

Plastic between your toes

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Credit: Leiden University

Plastic is everywhere. This is in short the key outcome of a study by bachelor's student Froukje Lots and her supervisor Thijs Bosker. They found that every kilogram of sand on European beaches contained on average 250 fragments of microplastic. In some locations the number can be even higher, a spot in Iceland had 700 microplastics per kilogram, in Italy it was as high as 1,500 per kilogram. Bosker has already found relatively high levels in the Netherlands, with 500 fragments per kilo on the beach near to The Hague.

These findings were part of a larger-scale investigation of microplastics on European beaches. The researchers, both of whom are affiliated to Leiden University College and the Institute of Environmental Sciences at

Leiden University, analysed a total of 23 locations in 13 different European countries. They published their findings in the journal *Marine Pollution Bulletin* on 12 October. "Our research shows that these microplastics are present on all beaches we sampled," said Bosker, Assistant Professor of Ecotoxicology. "If you fill an espresso cup with sand, it will contain easily twentyfive pieces of plastic, with the number of fragments changing according to the location."

In their research Lots and Bosker used a citizen sciences to collect samples. Via their website and social media channels the public was invited to collect sand around Europe. Their request met with an enthusiastic response, from colleagues and friends, as well as from other [beach](#)-goers throughout Europe. Lots and Bosker also used the extensive international network of Leiden University College. As a result they were able to include a large number of European beaches in their research.

"The citizen science approach was made possible because we previously developed a new standardised method to collect and extract samples from sand," Bosker said. "Until recently there was a lot of variation in how we determined levels of microplastics. For example, different types of salt-solutions were used for separating the sand and plastic, and some researcher collected sand at high tide line on beaches, while others collected it close to the low-tide line or the dunes."

Due to these variations in collection and extraction, it was like comparing 'apples with oranges," according to Bosker. Earlier this year, Aiken Besley, another of Bosker's bachelor's students, devised with a standardised method for analysing levels of microplastics on beaches. His research showed that the way sand samples are collected has minimal impacts of study outcomes, while differences in extraction methods in the lab are the major source of variation. Bearing in mind a few basic rules, there's little that can go wrong when collecting sand on

beaches. Bosker: "That's why this project lends itself so well to citizen science. With minimal resources, everyone can collect [sand](#) samples on beaches, and this way make a contribution to science."

Bosker is currently working on a follow-up study on the amounts of plastic on beaches along the Dutch coast and in the Caribbean region. As well as investigating the distribution of microplastics in the environment, his group is also studying how they might impact organisms. "It's also important to consider whether microplastics actually are a problem for the environment, so we are conducting experiments to find out if microplastics cause negative effects on plants and animals," Bosker explained. "Just because we see a lot of microplastics on beaches doesn't necessarily mean it impacts organisms. More work will be needed to see if we should be worried about the ecosystem health implications of microplastics."

More information: Froukje A.E. Lots et al. A large-scale investigation of microplastic contamination: Abundance and characteristics of microplastics in European beach sediment, *Marine Pollution Bulletin* (2017). [DOI: 10.1016/j.marpolbul.2017.08.057](https://doi.org/10.1016/j.marpolbul.2017.08.057)

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