

What Do We Know About the Ecological Impacts of Microplastic Debris?

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Marine plastic debris is a global conservation issue, raising concerns regarding ecological impacts. In the past, the focus of scientists was largely on macroplastic, whereas today it has shifted to microplastics. We examined the weight of evidence regarding perceived and demonstrated impacts of marine debris in general via a systematic review of the literature across 13 levels of biological organization (subatomic particle, atom, small molecule, macromolecule, molecular assemblage, organelle, cell, tissue, organ, organ system, organism, population, and assemblage). There were 366 perceived impacts across all levels of biological organization. Many were hypothesis-driven studies, wherein >83% were demonstrated impacts largely due to plastic debris. Overall, impacts were largely demonstrated at suborganismal levels of biological organization due to microdebris (<1 mm), while impacts at higher levels of organization (i.e., organism and above) were largely due to macrodebris (>1 mm). Decision-makers globally are requesting evidence of ecological harm to build effective policies. Here, we discuss the results and implication of our study with a focus on microplastic debris. In addition, we highlight some of the work on microplastic that has been published since completing our review (Rochman et al., 2015).

While we agree that further information is needed to fill research gaps and provide assessments of ecological risk, our results suggest that there are several lines of evidence that plastic debris causes impacts across multiple levels of organization, including ecological.

REFERENCE

Rochman, C.M., Browne, M.A., Underwood, A.J., van Franeker, J.A., Thompson, R.C., Amaral-Zettler, L.A., 2015. The ecological impacts of marine debris: unraveling the demonstrated evidence from what is perceived. *Ecology* 97 (2).