

Comparative Assessment of Marine Litter Accumulation Influenced by Riverine Inputs in Western and Southern Sri Lanka with Ditwah Disaster

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The 2025 Ditwah Cyclone caused severe flooding across Sri Lanka, transporting large volumes of debris into the marine environment via river overflows. This study presents a comparative assessment of marine litter accumulation on beaches influenced by nine rivers across the Western and Southern provinces of Sri Lanka, with special attention to debris associated with the Ditwah disaster. Marine litter surveys were conducted using a standardized line transect method; three parallel transects were established 50 m apart at each site, extending from the high-tide line to the vegetation zone. Litter items were classified by material type and size category, and one-way ANOVA was applied to assess significant differences in accumulation between rivers and provinces. Western Province sites included Kelani River, Attanagalu Oya, Ma Oya, Bolgoda River, and Kalu River; Southern Province sites included Kirindi Oya, Gin River, Manik River, and Walawe River. A total of 2,701 litter items were recorded across all survey sites. The Western Province accounted for 2,076 items (76.9%) compared to 625 items (23.1%) in the Southern Province, representing a 3.32-fold difference. One-way ANOVA confirmed statistically significant differences in litter accumulation both across all nine rivers ($F = 3.307$, $df = 8, 1602$, $p = 0.0009$) and between the two provinces ($F = 13.566$, $p = 0.0002$). Plastics and miscellaneous debris dominated both regions, with Western Province beaches characterised by urban and industrial waste, whereas Southern Province beaches contained mainly agricultural, fishing-related, and mixed municipal waste. Overall, the findings highlight significant regional disparities in marine litter accumulation, sources, and composition, emphasising the combined influence of riverine transport, population density, industrialisation, and cyclone-driven debris mobilisation. The study underscores the urgent need for improved solid waste management strategies, strengthened riverine monitoring systems, and disaster-responsive policy frameworks to mitigate future marine pollution in Sri Lanka.

Keywords: *Ditwah cyclone, Marine litter, Beaches, Waste management, Riverine transport*