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Revising global river plastic transport

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Plastic waste is globally of great concern. Rivers have the potential to transport and accumulate large amounts of plastic waste which can have harmful effects on human and animal welfare. Given the durability of plastic waste, the presence of plastic in river environments is forecasted to continue rising. As part of the project INSPIRE (Innovative Solutions for Plastic Free European Rivers), the main goal of our research is to establish a baseline for the current state of plastic litter in European rivers, with the overarching aim of facilitating the reduction of plastic waste. The initial step in achieving this reduction is the accurate modelling of plastic waste in rivers.

There is currently a lack of cohesion between plastic transport models, with models independently predicting the export of various plastic sizes (micro- and macroplastics) and in different riverine compartments (river water, riverbed sediment, riverbank). We aim to develop a single model accounting for the interaction between plastic sizes, due to degradation, and mediums, due to resuspension. Existing plastic models also generally use an annual time scale for predicting plastic concentrations in rivers. To estimate the impact of short-term climatic events, like storms and floods, on plastic concentrations in rivers, a higher temporal resolution would add value to plastic modelling.

Challenges in plastic modelling have arisen from a lack of data-availability. However, with the rise in focus on plastic research, river plastic data availability has steeply expanded, supporting a revision of current plastic modelling approaches. Our research aims to provide a more holistic approach to plastic modelling by exploring current modelling approaches to ensure an up-to-date understanding of factors affecting plastic concentrations in rivers.

Here, we revise and extend previously developed global river plastic models to also account for transport and retention. Modelling the plastic transport in rivers for all plastic sizes and in all mediums will be vital for identifying the types of plastic accumulating in the river, and in which locations. This will be imperative for the effective implementation of mitigation measures to ensure clean and safe waters for the future.

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