



Spatial Distribution of Transboundary Plastic Pellets and Mesoplastics Pollution Along the Western Province Coastline, Sri Lanka. A Post Incident Assessment of Pellets Originated from the MSC ELSA 3

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The MSC *ELSA 3* ship sank off the coast of Kerala, India, on May 25, 2025, resulting in billions of pellets being released into the Indian Ocean. This study investigates transboundary plastic pellet inputs following the MSC *ELSA 3* incident, to assess the spatial distribution of transboundary pellets and mesoplastic pollution along Sri Lanka's western coast. This study was conducted ten months after the MSC *ELSA 3* incident and indicates ongoing, day-to-day accumulation of plastic pellets along the Sri Lankan coastline. The study was conducted from March to April 2026 along 12 sites on Sri Lanka's western coastline using a 10 m × 1 m interrupted belt transect method across low, mid, and high tidal zones. 1 m² quadrats (Depth 0 – 5 cm) with triplicates were used for sampling. Core samples were collected using a 1 m soil corer and collected samples for 0-30 cm, 31-50 cm, 51-70 cm, and 71-100 cm. Plastic pellet abundance was quantified using the Pellet Pollution Index (PPI). Statistical analysis was performed using R statistical software. The results indicated the presence of two dominant colour categories of pellets, specifically semi-transparent and white. Four morphologically distinct pellet types were recorded. Pellet density across 12 coastal locations showed clear spatial variability and a consistent increase from low to high tide zones (Low < Medium < High). In the Low tide zones, the highest accumulation was recorded at Wadduwa with an average of 15.7 ± 3.0 m⁻². In the mid-tide zone, the highest accumulation was recorded at Dehiwala, with a peak of 302.0 ± 252.0 m⁻², indicating a localized pollution hotspot. The lowest count was recorded in Wattala, which has not recorded pellets in both low and mid tide zones. In the High tide zones, the highest accumulation was recorded at Dehiwala, with a peak of 109.7 ± 57.7 m⁻². Core sampling revealed vertical distribution, with pellets largely confined to the 0 – 30 cm sediment layer. The Pellet Pollution Index (PPI) ranged from 0.0 to 2.75, with most sites classified as low pollution. However, Dehiwala exhibited high pollution levels. Statistical analyses confirmed significant differences among tidal zones ($p < 0.05$). Meso plastic abundance was higher during high tide zones in Moratuwa (9.7 ± 4.2 m⁻²), and the lowest count was recorded in Wattala. Mid tide zone, the highest mesoplastics were recorded in Mt. Lavinia (4.5 ± 2.6 m⁻²), indicating increased coastal accumulation under strong tidal influence. Plastic pellets from the MSC *ELSA 3* incident showed significant spatial variability along Sri Lanka's western coast, with hotspots at Dehiwala. The findings highlight the important baseline evidence for coastal plastic pellet contamination in Sri Lanka and emphasise the need for site-specific monitoring.

Keywords: *MSC ELSA 3, Mesoplastics, Pellets, PPI, West coast*