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Occurrence of Microplastics in the Asian Freshwater Environments: A Review

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Abstract

Microplastics pollution has become a worldwide common problem. Despite the growing numbers in researches regarding the microplastics, the understanding of microplastics in the freshwater environment are still less. This paper overviews the present knowledge and findings on the occurrence of microplastics in water and sediment of the freshwater environments in Asia. The review also covers the size distribution, polymers, morphological characteristics and sources of microplastics to the freshwater systems. Perspective of the adsorption of heavy metals on the microplastics to the freshwater systems are also discussed in this review.

Keywords: Microplastics; Heavy metals adsorption; Freshwater environment; Plastic pollution

Introduction

Plastic pollution has become one of the greatest problem worldwide due to its adverse effects. Municipal wastes from heavily populated urban areas, industrial untreated wastes, and land activities are the major sources of plastic pollution in the freshwater environment. Plastics have been used extensively for many purposes due to their durability, low cost and resistance to corrosion [1], thus, increase the plastic demands over years. Plastic wastes were estimated to be around 42 – 79 million tonnes in Asia [2], and according to the World Bank [3], Southeast Asia countries (i.e. Thailand, Malaysia and Philippines) recycle only 18–25 % of their plastic wastes every year. Developed country likes Japan however, recycles about 83 % of their plastics [4]. China which is the world largest plastic producer, only recycles ~30% of their plastics [5]. Some smaller Asian developing countries such as Cambodia, Myanmar and Brunei Darussalam do not recycle their plastic wastes due to having the limited or almost none plastic recycling industries [6]. The plastic wastes mismanagement may pose severe threats to the ecosystem and human health, thus can extensively pollute the water, sediment, soil and air. Natural factors such as wind blowing, water body sizes and their residence times, storm waters, and floods may also contribute to the distribution of plastics in the freshwater environments [7], such as, rivers, lakes and ponds. Once plastics entering the aquatic environment, they are subject to physical, chemical, and biological processes,

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