
Behavior of macro and microplastics in surface waters in response to extreme meteorological events: a case study on a typical Mediterranean watershed.

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Abstract

Few studies have identified the impact of extreme meteorological events, and its correlation with urbanization on the behavior of macro and microplastics (MPs) in freshwater. This work assessed the potential input and variation of macro and MPs in Mediterranean waters linked to rainfall events and urbanization. Hence, water samples were collected during dry and wet periods, in two more or less urbanized Lebanese coastal outlets (Nahr Ibrahim, Nahr Antelias), with a total of seven sampling campaigns. Water samples of 100L were filtered with three sieves of 5 mm, 500 μm and 150 μm , respectively. Concentrations, sizes and shapes were determined, and polymer identification by Micro-Raman and MACRORAM is in progress. The results highlighted a significant spatio-temporal variation. Along Ibrahim river, high abundance of MPs was detected with a mean of 0.4 particles/L during wet season compared to 0.27 particles/L during dry season. In the contrary, results obtained in the of Antelias river, considered highly urbanized, showed higher abundance during dry season with a mean of 2.6 particles/L and 1.1 particles/L for the wet season. A greater diversity of fragments and macroplastics was observed during rainy periods. Moreover, during rainfall events, MPs abundance was linked to the urbanization of rivers. Indeed, Antelias outlet exhibited higher MPs abundance (1.1 particles/L) compared to Ibrahim outlet (0.4 particles/L), which could be the result of urban runoff, land use and anthropogenic activities. Besides, first polymer identification indicated the presence of rubber-like polymers in these samples. Finally, this study highlighted a significant correlation between rainfall, MPs abundance and type, as well as the correlation between urban activities and plastic pollution in surface waters using a straightforward sampling strategy. These results suggest to better take into consideration the meteorological events to define plastic level pollution to the marine environment with a standardized method.

Keywords: Microplastics, macroplastics, riverine plastic pollution, outlets, rainfall

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