
Persistent organic pollutants (POPs) in plastics and sediments from South Atlantic coastal wetlands, Bahía Blanca, Argentina

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Abstract

This study assessed for the first time the occurrence of legacy persistent organic pollutants (POPs), specifically organochlorine pesticides (OCPs) and polychlorinated biphenyls (PCBs), in plastics ranging from 1 to 25 mm (micro/meso-plastics) and 25 to 100 mm (macroplastics) and sediments from salt marshes at the Bahia Blanca Estuary, Argentina. These ecologically important ecosystems are located in the intertidal zone of a coastal environment heavily impacted by human activity, including deep-water ports, petrochemical complexes, and cities with populations of over 400,000 inhabitants with inadequate environmental management. Results showed that the average concentrations and detection frequency of POPs were substantially higher in the plastics than in the sediments: 167.4 ng/g, 25.2 ng/g and 2.7 ng/g, for micro/meso-plastics, macro-plastics, and sediments, respectively, showing the high capacity of plastics to accumulate organic substances. In regards to the environmental levels of the POPs series, in general PCBs > DDTs > HCHs > HCB > PeCB with independence of the location and matrix. Exceptions emerged close to an open dump and industrial effluents where HCB and PeCB were dominant. The spatial distribution varied depending on the POPs group series and the matrix; however, the levels of DDTs and HCHs were consistently low throughout the sedimentary record. While HCH and DDT were higher in plastics near Maldonado River discharge. Meanwhile, higher PCBs, HCB, and PeCB levels correlated urban-industrial facilities and open dumps. This is the first study on the presence of POPs in plastics from coastal wetlands around the world, as well as the first to assess the association of these chemicals in environmental plastics from Argentina.

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