

# **Identification, Abundance, and Chemical Characterization of Macro-, Meso-, and Microplastics in the Intertidal Zone Sediments of Two Selected Beaches in Sabah, Malaysia**

## **ABSTRACT**

This study aims to present the identification, abundance, and chemical characterization of plastics in the intertidal zone sediment of two selected beaches in Kota Kinabalu city, Sabah, Malaysia. Plastic debris was classified according to weight and size and was identified for its heavy metal concentrations and polymer types. Results showed that a higher abundance, by more than 2-fold of plastic debris was found in Kebagu beach (28.7 g) compared to ODEC, UMS (13.4 g). FTIR analysis showed that polypropylene (PP) and polyethylene (PE) were the dominant plastic polymers on both beaches, followed by polystyrene (PS) and polyethylene terephthalate (PET). Five heavy metals (arsenic, chromium, copper, zinc, and nickel) were detected from four types of plastics. The results showed that the concentration of Zn was higher in all four types of plastics on both beaches, with a range of 41 mg/kg–135.3 mg/kg, followed by Cr and As, while Ni was the lowest concentration detected in PE on both beaches: 5.6 mg/kg (ODEC) and 5.1 mg/kg (Kebagu stations). This study confirmed the presence of macro-, meso- and microplastics in both stations. Further studies remain necessary for a better understanding of the sources and fates of the pollutant in the marine environment. Findings from the studies of the Kota Kinabalu beaches have provided baseline data and a clearer understanding of the distribution of plastic debris. This demonstrates that commitments and actions are required to mitigate the potential risk to the ecological system and human health.