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# Abundance of the Plastic Debris in Accelerated Natural Regeneration of Mangroves Site in Anawilundawa and Periphery

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## Abstract

The Accelerated Natural Regeneration of Mangroves (ANRM) site in Anawilundawa Sanctuary is exposed to various anthropogenic impacts from domestic and industrial sectors, directly or indirectly. Recognizing these concerns, the present study aimed to assess the physico-chemical parameters of water and determine the contamination status of macro and microplastics in water and sediment of the ANRM and its periphery. Water and sediment samples were collected in three sampling times in the period of October to December 2022 from canals within ANRM site, and its feeding canals: paddy field outlet, shrimp farm outlets and Dutch canal. Temperature, salinity, conductivity, and pH were measured in-situ by multiparameter (HACH HQ2200) and the nitrate and phosphate were measured following standard APHA protocols. The status of macro litter was calculated following OSPAR marine protocol. Microplastics in water and sediment were extracted by organic matter digestion by 30% $H_2O_2$ and 10% KOH followed by density separation (saturated solutions of NaCl and Nal, respectively). The extracted microplastics were identified and characterized by stereomicroscope and FT-IR-ATR analysis. During the study period, the highest total nitrate was recorded from shrimp farm outflow (0.13± 0.00 - 0.38±0.01 $mgL^{-1}$) and the highest total phosphate concentration was recorded from the restoration site (0.33±0.01 - 0.55±0.01 $mgL^{-1}$), respectively. The highest total macro-plastic debris count, and weight were recorded from the Dutch canal (221 pieces, 2050 g) and the lowest from the paddy field inlet (120 pieces and 1010 g). The highest microplastic amount in sediment and water were recorded in shrimp farm outlets (1882.5 pieces/kg± 495.42) and ANRM site (4.67 pieces/L±0.34), respectively. Fragment was the highest observed shape (72.93%) and blue (40.68%) was the highest obtained color in microplastics. FT-IR analysis revealed the extracted microplastics belonged to poly (ethylene: propylene: diene). The finding of the present study emphasizes the importance of regular monitoring and the need for actions to prevent pollutant entry into sensitive habitats to maintain a healthy environment in the ANRM site and its surroundings.

**Keywords**: *Microplastic, OSPAR, Plastic debris, Water quality*