
COVID-19 effect on plastic pollution: analogies and differences of macro litter surveys at different spatial scales in the Mediterranean Sea

Vincenzo Donnarumma^{*1,2}, Stefano Aliani¹, Marta Azzolin^{3,4}, Ilaria Campana^{5,6}, Alberto Castelli⁷, Alessandro Cau², Roberta Cimmaruta⁵, Matteo Costantino^{3,4}, Roberto Crosti⁸, Marianna Farina⁹, Martina Gregorietti¹⁰, Fulvio Maffucci⁹, Giulia Mainardi⁷, Erica Moura⁹, Andrea Paluselli¹, Eugenia Pasanisi⁸, Marco Pecoraro¹⁰, Eleonora Pignata⁷, Martina Ramazio^{5,6}, Martina Russi¹⁰, Elena Santini⁸, Giancarlo Sarà¹⁰, Giuseppe Suaria¹, Roberta Teti⁹, and Antonella Arcangeli⁸

¹CNR-ISMAR (Institute of Marine Sciences – National Research Council) (CNR-ISMAR) – Forte Santa Teresa, Pozzuolo di Lerici, 19032, Lerici, La Spezia, Italy

²Department of Life and Environmental Sciences, University of Cagliari (UNICA) – Via T. Fiorelli 1, 09126 Cagliari, Italy, Italy

³Department of Life Sciences and Systems Biology, University of Torino (unito) – Via A. Albertina 13, 10123 Torino, Italy, Italy

⁴Gaia Research Institute (GAIA) – Corso Moncalieri 68B, 10133 Torino, Italy, Italy

⁵Department of Ecological and Biological Sciences, University of Tuscia (unitus) – Viterbo, Italy, Italy

⁶CoNISMa - National Inter-University Consortium for Marine Sciences (CoNISMa) – 00196 Rome, Italy, Italy

⁷Department of Biology, University of Pisa (unipi) – via Derna 1, 56126 Pisa, Italy, Italy

⁸Italian National Institute for Environmental Protection and Research (ISPRA) – Rome 00144, Italy, Italy

⁹Stazione Zoologica Anton Dohrn (SZN) – Villa Comunale, 80121 Napoli, Italy

¹⁰Laboratory of Ecology, Department of Earth and Marine Sciences (DiStEM), University of Palermo (unipa) – Viale delle Scienze Ed. 16, Palermo 90128, Italy, Italy

Abstract

During the COVID-19 pandemic, there have been significant drawbacks in the use and management of plastic items, which ultimately accumulated in terrestrial and marine ecosystems. Marine litter distribution and accumulation have been surveyed, partially also during the pandemic period, being one of the descriptors to take into consideration for achieving the good environmental status (GES) for the Marine Strategy Framework Directive (MSFD, 2008/56/EC).

In this work, data were collected within the general agreement among the Italian Ministry of the Environment and Energetic Safety (MASE) and the Italian Institute for Environmental Protection and Research (ISPRA), across the Mediterranean Sea, which is considered as one of the places with the highest concentration of floating litter in the world. Floating

*Speaker

litter items larger than 20cm were recorded by visual surveys using offshore and coastal assessments, carried out from large vessels (ferries) and small-medium vessels, respectively throughout the 2018-2022 period. Litter was categorized by source, characteristics, material and general consumer categories, according to the masterlist produced within the MSFD. Density of items was also calculated (per km²) for a total of more than 5000 km² surveyed. The aim of this work was to compare these two marine compartments and to investigate links to the COVID-19 pandemic. Our results confirm how a continuous, multi-year monitoring over the whole Mediterranean Sea is appropriate to intercept the great variability in the average levels and trends of litter distribution in space and time. Moreover, evidences related to COVID-19 were found, for instance, the noteworthy increase in the contribution of sanitary-associated plastics, during the 2020-21 period. This study revealed the importance of visual monitoring in order to tempestively detect changes in marine litter composition and to assess the original use of marine litter in order to allow policy-makers and stakeholders to promote waste reduction actions.

Keywords: Macroplastics, COVID19, MSFD, Mediterranean Sea