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## Domestic waste management strategies to reduce future river export of macro- and microplastics to the coastal waters of Africa

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The level of concern regarding plastic pollution within aquatic ecosystems has surged in recent years. The African continent is urbanizing more rapidly than other regions of the world with many countries experiencing a shift from predominantly rural populations to having more than half of their populations living in urban areas. Despite the stunning rate of urbanization and the undeniable impact on waste generation, there is a striking knowledge gap yet to address how pollution levels are changing under the twin pressures of urbanization and climate change for Africa. The need for studies that could predict pollution levels, while also addressing the role of waste management in the export of plastics into African rivers, becomes pressing.

Our study aims to identify effective domestic waste management strategies to reduce future river export of macro- and microplastics to the coastal waters of Africa. To this end, we apply the existing MARINA-Plastics model (Model to Assess River Inputs of pollutants to the seAs for plastics) to all sub-basins in Africa to better understand the trends and sources of macro- and microplastics for the past (2010 and 2020) and future (2050) based on the Shared Socio-Economic Pathway (SSPs) and Representative Concentration Pathway (RCPs).

Our model results show that in the past, the total river export of plastics to all coastal waters of Africa increased by 21% between 2010 and 2020. Such increases are a result of urbanization activities contributing more sewage connections and poorly treated wastewater from households. Most of the river export of plastics was macroplastics (over 80% in the past years). However, the share of microplastics in this total plastics increased from 3% in 2010 to 17% in 2020, indicating the increasing impact of urbanization over time in the recent past. In the future, the river export of plastics to all coastal waters of Africa is projected to further increase by more than double, between 2020 and 2050. This is a result of an increase in both river export of macro- (134%) and microplastics (59%) during this period. These trends are predominantly associated with factors such as increasing production and

consumption patterns, ongoing urbanization and other relevant contributors (e.g. climate change).

We further develop alternative scenarios oriented towards four directions for Africa. These alternative scenarios incorporate the implementation of different reduction options such as improvements in wastewater treatment, reductions in the consumption of plastics, better waste collection, and an optimistic scenario where all three strategies are combined. We quantify the impacts of these reduction options on the future river export of plastics for Africa under global change. Our study is useful for understanding the sources and spatial variability of plastic pollution in rivers and coastal waters of Africa under global change trends. It is relevant to support decision-makers and waste managers in the implementation of policies to achieve sustainable targets for responsible consumption & production (SDG 12), and clean water (SDG 6).

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