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Rapid assessment of floating macroplastic transport in the Rhine

Paul Vriend¹, Tim van Emmerik², Caroline van Calcar⁴, Merel Kooi³, Harm Landman⁵, and Remco Pikaar⁵

¹Wageningen University & Research, Water Systems & Global Change Group, Wageningen, Netherlands
(paul.vriend@wur.nl)

²Wageningen University & Research, Hydrology and Quantitative Water Management Group, Wageningen, Netherlands

³Wageningen University & Research, Aquatic Ecology and Water Quality Management Group, Wageningen, Netherlands

⁴Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, Netherlands

⁵Tauw, Capelle aan den IJssel, The Netherlands

Most marine litter pollution is assumed to originate from land-based sources, entering the marine environment through rivers. To better understand and quantify the risk that plastic pollution poses on aquatic ecosystems, and to develop effective prevention and mitigation methods, a better understanding of riverine plastic transport is needed. To achieve this, quantification of riverine plastic transport is crucial. Here, we demonstrate how established methods can be combined to provide a rapid and cost-effective characterization and quantification of floating macroplastic transport in the River Rhine. We combine visual observations with passive sampling to arrive at a first-order estimate of macroplastic transport, both in number (10 - 75 items per hour) and mass per unit of time (1.3 - 9.7 kg per day). Additionally, our assessment gives insight in the most abundant macroplastic polymer types the downstream reach of the River Rhine. Furthermore, we explore the spatial and temporal variation of plastic transport within the river, and discuss the benefits and drawbacks of current sampling methods. Finally, we present an outlook for future monitoring of major rivers, including several suggestions on how to expand the rapid assessment presented in this paper.