparing tidal zonation patterns across three beaches with varying slopes and management approaches. The results show high variation in microplastic concentration and polymer composition. The comparison between reflective and dissipative beaches suggests that beach morphology significantly influences the transport and accumulation of microplastics. In addition, the dominance of high-density microplastics, i.e. PET, on reflective beaches, combined with the prevalence of lighter microplastics in the high tidal zone, demonstrates the role of beach morphodynamics and coastal input in shaping microplastic distribution patterns. Furthermore, our findings suggest that local waste management practices and tourism can contribute to the uneven distribution of microplastics. For instance, the larger size of microplastics at the most visited beach suggests the role of local macrolitter that fragments down to microplastics as a pollution source. Our findings reveal a complex interplay between beach morphodynamics, local pollution sources, and microplastic distribution in sandy beaches. Addressing microplastic pollution on sandy beaches will therefore require targeted management strategies that consider both pollution sources versus coastal drift in relation to beach morphodynamics. The results of this study can be applied to support local practices in reducing microplastic pollution in shoreline ecosystems.

Keywords

Polymer, Sediment, Beach Management, Morphodynamics