

Plastic bags smother benthic marine life

First published 23rd April 2015

Dr David Blockley of SAERI has been collaborating with scientists in Ireland and the UK on new research that shows that plastic litter can smother marine life, dramatically reducing the numbers of organisms – and compromising the ecosystem services they provide – in coastal marshes.

That is the key message to emerge from this collaborative study led by Dr Dannielle Green, a Research Fellow in the Biogeochemistry Research Group at Trinity College Dublin. Dr Green is the lead author on a paper just published in *Environmental Science and Technology*, which describes the worrying ecological effects of discarded plastic carrier bags.



The experiment showed that in just nine weeks plastic bags smothered the surface of coastal sediment, preventing oxygen and nutrient flow, and blocking light. This caused a substantial reduction in the amount of 'microalgae' beneath the bags. These tiny algae form the base of the food webs in these habitats, which means their proliferation is important for animals higher up the food chain, including worms and bivalves, which, in turn, are food for commercially important fish which feed within the marsh when the tide is in.

Because some of the animals affected during this study are known to be hardy and resilient to other types of pollution, other, more sensitive groups of animals like those living in coral reefs could be more strongly affected from smothering by plastic waste.

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Dr Green said: "The same effects were there regardless of whether the plastic in question was biodegradable or not. While biodegradable plastics are produced because they are thought to be better for the environment because their persistence is shorter, our study suggests that the rate at which they break down may not be fast enough to have any meaningful advantage over conventional bags in marine habitats."

Professor Richard Thompson, Plymouth University, is co-author on the paper and has been working on the effects of marine litter for over 20 years. He said: "It is widely recognised that plastic litter can be harmful to individual organisms; but a key new finding of our current paper is that even within a matter of weeks this litter can affect communities of organisms and the services and food they provide to others."

He added: "Plastics bring many societal benefits, but it is also clear that accumulation of end-of-life plastics represents a waste management problem. Experimental evidence on the effects of plastic debris – in this case single-use plastic bags – in the natural environment is very important to help inform appropriate legislation."

Globally the production of plastic has increased from 1.5 million tonnes in the 1950s to around 300 million tonnes in 2013. Of this, single-use packaging items account for almost 40% and a not-insignificant portion could end up in the marine environment as litter, transported via wastewater flows, inland waterways, wind or tides. Worryingly, plastic litter currently accounts for up to 80% of all litter found in marine habitats.

Dr Green added: "Even if plastics degrade and seem to 'disappear', they persist as micro-plastics and could cause harm to marine organisms that ingest them."

"The potential for rapid effects coupled with the persistence of plastic debris, including plastics described as 'biodegradable', emphasises the need to focus on reducing and re-using plastic and subsequently recycling, rather than designing materials with enhanced degradation. These could lead to inappropriate disposal and further accumulation in marine environments as well as compromising recycling streams."

According to Dr David Blockley "Even though this research was carried out in the Northern Hemisphere, far from the South Atlantic Territories, it does have implications for us. Single use plastic packaging is a fact of life for the territories where so much is shipped in and contained in plastic and where we do not have the facilities to recycle it. More worrying is the potential for



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long range transport of plastic across the oceans to our shores, something we have no control of.”

This research has directly led to a new proposed research programme involving collaboration between SAERI and Trinity College Dublin. Dr Green is planning to visit Ascension Island and the Falkland Islands later this year to work with Dr Blockley looking at macro- and microplastics distribution in the waters around the islands. This research will not only give valuable information on potential ecological risks to these sensitive marine habitats, but will also provide an insight to potential long range transport of discarded plastic to remote island habitats.

For more information:

<http://cen.acs.org/articles/93/web/2015/04/Plastic-Bags-Cut-Wildlife-Populations.html>

<http://www.thejournal.ie/plastic-bag-marine-life-2060845-Apr2015/>