



Will COVID-19 Containment and Treatment Measures Drive Shifts in Marine Litter Pollution?

João Canning-Clode^{1,2*}, Pedro Sepúlveda^{3,4}, Sílvia Almeida¹ and João Monteiro¹

¹ MARE - Marine and Environmental Sciences Centre, Agência Regional para o Desenvolvimento da Investigação Tecnologia e Inovação, Funchal, Portugal, ² Smithsonian Environmental Research Center, Edgewater, MD, United States, ³ OSPAR Convention Intersessional Correspondence Group on Marine Litter Co-convenor, London, United Kingdom, ⁴ Direção Regional do Ambiente e Alterações Climáticas, Funchal, Portugal

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*Correspondence:

João Canning-Clode
jcanning-clode@mare-centre.pt

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INTRODUCTION

The persistence and global presence of plastic materials in both aquatic (Andrady, 2011; Akindele et al., 2019) and terrestrial ecosystems (Al-Jaibachi et al., 2018) has resulted in the conception of a new era—“The Plasticene” (Reed, 2015). The idea of a “Plasticene” era has been receiving growing support in recent years as research confirms the long-term persistence of plastic pollution and contaminants in the marine environment and suggests that discarded plastics can be traceable through future fossil records (Corcoran et al., 2014). Researchers are still finding new forms of plastic pollution and contamination worldwide (Gestoso et al., 2019; Haram et al., 2020), but one thing is clear: tackling plastic pollution in the marine environment requires concerted strategies and strong actions from policy makers and stakeholders on a global scale. Indeed, several efforts are already in place at the international, regional, and national levels, with several instruments [e.g., United Nations Convention on the Law of the Sea (UNCLOS), United Nations Environment Programme (UNEP), Regional Sea Programme, and the European Union Marine Strategy Framework Directive (MSFD)] being developed in recent decades to reduce and manage marine litter (Chen, 2015).

The incessant and growing delivery of plastic trash and debris to our oceans is recognized now as one of the most relevant pollution problems across the planet, impacting marine life through its ingestion, entanglement, or suffocation (Kühn et al., 2015; Rochman et al., 2016; Villarrubia-Gómez et al., 2018). In addition, marine litter is now considered a growing vector for the introduction of non-indigenous species with transoceanic rafting, potentially amplifying species invasions at a global scale (Carlton et al., 2017) and can promote microbial colonization by pathogens implicated in outbreaks of coral disease (Lamb et al., 2018).

In recent years, discussions and debates regarding marine litter have intensified around the globe. Governments, industries, scientists, and the public are increasingly seeking strategies and policies to respond to marine plastic pollution by reducing or banning single-use plastic (SUP) (Chen, 2015; Newman et al., 2015; European Commission, 2018; Tiller et al., 2019; UNEP–United Nations Environment Programme, 2019). In 2018 alone, environmental actions have reached hundreds of millions of people, with countries and several companies making commitments to ban SUP, which estimates suggest will represent 80% of all marine litter, by 2025 (UNEP–United Nations Environment Programme, 2019).

A NEW CHALLENGE

In late 2019, reports emerged of a new coronavirus in China (Chen et al., 2020) that rapidly transformed into a global pandemic with millions of infections and hundreds of thousands of casualties worldwide (e.g., 16.5 million infections and 650 thousand deaths as of 28 July 2020; Dong et al., 2020; WHO, 2020a). This COVID-19 outbreak represents one of the first global pandemics of a highly contagious disease in an era when plastics and disposable items are widely used. Globally, regulations and health recommendations in many countries currently require the use of disposable personal protective equipment (PPE) in professional health care, home care (WHO, 2020c), and the general population (WHO, 2020b) and the use of disposable items (e.g., bags, containers, cups, and plastic cutlery) for restaurants and other businesses to operate safely. As a result, and without clear instructions and disposing systems in place, numerous media outlets worldwide have been reporting on the surge of masks, gloves, visors, and other PPE and SUP items being found in beaches, coastlines, and rivers (e.g., CGTN, 2020; CNN, 2020; Euronews, 2020). This suggests that the wide use of PPE and the improper disposal of these single-use items may shift the main sources of marine litter pollution and potentially promote a spike in plastic pollution in the near future.

The growing use of PPE and its inappropriate disposal, therefore representing a new type of SUP, can be illustrated by our Internet query focused on “News” reports. To verify a possible trend in the use of PPE and littering, we conducted a search on “Google News” for news published online between January 2018 and May 2020 that included the criteria “PPE” OR “Personal Protection Equipment” AND “Litter.” Independently, we also conducted a similar query with the phrase “Marine Litter” to assess a possible correlation with the previously described search. These queries were conducted in English and the number of hits under the link “news” were registered on a monthly basis.

The results of this Internet query indicate that: (i) the number of news items focusing on “marine litter” fluctuate with no discernible pattern between 2018 and 2020; (ii) there is a similar fluctuation in the news associated with “PPE” and “litter,” which seems to follow the fluctuation of those on “marine litter” for the period from January 2018 to December 2019; and (iii) there is a massive increase in the number of news reporting “PPE” and “litter” in 2020 (Figure 1). More importantly, this increasing trend in news related to PPE and litter seems to have taken off after the first COVID-19 reports in December 2019 and increased significantly during the period when most countries enforced containment measures (i.e., in March–April 2020 when mandatory confinement, travel bans, border closing, and lockdowns took place). Interestingly, there is also a spike in the number of news during the month of May, when several countries started softening confinement measures and people were allowed to circulate more freely, allowing the public to use recreational areas and, in many cases, with requirements to use masks and/or other PPE. The queries do not provide robust data for the analysis of trends in litter contamination or composition, but they do illustrate an increase in the public

concern toward the issue and that poor PPE disposal as a source of litter contamination must be considered.

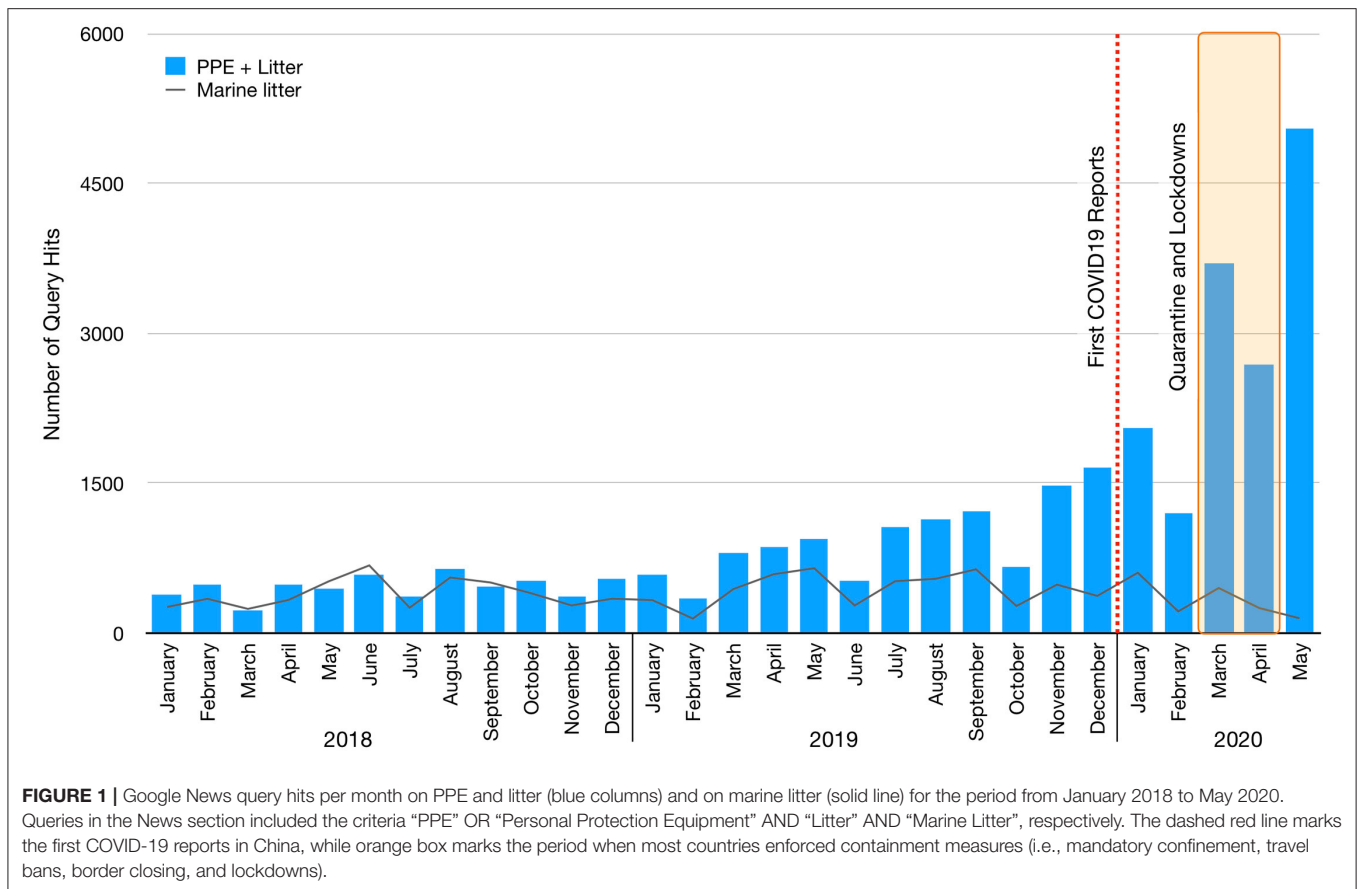
DISCUSSION

The COVID-19 global pandemic is now considered the most significant global health crisis to date in this century and the greatest challenge for the human population since World War II (Chakraborty and Maity, 2020). In addition to being a global health calamity, the COVID-19 pandemic will have severe economic, environmental, political, social, and cultural implications (Chakraborty and Maity, 2020).

While human health management requires full dedication and new practices, it is equally necessary to recognize that this global pandemic is promoting a global increase in the use of PPE and other SUP items, which in turn will likely become sources of plastic pollution, magnifying marine litter issues and the consequences to marine biodiversity. Inappropriate waste management practices and poor disposal of SUP and other plastic items are two of the key aspects of the growing marine litter problem (Chen, 2015; Newman et al., 2015; Tiller et al., 2019; UNEP–United Nations Environment Programme, 2019), making the scale of the current news and media reports on discarded PPE worrisome relative to the concerted efforts to tackle plastic pollution in the marine environment.

In this context, and considering the current need for single-use and disposable items during this global pandemic to minimize unintended consequences, stakeholders and policy makers must advance new “green” solutions and recycling streams of PPE and other SUP items. With many countries taking action to reopen their economic activities, we urge all stakeholders—international organizations, regional conventions, and national governments—to: (i) maintain a firm and steady course, not relieving or postponing any target or expected timeline implementation for previous agreements, measures, or goals (e.g., action plans signed under UNEP Global Partnership on Marine Litter, EU Strategy for Plastics in the Circular Economy, EU Single Use Plastic Directive, and Paris Agreement) to avoid major setbacks in marine litter and circular economy achievements and (ii) promote adequate recycling streams and waste management (e.g., the EU revision process of the Packaging and Packaging Waste Directive) at a time when the global use of PPE and other SUP has increased exponentially.

Finally, it is equally important to consider that ongoing marine litter monitoring programs [e.g., OSPAR Commission, MSFD, UNEP, and National Oceanic and Atmospheric Administration (NOAA)] were likely affected by this COVID-19 outbreak, with many countries forced to stop their field campaigns. This interruption will likely lead to time gaps between having monitoring data available and the ongoing intensification of the problem of PPE and SUP litter. Moreover, to the best of our knowledge, disposable PPE such as gloves, masks, visors, and other equivalent items are not included in marine litter monitoring programs for beaches, rivers,



and seafloor as specific categories (UNEP et al., 2009; Opfer et al., 2012; European Commission, 2013; Lippiatt et al., 2013), which may lead to an undiagnosed source of pollution if the current litter classification tables are maintained. We therefore support litter monitoring programs in different regions to include specific categories for PPE items in order to properly identify litter sources, which is essential in designing solutions to reduce plastic intake in the environment and in assessing the indirect impacts of the COVID-19 outbreak in marine ecosystems. Our recommendation to quickly adjust monitoring programs includes not only updating the lists of litter categories but also preparing monitoring teams (i.e., staff, researchers, volunteers, and citizen scientists) for the potential increase in PPE litter and how to adequately deal with these items that may be potentially contaminated with COVID-19.

The COVID-19 global pandemic has already made significant impacts on many aspects of people’s day-to-day lives and their overall livelihood. It is the authors’ opinion that action must be taken swiftly to address the rise in PPE use and other potential sources of marine pollution resulting from the current health recommendations.

AUTHOR CONTRIBUTIONS

JC-C and JM: conceptualization, methodology, writing—original draft preparation, and writing—review and editing. PS: conceptualization, writing—original draft preparation, and writing—review and editing. SA: methodology. All authors contributed to the article and approved the submitted version.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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