

Microplastics factsheet

Q. What are microplastics and where do they come from?

A. Microplastics are small particles of plastic with a diameter of less than 5mm. Most of the microplastic waste in the environment is made up of fragments from large pieces of litter such as plastic bags, bottles or packaging. These are known as secondary microplastics.

Primary microplastics are items that have intentionally been manufactured in a small size, such as microfibers from clothing, microbeads and plastic pellets (also known as nurdles).

Once released into the environment, microplastics are practically impossible to remove and will remain there for hundreds, if not thousands, of years.

Particles can be transported in the environment and can be further broken down into smaller fragments, spread over a wider area, thereby increasing the risk of organisms' exposure to microplastics.



Q. What research is the UK Centre for Ecology & Hydrology doing into microplastics?

A. Researchers at UKCEH are interested in investigating the points at which plastics first enter the environment, how they are transported and may change in the environment (e.g. degrade or are covered by microorganisms such as bacteria and fungi) and how they may affect terrestrial and freshwater organisms. This includes studying the impacts of microplastics on survival and fertility rates among small freshwater invertebrates and earthworms.

A [study](#) by our scientists in 2016 provided the first evidence of microplastic particles in UK freshwater environments, with major sources being synthetic fabrics (largely from washing machine wastewater), packaging products and road-marking paints. UKCEH completed the first comprehensive UK-based assessment of microplastics in the water supply chain.

Other areas of research include investigating the transportation of pesticides on microplastics; the chemical leakage rates from plastic particles in the environment; and improving analytical methods for finding microplastics in environmental samples.

Q. How do microplastics get into our rivers and seas?

A. Plastic waste gets into water courses by:

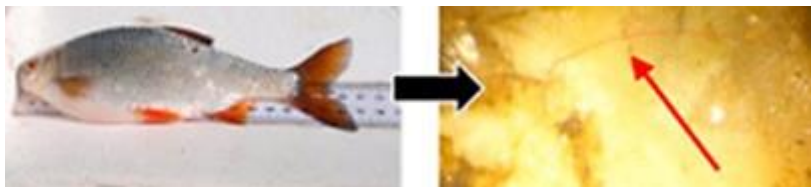
- Direct littering and later fragmentation
- Wastewater effluent
- Surface runoff (e.g. from roads and agricultural land) into soils, lakes and rivers.
- Transportation by wind
- Maritime activities – i.e. fishing and shipping – caused by lost fishing gear, cargo and other litter

Q. How do microplastics get into our soils?

A. While the problem of plastic in our oceans is well documented, there is significantly more plastic waste entering terrestrial environments. Each year it is believed up to 910,000 tonnes of plastic waste is released on to land in the UK – 23 times the amount estimated to be deposited into the sea. Sources include direct littering, atmospheric deposition, use of plastic sheeting in agriculture, sewage sludge and some forms of compost that are applied to land.

Q. What is the impact of microplastic waste on wildlife and ecosystems?

A. Many studies across the world have shown that organisms are ingesting microplastics, including a [study](#) by the UK Centre for Ecology & Hydrology which found fibres in the gut of freshwater fish in the River Thames, *pictured*.



There is some evidence to show microplastics can have harmful effects on organisms, hindering their ability to feed, grow, reproduce and defend themselves against predators, with effects likely to vary between types and sizes of microplastics. Most research so far has only shown effects where very high levels of microplastics – not necessarily representative of those found in the environment – have been used.

The majority of scientific studies to date on the impact of microplastics on wildlife have focused on aquatic wildlife, particularly crustaceans, fish and molluscs. One of the few but growing pieces of research into the impact plastics can have on soil organisms, a [hazard study](#) by UKCEH, found that at high concentrations, microplastics can reduce worms' fertility by up to 50% but do not affect their survival rates.

Q. Do water company treatment plants remove microplastics?

A. A [comprehensive study](#) by UKCEH carried out sampling at UK water treatment plants, which take water from upland reservoirs, aquifers or rivers and turn it into drinking water. It found the plants removed 99.9% of microplastics but particles may subsequently get into water that people drink through pipes, air and clothing. Meanwhile, testing at wastewater works that treat raw sewage before discharging effluent into rivers found these treatment plants remove 99% of microplastics, leaving typically five particles per litre released into rivers. Microplastics are also likely to get into rivers and seas through discharge of untreated effluent during sewer overflows.

Q. Do humans ingest microplastics and are they harmful?

A. As microplastics are present throughout the environment and can be passed up the food chain, it is known that humans are exposed to them, either through diet, household contamination or the air we breathe. There is little evidence yet about the impact of microplastics on human health and the [World Health Organisation](#) has called for further research into the potential impacts.

Q. What action is being taken to reduce microplastic waste?

A. A number of countries have introduced bans on microbeads in wash-off cosmetic products, including the UK in 2018. The European Chemicals Agency (ECHA) wants to go much further and plans to [introduce a ban](#) on microplastics in products sold within the EU. This would cover a wide range of products – from detergents and controlled-release fertilisers, to leave-on cosmetics and paints. ECHA estimates that, if adopted, its planned restriction could reduce emissions of primary microplastics in EU countries by at least 85%, preventing the release of 400,000 tonnes of plastic waste into the environment over 20 years.

Measures to reduce plastic use will also result in less microplastics in the environment, because over time there will be less waste disintegrating in the environment. Restrictions on single-use plastics such as plastic straws and cotton buds are coming into force in Scotland and England, while many businesses are using alternative materials to plastic packaging, plus increasing the price of plastic bags to deter shoppers from buying them.

Q. What are nanoplastics?

A. This term refers to plastic particles that are extremely small – below 0.0001mm in diameter. UKCEH is working on improving analytical techniques because, at present, it is hard to detect these items using existing methods. Other areas of research include looking at the fate and toxicity of nanoplastics.