



## Editorial

## Marine debris in mangroves and on the seabed: Largely-neglected litter problems

While the scarcity of up-to-date data on beach litter contamination in the Caribbean has been stressed in several recent studies, we here point to the even greater paucity of published work on litter in mangroves and on the shallow tropical seafloor. During collection of baseline data on beach litter contamination on the Southeastern Caribbean island of Bonaire (Debrot et al. *Mar. Poll. Bull.*, in press) we also collected preliminary data that may serve to highlight the need for further studies on these largely neglected litter issues.

In October 2011, we sampled litter pollution (objects  $\geq 5$  cm) at three wind-exposed mangrove beach sites of Lac Bay, Bonaire, and two submerged transects directly off the public beach in the same bay. The beach transects sampled in mangrove forests were 5 m wide and extended seawards from the last terrestrial vegetation (for differing lengths) straight out into the mangroves and towards the sea. Mangrove-shore litter concentrations per stretching metre of coast for the three transects were 44, 111 and 116 items  $m^{-1}$  and, respectively, 5.0, 6.6 and 3.7 kg of debris  $m^{-1}$ . When divided by transect length, the corresponding surficial debris concentrations in the mangrove forests were 6.3, 5.8 and 23.2 objects  $m^{-2}$  and, respectively, 0.71, 0.35 and 0.74 kg of debris  $m^{-2}$ . By weight, the two main components of the collected debris were plastics (39%) and wood (40%), while the numerically most important debris components were plastics (72%) and polystyrene (16%). Of the 86 objects that had labels indicating country of origin, 75% were found to have been manufactured in Venezuela. The documented debris concentrations are high and in the same range as for the heavily littered beaches of the wind-exposed east coast of Bonaire. The mangrove forest of Lac was seen to act as both a trap and filter for debris. Plastic bags, rope and wooden flotsam appear to be trapped up front and while smaller objects penetrate deeper into the mangrove forest, being driven in by wind and tidal forces.

Submerged beach debris collected in two 4-m wide  $\times$  25-m long transects parallel to the shore at 2–3 m depth in seagrass beds in front of the Lac public beach at Sorobon, amounted to 26 (0.5 kg)

and 71 (3.6 kg) pieces of man-made litter. The surficial debris concentrations were respectively 0.26 (0.005 kg)  $m^{-2}$  and 0.71 (0.036 kg) items  $m^{-2}$ . The nature of the litter collected was fully recreational, and plastic beverage cups that are easily blown into the water, comprised 71% of all items. The documented densities are comparable to those described for unmanaged public beaches in nearby Curaçao (Nagelkerken et al., 2001, *Mar. Poll. Bull.* 42:786–789).

Marine litter contamination is a wide-spread problem and considered to be one of the most serious threats to sustainable use of the region's marine and coastal resources. Mangrove litter and shallow submerged litter contamination figure significantly in Bonaire and we have made practical recommendations to help address these problems in a separate report to government. In presenting this synopsis here, we aim to draw scientific attention to these largely neglected facets of the litter problem and hope to see further studies to assess the extent of these problems in the Wider Caribbean.

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