
A comprehensive study of the spatial and temporal distribution of the microplastics pollution qualitative and quantitative composition in the recreational areas of the Sevastopol region with varying degrees of anthropogenic load

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Abstract

For the first time for the Black Sea region in recreation zones (RZ) a comprehensive monitoring of microplastics pollution (MP) was carried out, including a study of the spatial and temporal distribution of microplastic (MPs) qualitative and quantitative parameters in beach and bottom sediments, as well as in the surface water layer of adjacent water areas. Monitoring was carried out in the period 2018-2021 quarterly in calm weather and after storm episodes in five popular RZ of the Sevastopol region and two control areas (CA). A trend of MPs cumulation in beach and bottom sediments, as well as in the surface water layer of all studied areas was established. During the monitoring period, the MP concentration in beach sediments increased by 1,5 – 5 times, in bottom sediments by 5,5 – 6 times. The MP concentration in the surface water layer of the aquatories increased by 1,5 – 9,7 times.

The maximum MP average concentrations in beach sediments was 77-100 units·m⁻². At average MP concentrations in beach, bottom sediments and in the surface water layer of adjacent aquatories, which are 27 units·m⁻², 11,5 units·kg⁻¹ (dry weight) and 0,66 units·m⁻³, respectively.

According to the morphotype, MPs particles were differentiated into five main groups: fragments, granules, pellets, films, fibers. In the beach sediments fragments accounted for the largest share – 48-80%, fibers reached 25,8%; films were found on all beaches 1-21%. In all samples of bottom sediments, the proportion of fragments was maximum 50-83%, fibers 1-33%. Granules and pellets accounted for no more than 10%.

Acknowledgment. The study was carried out with the financial support of the Russian Foundation for Basic Research within the framework of the scientific project 18-44-920014 r_a, as well as within the framework of research work no. registration: 121040600178-6 and 121041400077-1.

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Keywords: microplastic, monitoring, marine ecosystems, beach sediments, bottom sediments, the Black Sea