

Role of conventional and innovative wastewater treatment plants as potential source of microplastics (MPs): impact in marine coastal ecosystem and process minimization solutions (MICROWASTE).

Global production of plastic has increased over the last 60 years, arising to 300 million tons in 2015. Plastic materials also pose a serious threat to the marine environment when not properly disposed or recycled: almost 10% of annual production ends up into the oceans as a global scale phenomenon, with an estimation of at least 5 billion floating particles for more than 270.000 ton. MPs have been defined as fragments with a grain size lower than 5 mm, manufactured ex novo for their use in cosmetics, industrial, textile or medical applications, or deriving from degradation and fragmentation of macroscopic debris. Once accumulated in marine habitats MPs can be ingested by animals, stored by tissues and cells, providing also a possible pathway for bioaccumulation of hydrophobic organic contaminants, sorbed from seawater, and constituent monomers and plastic additives, with potential negative consequences for marine organism health.

The main inputs of MPs into the sea derive from beaches and land-based sources; in some recent reports, treated effluent from municipal wastewater treatment plants (WWTP) were mentioned as potential sources of MPs in aquatic ecosystems because chemical characterization demonstrated a correlation, in terms of number and typology of MPs, with those extracted from coastal sediments.

The main objective of this project is to report for the first time, a complete survey on the presence of microplastic particles in wastewater plants, their removal during typical or innovative wastewater treatment process, as well as their potential transport to the marine coastal ecosystem.

This aim will be obtained with a multidisciplinary approach integrating environmental engineering, marine biology, ecotoxicology and chemical studies for quantitative and qualitative determination of MPs in WWTPs and marine environment.