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Prevalence of microplastics in the marine environment of Qatar's exclusive economic zone

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Microplastics are now firmly recognized as a ubiquitous and growing global threat to marine biota, as well as their associated ecology and habitats. The prevalence of microplastics in the marine waters within Qatar's Exclusive Economic Zone (EEZ) was investigated. Following sample extraction, microplastics were characterized using Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR) spectroscopy, and the polymer type then verified using OMNIC Spectra Library. Synthetic polymer microplastics were identified in seawater sampled from ten out of twelve marine monitoring stations, with varying shapes and sizes. Granular shaped microplastics present ranged from 120µm to 1.2mm in size, and fibrous microplastic ranged from 150µm to 10mm. Polypropylene (PP), low density polyethylene (LDPE), polyethylene (PE), polystyrene (PS), polyamide (PA), acrylonitrile butadiene styrene (ABS), polymethyl methacrylate (PMMA) and cellophane microplastic particles were identified. Copolymers were also identified from the collected samples, including poly(styrene:vinylidene chloride), poly(ethylene:propylene:diene) and alkyd resin e.g. paint debris. The most numerous type of synthetic polymer microplastic identified was polypropylene, with the greatest concentration found near Halul Island in the north east of the Qatar EEZ, where nearby anthropogenic activities include oil-rig installations and shipping operations. In addition, as part of the investigation, an optimized method was also developed for the extraction of microplastics from seawater samples rich in phytoplankton. The use of 1M NaOH proved to be more efficient digestion treatment than 10M NaOH and 22.5M HNO₃ solutions, as the latter two solutions resulted in structural damage and discoloration of the reference polymers: polyvinyl alcohol (PVA), polyvinyl chloride (PVC), polystyrene (PS), polyethylene (PE), and nylon.

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