

Science for Environment Policy

Microplastic particles in North Sea could harm marine organisms and enter human food chain

Researchers have discovered high levels of plastic particles and fibres, as well as black carbon (BC), which is formed by the incomplete burning of fossil fuels, in the waters of the Jade Bay, an inshore basin off the coast of Germany in the Southern North Sea. The concentration of suspended particles are of concern because they have the potential to be ingested by fish and other marine life, and enter the food chain.

Marine pollution caused by plastic debris is a global environmental problem. There is growing concern about [microplastics](#) – particles under 5mm in diameter, in the [marine environment](#), because they have been found in fish and mussels, as well as larger marine animals, including birds and seals. Microplastics can be formed when UV radiation or abrasion by sand breaks down larger pieces of plastic. They can also enter the marine environment as an ingredient of products including cosmetics and cleaning agents. BC, which accelerates climatic warming, enters the marine environment primarily by urban runoff and atmospheric deposition.

Much existing research documents the presence of microplastics and BC in sediments, but this is one of only seven studies to consider the presence of these particles suspended in the water column, where they have the potential to enter the food chain.

The researchers took surface water samples of 100ml at 20cm depth along a transect from the inner to the outer part of the Jade system between June and November 2011. They filtered and then dried the samples to count the number of suspended particles from each one.

Along the transect, they found an average concentration of 64 +/- 194 plastic particles per litre (L), 88 +/- 82 fibres/L and 30 +/- 41 BC particles/L. Maximum numbers found were 1,770/L for particles, 650/L for fibres and 330/L for BC particles. Particles were more concentrated in the inner part of the system, while fibres were found in greater numbers in the outer part. BC was distributed more uniformly. Sources of freshwater flowing into the Jade Bay, including sewage treatment plant effluents, contained microplastics. BC was only found at two of the discharge points.

The high level of variability in concentration of microplastics between samples suggests that they have a very uneven distribution within the study area. From the data, the researchers were able to tentatively identify the sources of the particles. The data suggest that, at least in this area, the primary sources of microplastics in the marine environment are land-based. Sea-based sources, for example, abraded ropes used in boating, are a likely source of the higher numbers of fibres in the outer area, but are relatively minor.

The researchers raise concern about the high numbers of suspended microplastics, which could have a negative impact on filter-feeders, such as mussels and oysters. These organisms play a vital role in the marine ecosystem. They are also, alongside fish, a food source for humans.



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