

Primary and secondary micro-nanoplastics: potential risk for human health and environment

Simonetta PALLESCHI - ISS

Since the advent of the first plastic material early in the twentieth century, the use of plastics is constantly growing worldwide. Plastics are a large heterogeneous family of relatively cheap, malleable, and versatile materials which explains their vast applications in so many sectors of human activities. However, most plastics in use are not biodegradable, reason for why they eventually accumulate into the environment. Micro- and nano-plastic (MNPs) are small plastic particles (typically less than 5 mm and 1 μm , respectively) whose dimensions make them enter the food chain and whose presence in the environment is raising growing concern in the scientific community and it is challenging the regulatory agencies. Microplastics have been detected in soils, oceans, air, freshwaters, food and drinking water. At difference, due to methodological issues, evidences for nanoplastics are scarce although their presence in the environment is considered highly plausible. Based on the source, MNPs are classified in two main categories, namely, primary and secondary MNPs. Primary MNPs are purposefully manufactured to address specific applications (e.g. pellets in industrial applications, additives in fertilizers, polishing agents in detergents and cosmetics) and are released in the environment as such. Secondary MNPs derive from the breakdown of larger plastic waste or debris occurring both in marine and terrestrial contexts. MNPs are very different in chemical composition and properties, size, shape and density, a variety of features making the risk characterisation very complex to determine. The surface adsorption of environmental organic contaminants to MNPs, as well as the intrinsic presence of residual, native chemical additives, further increase the complexity. In this communication an overview is provided of the current knowledge of MNPs sources and occurrence in the global environment, and the related potential risk for both the ecosystems and human health are presented.