Assessment of Transboundary Marine Litter Along the Northern Coast of Sri Lanka

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Marine litter has become a major global environmental issue affecting coastal and marine ecosystems. Due to its buoyancy and persistence, marine litter can travel long distances, resulting in transboundary marine litter (TBML). The northern coastline of Sri Lanka is vulnerable to this phenomenon because of its proximity to the Bay of Bengal and exposure to seasonal monsoon-driven ocean circulation, which facilitates the transport of TBML. This study assessed the abundance, composition, and spatial distribution of TBML accumulated along the northern coast of Sri Lanka. A total of twenty-two locations across the districts of Jaffna, Mannar, Kilinochchi, and Mullaitivu were surveyed between July and September of 2025. At each site, a 100 m transect was established parallel to the shoreline covering the low tide, high tide, and backshore zones. TBML was collected systematically with a fixed width covering the intertidal zone from the low water mark to the high tide line and extending into the backshore zone up to the vegetation line, and surveys were conducted three times per site. TBML was collected systematically, with origins identified primarily from the manufacturer's label, and unclear labels were recorded as unidentified. A total of 369 items were identified, with Mannar recorded the highest abundance (220 items), and Mullaitivu the lowest (6 items). Plastic dominated (98.65%), while metal (1.08%) and glass (0.27%) were minimal. Most items (73.98%) were found in the backshore zone. Origin analysis showed 89.15% of TBML originated from India, mainly Tamil Nadu (35.23%). The higher accumulation in Mannar (220 items) than in Mullaitivu during the southwest monsoon is attributed to Mannar's closer proximity to the Palk Strait and its differential exposure to prevailing wind and current patterns that facilitate debris transport from southern India. Long-term monitoring and community-based initiatives are essential for effective management and mitigation of this growing threat.

Keywords: *Coastal pollution, Northern Sri Lanka, Plastic debris, Transboundary marine litter*