

## What are microplastics?

Defined as being less than 5mm in size and observed down to the nanometer scale (small enough to have multiple particles within even a single cell), microplastics are ubiquitous across the marine environment, and at scarily high concentrations (100 000 particles in a single litre of water have been recorded at some industrial areas, although this is much higher than the concentrations found more generally). Estimates put the total amount of floating microplastics at 7000–35 500 tonnes. On top of this are all those that have sunk to the bottom of the ocean, washed up on beaches or have accumulated inside marine organisms.



Microplastics in the Chesapeake Bay Watershed  
(Photo credit: CC BY-NC 2.0/ URI: <https://www.flickr.com/photos/29388462@N06/16999300502>)

## Where do they come from?

The main problem with plastics is that they are designed to not break down. Although **larger items of plastic litter** do disappear over time, this is largely the result of them being broken up into smaller and smaller fragments –eventually becoming microplastics.

The synthetic materials used to make **clothing** are types of plastic and in a single wash, just one fleece can release nearly 2000 fibres. Every second, it is estimated that laundry water is adding around two billion microplastic fibres into Europe's waters alone. These enter the ocean through poor wastewater management.

Spillage of the tiny pellets used as the base material in the **manufacture of nearly all plastic products**, deliberate addition of pellets to water to act as a **scrubber in cleaning processes**, and, in the same way, addition of microplastic beads to **personal care products** (face and body scrubs, toothpaste etc.) to act as a scrubber are all sources of primary microplastics in to the marine environment.

## The 'missing' microplastics

Estimates for plastic breakdown range from 100s to 1000s of years, but with large-scale plastic production having only been widespread for around 60 years, these are approximations. Based on the measured quantities of larger plastic litter, known breakdown rates to microplastics, and measured quantities of microplastics, it is clear that a **large proportion of the expected microplastic particles are 'missing'**. So where are they?

- Could the rate at which plastics break down accelerate over time, or as the particles get smaller? This would be a good thing!
- Colonisation of plastic by biota can make the particles dense enough to sink to the ocean floor, where they can still be harmful.
- A number of organisms consume microplastics, either deliberately or accidentally, but we don't know to what extent.



Pre-production plastic pellets  
(Photo credit: NOAA Marine Debris Program)



The stomach contents of a dead albatross (Photo credit: NOAA Marine Debris Program)

## Why should we worry?

### The problem of consumption

Animals ranging from shellfish to whales have been found to have eaten microplastic particles, with suggestion that some may even be deliberately selecting plastic to consume. Algae can act a bit like a magnet for microplastics, which is both bad for the algae (blocking out the light it needs to make food) and for the animals that eat the algae. Microplastic contamination has been found in the flesh of mussels and oysters intended for human consumption: are we eating microplastics?

**Physical injury:** By accumulating in guts and stomachs, they can cause blockages, as well as limiting the amount of real food the animal can consume. They can also entangle smaller organisms.

**Poisoning:** Many plastics contain toxins and also attract and bind to many other pollutants found in the water, concentrating them to potentially dangerous levels. These chemicals can then be released after ingestion, threatening the health of the organism.

### The problem of rafting

Amongst the species found on microplastics are some that cause illness in humans and marine animals (eg. *Vibrio spp.* bacteria). Meanwhile, microplastics and their inhabitants are often carried long distances across the world in ocean currents. This can introduce them into ecosystems in which they are not currently present, and where they could have a negative impact.

## What actions can society take?

- **Avoiding products containing microplastics.** Websites like [beatthemicrobead.org](http://beatthemicrobead.org) provide country-specific lists of guilty (and safe) personal care products, while items of clothing should specify their material on the washing label. You can even fit filters to your washing machine to catch plastic microfibers before they enter the water system.
- **Reduce your plastic waste.** Even if you dispose of it correctly, wind, poor waste management and other factors can still cause it to end up in the marine system. Avoid single-use plastic products and those with excessive packaging and look for ways to avoid plastic where possible.
- **Push for government and business action** through purchase choice and your voice as a voter. The Netherlands and Canada have already moved to ban microbeads, along with eight US states, and the Netherlands, Austria, Belgium and Sweden are calling for an EU-wide ban in detergents and cosmetics.
- Perhaps most importantly, **spread the word!** The more people aware of the problem and taking action, the stronger the push for change.

## How is A Rocha helping?

A Rocha's Mediterranean Marine Project makes microplastic pollution one of its focal areas. Monthly sand samples are collected from the Camargue to determine the quantity of microplastics present and how this changes over the course of the year. Through partnerships with other research institutions and NGOs, these samples will ultimately be able to feed into a Mediterranean-wide microplastics programme. This research will generate a better picture of the sources of microplastic pollution in the Mediterranean.

These sampling events are open to volunteers and public participation, acting as a base for environmental education and building awareness amongst local and international communities.

## Further information:

[www.beatthemicrobead.org](http://www.beatthemicrobead.org)  
[www.plasticsoupfoundation.org](http://www.plasticsoupfoundation.org)  
[www.5gyres.org](http://www.5gyres.org)  
[www.meriresearch.org/focus/plastics-and-microplastics](http://www.meriresearch.org/focus/plastics-and-microplastics)