
MICROPLASTICS AND PHTHALATES IN THE PO RIVER DELTA: THE SPATIAL HETEROGENEITY OF THE PLASTIC ASSOCIATED POLLUTANT POOLS

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Abstract

Deltas are the locus of river-borne sediments and are considered hotspots of pollutants at the land-ocean continuum. Under this view, also the accumulation of plastic is here expected. At the present time, few literature surveys explored the distribution of plastic and plastic associated contaminants in deltaic environment. Under this view, we surveyed the spatial distribution of sediment as well as of microplastics (MPs) and Phthalates (PAEs) in the Po delta and specifically at the land-ocean transition after the 2019 flood event. As first, by multibeam bathymetries we determine a delta lobe and migrating bedforms as the main sectors of sediment accumulation. Successively, we determined MPs concentration by microFTIR analysis and PAEs concentration by LC-MS/MS. Interestingly, MP fragments resulted scarce (43 ± 32 items·kg⁻¹ DW) with the minimum concentration in the delta lobe likely due to sediment dilution. Fibers showed higher concentration (1354 ± 780 items·kg⁻¹ DW) with maximum values in the thalweg and in the lobe. The most abundant polymers resulted polyamide (37%), followed by polypropylene (27%), polyester (18%) and polyvinyl chloride (18%). Noteworthy the size abundance distribution of the particles was found to be deviating from a classical 1-d fragmentation model, displaying a lack of small size classes. Overall our findings imply that river-dominated systems characterized by high sediment accumulation rates do not necessarily represent pools of MPs, must probably because high sediment accumulation rates and oceanographic regime tend to dilute and disperse pollutants close to the coast and further to the basin, respectively. On the other hand a totally different behaviors is observed for microfibers, and thus particle size and shape and the related hydrodynamic seems to play a major role. Finally, we did not highlight direct correlation between PAEs and MPs.

Keywords: Delta, Microplastics, plastic associated contaminants, Po River, Italy

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