

Microplastics in the Seine River Catchment: Results and Lessons from a Pluriannual Research Programme

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Abstract : Microplastics (<5mm) in the environment and in hydro systems is one of the major present environmental issues. Over the last five years a research programme was conducted in order to assess the behavior of microplastics in the Seine river catchment, in a Man-Land-Sea continuum approach. Results show that microplastic concentration varies at the seasonal scale, but also at much smaller scales, during flood events and with tides in the estuary for instance. Moreover, microplastic sampling and characterization issues emerged throughout this work. The Seine river is a 750km long river flowing in Northwestern France. It crosses the Paris megacity (12 millions inhabitants) and reaches the English Channel after a 170 km long estuary. This site is a very relevant one to assess the effect of anthropogenic pollution as the mean river flow is low (mean flow around 350m³/s) while the human presence and activities are very intense. Monthly monitoring of the microplastic concentration took place over a 19-month period and showed significant temporal variations at all sampling stations but no significant upstream-downstream increase, indicating a possible major sink to the sediment. At the scale of a major flood event (winter and spring 2018), microplastic concentration shows an evolution similar to the well-known suspended solids concentration, with an increase during the increase of the flow and a decrease during the decrease of the flow. Assessing the position of the concentration peak in relation to the flow peak was unfortunately impossible. In the estuary, concentrations vary with time in connection with tides movements and in the water column in relation to the salinity and the turbidity. Although major gains of knowledge on the microplastic dynamics in the Seine river have been obtained over the last years, major gaps remain to deal mostly with the interaction with the dynamics of the suspended solids, the settling processes in the water column and the resuspension by navigation or shear stress increase. Moreover, the development of efficient chemical characterization techniques during the 5 year period of this pluriannual research programme led to the improvement of the sampling techniques in order to access smaller microplastics (>10µm) as well as larger but rare ones (>500µm).

Keywords : microplastics, Paris megacity, seine river, suspended solids

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