

Submitted Abstract

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Abstract

Macroplastic storage process in a mountain river channel has not yet been explored; however, its understanding is a prerequisite for identification of macroplastic accumulation hot-spots and evaluation of the related risks.

We determined the amounts of macroplastic debris deposited in the active channel of the gravel-bed Dunajec River, southern Poland. The study reach stored ~224 kg of macroplastic per 1 km of channel length, with 82.6% of the amount stored in/on wood jams that covered only 2.1% of the area of active river zone. On average, wood jams stored 9.5 plastic items/m² of active channel area, i.e. 32 times more than channel areas covered by non-woody vegetation and 95 times more than bare gravel surfaces. The average mass of macroplastic items trapped by wood jams was 3-4 times larger than those deposited in channel areas outside jams. On average, jams stored 113.2 g of macroplastic/m², with the amount exceeding 126 times the mass of macroplastic stored in areas overgrown with non-woody vegetation and 189 times that on bare gravel surfaces. We also found that macroplastic seen on the surface of wood jams represented 72.3% of its total amount trapped by jams. The proportion of inside jam-stored macroplastic debris increased linearly with jam volume ($p = 0.007$; $R^2 = 0.57$). These results demonstrate that wood jams trap a considerable proportion of macroplastic stored in the channel of mountain river and suggest that disintegration of such jams by flood flows may be an important source of remobilization of macroplastic during floods.