

Micro- and nano-plastics: Identifying key research needs for environmental and human health assessment

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Microplastics (MPs) and nanoplastics (NPs) are ubiquitous in the environment due to (1) the increasing amount of plastic products being produced and used and (2) improper handling of plastic waste. Yet, MPs and NPs can pose a significant risk to environmental and human health as they can easily be ingested by numerous species and humans through direct or indirect pathways. Moreover, MPs and NPs often co-occur with various contaminants leading to complex exposure scenarios. The single and joint effects resulting from co-exposure of MPs and NPs and other pollutants to organisms have been intensively studied in recent years. However, according to our analysis of 168 candidate publications, only about one fifth of the publications used concentrations that are environmentally relevant or within range of environmental concentrations currently measured. Furthermore, despite the wide diversity in composition, shape and size of MPs and NPs, polystyrene is the most frequently investigated polymer, and it has been used in almost 65% of the publications. In terms of shape and size, most studies focused on spherical particles with an average size between 100 nm to 10 µm. As such, research on MPs and NPs is heavily biased in terms of particle composition, shape and size. In order to provide useful information and key points for environmental and human health policy, novel research is needed to perform relevant effect studies which account for (1) relevant concentration ranges observed in the various environmental compartments and (2) the importance of shape, size and plastic composition of the particles on the (test) organisms.

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