Combined impacts of micoplastic type, concentrations and nutrient loading on freshwater communities and ecosystems

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Abstract

Microplastics are now ubiquitous in freshwater environments. As most previous research has focused on species-specific effects, little is known about their impacts at higher levels of ecological organization, such as freshwater communities and their associated ecosystem functions. To fill this knowledge gap, an outdoor freshwater mesocosm experiment was used to determine the effects of (i) microplastic type: conventional versus bio-based biodegradable (ii) concentration of microplastic particles and (iii) nutrient enrichment in 40 outdoor pond mesocosms. The independent and interactive effects of these treatments on pelagic community structure (taxonomic richness and composition) and ecosystem functioning (phytoplankton standing stock, periphyton productivity and leaf litter decomposition) were assessed. Neither taxonomic richness, community composition, phytoplankton standing stock or aspects of ecosystem functioning were affected by exposure to the experimental treatments. These findings indicate that predicted negative impacts of microplastics indication by laboratory studies may not readily be realized at the ecosystem scale.

Keywords: Biodegradable, ecosystem, level responses, experimental outdoor mesocosm, microplastic pollution, multiple stressors, nutrient enrichment

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