Macroplastic pollution hotspots across global mountain river catchments

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Mountain rivers in densely populated areas have recently been reported as substantially polluted by macroplastics [1]. Previous works suggest that macroplastic delivered to mountain river channel can be quickly fragmented to microplastic, because of distinct natural characteristics of mountain river channel (e.g. high energy of flow, steep gradient, coarse bed sediments). The produced microplastic (and related risks) can not only affect mountain rivers but can also be transported downstream to lowland rivers and oceans [2]. The information on local, regional, and global patterns of plastic emission within mountain river catchments is crucial for planning effective mitigation strategies.

Here we combine existing databases of river catchments [3] and mismanaged plastic waste (MPW) emission [4] to calculate flux of plastic waste from global mountain river catchments [t yr\textsuperscript{-1}]. Our results demonstrate the highest plastic emissions in Asian mountain river catchments, with the maximum (total MPW 37111630 t yr\textsuperscript{-1}) detected in Himalayas. Similar values were also observed in mountain river catchments in the Chilean Andes; however, the number of hotspots was lower in this region. Mountain river catchments in Europe (especially northern Europe) and Australia are influenced by three times lower emissions of MPW compared to those in Asia and South America. We identified numerous hotspots of MPW emission in mountain river catchments that coincide with areas of extreme rainfall occurrence (particularly in the Southeast Asia region). This spatial correlation may consequently accelerate microplastic production during extreme events and facilitate its downstream transport. The obtained data provide a unique source of information for future detailed research aimed at mitigating the plastic pollution problem in global mountain rivers and highlight areas that require urgent regulations to address the plastic pollution problem.

The study was completed within the Research Project 2020/39/D/ST10/01935 financed by the National Science Centre of Poland.

References

