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# Primary and secondary microplastics in rural and urban beaches in southern Brazil

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## Abstract

Primary and secondary microplastics (MPs) are found in virtually any marine and oceanic sedimentary environment, regardless of distance from urban areas. The objective of this study was to classify the degree of pollution of beaches using the Pellet Pollution Index (PPI). This methodology was adapted, and fragments were included. MPs were sampled in an urbanized (Capão da Canoa) and a rural (Cidreira-Cabras) beach, located in the northern coast of the state of Rio Grande do Sul. Sampling occurred during austral summer and winter 2018 in triplicates (50 x 50 cm squares) along the hightide strandline and the backshore, adding up 0.75 m<sup>2</sup> of superficial sediment sampled. During summer, more MPs were found in Cabras beach – strandline: 343 MPs [pellets  $np = 210$  (61.2%); fragments  $nf = 133$  (38.8%); PPI = 1.52 "moderate"]; backshore: 13 MPs [ $np = 4$  (30.8%);  $nf = 9$  (69.2%); PPI = 0.06 "very low"] – than in Capão da Canoa beach – strandline [ $nf = 26$  (100%); PPI = 0.12 "very low"]; backshore: 21 MPs [ $np = 6$  (28.57%);  $nf = 15$  (71.43%); PPI = 0.09 "very low"]. During winter, Cabras beach also presented the highest number of MPs - strandline: 194 MPs [ $np = 173$  (89.2%);  $nf = 21$  (10.8%); PPI = 0.9 "low"]; backshore: 93 MPs [ $np = 73$  (78.5%);  $nf = 20$  (21.5%); PPI = 0.41 "very low"]. Capão da Canoa - strandline: 29 MPs ( $np = 0$  (0%);  $nf = 29$  (100%); PPI = 0.13 "very low"); backshore: 78 MPs [ $np = 4$  (5.13%);  $nf = 74$  (94.87%); PPI = 0.35 "very low"]. Although cities are important sources of marine litter, particles are carried along the coast and end up stranding on a beach far from its origin. Therefore, as observed in the present study, rural areas are not free from MP pollution.

**Keywords:** Microplastics, beaches, fragments, pellets

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