Title of Research:

20-6-04

Development of a conceptual model for environmental risk assessment of microplastics and a trial risk assessment in Tokyo Bay

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Summary of Research:

The purpose of this study project is to review the existing domestic and international literature for environmental risk assessment of microplastics (MPs), to develop a conceptual model that concretely shows the risk assessment procedure of MPs, and to conduct a trial risk assessment for Tokyo Bay. In FY2020, we have reviewed a couple of assessment documents published by international organizations and the latest literature, and presentation materials found in academic conferences (SETAC Europe, SETAC North America, Water Environment Society of Japan). We have exchanged opinions with MPs experts to understand current research challenges. After reviews and discussions among co-researchers, current problems and challenges in conducting environmental risk assessment of MPs were identified under six categories, i.e., MPs in the ocean, emission estimates, exposure analysis, analysis and measurement methods of MPs, hazard assessment, and environmental risk assessment case studies and critical reviews. The key elements identified include lack of knowledge on the origin and formation mechanism of MPs in the ocean, determination and validation of emission factors necessary for estimating environmental emissions of various MPs, characterization of MP types, sizes, shapes, lack of information on vertical distribution of MPs in water and changes in density of MPs, lack of standard measurement methods for MPs, and lack of ecological relevance between toxicity tests and the real environment, and the need to clarify the purpose and target of the assessment. In addition, a draft framework for the environmental risk assessment of MPs was developed in order to propose a conceptual model that shows specific procedures for risk assessment considering the characteristics of MPs. In the next fiscal year, while reviewing the latest findings that will contribute to the environmental risk assessment of MPs, we will examine the methodology at each stage of the risk assessment, determine the important parameters, and start the trial risk assessment for Tokyo Bay.

Timeline:

March 1, 2020 - February 28, 2021

Topics:

Oral presentation at JCIA LRI Annual Workshop 2020 “Development of a conceptual model for environmental risk assessment of microplastics and a trial risk assessment in Tokyo Bay” (On-line, August 21st, 2020)

Publications:

Wataru Naito (2020) Challenges to Environmental Risk Assessment of Marine Plastics and Microplastics. BIOINDUSTRY 37(9): 40-49 (In Japanese)