



## Assessment of Spatial Variation of Oil and Grease Concentrations in Negombo Fishery Harbour

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Oil pollution is a major environmental issue affecting coastal waters worldwide, posing significant threats to marine ecosystems and coastal livelihoods. As an island nation heavily dependent on fisheries, Sri Lanka faces increasing challenges in maintaining the environmental quality of its coastal and harbour waters. This study assessed the spatial variation of oil and grease contamination across ten stations in Negombo Fishery Harbour using judgmental sampling. Oil and grease levels were quantified following EPA Method 1664 (Revision B) while, in situ physicochemical parameters including temperature, air pressure, dissolved oxygen (DO), electrical conductivity (EC), pH, and turbidity were measured using a calibrated YSI ProDSS multiparameter meter. Physicochemical measurements indicated highly dynamic harbour conditions, temperature ranging from 28.23-31.43 °C, pH from 6.78-8.08, EC from 4,364.67-50,856.00  $\mu\text{S cm}^{-1}$  and turbidity from 131.41 - 484.09 FNU and DO from 1.84 - 6.52  $\text{mg L}^{-1}$ . Oil and grease concentrations varied between 24.00 to 63.33  $\text{mg/L}$  with all sampling stations substantially exceeding the 10  $\text{mg L}^{-1}$  regulatory threshold specified by the Sri Lankan National Environmental Regulations (Gazette Extraordinary No. 2264/17) and the Indian CPCB Class SW-IV standard for harbour waters criteria. The Kruskal-Wallis test revealed significant spatial variation in oil and grease concentration ( $p < 0.05$ ), identifying two distinct pollution hotspots within the harbour. Spearman correlation showed a weak, non-significant negative relationship between oil and grease concentration and DO. Although elevated oil contamination is typically associated with reduced oxygen availability, this relationship was not evident, possibly due to the mechanical aeration generated by vessel activities. In contrast, a strong and significant positive correlation was observed between pH and DO ( $p < 0.05$ ). Pollution hotspots were concentrated near urbanized and fishery-related operational zones, indicating the influence of anthropogenic activities such as boat operations, wastewater discharge, and sediment disturbance. Overall, the findings demonstrate marked spatial heterogeneity in harbour water quality and widespread oil contamination exceeding permissible limits. These results highlight the urgent need for continuous monitoring, targeted pollution control strategies, and improved management interventions to protect the ecological integrity of Negombo Fishery Harbour.

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