MICROPLASTICS AS ENVIRONMENTAL THREAT

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Abstract

The reason for initiating this topic is the fact that the presence of microplastic in surface waters has become an alarming global problem. Except in water, microplastics can be found in sediment and soil, but also in groundwaters, bottled waters, sea salt, food from the sea, other foods (for example, honey) and drinks (for example, beer), air, etc. Both national and European regulations do not prescribe determination of microplastics in wastewaters discharged into the environment, as well as in drinking water, food and beverages. Considering the prevalence of the problem it can be expect this item to be entered into the relevant regulations. In addition, the European Marine Strategy Directive requires EU Member States to ensure that by 2020 "the characteristics and quantities of waste in the sea do not harm the coastal and marine environment". Preventive action and shared responsibility in combating damage would result in the preservation of biological balance. Regardless the regulations, it is desirable to know the extent of load of sea water and surface waters by microplastic. The production of plastic in the world has increased about 20 times, in the last few decades. Although the most of the used plastic is trying to recycle, a significant part gets to the environment, intentionally or accidentally. World production of plastic surpassed the 320 million tons mark in the 2016. Also, it is estimated that between 5 and 13 million tons of plastic waste leaks into the World´s oceans every year as a result of inappropriately dumped and mismanaged [1]. Sources of microplastics are widespread. It originates from diverse sources and can be broadly classified into land- and sea-based sources. They include: agricultural runoff, urban runoff, stormwater, aquaculture, textiles, tyres, paints, cruise ships, ocean dumping, etc. Terrestrial emissions are the dominant source of microplastics. Microplastics originate predominantly from automobile tire wear, household and laundry dust, industrial processes (e.g., blasting and deflashing of plastics), and through deterioration of surfaces made of or coated with plastic, for example, artificial turf and polymeric paint, etc. Most of these emissions occur in urban and residential areas [2]. Sea-based sources of microplastics are attributed to the fishing, shipping, and offshore industry sectors. Among mentioned sources, wastewater treatment plants are one of the dominant sources of microplastics. In his work Li et al. [3] lists the key results from the microplastics studies on several wastewater treatment plants.

Plastic products are produced to be long lasting and therefore pose a long lasting environmental hazard. When they get into the water, due to a different effects (wind, rain, UV light, mechanical action), the plastic objects are braking to the micro sizes of so-called microplastics (secondary microplastics). In addition, plastic origins from personal hygiene products (toothpastes, washing agents, roll-on deodorants, exfoliating body washes, facial scrubs etc.) gets into the wastewaters as micro-size balls of plastic so-called microbeads (primary microplastics). Microbeads are tiny polyethylene spheres which, contrary to microplastics, do not come from the degradation of large pieces of plastic. Instead, they are manufactured on purpose to be put into consumer products. These tiny plastic microbeads are usually less than 1 millimetre at their largest [4]. Due to their small size as well as small density, they can pass through the wastewater treatment plant and end up in the water in nature. Therefore, their use in the United States, Canada and the United Kingdom is already

prohibited, and a ban is also expected in the European Union. However, the risk of microplastic originating from larger plastic objects is and will remain a big problem for a long time.

Recent researches suggests that plastics can accumulate different pollutants. Based on the literature data, it is believed that the remains of plastics can attract and concentrate up to one million times more pollutants compared to their amount in seawater. Variety of animals living in the water adopt microplastic as food. Ingestion of microplastics by water organisms in most cases is accidental because the particle is often mistaken for food [5]. Microplastics ingested by water organisms can cause chemical and physical harm (hindering mobility and clogging of the digestive tract, inflammation, hepatic stress, decreased growth). The consuption of microplastics is common to a wide range of water organisms, such as invertebrates, mussels, barnacle, sea cucumbers, zooplankton and fishes. Also, turtles, fish-eating birds and mammals can consum microplastics, which can interfere with the food chain as microplastics ingested by organisms in the lower trophic level could pass up the food chain when lower trophic organisms are fed upon by organisms in the higher trophic level [6]. The presence of microplastics in water could lead to contamination of water products that humans use as food. One of such product is sea salt. These particles have also been reported in drinking water. Eerkes-Medrano et al. [7] reviewed studies about findings of microplastics in drinking water (bottled water and drinking water treatment plants). Presence of microplastics in food for human consumption and in air samples has been reported. Thus, microplastics exposure via diet or inhalation could occur, and cause the effects on human health.

Therefore, it is clear that it is necessary to take all measures to minimize damaging impact of microplastics on the environment, human and animal health. What are the solutions? Education and raising awareness about harmfull effects of microplastics on the environment, good management of plastic waste (e.g. recycling), reduce the use of plastic packaging, improve wastewater treatment processes and developing and improving of methods for microplastics detection and analysis

These are things to think about when it comes to the use of plastic and its impact on the environment. First of all, this refers to education, primarily children and young people, in order to raise awareness about the importance of this problem.

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