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ADDRESSING THE GLOBAL CRISIS OF PLASTIC POLLUTION IN OCEANS



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ABSTRACT

The ocean covers around 70% of the planet's surface, providing up to 80% of the oxygen humans breathe. However, a global environmental crisis threatens marine ecosystems, human health, and our planet's sustainability due to plastic pollution of the oceans.

Whether it is big pieces of plastic waste or almost invisible plastic fragments, they both pose an extremely threatening effect that nations worldwide must tackle holistically and effectively.

However, one of the foremost challenges that stakeholders face in the quest to fight plastic pollution is the absence of comprehensive international treaties and regulations that specifically target ocean plastic pollution. While many countries have implemented measures to reduce plastic waste, the lack of a unified, global framework hampers efforts to combat the issue effectively.

This comprehensive Whitepaper aims to reinvigorate international conversations through a multidisciplinary approach that combines data science techniques and public policy advocacy to make informed decision-making and emphasize the development of an international treaty.





PART I FOUNDATIONS

1. INTRODUCTION TO THE CONTEXT
AND RELEVANCE OF THE TOPIC
 - 1.1. EXAMINATION OF FUTURE TRENDS
 - 1.2. PLASTIC POLLUTION CHALLENGES
 - 1.3. ALIGNMENT WITH THE SUSTAINABLE
DEVELOPMENT GOALS (SDGS)
2. GOALS OF THIS WHITEPAPER
3. METHODS AND TECHNOLOGY TOOLBOX
4. STAKEHOLDERS (INTENDED AUDIENCE)

1.

INTRODUCTION TO THE CONTEXT AND RELEVANCE OF THE TOPIC

The oceans cover approximately 70% of the planet's surface and contain 97% of the Earth's water, absorbing about one-third of the CO₂ and providing up to 80% of the oxygen that humans breathe [1].

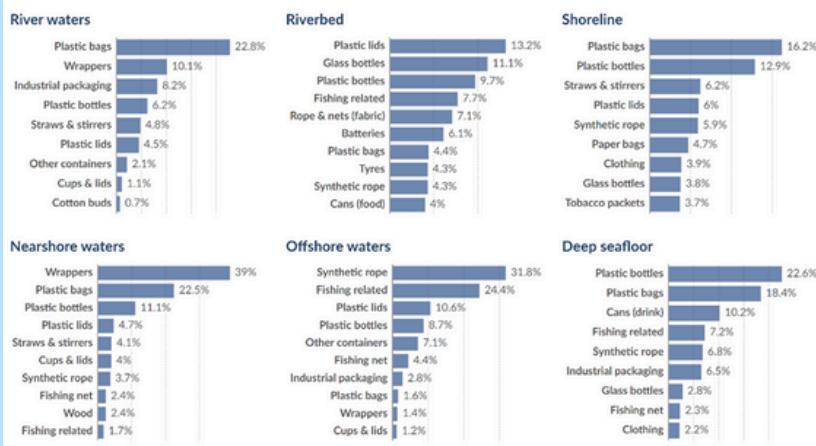
One of the most prominent and visible pollution-related problems in the oceans is plastic. Annually, around 275 million tons of plastic waste are generated worldwide, of which between 4.8 million and 12.7 million tons are intentionally dumped at sea.

Much of these will be single-use plastic products, such as bottles, bags, balloons, packaging, and straws, which can take decades to decompose. This debris is ingested by a wide range of marine animals, including fish, dolphins, seals, and turtles, and at least 267 different species have been recorded to have suffered digestive tract obstruction due to plastic [2].

What Items Of Waste Do We Find In Rivers And The Ocean

What items of waste do we find in rivers and the ocean?

Each item's share of total litter in different river and ocean environments. This is shown for the 10 most common items in each environment, based on the number of items found.



Data source: Morales-Caselles et al. (2021)

Note: Data comes from global samples of more than 12 million litter items in major aquatic environments.

These are the top ten everyday plastic-related items harming our oceans. Which ones have you used today?

1. Wrappers

2. Synthetic Rope

3. Plastic Shopping Bags

4. Plastic Bottles and Lids

5. Plastic Straws & Stirrers

6. Plastic Cutlery

7. Plastic Takeaway Containers

8. Finishing nets

9. Tyres

10. Clothing

1.1. EXAMINATION OF FUTURE TRENDS

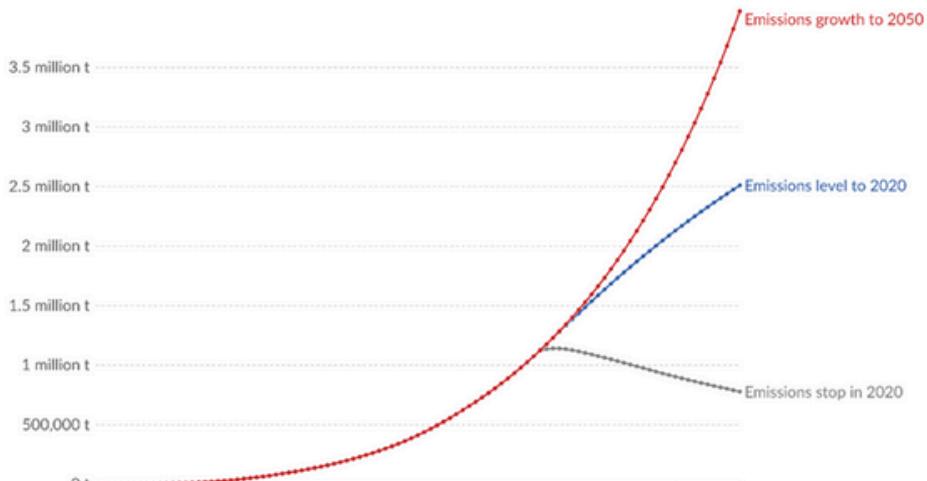
It is projected that by 2025, plastic consumption in Asia will increase by 80%, exceeding 200 million tons [2]. Also, industry experts anticipate that by 2050, we will be producing three times more plastic than today, and according to the World Economic Forum, by the same year, there will be more plastic than fish in the oceans [3] [4].

Macroplastics And Microplastics In The Surface Ocean – Forecast



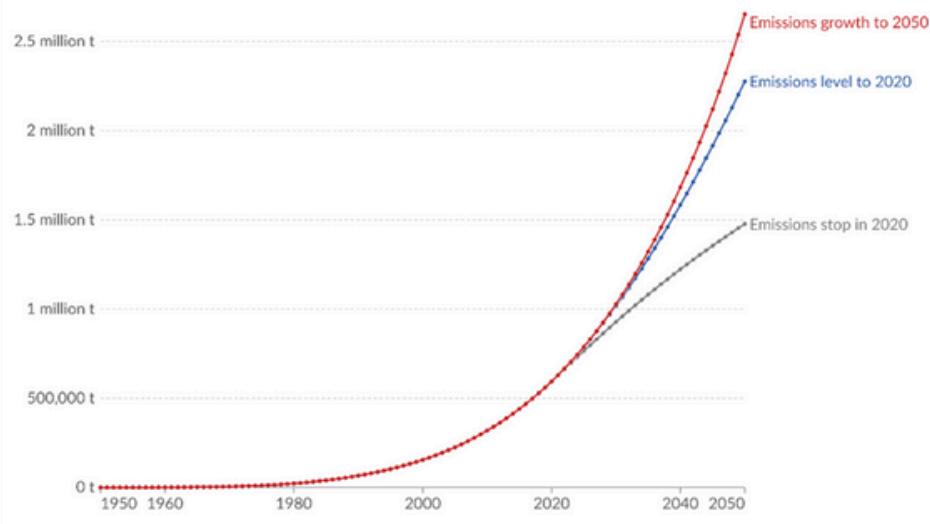
Macroplastics in the surface ocean, 1950 to 2050

Macroplastics are buoyant plastic materials greater than 0.5 centimeters in diameter. Future global accumulation in the surface ocean is shown under three plastic emissions scenarios: (1) emissions to the oceans stop in 2020; (2) stagnate at 2020 rates; or (3) continue to grow until 2050 in line with historical plastic production rates.



Microplastics in the surface ocean, 1950 to 2050

Microplastics are buoyant plastic materials smaller than 0.5 centimeters in diameter. Future global accumulation in the surface ocean is shown under three plastic emissions scenarios: (1) emissions to the oceans stop in 2020; (2) stagnate at 2020 rates; or (3) continue to grow until 2050 in line with historical plastic production rates.



Source: Missing plastic budget (Lebreton et al. 2019)



1.2.PLASTIC POLLUTION CHALLENGES

Plastic pollution presents many challenges, ranging from the absence of specialized technology for removing plastics from marine environments – encompassing both surface waters and seabed sediments [5] – to insufficient public awareness and engagement [6]. Moreover, complex supply chain issues [7], alongside socioeconomic impacts and equity concerns [8], add layers to this intricate problem. However, one of the most pressing challenges remains the lack of a binding international treaty or convention aimed explicitly at addressing ocean plastic pollution.

Although the UN Convention on the Law of the Sea (UNCLOS) establishes a solid framework for marine environmental protection [9], the absence of a comprehensive, unified global regulatory framework poses a significant hurdle for stakeholders invested in combating plastic pollution.

As a result, tackling plastic pollution based on a global collaboration will promote international cooperation and goodwill, allowing countries to better themselves and work together for a greater social cause, that is, 1) preservation and protection of the ecosystems and wildlife by preventing harm from plastic debris; 2) conservation of valuable natural resources like oil and water; 3) enhancement of human health by reducing the exposure to harmful chemicals; 4) reduction of greenhouse gas emissions.

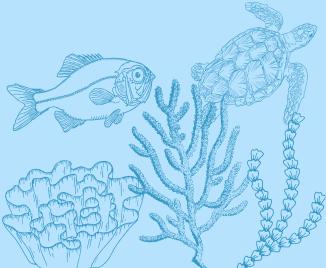


1.3.ALIGNMENT WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGS)

As mentioned in the previous section, it is essential to acknowledge that the problem of microplastic pollution and its harmful consequences for humans and the planet involves a joint international perspective through the United Nations' Sustainable Development Goals (SDGs) [10].

The SDGs set out a universal agenda structured in 17 interconnected global goals established in 2015 to jointly address social and environmental challenges and achieve a more equitable, prosperous, and sustainable future.

Tackling microplastic pollution aligns closely with several of the SDGs, in particular Goal #6, “Ensure access to water and sanitation for all,” [11] [12] and Goal 14, “Conserve and sustainably use the oceans, seas, and marine resources” [13]. To accomplish these goals, several milestones or targets are set, which are especially relevant in the context of marine pollution and its negative effects.

	Target 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing the release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally [11].
	Target 14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution [13].
	Target 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience and taking action for their restoration in order to achieve healthy and productive oceans [13].

2. GOALS OF THIS WHITEPAPER



This study is conducted in a **global context** where marine plastic pollution is one of our time's most pressing environmental challenges. In this sense, the relevance of this study lies in the need to understand better the relationship between mismanaged plastic in oceans and the most affected regions that experience the negative effects of it.

The research seeks to provide a sound scientific basis to guide a conversation that materializes into an international treaty that mitigates microplastics in the marine environment and national public policies, actions, strategies, and recommendations to implement effective plastic management processes that seek ocean protection.

Hence, considering the intricate nature of the issue and the specific audience, this white paper emerges as the optimal format, allowing for an in-depth exploration and articulation of our findings and recommendations.

The resulting comprehensive Whitepaper aims to reinvigorate international organizations – that have the visibility and the resources – reminding them of the urgency of collectively addressing this issue.

The ultimate goal of the Whitepaper is to resume, inspire, sustain, and advance the ongoing conversation surrounding the establishment of an international treaty dedicated to collaboratively and effectively addressing and mitigating plastics in the marine ecosystem.



3.

METHODS AND TECHNOLOGY TOOLBOX

To achieve these goals, this Whitepaper has analyzed the United Nations “per-capita-ocean-plastic-waste” dataset [14], which reveals information on inadequate plastic waste management during 2019, garnering data from 165 of the world’s 195 countries, indicating that information on plastic waste management is available for most countries worldwide.

Moreover, using **Python, Google Colab Platform, and BigML Platform** [15] will support examining the dataset in detail and see the degree of completeness of the data, the balance and distribution, categorical and numerical variables, the variables with greater and lesser relevance to our study, the patterns in the data, and so much more.

Thus, a comprehensive analysis is developed that not only evidences the magnitude of the problem but also provides valuable tools for monitoring and informed decision-making. This technological and analytical approach is indispensable for understanding the complex dynamics of mismanaged plastic pollution and for designing a more comprehensive framework to mitigate its impacts on humans and the ecosystem.



Once we have an understanding of the dataset variables, we will proceed to perform:

Develop Clustering models to identify the oceans and seas with the highest presence of microplastics (i.e., most polluted), based on the volume of microplastic density; and to identify the regions with the highest volume of microplastic density.

Build Regression and Classification models to analyze the relationship between the countries and their microplastic emission volume of microplastics.

Enrich the current dataset with external data to build predictive models to forecast future trends regarding microplastic pollution in water environments.

Create a visualization through a heat map indicating the regions and oceans most affected by microplastics.

4. KEY STAKEHOLDERS (INTENDED AUDIENCE)

Marine plastic debris was not the primary focus of global agendas, and current strategies and governance approaches are still far too fragmented (lack of harmonization) to adequately tackle this global problem [16]. For that reason, the present Whitepaper targets three key stakeholders at both international and national levels, recognizing their past efforts in protecting the marine ecosystem and looking to boost their critical roles in addressing the pervasive issue of microplastic waste management.



1. Intergovernmental Oceanographic Commission (IOC)

At the forefront of international cooperation in marine sciences, the IOC, a subsidiary of UNESCO, serves as a pivotal platform for promoting collaborative efforts among its 150 Member States. With a mandate to enhance the sustainable management of oceans, coasts, and marine resources, the IOC's involvement is indispensable in advancing comprehensive solutions to microplastic pollution.



2. Ad-Hoc Open-ended Expert Group (AKA AHEG)

Established through the United Nations Environment Assembly (UNEA) to combat marine plastic debris and microplastics. This group comprises three elected government representatives: Mrs. Elizabeth Taylor Jay, Mrs. Jillian Dempster, and Mr. Mphatso Kamanga [18].

The AHEG sought a new global agreement that provides a legal framework for global response and facilitates national responses, increasing regional and international cooperation to support effective national responses. However, it seems that this work has been discontinued, and even the fifth session of AHEG has been left pending (TBD) [19].



3. The countries in the regions of the Caribbean Sea (South America) and the Coral Triangle Region (South Asia),

According to the data analysis carried out in this paper, these developing regions are the most affected by mismanaged plastic pollution. The objective is to support them in putting in place plans that could cover as far as possible all life cycle stages of plastics from upstream, including sustainable production and consumption, to downstream, including environmentally sound waste management, as the basic framework that grounds countermeasures on marine plastic litter [16].



PART II

MISMANAGED MARINE PLASTIC ANALYSIS – GLOBAL APPROACH

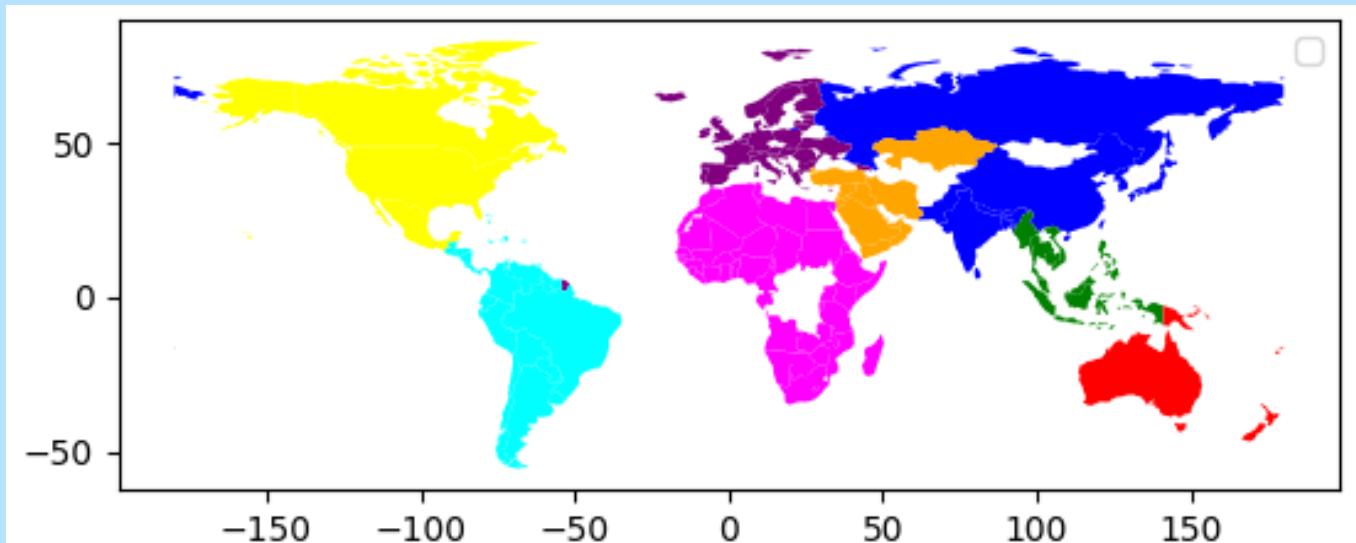
1. UNDERSTAND THE DATA
2. ANALYSIS BY REGIONS
 - 2.1. THOROUGH ANALYSIS OF THE REGIONS AND THEIR COUNTRIES

1. UNDERSTAND THE DATA

The preliminary findings of the analysis, using the United Nations “per-capita-ocean-plastic-waste” dataset, reveal that information on inadequate plastic waste management during 2019 has been collected for a total of 165 of the world’s 195 countries. This indicates that information on plastic waste management is available for most countries worldwide.

Of the 165 countries analyzed, it has been identified that there is a total of 34,200.31 kilograms of mismanaged plastic per capita. This means that, on average, each person in these countries generates approximately 34 kilograms of mismanaged plastic per year.

Further analysis is required to fully understand the implications and patterns of plastic waste management in different regions and countries. Therefore, the 165 countries have been grouped into 8 geographic regions: 1) North America, 2) South America, 3) Africa, 4) Europe, 5) Middle East, 6) Indo–North Asia, 7) South Asia, and 8) Oceania.



Source: Rose Barragan (own)

Region	Entity (Country)
Indo-NorthAsia	India, China, Japan, South Korea, Pakistan, Taiwan, Bangladesh, Sri Lanka, Nepal, Bhutan, Maldives, North Korea, Russia
South-Asia	East Timor, Thailand, Myanmar, Malaysia, Indonesia, Vietnam, Brunei, Cambodia, Philippines, Singapore, Hong Kong
Oceania	Solomon Islands, Australia, New Zealand, Fiji, Papua New Guinea, Marshall Islands, Tonga, Kiribati, Palau, Samoa
Europe	Montenegro, Albania, Bosnia and Herzegovina, Germany, France, Italy, Spain, United Kingdom, Netherlands, Switzerland, Sweden, Norway, Finland, Belgium, Austria, Greece, Denmark, Czech Republic, Portugal, Poland, Hungary, Romania, Ireland, Slovakia, Croatia, Estonia, Slovenia, Lithuania, Latvia, Cyprus, Luxembourg, Malta, Iceland, Liechtenstein, Monaco, San Marino, Andorra, Vatican City, Bulgaria, Ukraine, Georgia
Middle East	Palestine, Saudi Arabia, Turkey, Iran, United Arab Emirates, Kazakhstan, Iraq, Israel, Yemen, Bahrain, Jordan, Lebanon, Syria, Kuwait, Oman, Qatar
North America	United States, Canada, Mexico
South America	Grenada, Saint Vincent and the Grenadines, Saint Lucia, Saint Kitts and Nevis, Guadeloupe, French Guiana, Martinique, Dominican Republic, Dominica, Nicaragua, Panama, Guatemala, Brazil, Belize, Argentina, Antigua and Barbuda, Bahamas, Barbados, Chile, Peru, Colombia, Venezuela, Ecuador, Bolivia, Paraguay, Uruguay, Guyana, Suriname, Costa Rica, Trinidad and Tobago, El Salvador, Haiti, Honduras, Jamaica, Puerto Rico
Africa	Togo, Libya, Nigeria, South Africa, Egypt, Algeria, Kenya, Ethiopia, Morocco, Western Sahara, Zimbabwe, Angola, Benin, Sudan, Ghana, Uganda, Angola, Tanzania, Zambia, Mozambique, Cameroon, Côte d'Ivoire, Madagascar, Guinea, Senegal, Benin, Tunisia, Chad, Somalia, Rwanda, Burundi, Mali, Niger, Malawi, Liberia, Mauritania, Botswana, Lesotho, Gambia, Gabon, Namibia, Central African Republic, Sierra Leone, Eritrea, Congo, Mauritius, Reunion, Swaziland, Djibouti, Comoros, Equatorial Guinea, Guinea-Bissau, Sao Tome and Principe, Seychelles, Saint Helena, Burkina Faso, Cape Verde, Côte d'Ivoire, Democratic Republic of Congo

2. ANALYSIS BY REGIONS

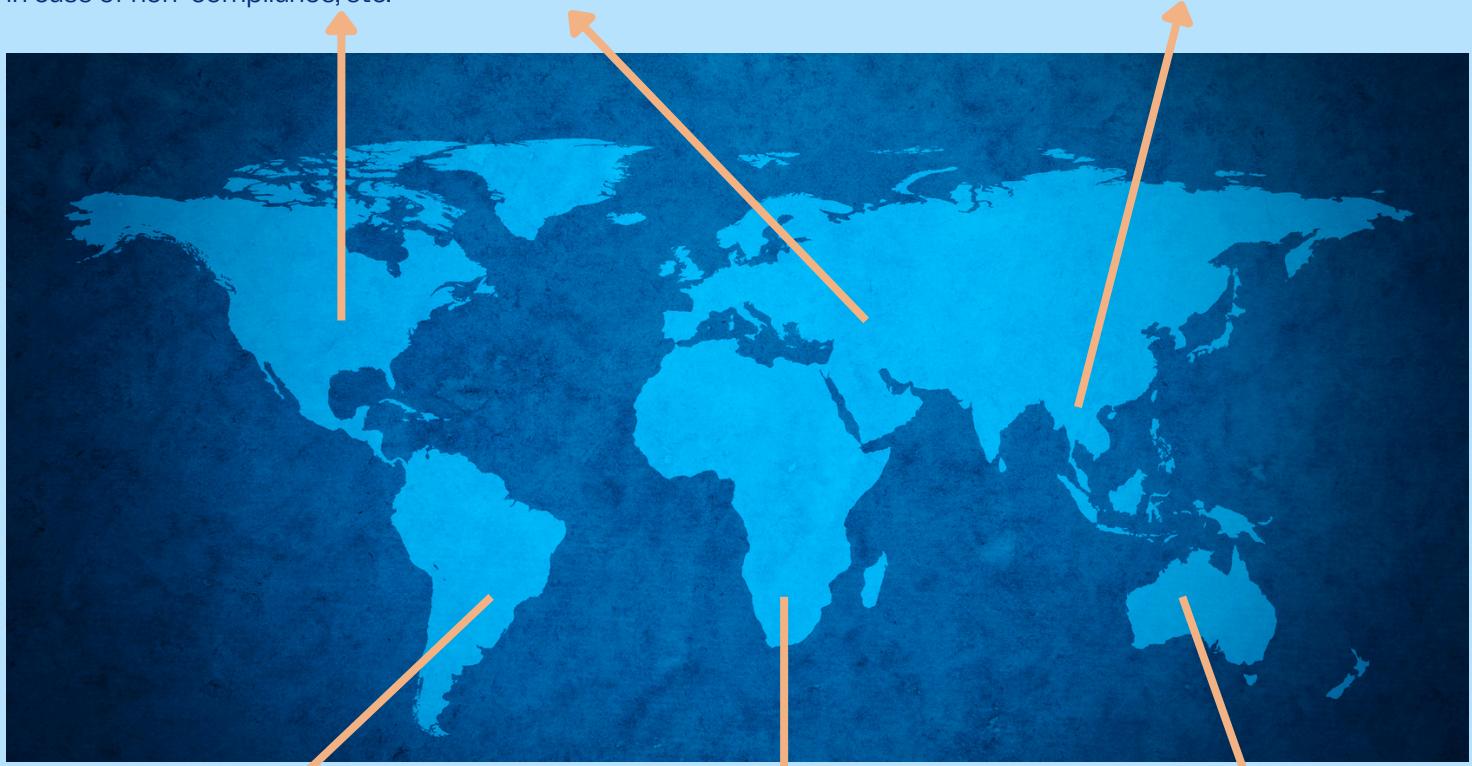
Total Mis_Plastic_waste_(kg) per Regions:	
Regions	
Africa	4.342103
Europe	0.752584
Indo-NorthAsia	0.799804
Middle East	0.327380
North America	0.041278
Oceania	1.312306
South America	18.618788
South-Asia	7.432661
Unknown	0.573407

Source: Rose Barragan (own)

After grouping the countries by region, the most interesting insights are as follows

Regions such as Europe, Indo-North Asia, the Middle East, and North America show lower mismanaged plastic waste totals than the regions mentioned above. This may be due to the implementation of improved plastic waste management practices, increased social awareness initiatives, implementation of regulations with punitive sanctions in case of non-compliance, etc.

In second place is the South Asia region, where the total amount of poorly managed plastic waste per person is 7.43 kilograms. This region also faces significant challenges in plastic waste management, although to a lesser extent than South America.



South America is the region with the highest total of mismanaged plastic waste per person, reaching a total of 18.62 kilograms per region. This suggests that the region faces significant challenges in plastic waste management, an evident lack of social awareness and environmental policies, and ineffective plastic management methods.

In third position is the African region, which has a total of 4.34 kilograms of poorly managed plastic waste per person in this geographic region, indicating that it also faces considerable challenges in managing plastic waste, although to a lesser extent than South America and South Asia.

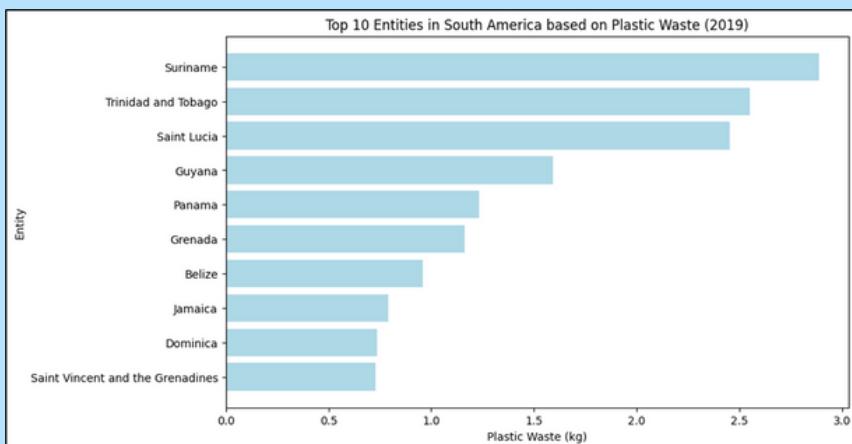
It is surprising to observe that the Oceania region has an equivalent of 1.31 kilograms of mismanaged plastic, as it is a region with developed countries such as New Zealand and Australia where environmental awareness is at the forefront.

2.1. THOROUGH ANALYSIS OF THE REGIONS AND THEIR COUNTRIES

After identifying and ranking the regions with the highest degree of mismanaged plastic waste. It is necessary to look under the microscope at which countries are the biggest polluters.

This analysis is key, as it can give us two types of possible conclusions: 1) the most polluting countries are indeed located in the most polluting regions, or 2) the most polluting countries are not necessarily found in the most polluting regions; this may be because one region may have a more significant number of countries under its umbrella and that is why the sum of kg of waste is greater, but this does not indicate that the most polluting countries are in the most polluting region.

The threshold by which we are going to rank countries (Entity) is those whose values are close to or above 1kg of mismanaged plastic waste.

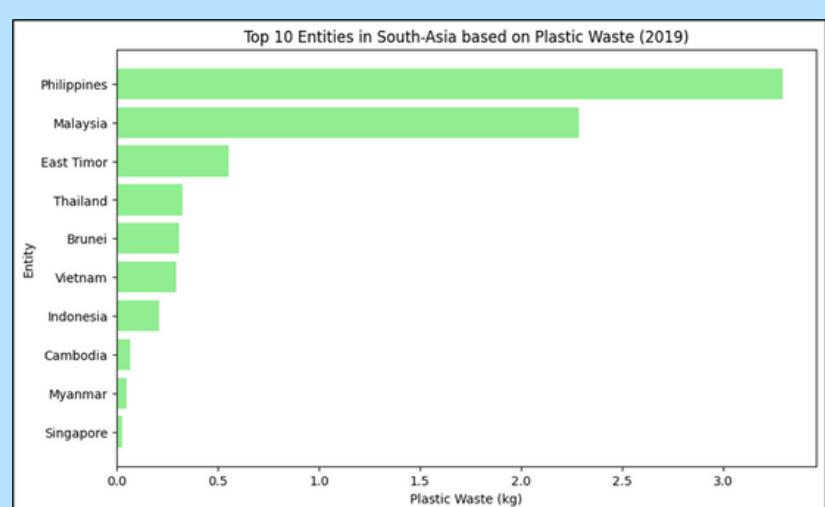


Source: Rose Barragan (own)

The second region to be analyzed is South Asia, which had the second highest amount, with 7.432kg. In this region, there is a big difference between the countries that exceed the 1kg threshold and those that are below it. Thus, the Philippines is in first place as the most polluting South Asian country with 3.296kg, followed by Malaysia with 2.29kg.

Beyond these two, there is a giant leap in the ranking of the following countries, as subsequent countries are below 0.55kg.

Starting with the "South America" region with a total of 18.62 KG of plastics waste mismanaged, the top 7 most plastic polluting countries are 7) Belize (0.959 kg), 6) Grenada (1.16kg), 5) Panama (1.2kg), 4) Guyana (1.59kg), 3) Saint Lucia (2.45kg), 2) Trinidad and Tobago (2.55kg) and 1) Suriname (2.89kg).



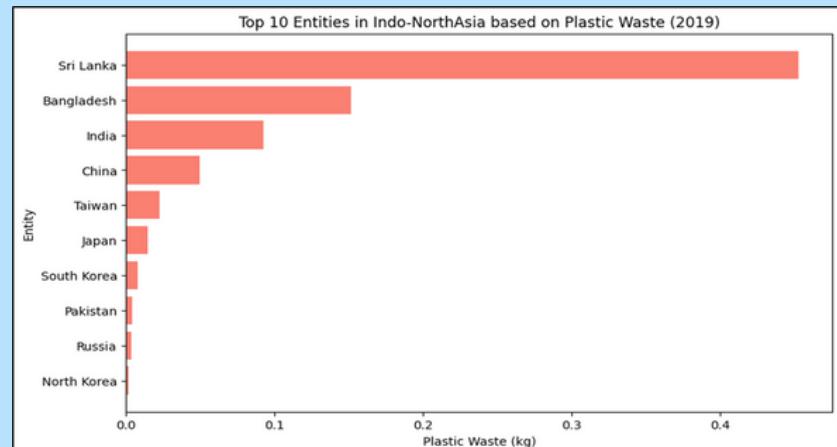
Source: Rose Barragan (own)

Since we are in the Asian region, it is interesting to continue analyzing the neighboring countries. A first hypothesis could be that powerhouses such as China, India, or Japan are leaders in ocean plastic pollution.

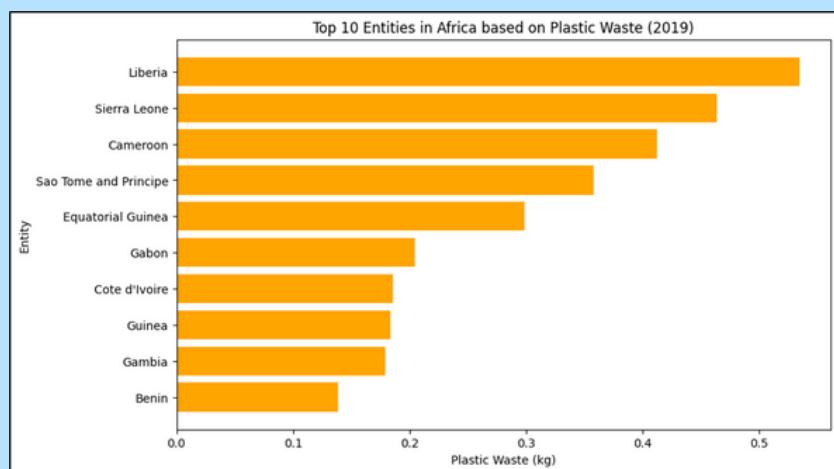
However, according to the data analyzed in 2019, these regions are far from leading the first positions (neither regionally nor globally). Their pollution levels are far below those of the world's leading countries.

This may indicate that countries in the Indo-North Asia region produce plastic products but are not the largest consumers or that their recycling policies more efficiently address the mismanaged problems.

Continuing with the preliminary ranking of the most polluted regions, Africa is crowned in the top 3, being the top three countries: Liberia (0.53kg), Sierra Leone (0.46kg), and Cameroon (0.413kg). But still below the 1kg threshold.



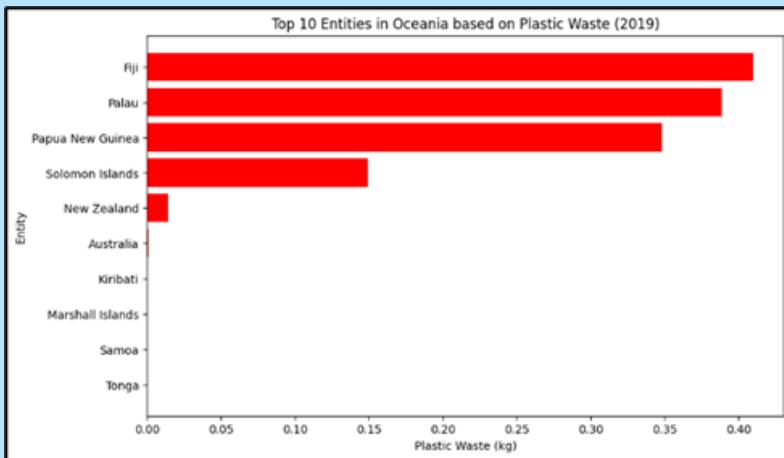
Source: Rose Barragan (own)



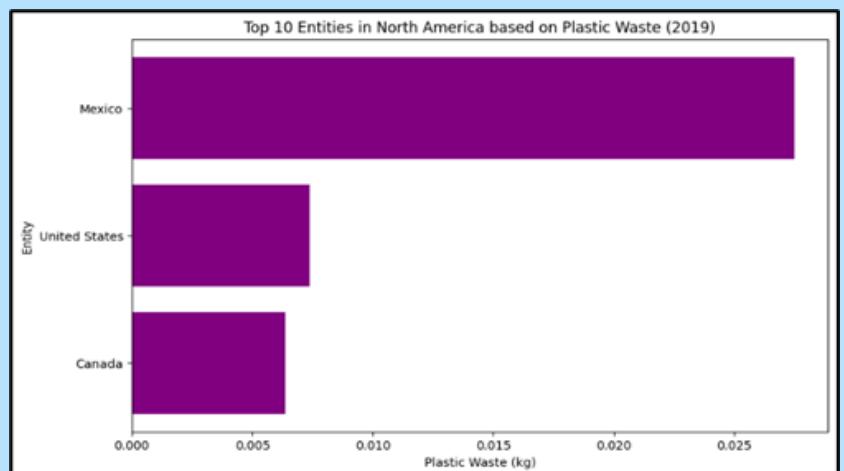
Source: Rose Barragan (own)

Last but not least, the countries located in these four regions (Oceania, Europe, North America & Middle East) present the lowest levels of mismanaged plastics, where most of the countries are close to 0.015kg (only Fiji and Albania are outliers with a rate of around 0.50kg). Moreover, it is worth noting that, surprisingly, the United States does not rank among the top countries with the highest levels of mismanaged plastic pollution.

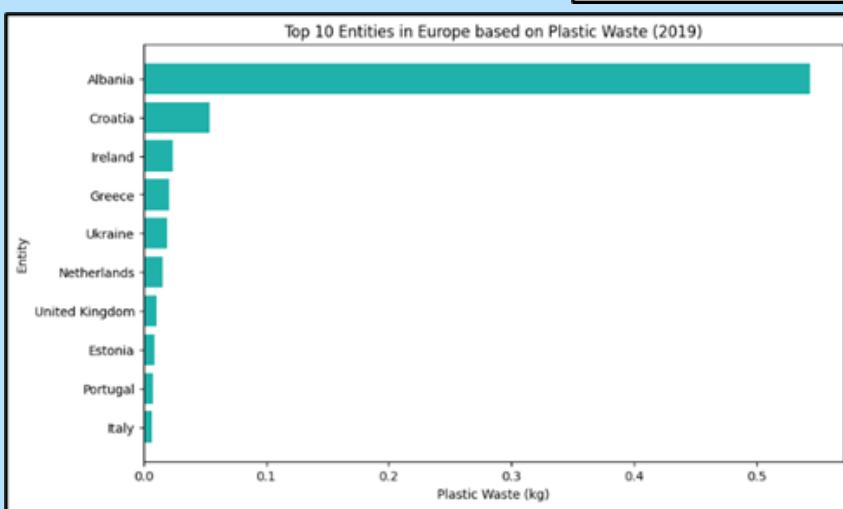
Overall, these data reflect good practices and awareness of the problem of plastic mismanagement on the environmental footprint and the struggle to combat it



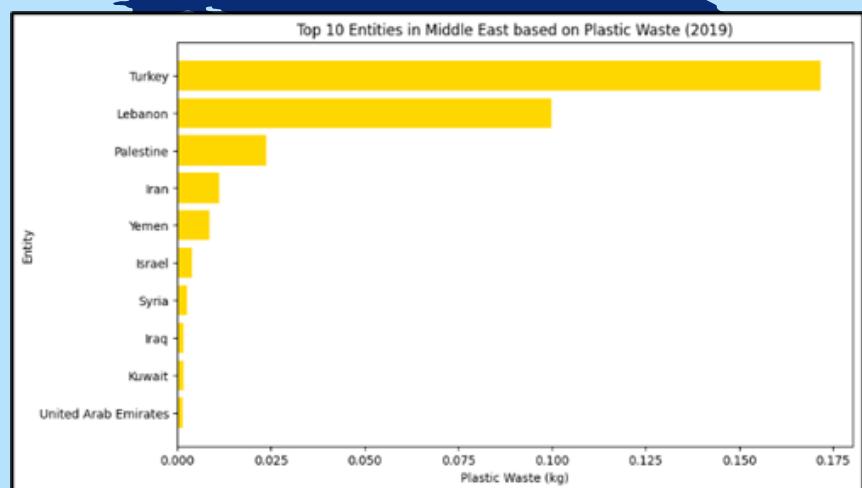
Source: Rose Barragan (own)



Source: Rose Barragan (own)



Source: Rose Barragan (own)



Source: Rose Barragan (own)



PART III

CHALLENGING THE INITIAL THOUGHTS

1. TEST THE HYPOTHESIS AND CREATE A RANKING
2. CHALLENGING OUR DATA INSIGHTS: PROVIDING FURTHER OBJECTIVITY

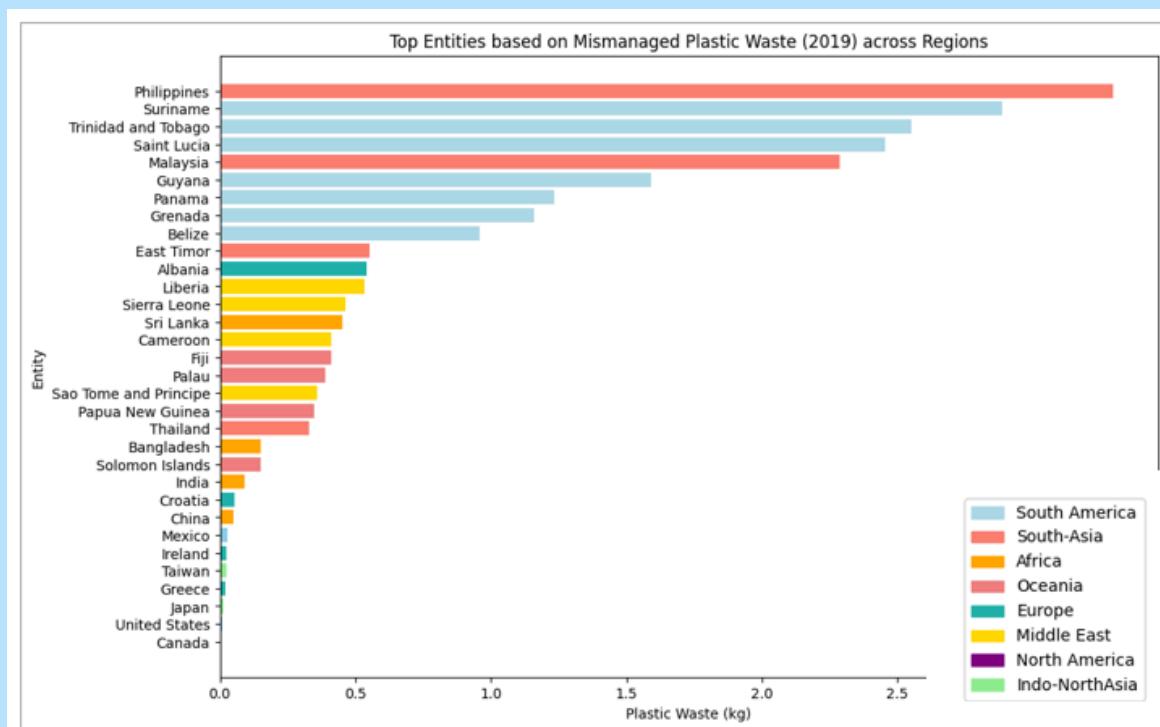
1. TEST THE HYPOTHESIS AND CREATE A RANKING

Surprisingly, China, India, and the United States—typically perceived as major contributors to marine plastic pollution—are absent from the top rankings of regions leaders of mismanaged plastic waste.

In other words, based on the United Nations “per-capita-ocean-plastic-waste” dataset thoroughly analyzed – for providing sufficient analytical evidence for the present Whitepaper – these three world powers – which are often associated with significant plastic waste generation in oceans – surprise with comparatively low levels. In fact, they are found in lower positions in the world ranking: India (position #23), China (position #25), and the United States (position #31).

On the other hand, the ranking of the top ten polluting countries is headed by the Philippines in the first position, followed by 2) Suriname, 3) Trinidad and Tobago, 4) Saint Lucia, 5) Malaysia, 6) Guyana, 7) Panama, 8) Grenada, 9) Belize and 10) East Timor.

Notably, **70% of these countries are in South America (specifically the Caribbean Sea region) and 30% in South Asia (specifically the Coral Triangle)**. Furthermore, another fascinating insight is that **these regions coincide to be near the Equator line, leading to an underlying pattern**.



Source: Rose Barragan (own)

2.

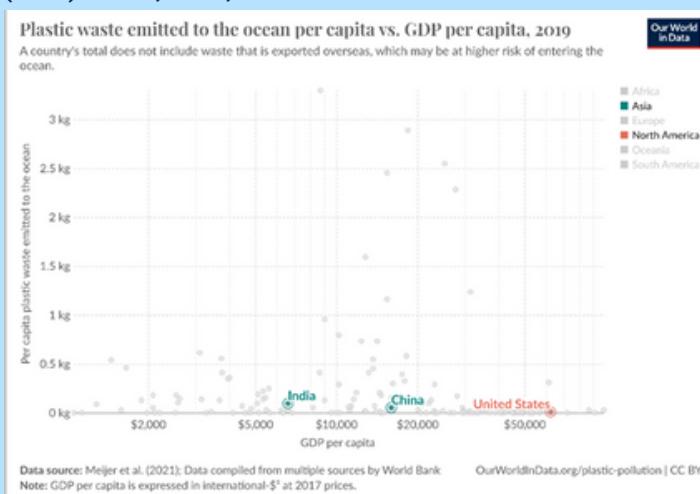
CHALLENGING OUR DATA INSIGHTS: PROVIDING FURTHER OBJECTIVITY

To provide an objective perspective on the matter, it was performed a second research, leveraging other experts' insights in the field and comparing them to the ones presented in the present Whitepaper. For that reason, it is worth referencing Meijer et al. (2021), who analyzed more than 1000 rivers account for 80% of global riverine plastic emissions into the ocean (kilograms per person), leveraging the World Bank dataset updated on May 29, 2023*[20].

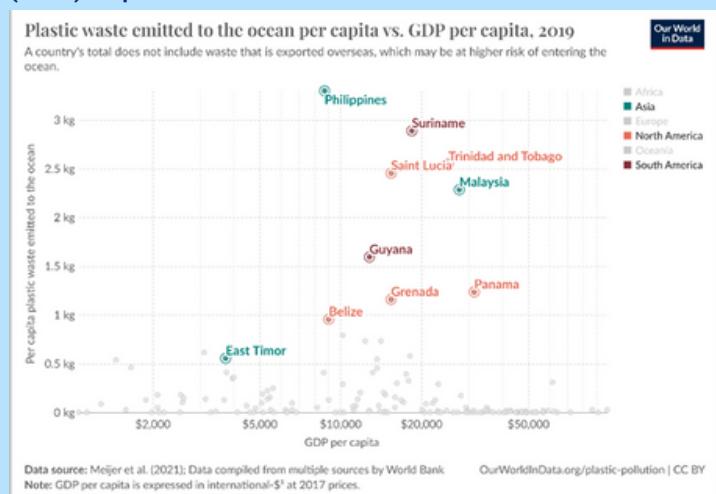
Mijer et al. (2023) compare the emitted marine plastic waste and the Gross Domestic Product (GDP) per capita in each region. Their conclusions were aligned with what the present paper is presenting, leveraging the UN dataset.

- 1) India, China, and the United States of America are not heading the ranking of countries with the highest plastic waste emitted to the ocean (per capita); quite the contrary. The US presents a per capita plastic waste emitted to the ocean of less than 0.01kg and a GDP per capital equal to \$62,475; China presents a per capita plastic waste of 0.05kg and a GDP of \$15,978, and India presents a per capita plastic waste emitted of 0.09kg and a GDP equal to \$6,609.
- 2) On the other hand, the top countries that lead the ranking are from the Asian regions (The Philippines, Malaysia, and East Timor) and the Americas region (Suriname, Trinidad and Tobago, Saint Lucia, Guyana, Panama, Grenada, and Belize). The same conclusion was reached, and the insights were presented in the previous chapter.

Plastic waste emitted to the ocean per capita vs. GDP per capita (2019) – India, China, and the United States.



Plastic waste emitted to the ocean per capita vs. GDP per capita (2019)– top 10 countries.



* Next expected update May 2024

Source: Mijer et al. (2021)

International dollars: International dollars are a hypothetical currency that is used to make meaningful comparisons of monetary indicators of living standards. Figures expressed in International dollars are adjusted for inflation within countries over time, and for differences in the cost of living between countries. The goal of such adjustments is to provide a unit whose purchasing power is held fixed over time and across countries, such that one International dollar can buy the same quantity and quality of goods and services no matter where or when it is spent. Read more in our article: What are Purchasing Power Parity adjustments and why do we need them?

CLUSTER REGIONS	COUNTRY	PLASTIC WASTE EMITTED TO THE OCEAN PER CAPITA (KG) – UNITED NATIONS DATASET	PLASTIC WASTE EMITTED TO THE OCEAN PER CAPITA (KG) – WORLD BANK DATASET	GDP PER CAPITA (\$) – WORLD BANK DATASET
THE CORAL TRIANGLE REGION	The Philippines	3.296	3.3	8,732
	Malaysia	2.29	2.29	27,674
	East Timor	0.55	0.55	3,738
THE CARIBBEAN SEA	Suriname	2.89	2.89	18,449
	Trinidad and Tobago	2.55	2.55	25,307
	Saint Lucia	2.45	2.45	15,461
	Guyana	1.59	1.59	12,820
	Panama	1.2	1.23	31,544
	Grenada	1.16	1.16	15,394
	Belize	0.959	0.96	9,029



PART IV

PATTERNS AND RECOMMENDATIONS

- 1. UNDERLYING PATTERNS IN MISMANAGED PLASTIC POLLUTION**
 - 1.1. ECONOMIC AND SOCIAL FACTORS**
 - 1.2. REGULATORY FACTORS**
- 2. RECOMMENDATIONS**
 - 2.1. BEST PRACTICE RECOMMENDATION**
 - 2.2. INTERNATIONAL TREATY DRAFTING RECOMMENDATIONS**
- 3. FINAL TAKEAWAYS**

1.

UNDERLYING PATTERNS IN MISMANAGED PLASTIC POLLUTION

1.1. ECONOMIC AND SOCIAL FACTORS



Countries with lower GDP per capita, such as Belize, Grenada, Panama, Guyana, Saint Lucia, Trinidad and Tobago, Suriname, The Philippines, Malaysia, and East Timor, often struggle with waste management infrastructure.

This is partly due to limited economic resources, which hampers investments in waste collection and recycling facilities, as well as public education on waste handling. High population density, especially in coastal urban areas, compounds these challenges by generating large quantities of waste that exceeds the handling capacity of existing facilities.

Additionally, the significant tourism industries in these countries contribute further to the plastic waste problem as tourist activities generate high volumes of single-use plastics.



1.2. REGULATORY FACTORS



The regulatory landscape for managing plastic waste varies among countries, but there is often a lack of **stringent enforcement of existing laws**, or the **laws themselves are not robust enough** to tackle the scale of the problem.



Malaysia's Regulatory Framework to Address Plastic Pollution

For instance, **Malaysia** has been developing its regulatory framework and has implemented several initiatives aimed at reducing plastic pollution, including a nationwide ban on single-use plastics in federal territories.

The Roadmap Towards Zero Single-Use Plastics 2018–2030 is the most notable regulatory effort. This roadmap aims to phase out the use of single-use plastics and promote the adoption of eco-friendly alternatives across the country. It includes strategies such as introducing a levy on plastic bags, encouraging the use of biodegradable bags, and improving recycling systems. The roadmap reflects a comprehensive approach to tackling the issue of plastic pollution within Malaysia's borders.



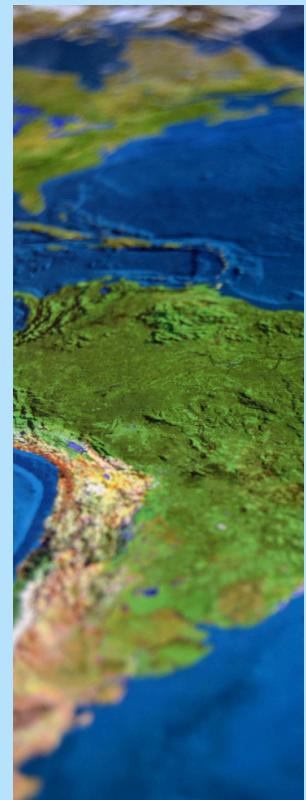
Regional Agreements in Other Countries



1. Caribbean Region:

Caribbean countries often participate in broader environmental agreements that include aspects of waste management and pollution control. One of the key agreements is the Cartagena Convention, specifically its Protocol Concerning Pollution from Land-based Sources and Activities (LBS Protocol). This protocol aims to address pollution from land-based sources, including plastics, entering the marine environment.

Countries like Trinidad and Tobago, Saint Lucia, and Grenada are parties to this convention, which encourages them to develop national regulations and strategies to minimize pollution inputs into the Caribbean Sea.



2. Southeast Asian Agreements: Countries

For example, the Philippines and East Timor are part of the **ASEAN Agreement on Transboundary Haze Pollution**, although primarily focused on air quality, this agreement reflects regional cooperation on environmental issues that could be extended to include marine plastic pollution.

Further efforts specific to marine pollution are discussed in various forums and initiatives under the ASEAN umbrella, aiming to foster regional collaboration to **tackle environmental challenges**.

2. RECOMMENDATIONS

2.1. BEST PRACTICE RECOMMENDATION

For the countries in the Americas and Asian regions that struggle with high levels of plastic pollution, enhancing waste management infrastructure is crucial.

1

Modernizing facilities but also ensuring that there are adequate systems for waste collection and processing.

Public education campaigns can play a pivotal role in changing consumer behavior, particularly in reducing the reliance on single-use plastics.

2

3

Regulatory reforms are necessary to support these changes; this could include introducing bans on single-use plastics and providing incentives for businesses to adopt sustainable practices.

In terms of international involvement, countries like the USA, China, and India, though not leading in per capita plastic waste, should still be part of the global conversation due to their significant resources and technological capabilities.

These nations can provide financial and technical support to build infrastructure and foster international collaboration. They can also lead the development of global standards for managing plastic pollution and support research into sustainable materials and waste reduction technologies.

2.2. INTERNATIONAL TREATY DRAFTING RECOMMENDATIONS

Embedding Other International Efforts

this agreement should not operate in isolation but should be integrated with other international environmental agreements and efforts, such as the Sustainable Development Goals (SDGs), the Basel Convention, and regional efforts like the ASEAN initiatives and the Cartagena Convention. This integration ensures a cohesive and unified approach to environmental protection and sustainable development.

Comprehensive Scope and Objectives

The agreement should set clear, ambitious objectives to reduce plastic pollution on a global scale, with specific targets tailored for regions with high mismanagement rates, such as Southeast Asia and the Caribbean. Objectives should include reducing the total volume of plastic waste, enhancing recycling rates, and promoting the adoption of alternatives to single-use plastics.



Regional Implementation Plans

These plans would be tailored to the unique environmental, social, and economic conditions of each region, ensuring that strategies are both practical and effective.

Public Participation and Transparency

To build support and ensure sustainable practices, the agreement should promote public participation in the policymaking process. This could include public consultations, involvement of NGOs, and partnerships with local communities. Ensuring transparency in how countries meet their commitments and share data can also build trust and foster global cooperation.

Binding Commitments

These commitments could include phased reductions in plastic production, bans on certain single-use plastics, and mandatory recycling quotas. Moreover, the agreement should have mechanisms for monitoring compliance and penalties.

Resource Allocation and Support

Recognizing the disparities in economic capabilities among countries, the agreement should provide mechanisms for financial and technical support to lower-income nations. This could include a dedicated fund to which wealthier countries contribute, aimed at building waste management infrastructure, supporting recycling programs, and funding public education campaigns.

3. FINAL TAKEAWAYS

These recommendations look to lead the conversation to attain international frameworks and agreements, which are crucial for managing plastic pollution. Still, their effectiveness largely depends on the **commitment to enforcement** and the **allocation of sufficient resources** to implement the required measures.

Enhanced regional cooperation and stronger national frameworks are also essential to effectively address the transboundary nature of marine plastic pollution.

In conclusion, tackling the issue of mismanaged plastic pollution requires a **multi-faceted approach that includes local actions** to improve waste management and **global cooperation** to ensure resource and technology sharing.

This approach **not only addresses the symptoms of pollution but also the systemic issues** that contribute to it, offering a sustainable path forward for all countries involved.





PART V REFERENCES

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2. CONTACT

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