
Ecotoxicological effects of microplastics in the marine environment

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Abstract

The inherent toxicity linked to plastic ubiquitous presence in the environment has received a growing interest in the last decades. Even though laws, policies and scientific projects addressing plastic pollution and its impact have recently flourished, very few concerned plastic risk assessment (i.e. linking plastic exposition and their effects on ecosystems). Our objective was to provide a critical view of the current state of the art of microplastic toxicity studies and their potential limits in order to develop relevant risk assessment.

On the basis of more than 50 scientific articles, we synthesized the observed impact of microplastics at the molecular, cellular, organ, individual and population levels. We underlined the scarce number of organisms tested and the limited amount of ecotoxicological studies on communities in their natural environment. This review also emphasized on methodological limits of toxicity tests, generating a partial assessment of the impact of microplastics on marine organisms. Indeed, several biases such as concentration, size, shape, chemical composition and weathering characteristic of plastic were recorded. Moreover, the impact of biofouling and adsorption of pollutants on plastic surfaces remain poorly explored.

Relevant standards to evaluate plastic toxicity are missing, hindering an effective risk assessment that is representative of the fate of more than 5,300 grades of plastics that potentially enter a wide variety of ecosystems.

Keywords: toxicity, plastic, ecotoxicology, risk assessment

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