Assessment of macro- and microplastics in the mangrove bay of Gazi (Kenya)

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Environmental plastic pollution in Kenya is a major issue as more than 80% of the total waste is inadequately managed. Even though the Kenyan Government introduced several bans on the use and import of several single-use plastic items, the country is still drowning in plastics. Numerous studies focused on the presence of plastic pollution in the marine environment, but studies on mangrove ecosystems are largely missing. This study aimed to provide primary evidence of plastic contamination in the mangrove forest of Gazi Bay, south coast Kenya. Macro- and microplastic distribution and abundance along the mangrove and the coastline were recorded and the plastic recovered was categorised according to its type and use. To investigate the relationship between our findings and the perception and behaviour towards plastic use and disposal of the inhabitants of Gazi, a questionnaire was developed. The average abundance of debris was 0.79 +- 2.21 items.m^{-2}, while an average of 0.16 +- 0.25 items.$tree^{-1}$ (0.1 +- 0.24 items.m^{-2}) was found in the trees. The landward zone contained 3 to 8 times more plastic on the ground than the seaward zones and beaches, while plastic abundance and cover in the trees were highest on the seaward transects. Overall, unidentifiable plastic fragments and bottles were most recovered. The concentration of large microplastics (LMPs: 1-5 mm) varied strongly between sites. While the landward transects contained the most LMPs on average (0.41 +- 0.06 LMPs.kg^{-1} dry), the beach zone contained the most replicates that were contaminated (25.93% of all replicates). Both the data and the information gathered by the questionnaire confirmed that most plastic recovered on the landward side was of domestic origin. Littering, dumping and burning are still considerable plastic disposal methods used in Gazi. Consequently, this study strongly advocates for the availability of better waste management and recycling opportunities in Kenya to minimise the degradation of nearshore habitats.

Keywords
Mangroves; Plastic Pollution; Mangrove Litter; Gazi Bay; Kenya; Macroplastics; Microplastics; Marine Litter; Mangrove Management