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Ecotoxicological impact of persistent organic pollutants adsorbed on microplastics on the marine biota along Indian west coast

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Massive production of plastics globally (300 million tons/year) and its widespread use in the modern era has become a serious environmental concern. Plastics potentially act as vectors for the transport and release of adsorbed organic pollutants. Microplastics and associated persistent organic pollutants (POPs) have largely remained an unperceivable threat to the marine biota affecting over 250 species of organisms in the world. The harmful effects of these pollutants on organisms includes reductions in fecundity, lower feeding rates, reduced ability to remove pathogenic bacteria, reduced energy reserves and balance and decreased lysozyme stability. Consequently, it would impact the socio-economic status by modifying the marine food chain and ecosystem leading to serious health implications. Research in this arena has taken a huge leap recently but unfortunately in Indian scenario, only a few snapshots are available. We undertook first ever comprehensive study on the identification and ecotoxicological impact of microplastics, associated POPs in the coastal Arabian Sea. Our study revealed different types of plastic contaminants i.e., fragments, fibers, films and pellets ranging from 5-100 mm along the west coast of India (Maharashtra, Karnataka and Goa) during 2016. Microplastic pellets (<5 mm), tend to accumulate POPs, easily get transported and enters marine food chain as a xenobiotics. Microplastic pellets with variable colors were abundant (n>250/km) in all the beaches of Maharashtra, moderate amount (n>150/km) were observed along Karnataka coast and lowest abundance were found (n>50/km) along Goa coast. Further analyses and experiments are under progress which will give an insight into the environmental threats posed by microplastics, associated POPs and their toxicity based on their potential to induce oxidative stress in marine organisms particularly commercial seafoods. These findings will enhance our understanding about deleterious impact of microplastics and associated POPs on the marine ecosystem providing crucial information on the complex chemico-biological interplay and will give early warnings of this impending invisible threat.

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