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Prevalence of microplastics in the ocean in Latin America and the Caribbean

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ABSTRACT

The release of microplastics to the ocean is an increasing global environmental concern. The specific characteristics of the Global South (e.g., widespread mismanaged waste and wastewater) make this an even greater challenge. The current study performed a critical review related to the prevalence of microplastics in the ocean in Latin America and the Caribbean, analyzing also the possible sources of microplastics release to the marine environment. A majority of the studies assessed point towards mismanaged waste, inland or offshore, as well as mismanaged wastewater as critical sources of plastic pollution into the ocean. However, there is a need to delve into the effects that these microplastics are generating on local biota and human health.

Introduction

Marine litter has become a major environmental matter of concern worldwide in recent years (Schnurr et al., 2018). Despite the existence of some marine-related activities that release litter to the sea (e.g., fishing or tourism activities on cruise ships), research on the origin of marine waste has identified terrestrial sources as the main responsible of this accumulation in the oceans (Jambeck et al., 2015; Schmidt et al., 2017). Marine litter is mainly composed by plastic polymers, due to their widespread use in packaging and disposable materials, as well as other applications in different industries (Law, 2017). In fact, plastics are part of our daily life, being used in most areas and products, such as packaging, construction, electronics, and others. Their versatility, low weight and low price are some of the main reasons for their popularity (Boucher et al., 2020).

However, the lack of appropriate plastic waste management around the globe and the still low recycling rate of plastics in most countries, among other reasons, have triggered the accumulation of plastic materials in nature (Geyer et al., 2017; Margallo et al., 2019). In addition, their persistence together with their propensity to degrade and fragment when released (Barnes et al., 2009) have magnified the problem substantially. Degradation and fragmentation in the technosphere or the environment have led to the release of a variety of plastic polymers of different sizes (Eerkes-Medrano et al., 2015). Although different scales can be found in the scientific literature, two main subgroups are generally considered: macroplastics and microplastics (MPs). While an important proportion of MPs are released directly from the technosphere into water bodies and eventually the ocean, referred to commonly as primary MPs, others are generated as the result of the degradation of macroplastics and subsequent division in smaller particles, by physical, chemical, or biological processes (Li et al., 2016).

MPs are currently ubiquitous in the environment and in the technosphere. In fact, they have been found even in remote uninhabited areas, such as the highlands of the French Pyrenees (Allen et al., 2019), remote islands (Monteiro et al., 2018), bottled water (Koelmans et al., 2019) and even in human feces (Schwabl et al., 2019) and placenta (Ragusa et al., 2021). Despite widespread accumulation of MPs in the environment across the globe, it is plausible to assume that these cumulative processes are more likely to be triggered by leakage in emerging and developing nations where the loss of plastic through littering or mismanaged waste or wastewater is substantially higher than in developed countries (Ita-Nagy et al., 2021; Jambeck et al., 2015), regardless of the final distribution of MPs in the ocean (Galgani et al., 2015). Consequently, there is an imperative need to understand the leakage, transport, degradation and fragmentation processes linked to MPs that are currently occurring in the Global South, as these are bound to be the driving source of global pollution due to MPs.

The case of Latin America and the Caribbean (LA&C) is particularly interesting given the low rates of adequately managed waste and wastewater flows (Margallo et al., 2019; Torre et al., 2021), low recycling rates for plastic (Valerio et al., 2020) or the dependence of the economy in many LA&C nations on two sectors that are somewhat vulnerable to MP accumulation in the ocean: tourism and fishing. Therefore, the main objective of this study is to provide a short critical review regarding the scientific literature linked to the release of MPs in

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LA&C. Firstly, evidence of MPs accumulation in coastal and open waters throughout the region was assessed, with focus on their concentrations. Secondly, the main sources generating these releases to the environment are tracked. Finally, effects of MPs on local biota are evaluated. We expect this short review to be of utility for researchers in LA&C, as well as stakeholders in ocean resources and marine conservation, including policymakers, in order to get a site-specific current picture of MPs in coastal environments in the region.

Evidence of microplastics releases to the ocean in Latin America and Caribbean

The scientific articles reviewed in this study were retrieved using the keywords combination "microplastics + Caribbean + sources", "microplastics + Latin America + sources" and "microplastics + South America + sources". Google Scholar and Scopus were the web search engines selected. The period of study selected was 2017–2021,[1] conducted at an international level and focusing on articles written in English exclusively. Out of a total of 36 articles gathered, 23 were selected and evaluated in depth. Studies without any relation to MP quantification in LA&C were discarded. The coasts of Colombia were the most analyzed (eight studies in total), followed by Peru (four studies) and Ecuador, Chile, Brazil and Argentina (two studies). Additionally, most articles were published during the years 2019 (seven) and 2020 (nine), demonstrating a clear trend of increasing interest in this topic in the region (see Figures S1 and S2 in the Supplementary Material).

It was identified that available studies in the scientific literature related to the evaluation of MPs in LA&C coasts have been performed mostly at a micro scale, considering relatively small areas to evaluate the presence of marine litter, and quantify and classify the different types of particles. In order to diminish the amount of MPs entering the environment, a better understanding of the sources, transportation and distribution pathways are needed to both identify MP release hotspots and prevent future littering (Woods et al., 2021). Therefore, the studies considered in this review constitute a good baseline to understand the development of site-specific MP prevalence in marine environments in LA&C, but do not allow a comprehensive analysis of the marine litter problem in the region.

Comparison among studies selected must be performed with care, since the methodology used for collection and evaluation of samples, together with the size of the particle considered for MP quantification (see Table 1), varied considerably. In terms of location, all studies selected sandy beaches, except for Garcés-Ordóñez et al. (2019), which selected a mangrove area instead; and reported their findings mostly in items or particles per area. Most studies performed only one sampling campaign. However, studies performing more than one campaign considered necessary to include in the assessment the influence of tourism (Garcés-Ordóñez et al., 2020a) and weather conditions (rainy season and dry season) (Acosta-Coley et al., 2019a; Alves and Figueiredo, 2019; Rodríguez et al., 2020). This differentiation is necessary to be able to compare and determine the influence of these phenomena on macroplastic and MP transportation in the region.

Even though most studies analyzed the chemical composition of MP in their samples using Fourier Transform infrared spectroscopy (FT-IR) (see Table 1), it is important to mention that the analysis was performed in only part of the collected MP. Thus, the presence and concentration of each type of plastic described in these articles should not be extrapolated to the whole sample that was collected in each one. Most of the evaluated MP were identified as polyethylene (PE), polypropylene (PP) and polystyrene (PS), which could be a consequence of their low densities compared to other type of polymers, such as polyethylene terephthalate (PET) or polyvinyl chloride (PVC). The former, given the low density, have more possibilities to be transported longer distances by sea currents and rivers (Alvarez-Zeferino et al., 2020).

Most of the evaluated studies included a classification of MP by color, being white and transparent the abundant ones. Taking into account the influence MP color and shape may have during ingestion by aquatic organisms (Xiong et al., 2019), these attributes should also be taken into account when analyzing MP prevalence. This is possibly related to the presence of Styrofoam fragments (De-la-Torre et al., 2020) or pellets with relatively low exposure time in the marine environment (Mazariegos-Ortíz et al., 2020).

The following paragraphs summarize the main findings related to the evidence of MPs along coasts in LA&C, from the northernmost location southwards. A study performed by Bosker et al. (2018), evaluated the presence of MPs in beach sediments in a specific Caribbean region, in four islands of the Lesser Antilles (i.e., St. Anguilla, St. Barthelemy, St. Eustatius, and St. Martin). All samples collected along the four islands contained MPs, with an average 261 ± 6 items/kg of dry sand (see Table 1) and no significant difference between the content of MP in windward and leeward beaches (Bosker et al., 2018).

An extensive study conducted in Mexico included sampling in 33 beaches throughout different regions of the country. The study evaluated the presence of MPs and their relationship with urbanization and weather events (Alvarez-Zeferino et al., 2020). The study found a range of 31.7–545.8 items/m^2, with higher concentrations in urbanized beaches and after the presence of extreme weather events.

El Quetzalito Beach in Guatemala is a protected area that has suffered recurrent littering events (e.g., purposeful dumping or leakage from mismanaged open dumps), mostly linked to plastic waste from land-based activities, mainly transported through the Motagua river (Diez et al., 2019). Mazariegos-Ortíz et al. (2020) identified PS foam (67%) and PP fragments (26%) as the main plastic polymers present in the samples at this beach, being the fragmentation of macroplastics the main source. During MP sampling, an average of 279 items/m^2 were found, mainly composed of secondary MPs (Mazariegos-Ortíz et al., 2020).

Another study, by Acosta-Coley et al. (2019a), assessed the spatial distribution of MPs along the coast of Colombia. They found a correlation between MP concentration, both primary and secondary, and seasonality (i.e., rainy and dry season), together with the proximity to the possible sources, i.e. a local plastic factory (Acosta-Coley et al., 2019a). Additionally, another study performed in 43 Colombian sandy beaches in both the Caribbean and Pacific coast, found an average of 318 ± 314 items/m^2 on Caribbean beaches and 138 ± 125 items/m^2 on the Pacific beaches without relevant differences between urban and rural areas or protected and unprotected areas (Garcés-Ordóñez et al., 2020b). A third study, performed also in Colombia, evaluated the presence of MPs in 11 beaches in Santa Marta and their relationship with tourism (Garcés-Ordóñez et al., 2020a). This study found higher presence of MPs in urban beaches, especially during the low tourist season, and a low correlation with the presence of macroplastics.

A study conducted by Purca and Henostroza (2017) in four sandy beaches along the central Peruvian coast evaluated the presence of MPs < 2.5 mm, restricting sampling to that threshold. MPs > 1 mm were founded in all samples, representing 80% of the total. MPs were found in a range of 4.67–463.33 items/m^2, and 0.5–2.6 g/m^2 (Purca and Henostroza, 2017). Another study performed in Peru, analyzed four sandy beaches located in the capital city, Lima. The study was performed during the months of March and April of 2018 and reported MPs between 1 and 5 mm in all samples, ranging from 16.67 ± 4.26 items/m^2 to 489.7 ± 143.5 items/m^2 (De-la-Torre et al., 2020). The authors argue that the differences among the four sampled sites in relation to MPs per m^2 may be related to differences in coastal currents and man-made infrastructure.

Bays can also be highly affected by mismanagement of MSW and industrial, domestic, and agricultural effluents with poor treatment. For instance, the Guanabara Bay in the coast of Brazil has been evaluated regarding its pollution with MPs. It was found that high concentrations of

[1] For the year 2021, we considered articles published until May.

Table 1
Summary table of reviewed studies for presence of microplastics (MPs) in coastal areas of Latin America and the Caribbean, including sampling location and main findings.

Authors (year)	Location	MPs size sampled	Amount of microplastics (mean)	Color	Shape type	Chemical composition
Purca and Henostroza (2017)	4 beaches, between Lima and Chimbote, Peru	1–2.5 mm	129.8 ± 222.9 items/m^2	N.A.	89% fragments, 7% foam, 2% black pellets, 2% others	50% PU, 20% PS
Bosker et al. (2018)	21 beaches, St. Anguilla, St. Barthelemy, St. Eustatius, and St. Martin (Lesser Antilles)	0.3–5 mm	261 ± 6 items/kg of dry sand	N.A.	97% fibers, 3% others	N.A.
Acosta-Coley et al. (2019a)	4 locations, Caribbean Coastline, in Colombia	0.4–5 mm	Not available	N.A.	Pellets (PMP) and SMP	PE, PP
Alves and Figueiredo (2019)	Guanabara Bay, Brazil	15 µm – 5 mm	14,732 ± 1037 items/m^2	84% translucid, 5% gray, 3.2% black	89% Fibers, 10% films, 1% fragments	N.A.
Garcés-Ordóñez et al. (2019)	Ciénaga Grande de Santa Marta, Colombia	1–5 mm	540 ± 137 items/ha near populated centers 31 ± 23 items/ha away from populated centers	N.A.	Films, fragments, foams, filaments	HDPE and LDPE
Martinelli-Filho and Monteiro (2019)	Corvina Beach, Pará, Brazil	0.25–5 mm	492.5 ± 556.4 items/m^3	Fibers and fragments: blue > drak-green > reddish > others	95% fibers, 5% fragments, <0.01% pellets	N.A.
Alvarez-Zeferino et al. (2020)	33 beaches, Mexico	0.5–5 mm	133 items/m^2	23% white, 17% green, 17% blue, 16% yellow, 11% transparent 6% red, 10% others	56% fragments 15% foam, 11% fiber, 10% film, 5% pellets, 3% others	56% PE, 21% PP, 12% PS
De-la-Torre et al. (2020)	4 beaches, Lima, Peru	1–4.75 mm	174.1 ± 76.7 items/m^2	84.8% white, 4% blue, 2.6% red, 2.2% green, 2% yellow, 3.2% others	78.3% foams, 17.4% fragments (SMP), 2.8% pellets, 1.5% fibers.	48% HDPE, 20% PS, 16% PP, 12% IPP
Garcés-Ordóñez et al. (2020b)	43 beaches, Colombia	1–5 mm	318 ± 314 items/m^2 on Caribbean beaches	N.A.	52% fragments, 20% filaments, 11% pellets, 10% foams, 4% granules, 3% films	50% PE, 28% PS, 20% PP, 0.6% PVC, 0.5% PU, 0.4% HIPS, 0.3% PET
			138 ± 125 items/m^2 on the Pacific beaches			
Garcés-Ordóñez et al. (2020a)	11 beaches, Santa Marta, Colombia	1–5 mm	112 ± 103 during low tourist season 32 ± 23 during high tourist season	N.A.	Fragments, foams, filaments, films, others	PS 39.2%, PE 33.3%, PP 27.5%
Portz et al. (2020)	Albuquerque Atoll, San Andrés, Colombia	1–5 mm	90 items/m^2	orange/brown (29%), green (21%), white (22%), gray (10%), blue (9%), red (3%), yellow (6%) and black (1%)	56% fragments, 18% pellets, 10% foams, 8% films, 8% filaments	N.A.
Mazariegos-Ortíz et al. (2020)	El Quetzalito beach, Guatemala	1–5 mm	279 items/m^2	white or transparent > blue > multicolor > green > others	64.5% foam, 20.6% fragments, 11.2% pellets, 2.3% granules, 1.4% films	PS 66.8%, PP 25.8%, PE 7.4%
Rodríguez et al., 2020	4 beaches, Punta del Diablo, Uruguay	1–5 mm	N.A.	Only pellets: white > yellow > others	59.4% fragments, 39.5% pellets, 1.1% foams	70% PP, 30% PE, <1% PVC and PS
Jones et al. (2021)	Galapagos Island, Ecuador	10 µm–5 mm	53 ± 30 items/m^2	White/ black/ blue fragments and blue/green fibers mostly	78% fragments, 13% fibres, 4% films, 2% pellets	80% PE and PP

PE= polyethylene; PS= polystyrene; PP= polypropylene; PVC= polyvinyl chloride; PU= polyurethane; HDPE= high density polyethylene; LDPE= low density polyethylene; IPP= isostatic polypropylene; HIPS= high impact polystyrene; N.A.= not available; PMP= primary microplastics; SMP= secondary microplastics.

pollutants were present in the bay's sediments, including MPs (Alves and Figueiredo, 2019). MPs were found in all samples, with a mean 528 ± 30 items/kg and 14,732 ± 1037 items/m^2, presenting higher abundance compared to the rest of studies evaluated. Another study, performed in the northern coast of Brazil, analyzed the content of MPs on Corvina Beach, finding plastic particles in all samples with an average of 492.5 ± 556.4 items/m^3 (Martinelli Filho and Monteiro, 2019). Fibers were the most abundant MP type identified. The study analyzed MPs considering a depth of 60 cm, divided in three strata, finding that a steady decrease in concentration with depth was visible.

Four frequently visited beaches were also monitored in Uruguay to analyze the concentration of MPs and their relationship with tourism (Rodríguez et al., 2020). The values obtained resulted in a low presence of MPs and mesoplastics (bigger than 5 mm). Interestingly, the sampling site located furthest from the most urbanized area showed higher concentration of MPs, suggesting that distribution of MPs was influenced by marine winds, currents and the orientation of the beach.

Mangroves are coastal-marine ecosystems with strategic ecological functions and services. However, mangrove degradation is currently a worldwide problem (de Lacerda et al., 2019), mainly related to overexploitation, urban expansion and wastewater and solid waste pollution, among others (Garcés-Ordóñez et al., 2019). Sampling performed in the Ciénaga Grande de Santa María (Colombia), an important mangrove area in the Caribbean, determined the amount of MPs present in the sediments. Sizes sampled ranged from 1 to 5 mm, obtaining 31 to 2863 items/kg of dry sediment, with the highest concentration close to populated areas. Most MPs were from secondary sources, mainly packaging materials, disposable cutlery, and fishing waste (Garcés-Ordóñez et al., 2019), which is in line with the main anthropogenic activities that occur in the area.

Finally, plastic litter, including MPs, are also polluting unpopulated areas and remote oceanic islands (Jones et al., 2021). For example, marine litter has been identified in the Seaflower Biosphere Reserve, in Colombia (Portz et al., 2020); the Galapagos Biosphere Reserve, in Ecuador (Jones et al., 2021; Mestanza et al., 2019; Van Sebille et al., 2019); and the Juan Fernandez Archipelago Biosphere Reserve, in Chile (Hidalgo-Ruz et al., 2018). In this case, even though some anthropogenic activities take place in some of these areas, marine litter pollution is also associated with marine-based sources (e.g., waste generated due to offshore activities) or litter originated in onshore activities from different locations that could be transported via sea currents (Portz et al., 2020; Van Sebille et al., 2019). During sampling performed in the Seaflower Biosphere Reserve, an average of 90 items/m^2 were found for large MPs (1–5 mm). The island of San Cristobal in the Galapagos archipelago, was sampled in both tourist sites and remote areas, for MPs between 1 and 5 mm and smaller than 1 mm, including sand, seawater and benthic sediments (Jones et al., 2021).

Main sources of MP pollution in Latin America

The release of MPs to the environment can occur during the whole life cycle of products and services, from accidental spills during production (Ryberg et al., 2019) to inadequate waste and wastewater management, including degradation processes from abrasion or wearing (Vázquez-Rowe et al., 2021). Additionally, MP can also be created due to the degradation and fragmentation of macroplastics into smaller particles (Auta et al., 2017). MPs are mostly transported by riverine systems, discharge of domestic and industrial wastewater (Besseling et al., 2017), and directly discarded during marine activities (Boucher and Friot, 2017).

During the evaluation of four locations in the Colombian Caribbean, plastic pellets found on beaches in Cartagena were attributed to the local production of plastic (Acosta-Coley et al., 2019a). Additionally, secondary MPs were more concentrated during the rainy season, suggesting river transportation and proximity to river mouths as the crucial factors. Secondary MPs were also predominant in the remote sensing study conducted by Kikaki et al. (2020) in the Bay Islands (Honduras), in which an important influx of these MPs was observed and verified during in situ sampling, especially in the rainy season. Observations suggest that concentration of macroplastics and secondary MPs were related to the proximity to land and river mouths (Kikaki et al., 2020).

Alves and Figueiredo (2019) did not find significant differences among sampling sites or due to seasonal rainfall, but determined that fibers were the most abundant MPs type (89%) in the Guanabara Bay, Brazil. This type of MPs might be correlated to the high amount of untreated or partially treated domestic sewage that enters the bay, together with the high density of this specific polymer, which increases its capacity to sink and accumulate in the sediments. Similarly, Purca and Henostroza (2017), in Peru, attributed the presence of MPs mostly to secondary origins from urban areas, especially wastewater effluents, fishing activities and tourism. Moreover, De-la-Torre et al. (2020), analyzed the presence of MPs in four sandy beaches located in Lima, Peru, identifying foams and fragments as the most abundant types of MPs, while suggesting that secondary MPs predominate.

Garcés-Ordóñez et al. (2019) found that the highest concentrations of marine litter and MPs in mangroves were detected nearby populated areas, with inadequate sewage management and disposal of municipal solid waste, leading to dumping or littering in the mangroves. Additionally, the discharge of solid waste into water bodies located close to mangroves was identified as an important source of pollution, since waste is then transported by winds and currents, becoming retained in mangrove roots. Another study in 43 sandy beaches in Colombia identified a probable link of MPs concentration and poor waste and sewage management practices, tourism, industrial production of plastic and fishing activities as the main sources of MPs, where most MPs found were fragments of macroplastics (secondary MPs) (52%) and filaments (20%) (Garcés-Ordóñez et al., 2020b).

Finally, as mentioned by Garcés-Ordóñez et al. (2020), areas with higher tidal amplitude seem to facilitate the export of plastic waste to rural beaches from urban areas, showing a higher accumulation in the upper zone of the evaluated beaches. In Caribbean areas with low tidal amplitude, in contrast, waste tended to accumulate in the middle and upper zone of the beach, avoiding litter mobilization to other areas. More research on this dichotomous behavior linked to tidal amplitude would be useful to target specific actions to remove MPs in beaches.

Presence of MPs on local environments and biodiversity

Marine waste, including MPs, are a present threat to ecosystems, due to their extended presence, bioavailability and rapid accumulation in the environment (Wang et al., 2020). Damage effects related to the presence of MPs in aquatic environments include impacts to organisms caused by ingestion, increased bioavailability of pathogens, increased dispersion speed of invasive species and the transportation of potentially toxic chemicals, as part of their composition (Vázquez-Rowe et al., 2021). In this context, Jones et al. (2021) performed a marine invertebrate sampling to analyze the presence of MPs, including seven representative species, in Galápagos, Ecuador. Synthetic particles were found in all seven sampled species, and petrochemical-based MPs were found in six species, with an ingestion incidence of 52%; however, no significant drivers were detected that may influence particle uptake (Jones et al., 2021).

A transnational study performed in Panama, Colombia, Ecuador, Peru and Chile along the southeast Pacific Ocean collected 292 planktivorous fish to analyze the presence of MPs in their digestive tract (Ory et al., 2018). The study found that the presence of MPs in the individuals evaluated was rather low (2.1%), suggesting that MPs entering the coast from land base sources are transported away by offshore movement of surface water replaced by cleaner deeper waters. A more local, but similar study, analyzed the presence of MPs in four fish species from the Ciénaga Grande estuary in Colombia (Calderon et al., 2019). Calderon and colleagues found that 12% of all samples collected and examined presented MPs, being fibers the most abundant type. Similarly, Garcés-Ordóñez et al. (2020c) analyzed 22 fish species (302 specimens) in Cispata, Colombia, finding MPs, mostly fibers, in 7% of them. Moreover, a recent study that evaluated the presence of plastic particles in two commercial fish species in Peru found a relatively low presence of MPs (0.3%) in the stomachs of the specimens analyzed (Fernández-Ojeda et al., 2021).

MPs may also indirectly impact ecosystems by acting as transporters of toxic pollutants. A study performed in the coastal area of Cartagena, Colombia, analyzed the presence of heavy metals in primary and secondary MPs found in different beaches (Acosta-Coley et al., 2019b). The authors found a higher concentration of mercury and other trace metals in secondary MPs and white-degraded MPs, compared to primary ones, which is linked to MPs with higher degraded surfaces, which enhance the surface retention capacity. Thus, the ingestion of MPs containing heavy metals could affect different species in those environments.

Moreover, Pazos et al. (2018) found a correlation between high concentration of MPs and the deterioration of coastal habitat quality. In this study, plankton samples were collected in the Río de la Plata estuary (Argentina) to analyze the presence of MPs in the planktonic community. MPs were present in all samples, with a higher prevalence near sewage discharges and urbanized areas. Another study developed also in Argentina, in the Bahía Blanca estuary, also suggested a correlation between MPs and coastal biota negative impacts (Arias et al., 2019). This study evaluated the presence of MPs in the fish species *Micropogonias furnieri*, finding particles in all samples assessed and a positive correlation between the amount of MPs found and a higher hepatosomatic index (Arias et al., 2019). In both cases, these correlations need further assessment to understand the direct or indirect effect of MPs on marine biota, also considering the effects of other pollutants present in the environment, and the interaction between them and MPs.

Conclusions

In the last five years, the region of LA&C has shown an increasing number of scientific work related to macroplastic and MP releases into the ocean, as well as the effects of MPs on local environments and biodiversity. Although available literature in the Global North outnumbers that of the Global South, the studies included in this review are an important source of information for the region and a starting point for upcoming discussions on initial strategies to reduce plastic contamination in the ocean and, more specifically, concrete coastal environments in LA&C. A majority of the studies assessed point towards mismanaged waste, inland or offshore, as well as mismanaged wastewater as critical sources of plastic pollution into the ocean. However, there is still a lack of material flow analysis in the region to identify the main flows of plastics that are responsible for plastic prevalence in the ocean.

Additionally, it is important to work on a common methodology for the evaluation of MP in sandy beaches and coastal areas. The studies evaluated were performed using different sampling procedures, following different MP sizes, shapes and colors categorization, which does not allow for an easy comparison among the results obtained. Following a standardized methodology is key to obtain results that can be translated into databases to assess MP distribution in the area.

Solutions aimed at tackling the technological, social and environmental challenges in the region will definitely help mitigate the intake of plastics by the ocean. These are problems that require important economic investments and that have been systematically ignored, to date, by local and national governments. Consequently, from an academic perspective, a broader range of articles is needed to understand not only the concentrations of MPs in LA&C coastal habitats, but also determine the damage that these are exerting on biota and ultimately on human health.

Declaration of Competing Interest

Nothing declared.

CRediT authorship contribution statement

Diana Ita-Nagy: Resources, Data curation, Investigation, Writing – original draft, Writing – review & editing. **Ian Vázquez-Rowe:** Conceptualization, Resources, Methodology, Data curation, Investigation, Writing – original draft, Writing – review & editing. **Ramzy Kahhat:** Resources, Project administration, Funding acquisition, Writing – original draft, Writing – review & editing.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.hazadv.2021.100037.

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