Features

Oceans – time to take out the garbage

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Image: ECOS Magazine

When the Plastiki – a boat made of 12 500 plastic bottles – arrived in Sydney in July, it alerted Australians to the impact of refuse on our oceans and sea life. In a statement congratulating the Plastiki crew, the United Nations Environment Programme (UNEP) noted that marine debris kills 100 000 turtles and other marine animals – dolphins, whales and seals – each year.

The UNEP statement also noted that if we collectively continue using the sea as a dustbin, 'human beings will soon have turned the once beautiful and bountiful marine environment from a crucial life-support system into a lifeless one'.

Ms Kim McKay, from Momentum 2 and the Sydney Institute of Marine Science Foundation, says the issue of marine debris has been a driver in her life since 1989, when she co-founded Clean Up Australia – now a worldwide movement – with Ian Kiernan.[1]

'The sad thing about the Plastiki voyage was that they didn't see many fish. They only caught four fish during the entire voyage,' she says.

Where does all the rubbish come from? Shipping is an obvious source. A UNEP report published in April 2009 cites a need for international agreements through national regulations for 'reception facilities for ship-generated wastes (including damaged fishing gear and nets) [and] cooperative action within the fishing sector to prevent abandonment and discarding of old fishing gear'.[2] A lot of rubbish also comes from unsustainable land-based waste disposal practices such as throwing away plastic water bottles.

Mr Doug Woodring, from Project Kaisei – a collaborative research initiative established to identify the scale of marine debris and its impact on the marine environment – says the project's mission is to prevent the increase of marine debris, to collect it sustainably, and to enable its conversion into recyclable energy.[3]

The project's current research is focused on the North Pacific, where one of five major gyres in the world spins a widening spiral of rubbish, estimated to be many thousands of square kilometres in size. Mr Woodring believes up to 80 per cent of ocean debris originates from land pollution.

'Governments have an obligation to use better practices to prevent this pollution, for example, when land waste products pour into the sea from river mouths during rainstorms,' he says. 'A solution to the problem lies in enforcing national laws, so polluters are fined if they flout laws that reflect moral and societal responsibilities. The way the laws of the sea are written means there's a focus on national boundaries and ocean-related business such as shipping lanes, industrial spills and fishing.'

Mr Woodring and his team – based in California and Hong Kong – are instead encouraging an international approach to tackling the problem of marine debris, with community engagement at the local level.

Plastic bags constitute a particular problem, as seals and other mammals can mistake them for jellyfish and consume them. Other plastics break down into small edible pieces, and the toxicology of their breakdown is little understood.

Having found plastic at depths of 200 metres during last year's expedition, the Project Kaisei team tested for chemical toxicity on molluscs and other sea life. This year, the team sent a vessel to verify modelling of where debris collects within the gyre. This required tracking thousands of GPS-equipped buoys.

Mr Woodring hopes plastic marine debris might be harvested using 'passive' systems such as nets and booms, while 'ghost nets' might be recovered through a reward system encouraging fishers to bring back nets to shore for waste-to-energy programs, which already happens to a small extent in the United States and Korea.

According to a 2009 report on the impact of plastic debris on Australian marine wildlife, most records of impacts of plastic debris on wildlife relate to 'entanglement rather than ingestion'.[4] However, the report's author acknowledges that 'the rate of ingestion of plastic debris by marine wildlife is difficult to assess as ... [ingestion] may not be recorded where it is not considered as the primary cause of death'.

The report cites 77 species impacted by entanglement or ingestion of plastic debris since 1974. These include six species of marine turtle, 12 of cetacean, at least 34 species of seabirds, six of pinnipeds (seals), at least 10 of sharks and rays, and dugongs. The report called for a national database to be established on the impacts of plastics on marine wildlife.

Dr Jennifer Lavers, who currently works at CSIRO, has studied flesh-footed shearwaters on World Heritage-listed Lord Howe Island. She says seabirds ingest plastic after mistaking it for food. This has been linked to population declines, including the shearwaters on Lord Howe, where the number of breeding pairs has declined by more than 60 per cent since the late 1970s.

'Chicks remain in the nest for 90 days, and it's during this time that the parent birds ingest plastic, and then download it to their offspring,' Dr Lavers says.

'In a number of seabird species, chicks containing large plastic loads were found to be significantly lighter and in poorer body condition compared with chicks who were fed less plastic by their parent, so their chance of survival during the first crucial year at sea was likely to be a lot lower.

'On Lord Howe, up to 90 per cent of flesh-footed shearwater chicks were found to have plastic in their stomachs. This plastic has resulted in ulcers, rupturing of the digestive tract, and contamination of the bloodstream with toxins such as mercury and arsenic, which are used in the plastic manufacturing process.'

Dr Lavers is seeking funding from individuals and corporate bodies interested in investing in seabird conservation and marine debris research in Australia.

Mr Jonathon Larkin from WWF Australia is concerned about the far-reaching effects of the North Pacific gyre, but acknowledges that the solution to the problem lies much nearer to home.

'Marine debris doesn't become an Australian government issue until it reaches Commonwealth waters, and I know of no international efforts to collect marine debris at sea,' he says. 'WWF strongly believes that we need to stop the rubbish getting into the ocean in the first place. Reducing the amount of disposable plastic (eg shopping bags, water bottles, food containers) that we consume is vital.'