

Small plastic debris in beach sand: A quantitative analysis with regards to beach usage

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Plastics that are brought in to beaches by different activities face weathering and fragmentation and break down into small pieces, which easily incorporate with beach sands. The objective of this study was to quantify the small plastic debris (ranges between 0.5 to 5 mm) in the sand of four beaches, Pareiwella, Nilwella, Dickwella and Rekawa. Pareiwella is with recreational significance, while Nilwella is a popular fishing beach. Dickwella beach was selected as it runs a freshwater outlet to the sea. Rekawa beach was considered as the controller site since it is a protected area. Five random sand samples were collected using a 5 L bucket at each site and analyzed for small plastic debris. Each of the five samples at all sites was sieved using 3.15, 2.00, 1.00 and 0.5 mm meshed sieves. Retained debris in the sieves was separated into categories of plant, plastics and other. Collected plastic pieces were again categorized into 4 groups namely, foam, line, pellets and fragments. The average total weight and the average total abundance of plastic debris at each site were determined using a weighing scale and a light microscope respectively. The study was carried out on 11th of February for twelve hours. The average weights of small plastic debris in Pareiwella ($0.646\text{g}\pm 0.903$), Rekawa ($0.046\text{g}\pm 0.0639$), Nilwella ($1.628\text{g}\pm 2.228$) and Dickwella ($0.0640\text{g}\pm 0.0631$) were significantly different from each other (Kruskal-Wallis test; $p < 0.05$). The average abundance of small plastic debris in Pareiwella (8.8 ± 6.76), Rekawa (1.0 ± 1.414), Nilwella (221.0 ± 320) and Dickwella (23.2 ± 11.3) were also significantly different (Kruskal-Wallis test; $p < 0.05$). The highest abundance of small plastic debris was recorded in Nilwella, consisted of 51% foams, 24% line, 20% pellets and 4% fragments. The lowest was recorded in Rekawa which was consisted of 100% lines. The research concludes that the accumulation trends of small plastic debris vary according to the beach usage and management measures shall be specified accordingly.

Keywords: accumulation, beaches, small plastic debris

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