



EVALUATION OF URBAN CONTRIBUTION TO MICROPLASTIC TRANSPORT FROM THE RIVER TO THE SEA: THE CASE OF THE CITY OF ROME (LATIUM, CENTRAL ITALY)

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Microplastics (solid synthetic particles of polymeric matrix, which dimensions range between 1 μm and 5 mm) represent a serious anthropogenic pressure. MPs can be divided into primary and secondary, depending on their origin, and both can cause direct and/or indirect effects at organism and food web levels. Microplastics (MPs) are ubiquitous pollutants, in fact, they have been detected throughout the biosphere: in the air (inside and outside buildings), in water (freshwater, brackish, marine, and underground water) and in soil. Their occurrence in the sea is the main subject of the studies available in the literature but the knowledge of MP contribution poured by rivers into the marine environment is relatively scarce. Attention has been paid to rivers only in the last years, as they have been recognized as one of the key sources of MP transport to the sea. Unfortunately, some different methodologies are applied that compromise comparisons between studies. Further, many of these data do not consider the spatial and temporal variability that characterizes the distribution and abundance of MPs in rivers either they don't identify the land-based pathways and sources by which MPs reach the river. Both spatial and temporal factors, in fact, affect the distribution and abundance of MPs in rivers. These factors can be different, according to the extension of the catchment area, the stream order, the urbanization level, and type of the riverine banks. In remote areas, distribution and abundance of MPs may be spatially modified by air transport, atmospheric deposition, tributaries, runoff from perfluvial strip, dikes and dams, meso- and micro-habitats, level of the river naturalness. In populated areas, the spatial distribution changes according to the anthropic activities (agricultural, industrial, social, airports) existing in the catchment area, the soil consumption, the presence of ditches and channels, and the population density (wastewater treatment plants, littering, use of vehicles and transport). Along the entire inland waterway, temporal variations in MPs depend on the seasonal variation of flow regime, floods, overflows, drought, atmospheric precipitations, humidity level, wind, exceptional climatic events, and touristic fluxes. Another knowledge gap in literature is the scarcity of data on the urban contribution to the MPs pollution, especially in Italy. The investigation on the river, and in particular of the urban stretch, ruling as conveyor of the MPs into the sea, is particularly necessary in order to actualize effective containment actions. In this framework, the aim of this PhD project is to contribute to the characterization and quantification of floating MPs in the urban stretch of the Tiber River, both spatially and temporally, to identify the main urban inputs of MPs from the City of Rome. This will be performed by means of seasonal sampling in strategic points of the city, i.e., as upstream, and downstream of the metropolitan centre, in WWTP and tributaries effluents. The map of the urban secondary hydrographic network, chemical data on Tiber water, data on WWTPs flows hourly variations, meteorology and other statistics will be collected to perform a multivariate analysis and to validate models on export of MPs by means of rivers to the sea available in literature.



Papini G., Boglione C., Petrella G., Cicero D.O., Rakaj A., 2021. Preliminary contribution to the quantitative evaluation of polystyrene microplastics in the marine sediments facing the mouth of the Tiber River. Poster al Congresso 'Ecology for an Ecological Transition' – XXX Congresso della Società Italiana di Ecologia, Lecce 25-27 ottobre 2021.