

Towards 2048: the next 25 years of river studies

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A mass balance model for transported waste in rivers

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Highlights

- A mass balance model for transported waste in rivers was developed
- Results match with observations in the field and allow deeper understanding of waste accumulation sites
- The model is useful for strategic planning of monitoring campaigns, for estimating yearly waste emissions to the sea and to indicate suitable solutions.

Overview

We are proposing a new methodology to grasp the mass balance of transported waste in rivers. The approach is based on a simplified representation of flow distributions in compound channel sections, and relates transported and deposited waste to proportions of flow that go through the main channel and the floodplains. A key assumption in the model is that in floodplains the retention rate for transported waste is much higher than in the main channel, which leads to a net “sink effect” of waste as it is transported down the river. We show that the simplified model matches with field observations of waste depositions after a recent flood event, and demonstrate how it adds more insightful interpretation of waste accumulation sites. The model also allows a more strategic planning of waste monitoring in a real river setting, by highlighting which inputs are needed to get a complete overview of the quantities and timings of transported waste throughout the river system. Finally, the model can be used to estimate the yearly waste loads that a river transports to the sea and the proportion that remains stored in the river itself.

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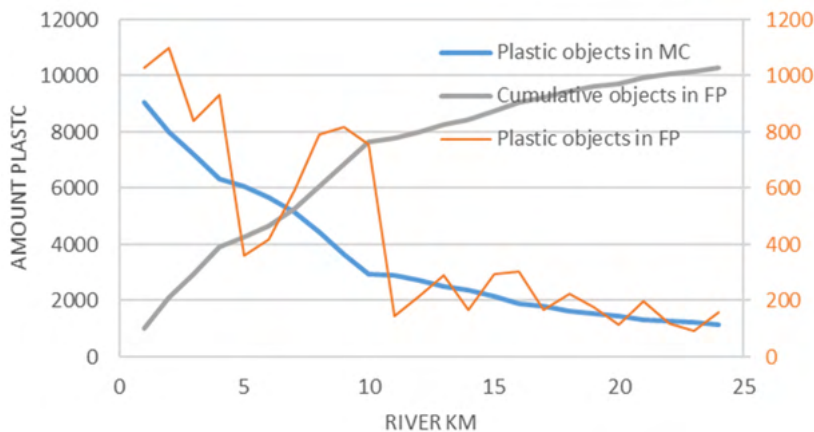


Figure 1. Results from the new waste balance model for an idealized river section of 25 km length, showing downstream filtering of waste in the main channel (MC) and accumulation in the floodplains (FP).