

## **Plastics associated with birds from St. Brandon's, Mauritius, Western Indian Ocean**

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### **Background:**

We live in a throwaway society in which the packaging of our food and beverages are mostly composed of plastic that ends up in the environment, prompting environmental and health concerns globally. The marine environment is spared from plastic. Plastic production and consumption is increasing globally, with a concomitant expectation that loss to the marine environment will also increase. Plastic comprises 80-85% of all visible marine debris, derived from two main sources namely, 'offshore' such as fishing gear and 'land-based' such as from beach-goers and waste disposed of in rivers that make their way to the oceans. Less than 5% of all marine debris is recovered. The presence of plastic in marine areas is an increasing problem, not only aesthetically but it also poses a great threat to the environment. Mistaking them for jellyfish, sea turtles ingest plastic bags and can be killed. Marine mammals can get entangled in discarded fishing gear and drown. Microplastics can be ingested with barely understood consequences. Economic depression in some areas can be caused by plastic debris hindering tourists from visiting the area. Alien species and pathogens can be transported facilitated by plastic debris because it can travel long distances over the ocean. Fifty percent of all seabirds are affected by oceanic debris through entanglement and ingestion. Forty-four percent of studied bird species ingest plastic. POPs can be transmitted into their bodies by way of plastic ingestion as well. These stressors lowers fitness and can affect populations and the local ecology.

Very little is known about the plastic pollution situation in the Western Indian Ocean (WIO). The aim of this study was threefold; firstly to determine the polymeric composition of macro plastics on the beaches of St. Brandon's atoll (SBR) and Rodrigues; secondly, to determine the polymeric composition of macro plastics in the nests of Brown Noddies (*Anous stolidus*), and thirdly; to determine the size and colour of microplastics in the nests of Sooty Terns (*Onychoprion fuscatus*) on SBR.

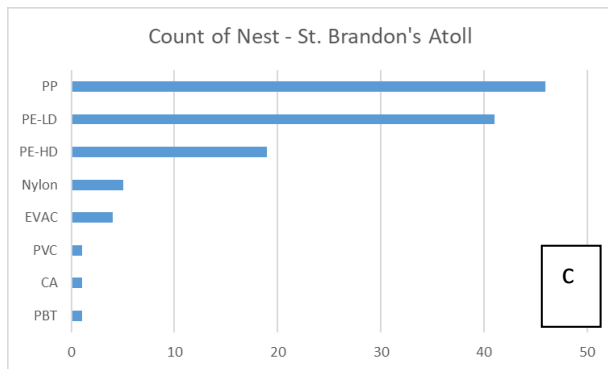
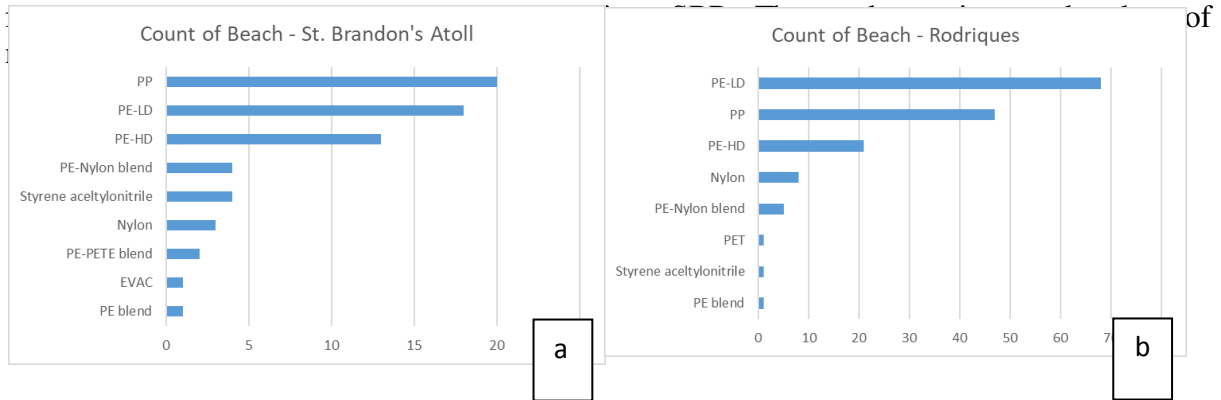
### **Methods:**

Plastic debris was collected from bird nests between 2014 – 2016 at SBR, which is located 430 km north-east of Mauritius, and Rodrigues located 560 km east of Mauritius. Samples were collected from the beaches of SBR and Rodrigues and from abandoned tree nests of Brown Noddies on SBR. Sand samples were also taken from abandoned nests of Sooty Terns at SBR.

Macro plastics were analysed using a mobile Fourier Transfer Infrared Spectrometer (FT-IR) to determine the composition of each piece of plastic, based on a polymer spectrum library compiled at the North-West University. Sand samples for microplastics were sieved, digested, and then examined with a Nikon AZ100 stereomicroscope to determine the size and colour of particles.

### **Results:**

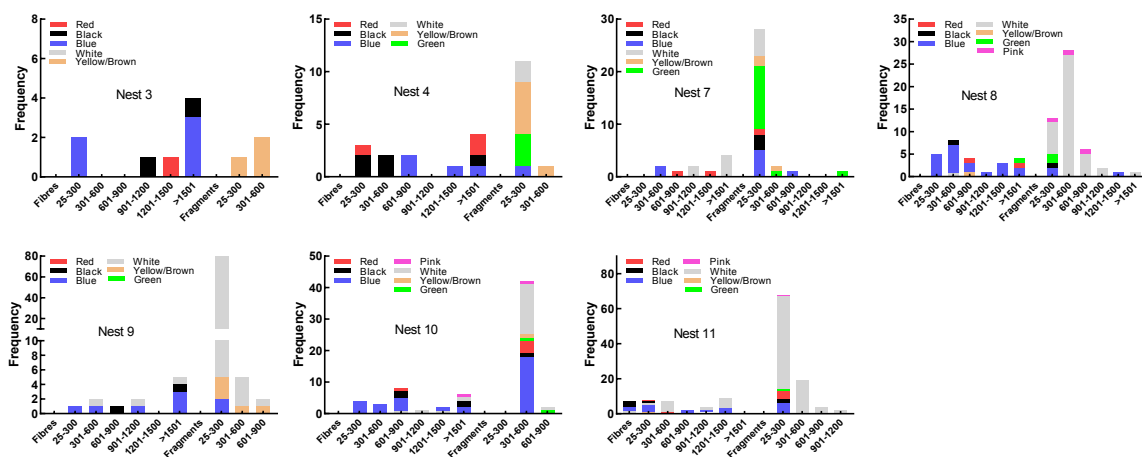
Figs. 1a and b shows the number and composition of macroplastics collected on the beaches of SBR and Rodrigues. Fourteen different polymers were identified. Polypropylene and polyethylene were most abundant on SBR and Rodrigues beaches and in the nests of Brown Noddies on SBR. Other polymers were PE-blends, EVAC (copolymer of ethylene with vinyl acetate), PE-PETE blend (polyethylene-polyethylene terephthalate), nylon, styrene acetylonitrile, PE-Nylon blend, PET (polyethylene terephthalate), PBT (polybutylene terephthalate), CA (cellulose acetate) and PVC (polyvinyl chloride). Fig. 1c shows the same



**Fig. 1a** Number and polymeric composition of macroplastics from St. Brandon's atoll.

**Fig. 1b** Number and polymeric composition of macroplastics on beaches from Rodrigues.

**Fig. 1c** Number and polymeric composition of macroplastics in nests of Common Noddies, St. Brandon's atoll



**Fig. 2** Microplastics from the nests of Sooty Terns from St. Brandon' atoll. The left part of each graph represents fibres, and the right side are fragments.

**Conclusions:**

A wide variety of polymers was found on the beaches of the two islands, which were also reflected in the nests of the Common Noddy. Very small pieces of plastic fibres and fragments were found in sand from Sooty tern nests. The particles and fibres we hypothesize

could have come via food fed to the chicks on the nests, via their parents. The implications of these findings need further research.