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Assessing the need for harmonized marine debris monitoring and equity to support participation in the Global Plastics Treaty negotiations by Caribbean SIDS

Kristal Ambrose
World Maritime University

Contextual Barriers Facing Caribbean SIDS in the Global Governance of Plastic Pollution

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A dissertation submitted to the World Maritime University in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy in Maritime Affairs

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Dedication

I'd like to dedicate this PhD to those whom I've loved dearly and have unfortunately lost during this PhD journey. The Late Walter 'Ben' Bohl, who awarded me my very first academic scholarship and believed in me with unwavering faith. My Grandfather, the late Cornelius Wilworth Ambrose, who always reminded me who I am, 'An Ambrose', to always take care of myself and to never forget where I came from, always encouraging me to pursue knowledge, "no one can take that away what's in your head". My dearest friend and mentor, the late Cindy Klok-Simmons who encouraged me to pursue my passion at all costs and live life in love and gratitude. My dear friend, the late Keniesha Frankia Delancy, whose enduring love, support, friendship and beautiful smile brought endless joy and laughter to my life on Eleuthera. Lastly, my uncle Ellis, a.k.a Big Youth, I'll stay 'true-true' to who God says I am. Rest well.

To every Bahamian child with a dream, yes you can.

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Acknowledgements

And God is able to make all grace abound toward you; that ye, always having all sufficiency in all things, may abound to every good work

2 Corinthians 9:8

Glory be to God and my Lord and Saviour Jesus Christ for the gift of grace that has seen me through this PhD journey. What a journey it has been! From changing my research topic countless times to producing all of my PhD outputs in 90 days (pressure!), it was truly God's grace that not only sustained me but led me to the tailor made PhD programme of my dreams. Pursuing this degree has not been without its sacrifices, as I had to pause my organisation, Bahamas Plastic Movement and take time away from my beloved students for two of the three years of my academic pursuit. Though far from easy, it has been worth the journey as I'll be able to return home having grown spiritually, physically, emotionally and academically; ready to pick up the mantle again and lead the charge towards a Bahamas free of plastic debris.

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Abstract

This research addresses the challenge of marine plastic pollution with particular reference to Caribbean Small Island Developing States (SIDS). Marine plastic pollution is of particular significance to these states since they suffer from a disproportionate incidence of plastic pollution on their coasts. In line with the region's need to protect its marine environment and subsequently its economy from the grave impacts of plastic pollution, this work assesses marine debris monitoring within Caribbean SIDS, and the barriers faced and considerations needed for unified monitoring efforts that support policy development. Additionally, the research examines microplastics on the beaches of Caribbean SIDS, and highlights concerns over scientific research on this issue being conducted by and often retained by extra-regional research teams and institutions.

The research further recognises that the United Nations (UN) member states are currently engaged in historic negotiations to develop an international legally binding instrument (ILBI) to end plastic pollution, including in the marine environment. It is hoped and anticipated that this ambitious process of intergovernmental negotiations will lead to an ILBI, informally known as the "global plastics treaty" (note that ILBI and global plastics treaty are used interchangeably henceforth). It is intended that this instrument will comprehensively address the full life cycle of plastics from production to disposal. The ILBI is set to be achieved through five Intergovernmental Negotiating Committee (INC) meetings to negotiate the specifics of the treaty between 2022 and 2024. Caribbean SIDS are disproportionately affected by the transboundary nature of plastic pollution and face challenges in equitably participating in the global plastics treaty negotiations.

Through the lens of collective action to support the development of the global plastics treaty, this thesis explores the gaps and limitations experienced by Caribbean SIDS in their ability to coordinate and participate in the negotiations and also explores their ability to ascertain localised scientific data that supports negotiating positions. This work assesses key barriers hindering the equitable participation of Caribbean SIDS in the INC meetings in real time, and proposes applicable solutions. Additionally, it contributes novel information to discourse on contextual equity in environmental decision making by providing a framework to identify key factors needed by Caribbean SIDS to foster equity throughout the entirety of the INC process. Moreover, this work illustrates the importance of how relevant scientific research, equitable processes for participation in environmental negotiations, and adequate coordination mechanisms for multilateral environmental agreements can bolster efficacy for Caribbean SIDS participating in the global plastic treaty negotiations.

This thesis applies both natural and social science methodologies, along with event ethnography, participant observations, extensive reading of primary, secondary and grey literature, document analysis, interviews, informal conversations, webinars and participation in the INC-1 meeting.

Keywords: Caribbean, Small Island Developing States, Global Plastics Treaty, Marine Debris Monitoring, Negotiations, Equity, United Nations, CARICOM, Capacity Building

Abbreviations

ACS	Association of Caribbean States
AO	Atlantic Ocean
AOSIS	Association of Small Island States
BB	Bahamas Bank
BBNJ	Biodiversity of areas Beyond National Jurisdiction Agreement
CARICOM	Caribbean Community
COP 15	15th Conference of the Parties United Nations Convention on Biological Diversity
COP 27	27th United Nations Conference of the Parties of the United Nations Framework Convention on Climate Change
ES	Exuma Sound
GAF	Governance analytical framework
GDP	Gross domestic product
GRULAC	Group of Latin America and Caribbean Countries
HOG	Heads of government
ILBI	International legally binding instrument
INC	Intergovernmental Negotiating Committee
INC-1	First Intergovernmental Negotiating Committee Meeting
LOP	List of Participants
MEA	Multilateral environmental agreement
NGO	Non-governmental organization
OECS	Organization of Eastern Caribbean States
OECS	Organization of Eastern Caribbean States
OEWG	Open Ended Working Group
OEWG-1	First Open Ended Working Group Meeting
POPS	Persistent Organic Pollutants
RAP-MaLi	Regional Action Plan on Marine Litter

SICA	Central American Integration System
SIDS	Small island developing states
UN	United Nations
UNCBD	United Nations Convention on Biological Diversity
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNEP-CEP	United Nations Environment Programme – Caribbean Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WCR	Wider Caribbean Region

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List of papers included in this dissertation

Paper 1:
Ambrose, K. K. (2021). Coordination and harmonization of a marine plastic debris monitoring program for beaches in the Wider Caribbean Region: Identifying strategic pathways forward. Marine Pollution Bulletin, 171, 112767. https://doi.org/10.1016/j.marpolbul.2021.112767

Paper 2:
Ambrose, K.K. and Walker, T.R. (2023). Identifying opportunities for harmonised microplastics and mesoplastics monitoring for Caribbean Small Island Developing States using a spatiotemporal assessment of beaches in South Eleuthera, The Bahamas. Marine Pollution Bulletin, 115140. https://doi.org/10.1016/j.marpolbul.2023.115140

Paper 3:
Stöfen-O'Brien, A., Ambrose, K. K., Alleyne, K. S., Lovell, T. A. and Graham, R. E. (2022). Parachute science through a regional lens: marine litter research in the Caribbean Small Island Developing States and the challenge of extra-regional research. Marine Pollution Bulletin, 174, 113291. https://doi.org/10.1016/j.marpolbul.2021.113291

Paper 4:
Ambrose, K.K. (2023). Assessing and Addressing Contextual Equity: A Framework for Key Drivers Needed by Caribbean Small Island Developing States to Achieve Contextual Equity in the Global Plastics Treaty Negotiations (In review). Frontiers in Marine Science

Paper 5:
Ambrose, K.K. (2023). The Caribbean Community (CARICOM) as the Coordination Mechanism For Caribbean Small Island Developing States Participating in The Global Plastics Treaty Negotiations? (Accepted). Ocean Yearbook

1 Research overview

1.1 Research rationale

Initially, this research focused solely on the need for adequate, coordinated, monitoring methodologies for marine debris in the Wider Caribbean Region (WCR) to support management strategies for marine debris on Caribbean beaches. Experiencing the first hand effects of marine plastic pollution on the shorelines of The Bahamas served as a driving force of this work. This led to the realisation that monitoring was an under-appreciated dimension of addressing the problem of plastic pollution. However, in light of the historic and progressive step towards the development of a legally binding instrument to govern global plastic pollution, the candidate's research focus shifted, due to the significance that this process may have for Caribbean SIDS. Given the limited resources and capacity to address marine plastic pollution among Caribbean SIDS, the choice was made to understand the key barriers hindering their equitable participation in the INC meetings from a contextual perspective. Within this context, the idea of contextual needs is defined by the set of circumstances needed to participate in a particular event or situation, Here, it can be observed that monitoring of marine debris remains crucial to informing the negotiating positions of delegates to the INCs from Caribbean SIDS.

Bearing in mind United Nation Environment Assembly (UNEA) Resolution 5/14, this research was further shaped by its recognition of the need to strengthen scientific, technical and technological knowledge with regard to plastic pollution, including in the marine environment, on methodologies for monitoring. As such, this research uses science as an entry point to assess the science-policy interface required by Caribbean SIDS to formulate their negotiating positions for the development of the global plastics treaty. Further, it creates a pathway to explore possible contextual barriers affecting Caribbean SIDS participation early on in the INC negotiation process. Though it is intended that the treaty will address the full life cycle of plastics from production to disposal, the monitoring aspect of this research focuses on the existing marine pollution, which is an indicator for leakages and failure in the plastic pollution management system. However, the outcomes of this research remain applicable to monitoring needs outside the marine environment. For example, it calls attention to the need for monitoring that encompasses plastic production, use and disposal within Caribbean SIDS. As monitoring and evaluation

play a key role in both the development and measurement of success for a treaty, understanding the limitations and challenges faced by various actors involved in the treaty formulation process must be considered as part of the pursuit of global governance for plastic pollution.

1.2 Research contribution

During the fifth session of the UN Environment Assembly (UNEA) (UNEA-5.2) (March 2022), United Nations member states, including all Caribbean SIDS, adopted Resolution 5/14 *End plastic pollution: Towards an international legally binding instrument* (ILBI) (UNEA 5/14), which is intended to combat plastic pollution with a global and legally binding plastics treaty by 2024 (Bergman et. al, 2022; WWF, 2022, UNEP, 2022). Informally known as the "Global Plastics Treaty", this instrument is designed to comprehensively address the full life cycle of plastic, potentially from production to disposal (UNEP, 2022; WWF, 2022).

The need to protect the marine environment from sea-based and land-based sources of pollution, including plastic, has been long recognised by Caribbean SIDS that are parties to international instruments aimed at mitigating its effects. For example, nearly 95 per cent of Caribbean SIDS have ratified Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL), which is intended to eliminate and reduce the amount of refuse and waste being discharged into the sea from ships (IMO, 1978; Ecolex, 2023; Serra-Gonçalves et al., 2023). Similarly, the Cartagena Convention, a regional legal agreement for the protection of the Caribbean Sea, was adopted in 1983 with technical agreements including, but not limited to, protocols for combating oil spills in the WCR and pollution from land-based sources and activities (UNEP, 2023a). All Caribbean SIDS ratified either parts or all protocols of the Cartagena Convention (UNEP, 2023a).

However, despite this State practice with regard to intergovernmental agreements related to preventing pollution of the marine environment, there is limited literature engaging with the crucial issue of how actors from Caribbean SIDS prepare for and participate in these multilateral environmental agreement negotiations. To some degree, an academic discourse on Caribbean SIDS engagement and participation in the Biodiversity of areas Beyond National Jurisdiction Agreement (BBNJ) has emerged, albeit from a very small pool of researchers (Hassanali, 2022a; Hassanali; 2022b). Consequently, a significant research gap exists, particularly with regard to detailed understanding of the drivers required by Caribbean SIDS to support effective preparation, participation and future implementation of an ILBI.

Bearing this research lacunae in mind, and recognising the potential implications for plastic pollution, especially marine plastic pollution, to be managed through an

ILBI, this research primarily addresses Caribbean SIDS' preparation for and participation in the ongoing INC negotiations to develop an ILBI on plastic pollution, including in the marine environment. During these negotiations Caribbean SIDS have the opportunity to shape the development of this new global treaty. In particular, this negotiations process offers a chance for Caribbean SIDS to address specific challenges they face due to plastic pollution in an effort to derive the benefits of improved environmental governance of plastic pollution at national and regional levels (Hassanali, 2022b; UNEP, 2023b). This may arguably also affect the effectiveness of these agreements.

The present research is both timely and urgent in character. It is intended to provide a new academic and knowledge contribution to this little studied and researched academic field. The research will also contribute to general equity questions in international relations and law. Chasek (1997), defined and summarised the six phases of multilateral environmental agreement (MEA) negotiations into:

a) **Precipants** serve as events that bring a particular environmental problem to the attention of the international community. In this case UNEA 5.2, which produced Resolution 5/14

b) **Issue definition,** where government delegates and/or scientists and other technical experts work together to define the nature of the problem

c) **Statement of initial positions**, where governments state their initial positions with regard to the environmental problem at hand, its causes and effects, and possible solutions, and start to form coalitions

d) **Drafting/formula building,** where delegates begin to forge consensus on the nature and provisions of the basic agreement.

e) **Final bargaining and details,** where governments work out the final, often contentious, details of the agreement.

f) **Ratification/implementation,** which takes place after the agreement has been adopted.

Through an examination of the phases of the MEA process as outlined by Chasek (1997), this work is intended to strategically identify areas of need at specific access points within the negotiations where Caribbean SIDS may experience challenges to equitable participation, based on the requirements of each negotiation phase (Figure 1).

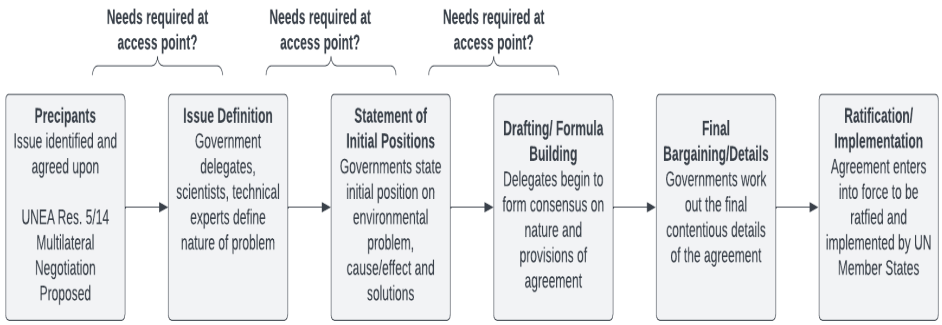

Figure 1 Areas of need for Caribbean SIDS at varying negotiation access points
(Source: the author; Chasek, 1997)

The novelty of this work is that it provides an analysis of the state of marine debris monitoring within Caribbean SIDS, summarised in **Paper's 1, 2 and 3.** Additionally, it provides a foundational framework, included in **Paper 4**, which allows for the observation, documentation, assessment and measurement of the current state and trajectory of Caribbean SIDS participating in the INCs. Lastly, in **Paper 5** it examines the role of CARICOM as a potential coordination mechanism for Caribbean SIDS preparing for the INCs. Moreover, this research approach can be applied to various MEA processes for both developed and developing countries. Similarly, the nature of this framework may be applied to the ongoing INC process to test research outcomes to verify its influence on either improving, reducing or eliminating barriers facing Caribbean SIDS in MEA processes. Based on Hufty (2008), requirements for scientific research to be utilised to support governance must have a defined objective and propose a methodology. The criteria below detail the character and contributions of this research (Hufty, 2008):

a) **Added value:** provides data on experiences and challenges facing Caribbean delegates, relevant stakeholders and regional organizations participating in the INCs while offering pathways for overcoming the barriers faced

b) **Scientific character**: The work is verifiable through the peer reviewed methodologies applied and theoretical underpinnings which allow for the work to be tested and reproduced through the multidisciplinary approach adopted, which encompasses social science and natural science, coupled with elements drawn from political science and international relations and law.

c) **Operationality:** The methodology applied in this work developed a course of action that identified problems while also offering opportunities for the methodology to be utilised, modified and/or expanded by non-specialists.

2 Introduction

Plastic's pervasive existence as a pollutant has become a cause of global concern due to its ubiquitous character but, in particular, as a result of its adverse effects on marine organisms, ecosystems, economies and human health (Derraik, 2002; Kershaw, 2016; Villarubia-Gómez et al., 2018). Within Caribbean SIDS, the impact of plastic pollution on the marine environment is relatively understudied and the research that does occur on this issue is predominantly conducted by extra-regional scientists and organisations, and seldomly shared with the governments of Caribbean SIDS (Stofen-O'Brien et al., 2022).

Caribbean SIDS comprise 16 countries, [here defined as including Antigua and Barbuda, The Bahamas, Barbados, Belize, Cuba, Dominica, the Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago] (Figure 2). These countries experience similarities in their ecology, culture and economic reliance on tourism and ocean-based industries (United Nations, 2021; Diez et al., 2019; Stofen-O'Brien et al., 2022). For example, tourism accounts for 70-80 per cent of the gross domestic product (GDP) of most Caribbean SIDS, with projections expected to increase, further driving up pressures on the marine environment while maintaining expectations of clean, healthy oceans to support revenue generation (Diez et al., 2019).

Caribbean SIDS are disproportionately affected by marine debris as a consequence of the transboundary nature of the problem, meaning that they receive far more marine debris than they produce or consume (Lachmann et al., 2017). It has been observed that this challenge requires interventions at global, regional and local levels to support management in the region (Lachmann et al., 2017; Ambrose et al., 2019). For example, at a fundamental level, there is currently no coordinated and harmonised approach to marine debris monitoring that could form a baseline understanding of the pathways, sources and distribution of marine debris in the region. Such an approach could support management efforts by providing the scientific base to inform the formulation of policies (Lovett et al., 2007). However, Caribbean SIDS currently lack adequate harmonised and standardised scientific protocols for unified marine debris monitoring in their marine environment (Ambrose, 2021).

Increasing trends in the production of plastics and the pollution of the marine environment have led to a unified call by states, civil society, academia, policy makers and non-governmental organisations (NGOs), among others, for the development of a global plastics treaty to address plastic pollution (Eriksen et al, 2014; Geyer et al., 2017; UNEP 2022; WWF, 2022). The global plastics treaty negotiations, to create an ILBI to end plastic pollution, including in the marine environment began in November 2022 (UNEP, 2022).

Caribbean SIDS face multiple, inter-related challenges that tend to reduce their opportunities to equitably participate in multilateral environmental decision-making processes, such as the global plastics treaty negotiations, due to their varying capabilities and resources, inclusive of financial and human capacity (Campbell et al., 2021; Hassanali, 2022a). Capacity building is often proposed as the answer in this context. (Harden-Davies et al., 2022a; Hassanali, 2022a; Hassanli, 2022b). Here, it is important to note that capacity building is a broad term, the definition of which requires framing based on the context in which it is used in (Harden-Davies et al., 2022a). Generally, it can be defined as "the process by which individuals and organisations obtain, strengthen, and maintain the capabilities to set and achieve their own development objectives over time" (UNESCO-IOC 2021; Harden-Davies et al., 2022a). Perpetual gaps in capacity can limit or constrain the Caribbean SIDS from realising their full potential to support global goals and policy development for plastic pollution (Polejack and Coelho, 2021; UNESCO-IOC 2021; Harden-Davies et al., 2022a). Here, capacity is defined as the required capabilities Caribbean SIDS must possess to participate in the plastic treaty negotiations—and subsequently its implementation—effectively and equitably.

Themes of equity are commonplace in environmental negotiations and can aid in identifying fair compromises given the collective interests and capacities of all players (Ashton and Wang, 2003). Such negotiations tend to prioritise distributive equity, which considers the distribution of costs, risks and benefits of the particular environmental issue or issues being discussed, while overlooking procedural equity. The latter concept concerns the involvement of all stakeholders—including indigenous communities and marginalised groups such as women and youth—and their right to participate in the decision-making process (McDermott et al., 2013; Martin et al., 2014; Law et al., 2018; Hass et al., 2019; Campbell et al., 2021; Ruoso and Plant, 2021). In contrast, contextual equity, which is the focus of this work with respect to equity issues, refers to equity in access and calls attention to pre-existing imbalances in the form of financial resources, political power, human capacity, and negotiating skills, issues which tend to create an unlevel playing field for participants in the decision-making process (Martin et al., 2014; Law et al., 2017; Hass et al., 2019). This arm of equity has received little attention or research priority as most equity arguments are focused on distributive or procedural equity (Friedman

et al., 2018). Yet, contextual equity serves as the gateway to achieving all dimensions of equity within environmental decision making (Hass et al., 2019).

With limited information on how Caribbean SIDS prepare and participate in MEA negotiations, this study fills a significant lacunae in knowledge by aiming to identify, understand and develop a framework of key drivers needed to support equitable participation for Caribbean SIDS in the development of a global plastics treaty. This work also addresses the role of science through marine debris monitoring of macro and microplastics on beaches within Caribbean SIDS; equity, through the identification of barriers impeding equitable participation in the negotiations, and the role of a coordination mechanism for Caribbean SIDS to bolstering equitable participation.

Figure 2 Map of Caribbean SIDS and CARICOM member states
(Source: the author)

2.1 Marine plastic pollution and the need for global intervention

2.1.1 Global impacts of plastic pollution

Marine debris is predominantly composed of plastic pollution (Derraik, 2002). Consequently this form of pollution is hereafter referred to as marine plastics or marine litter. Marine plastics have been classified as one of the most ubiquitous and rapidly growing pollutants along all marine environments of the world (Beamount et al., 2019; Pierdomenico et al., 2019; Buitrago et al., 2020). The harmful effects of marine plastics, notably on marine organisms and human health, have been far reaching and have generated substantial global attention (Gall & Thompson, 2015). Of particular concern from a marine environmental perspective, with respect to interactions between marine debris and marine organisms, 92 per cent involved plastic (Gall & Thompson, 2015), negatively affecting 2,110 species, including 40 per cent of mammal species, 100 per cent of sea turtles, and 46 per cent of bird species (Worm et al., 2017; Litterbase, 2018, Ambrose et al., 2019).

An estimated 4.8–12.7 million tonnes of plastics entered the oceans in 2010, mainly from rapidly developing coastal countries (Jambeck et al., 2015; Geyer et al., 2017). Once afloat in the ocean, buoyant plastic debris further accumulates into oceanic zones known as subtropical gyres (Lebreton et al., 2012; Eriksen et al., 2013). Eriksen et al., (2014), measured 5.25 trillion particles afloat in all five subtropical gyres. More recently, it has been calculated that globally this number has reached 170 trillion plastic particles, mainly microplastics (<5mm) (Eriksen et al., 2023).
Microplastics, categorised as primary (purposely produced industrialised plastic pellets or microbeads) or secondary (ultraviolet (UV) fragmentation and degradation of larger plastics in the environment), contain chemicals incorporated during its production along with persistent organic pollutants (POPS) that are absorbed from the seawater (Andrady, 2011; GESAMP, 2015). As this presents avenues for harmful toxins to enter the marine and human food web through plastic ingestion, scientists are concerned with understanding the implications of marine plastics for human and marine health (Andrady, 2011, Xanthos and Walker, 2017). Further, marine plastic pollution also has economic effects, through costs associated with loss and damages, including costs in terms of public health, clean up and losses in tourism revenues which have been estimated to be US$13 billion per year (Raynaud, 2014; Hardesty et al., 2015; Xanthos and Walker, 2017). The amalgamation of the ecological, economic and human health effects of marine plastic pollution has driven the contemporary need for urgent action and solutions at the global level.

2.1.2 The global plastics treaty negotiations

During the fifth session of the United Nations Environment Assembly (UNEA) (UNEA 5.2), in March 2022, Resolution 5/14 End Plastic Pollution: Towards an international legally binding instrument (ILBI) (UNEA 5/14) was adopted by 175 United Nations member states. The resolution proposed that an INC be convened to develop the text of an ILBI on plastic pollution, including in the marine environment (Stöfen-O'Brien, 2022). Unofficially—but frequently—termed the "global plastics treaty", the ILBI is intended to inclusively address the full life cycle of plastic from production to disposal through five INC sessions intended to build the specifics of the treaty between 2022 and 2024 (UNEP, 2022, WWF, 2022).

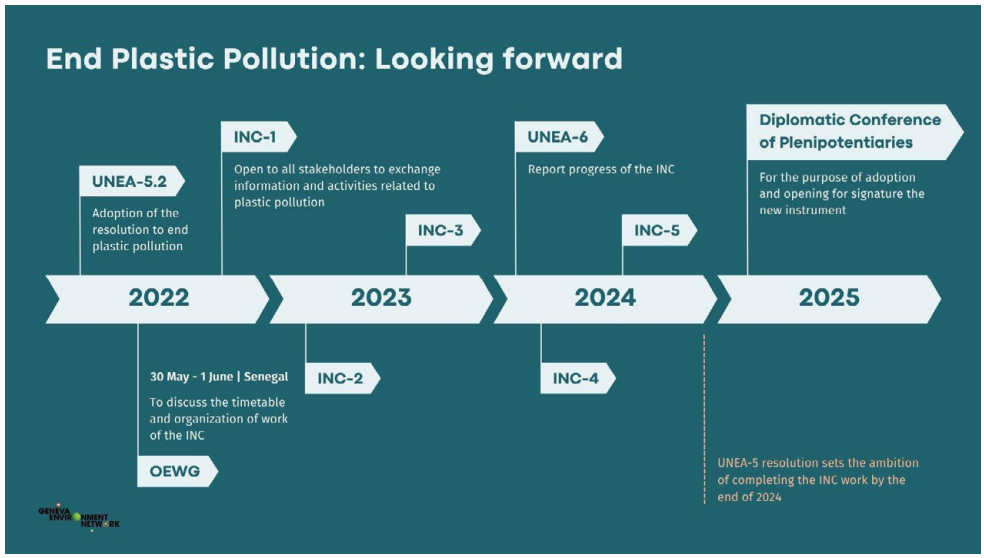

Figure 3 INC meetings timeline
(Source: Geneva Environment Network)

The landmark decision through UNEA 5/14 to develop an ILBI to end plastic pollution, including in the marine environment, has the potential to fill the global governance gaps that arise from the fragmented character of structures for global management of plastic pollution. It is especially notable that accountability is currently absent in relation to the effects of transboundary marine plastics (Hugo, 2018). Resolution 5/14 established an ad-hoc open ended working group (OEWG) and INC meetings, composed of United Nations member states, to host five INC sessions to negotiate on material and procedural obligations contained in the treaty, with negotiations set to conclude in a meeting of plenipotentiaries in early 2025

(UNEP, 2022; WWF, 2022; UNEA 5/14) (Fig. 3). The Resolution indicates that participation in the OEWGs and the INCs should be open to all member states of the United States and members of its specialised agencies, regional economic integration organisations, as well as relevant stakeholders (UNEA 5/14, 2022).

In principle, all United Nations member states, inclusive of SIDS, have the right to access the negotiating forum to have their voices and positions heard. However, international environmental negotiations and current United Nations structures have been deemed highly inequitable by scholars, who have pointed out that its institutional architecture systematically obstructs progress towards the development and implementation of international environmental policies (Schroeder et al., 2012; Heyward, 2007). This includes a certain degree of inequity in environmental treaty making, where developed countries are more equipped than less-developed states to negotiate more favourable outcomes due to the considerable disparities in resources and power dynamics (Takamura, 2003; Penetrante, 2011; Heyward, 2007). This study engages with the inequities faced by Caribbean SIDS in the context of negotiations towards a global plastics treaty by assessing how equity is experienced through their participation in the first Intergovernmental Negotiating Committee Meeting (INC-1). Further, the research identifies the need for harmonised marine debris monitoring to support decision making in addition to the key drivers needed to support the equitable participation of Caribbean SIDS in the development of the global plastics treaty.

2.2 Caribbean SIDS

SIDS are a distinct group of countries representing the geographical areas of the Caribbean, the Atlantic, the Indian Ocean and the Pacific, who experience unique social, economic and environmental vulnerabilities and challenges (United Nations, 2021; United Nations, 2023). Based on their predominantly remote geography, SIDS face varying challenges in their reliance on imports of goods and services and their vulnerability to economic effects that may be associated with ecosystem damages, biodiversity loss and climate change impacts (United Nations, 2023).

The Caribbean Sea is considered to be the most geographically and oceanographically secluded tropical ocean on the planet, and is an important global hotspot of marine biodiversity within its Caribbean Large Marine Ecosystem (CLME) (Jackson et al., 2014; Diez et al., 2019; Kanhai et al., 2022). The Caribbean states have long been recognised as being particularly at risk to climate change, and within recent times have experienced increases in the effects of plastic pollution (Lachmann et al., 2017; Thomas et al., 2020).

2.3 Marine plastic, Caribbean SIDS and the need for harmonised marine debris monitoring to support policy development

Marine plastic debris, also referred to as marine litter henceforth, is transported to and accumulates on Caribbean coastlines by way of the great Ocean Conveyor current and currents associated with the North Atlantic subtropical gyre (Law et al., 2010; Ambrose et al., 2019; Woods Hole Oceanographic Institute, 2020; Clayton et al., 2020). Caribbean SIDS' adjacency to currents and subtropical gyres—coupled with limited waste management infrastructure and the substantial dependence of these states on imported goods—creates a multifaceted pollution problem, necessarily requiring multifaceted responses and solutions (Starkey, 2017; Ambrose et al., 2019).

This creates an increasing threat as marine macroplastics (>25mm), mesoplastics (5-25mm) and microplastics (<5mm), afloat at the sea surface are deposited on shorelines, which capture most of the floating material (Lebreton et al., 2019). These materials are naturally sorted within coastal environments, converting beaches in Caribbean SIDS to sinks for marine plastics with concentrations nearly three times the global average, given the transboundary nature of plastic debris (Diez et al., 2019). For island nations such as Caribbean SIDS which, as noted above, are heavily reliant on ocean-based tourism, excessive streams of marine plastics threaten to compromise over 37 tourism dependent economies (Diez et al., 2019). Indeed, this has already translated into an estimated annual economic deficit of US$350-870 million across the region (Diez et al., 2019).

Developing a standardised marine debris monitoring programme for Caribbean SIDS, is a critical step for building regional scientific capacity to develop and evaluate management and policy interventions, including the global plastics treaty (Lovett et al., 2007). Current monitoring efforts for marine plastic debris on beaches in Caribbean SIDS do not accurately reflect the urgency of the threats associated with marine plastic pollution. This creates disparities in unified information, which is required to address these issues at national, regional and global scales (Serra-Gonçalves et al, 2019). For instance, regional instruments like the Cartagena Convention (1983)—developed to reduce land-based sources of marine pollution, including plastics—have been adopted to mitigate the effects of marine debris within Caribbean SIDS. However, this instrument lacks a basis for ongoing marine debris monitoring (UNEP, 2020). Similarly, the 2014 Regional Action Plan for Marine Litter (RAPMaLi) for the WCR was developed in response to the increased concerns of marine debris, and listed marine debris monitoring and research as a primary action category but only offered examples of individual monitoring events with limited opportunities for replication or regional expansion (UNEP-CEP, 2014).

SIDS are a focal point for the application of important global ocean targets such as the United Nations Decade of Ocean Science, which include identification and monitoring of ocean and land-based pollution sources (Ryabinin et al., 2019). This strategic focus can support the initiation and implementation of sustainable monitoring data gathering systems that can support informed science-based decision making (Ryabinin et al., 2019).

The creation of empirical monitoring data sets for marine plastic debris in Caribbean SIDS can drive management and policy implementation using data that are comparable and robust in terms of various research elements. However, as outlined in Paper 1 of this study, this requires standardisation of sampling methodology and reporting metrics to broaden the understanding of marine plastic dispersal, accumulation, composition and abundance on beaches within Caribbean SIDS with an intent to utilise data to support national, regional and global management of marine plastic pollution. (Vetger et al., 2014; Serra-Gonçalves, et al., 2019; Ambrose, 2021).

3 Theoretical underpinnings and research aims, objectives and questions

The detrimental effects of plastic pollution create a multifaceted governance problem, requiring collective action at global, regional and national levels to develop effective management strategies (Cho, 2005). The formulation of a global plastics treaty agreement is the beginning of a regime that encompasses the development of a MEA among United Nations member states with the aim of addressing this problem and regulating global actions that address plastic pollution (Haggard and Simmons, 1987). This research is theoretically underpinned by the multidisciplinary aspects of Collective Action Theory, Regime Theory and a Governance Analytical Framework (GAF), which encompass elements of governance, social science and international law. Together, these are intertwined to frame and analyse the state of global collective action on plastic pollution while investigating and unveiling barriers inhibiting Caribbean SIDS from equitably participating in these actions.

This study is framed by the definition of governance, understood as the processes of interactions between the actors involved in a collective issue that lead to the development of a regime (Hufty, 2008). In this context, this work is using the collective action process for building the global plastics treaty as its focus and governance frame. This framework will aid in distinguishing between generalisations of inequities facing Caribbean SIDS within collective decision making for the environment by identifying exactly what they are and the areas in which they occur within the MEA process (Schroder et al., 2012; Hassanali, 2022a). The study is underpinned by empirical observations made and data collected on Caribbean SIDS' participation in the collective decision-making process on plastic pollution during INC-1.

3.1 Contextual equity in environmental decision making

Broadly defined as fair or just, equity is a moral ideal that accounts for meeting the unique needs of individuals or groups to achieve a particular goal or to eliminate barriers that restrict equal opportunities (Heyward 2007, Law et al., 2017). Within environmental decision making, there are various dimensions to equity that facilitate inclusion, access to resources and distribution of environmental benefits and burdens (McDermott et al., 2012). Four dimensions of equity within environmental decision making have been identified and conceptualised in the literature with each playing an intrinsic role in the development, negotiation and implementation of an ILBI. Each dimension of equity has been summarized below based on the following literature:-Young 2011; McDermott et al., 2013; Martin et al., 2014; Law et al., 2017; Hass et al., 2019; Dawson et al., 2018; Campbell et al., 2021; UNEP, 2021; and Ruoso and Plant, 2021.

Procedural equity is concerned with the involvement of all stakeholders, including indigenous communities and marginalised groups such as women and youth, and their right to participate in the decision-making process. *Recognitional* equity accounts for the inclusion of diverse and traditional knowledge, values and norms of various stakeholders and their application and integration into the design and implementation of an ILBI. *Distributive* equity considers the distribution of costs, risks and benefits among stakeholders within environmental decision making, while *contextual* equity refers to equity in access and accounts for how pre-existing political, social, cultural and historical factors may hinder various groups from equitably participating in environmental decision-making processes.

As outlined by Heyward (2007), a key principle of equity within environmental decision making specific to the actors—in this case United Nations member states involved in the decision-making process—is the principle of capacity. The concept of capacity as it relates to equity within environmental decision making recognises the considerable differences in countries' capabilities to address global environmental issues on the basis of:

a) **Economic situation and resource availability:** addressing an environmental problem on the basis of economic and resource capabilities

b) **Basic needs:** addressing an environmental issue on the basis that the basic needs of developing countries are a primary concern

c) **Domestic constraints:** actors' capacity to address an environmental issue while taking into account domestic constraints on action

d) **Opportunities:** actors' capacity to address environmental issues should take into account the relative availability of cost-effective opportunities to do so

Varying factors, such as wealth, science and technology, skills and information, infrastructure and competing domestic pressures and interests can impede a country's ability to participate in and/or implement an MEA (Heyward, 2007). The issue of capacity is directly linked to the dimension of contextual equity, which provides the theoretical underpinnings for this research. The exploration of contextual equity and contextual factors and its interaction within environmental decision making is particularly relevant, as understanding prevailing structural conditions within a society is crucial for the outcome of political interventions (Friedman et al., 2018; Law et al., 2018; Hass et al., 2019). For Caribbean SIDS participating in the INC process, it is crucial to understand factors that enable or constrain their achievement of equity by evaluating their experiences with contextual equity during the initial phases of the INCs (Law et al., 2017).

3.2 Collective action, Regime Theory and the Governance Analytical Framework

Collective action has been defined as a shared interest by a group of people involving a common action that favours the pursuit of a shared interest (Ostrom, 2010). For example, in the context of the present study, this can be understood as collective action aimed at protecting the oceans from plastic pollution (Ostrom, 2010; Graham et al., 2019). This approach demands recognition of the interaction between interested groups and the opportunities afforded to them, in addition to examining the role of organisational structures and how they facilitate behaviours that promote collective action (Flanigan et al., 2006). It also seeks to understand how individuals or actors with shared interests coordinate their efforts with a view to attaining a common goal that is dependent on the efforts of other individuals (Flanigan et al., 2006).

This study also uses a conceptual framework adapted from Ayre (2017)—collective action for adaptive governance—and applies elements of Hufty's (2008) GAF. Accordingly, this work conceptualises collective action for plastic pollution based on the requirement of relevant scientific research: for example, assessing the state of Caribbean SIDS scientific capacity for conducting harmonised monitoring. Here, science has a dual function, which is to inform and measure a plan of action. (Figure 4). In this case, the key actors are United Nations member states participating in the INC negotiations towards agreement and implementation of the ILBI to end plastic pollution.

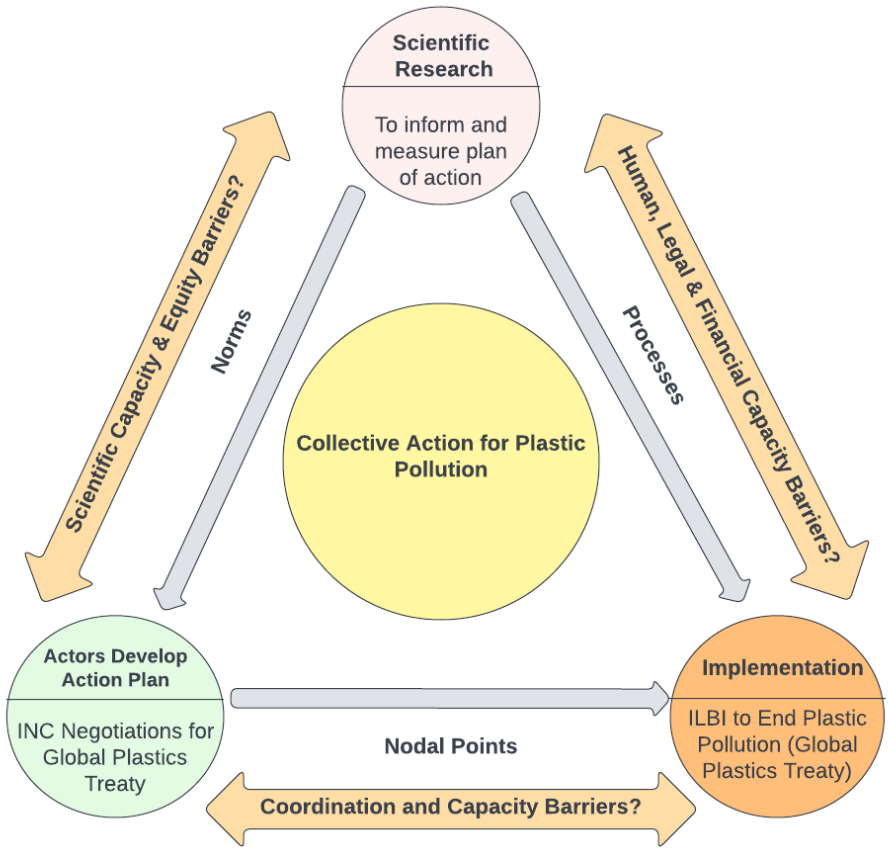

Figure 4 Conceptual Framework for assessing the barriers facing Caribbean SIDS in the collective action of building a regime for plastic pollution
(Source: the author; adapted from Hufty (2008), Governance Analytical Framework and Ayre and Nettle (2017), Conceptual Framework for Collective Action)

Regime theory seeks to explain the dynamics between states and the norms, rules and decision-making processes in which actors' expectations are merged within a given area of international relations (Bradford, 2007). The utilisation of regime theory with regard to the development of the global plastics treaty focuses on agenda setting, regime design and regime operation (Young, 1999). This work is intended to examine what can be referred to as the 'outer boundaries' of establishing an equitable regime, in this case the global plastic treaty, by assessing which barriers impede the preparations for and participation in the development of the regime as faced by Caribbean SIDS. As such, this work will not focus on the inner workings of the treaty, such as its content and obligations, but instead will identify factors inhibiting participation in its formulation. Here, dimensions of regime theory are combined with aspects of the GAF developed by Hufty (2008). As governance

processes for participating in forums such as the INCs vary between actors, for example, between developed and developing states (Takamura, 2003; Penetrante, 2011; Heyward, 2007), the GAF provides a methodological analysis that systematises the complexities within the processes for formulating and implementing collective decisions (Hufty, 2008; Allen et al., 2021; Díaz-Castro et al., 2022). The GAF consists of five analytical categories: the problem; the actors; the nodal points; the norms; and the processes (Hufty, 2008). (Fig. 5)

a) **Actors** are those involved in the collective decision-making process, conditioned by their nature, power, interests, ideas and history.

b) **Nodal points** represent the interaction of all identified problems, actors, processes and norms required

c) **Norms** express the multi-level aspect of governance as expressed through a collective decision made on behalf of actors to take collective action on an issue

d) **Processes** are successions of states through which a regime passes

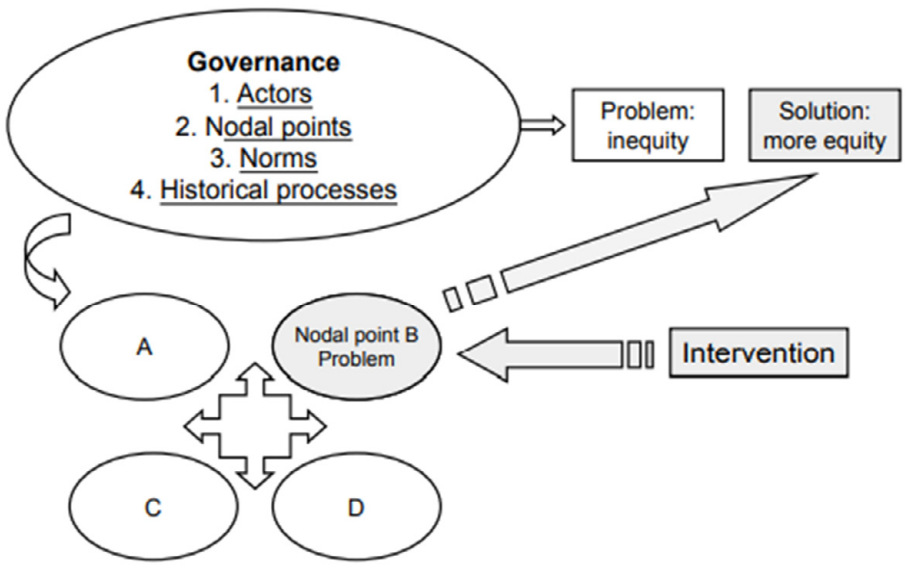

Figure 5 Governance Analytical Framework.
(Source: Hufty, 2008)

For the present research, the inequities facing Caribbean SIDS in their participation in the INC decision-making forum have been identified as the governance problem. Further, in accordance with the above-mentioned approach of Hufty (2008):

A. United Nations member states are the actors;

B. the INC negotiations are a nodal point;

C. the recognition of the need for collective action on plastic pollution under UNEA 5/14 is the norm; and,

D. the finalisation, ratification and implementation of the global plastics treaty is the process (Fig. 4).

Data gathered to support this research will be applied to the GAF to assess the interactions between the identified problem and the analytical categories to identify solutions needed and specific areas requiring intervention (Figure 6).

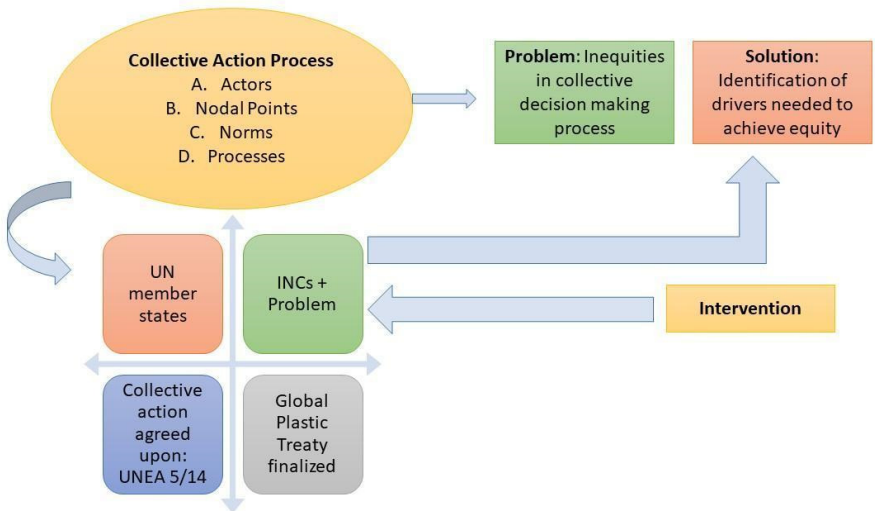

Figure 6 Governance Analytical Framework for Caribbean SIDS participating in INC-1
(Source: the author; Adapted from Hufty, 2008)

3.3 Research aims

This research aims:

a) To assess the current state of marine plastic monitoring for beaches in the WCR and critically analyse the barriers to establishing harmonised marine plastic monitoring in the WCR across scales

b) To understand and develop a framework of key drivers and enabling factors needed to support equitable participation for Caribbean SIDS in the development of an ILBI on plastic pollution, including in the marine environment

3.4 Research objectives and questions

Research objectives

1. Analyse gaps and data collection methods for macro, meso and microplastics in the marine environment to support preparation and participation for INCs for the global plastics treaty agreement
2. Analyse barriers to achieving and key drivers needed to achieve equitable participation and preparation in the INCs by Caribbean SIDS
3. Assess CARICOM's role as a coordination mechanism within and among Caribbean SIDS to support preparation and participation in the INC

Research questions

1. What barriers exist and what considerations are needed to support harmonised monitoring for marine plastic debris, including microplastics in the marine environment of Caribbean SIDS? ***(Paper 1 and 2)***

   Who are the dominant actors conducting marine debris monitoring within Caribbean SIDS? ***(Paper 3)***
2. What barriers do Caribbean SIDS face to achieving equitable participation in the INC process and what key drivers are needed to overcome them? ***(Paper 4)***
3. How does CARICOM function as a regional coordination mechanism for Caribbean SIDS in multilateral environmental agreements and what are the implications for the INC process? ***(Paper 5)***

4 Methodology

4.1 Methodology overview

This study incorporated six methodological approaches: a literature review, a document analysis, a microplastics debris beach survey, event ethnography, participant observation and semi-structured interviews.

The literature review was aimed at understanding the state of marine debris surveys conducted on beaches throughout the WCR while the document analysis served as a critical analysis of a proposed approach to harmonised marine debris monitoring for beaches in the WCR. The WCR was the initial geographic scope of Paper 1 to gain an understanding of the regional state of marine debris monitoring on beaches. Paper 2, on the other hand, focused on microplastics monitoring conducted on beaches within one of the Caribbean SIDS (The Bahamas) and offered considerations needed for harmonised microplastics monitoring on beaches within Caribbean SIDS.

Event ethnography and participant observation were used in tandem to participate in and observe various meetings associated with the global plastics treaty negotiations. Additionally, it analysed statements presented during negotiation plenaries by the Group of Latin America and Caribbean Countries (GRULAC) and the Association of Small Island States (AOSIS). Lastly, semi-structured interviews were utilised to understand the attitudes and perceptions of stakeholders from Caribbean SIDS, namely delegates and NGO representatives, to determine their views and experiences on equity and the equitable preparation and participation of Caribbean SIDS during INC-1. Also, CARICOM secretariat staff were interviewed to gain insight into the organisation's role as a coordination mechanism for its Caribbean SIDS member states.

4.2 Literature review

This methodology was applied to ***Paper 1*** to understand the scope of marine debris surveys conducted on beaches within the WCR, a literature review was conducted using only peer-reviewed articles. Articles were sourced via academic research

platforms Scopus (www.scopus.com) and Google Scholar (www.scholar.google.com) using the keywords “marine debris”, “marine plastic debris”, “marine plastics”, “marine litter”, “plastics”, “ocean plastics”, “marine environment”, “coastal environment”, “beach”, “shoreline”, “monitoring”, and “survey”, all combined with Caribbean or Wider Caribbean Region. Article snowballing, by way of other relevant studies referenced within a selected article was also utilised. This review focused on marine debris monitoring on beaches in the WCR specific to macro debris >5mm. Microplastic surveys were excluded from the literature search, due to discrepancies in definition and size classification. Fifteen peer reviewed articles were selected and each article was assessed against criteria developed on the basis of the considerations needed for establishing a marine plastic debris monitoring programme, including:

a) study location;

b) site selection;

c) number of sites surveyed;

d) methodology used;

e) transect measurements;

f) beach type;

g) monitoring frequency;

h) site replication;

i) dominant debris type;

j) debris totals;

k) dominant debris source;

l) dominant geographic location;

m) administration;

n) actors;

o) data sharing and storing; and,

p) funding schemes associated with monitoring events.

4.2.1 Document analysis

Similarly, this method was also applied in research contributing to ***Paper 1*** whereby document analyses were conducted for the published reports, *Harmonizing Marine Litter Monitoring in the WCR: A Hybrid Approach* (2019) and the Action Plan for

Harmonizing Marine Litter Monitoring in the WCR (2021), both by Caporusso and Hougee, to assess their proposed approaches for unified marine debris monitoring on beaches within the WCR, inclusive of Caribbean SIDS. The analytical procedure entailed synthesising the data contained within the documents by appraising their content and categorising it into themes including, research methodology, funding mechanisms, monitoring governance, data sharing and storage, sovereign and territorial states and debris categorisation (Labuschagne, 2003; Bowen, 2009). Guided by Bowen (2009), this document analysis was combined with the qualitative research method of literature review, mentioned above, to develop empirical knowledge on gaps in knowledge regarding harmonised marine debris monitoring and considerations for pathways forward.

4.3 Microplastics beach survey

For ***Paper 2,*** microplastic debris surveys were conducted on 16 beaches within three coastal exposures in South Eleuthera, The Bahamas. The objective of these surveys, which utilised citizen science to collect data, was to assess micro and mesoplastic abundance and distribution. The coastal exposures included the Atlantic Ocean (AO), AO (east of Eleuthera) is characterised by the deep waters and circulating currents of the North Atlantic sub-tropical gyre (Law et al., 2010); the Exuma Sound (ES), a largely enclosed basin >1,000 m deep, with steep canyons (Colin, 1995) and the Bahama Bank (BB), shallow water carbonate banks. Each beach was monitored twice: once in spring (dry season) (March–May 2013) and again in fall (wet season) (September–November 2013), at the same location, verified using a handheld Garmin GPSMAP® 76 GPS.

The author collected the unpublished dataset resulting from the abovementioned surveys before the present study, but it has been analysed as part of the PhD research. Though a decade old, the dataset provided substantial data on meso and microplastic abundance. Analysis infers that given the increase in microplastics at the sea surface globally, Caribbean SIDS would likely receive depositions of microplastics to its shores. Additionally, analysis of the dataset provided an opportunity to critique the methodology used to collect the data and enabled the discussion of key considerations for establishing harmonised microplastics monitoring in the WCR. It serves as a baseline for understanding the threshold of acceptable levels of pollution that may be incorporated into a treaty regime over time.

A modified methodology from the 5 Gyres Institute's microplastics beach sampling guide (5 Gyres, 2012) was utilised to collect samples. Four random 5m-wide transects within a 100m section of shoreline were initially selected for a macro

debris survey (Figure 5). A measuring tape ran perpendicular to the shoreline from the back beach or first sign of vegetation to the high tide mark, also known as the 'wrack line' (consistent with the high tide line where seaweed is deposited), to identify the length of each transect. Within each transect, four 1x1m quadrats were randomly casted by volunteers, within the wrack line of each transect selected for the macro debris survey (Figure 7). Using a small shovel, 3 cm of sand was scooped evenly across the grid and sieved through a set of nested sieve boxes with a mesh size 1 mm capturing microplastics and mesh size of 5 mm capturing mesoplastics.

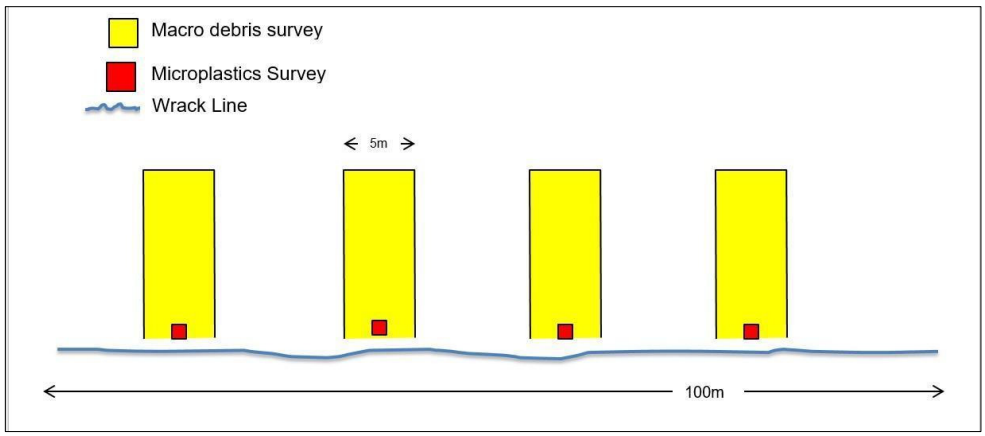

Figure 7 Microplastic and mesoplastic debris survey area
(Source: 5 Gyres)

Microplastic and mesoplastic particles obtained were quantified along with fragments of plastic foam, film, food wrappers, pellets, filaments, jugs or containers, cigar tips, cigarettes, personal care products and other miscellaneous plastics. Plastic particles were quantified and categorized before being extracted from each sieve and placed in appropriately labelled sample bags. This study excluded microfibers and focused on microplastics readily visible to the naked eye and quantifiable within the sieve boxes. All data points collected between seasons were pooled together for analysis using JMP® Statistical Analysis Software. Due to non-normal distribution of the data, a non-parametric Wilcoxon test was used.

4.4 Event ethnography and participant observation

Papers 3 and 4 utilized event ethnography and participant observation, which enables researchers to learn about the activities of people or an event under study in the natural setting through observing and participating in those activities. (Kawulich, 2005). This method offered access to unique insights into the inner workings of multilateral environmental negotiation events, and aided in broadening understanding of global environmental governance (Duffy, 2015). Both methods offered flexibility in that there is no rigid structure or defined procedure for conducting ethnographic research. However its main components were fieldwork, semi-structured interviews and document analysis (Jaimangal-Jones, 2013). Semi-structured interviews take on a conversational approach and steer towards a range of topics within a subject area (Jaimangal-Jones, 2013). The use of event ethnography and participant observation yielded insights into Caribbean SIDS participation in meetings associated with the global plastic treaty negotiations, including the first meeting of the Open Ended Working Group (OWEG-1) and the INC-1.

Semi-structured interviews focused on delegates from Caribbean SIDS who attended the first Ad-Hoc OEWG (OEWG-1) and INC-1 meetings to glean insight into their preparation, processes and challenges faced within the ongoing INC negotiations. This approach, utilised during the INC-1, probed into themes of equity, participation, preparation and challenges faced by Caribbean SIDS, their delegations and relevant regional actors and stakeholders engaged in the negotiation process.

The methods utilised also supported an analysis of meeting documents, including the GRULAC declaration and a statement made by AOSIS. During the plenary session of the OEWG-1 and INC-1 meetings, Caribbean countries in attendance and the size of their delegations were observed, noted and confirmed using United Nations Environment Programme (UNEP) List of Participants (LOP) data. Regional meetings hosted by GRULAC during the OEWG-1 and INC-1 were also observed, where the subjects of the study were identified and interviews were requested.

A snowball sampling method was used where various participants suggested others for the study. Meeting observations were conducted both virtually during the OEWG-1 and in-person during the INC-1 in Punta del Este, Uruguay. Twelve semi-structured interviews were conducted via Zoom (n=2) and in-person at INC-1 (n=10), with 14 individuals representing Caribbean delegates, NGOs, a United Nations regional group coordinator, lawyers and policy advisors, with the latter accounting for a single interview (Table 1). All respondents attended either the OEWG-1, the INC-1 or both, worked in or with the Caribbean region and were actively engaged in the negotiation process. Study participants were asked questions

related to equity, their preparation for and participation in the INC meetings, and challenges faced in achieving equity. The small sample size represents a substantial proportion of key stakeholders present given the small size of Caribbean SIDS delegates attending OEWG-1 and INC-1. Additionally, out of the small pool of candidates suitable for interview, several individuals declined their invitations to participate in the study.

Table 1 Semi-structured interview study participants

Role	Number of individuals
Delegate	8
Lawyers and policy advisors	3
NGOs	2
Regional Group Coordinator	1

For ***Paper 4,*** based on the findings of Paper 3, specifically suggesting the lack of priority of the INC forum by CARICOM, up to the time of writing, a semi-structured interview was conducted with the CARICOM Secretariat to understand CARICOM's approach to and challenges with preparation of its member states for MEAs. Interviews with CARICOM member states and other regional organisations were not considered necessary because of: a) CARICOM's participation in multiple MEA forums; b) its role as the primary coordination mechanism for its member states participating in MEAs; and c) its positioning as an important negotiation bloc in MEAs (Hassanali, 2022). The Secretariat, also referred to as the study participant, was asked questions related to: a) challenges faced in coordination; b) achieving priority among member states, funding and MEA preparation; and c) participation, capacity building, stakeholder engagement, science and crafting negotiating positions.

4.4.1 Data analysis

Papers 3 and 4 followed a modified methodology by Ison et al., (2021). All interviews were transcribed using the Otter.ai software. Using Nvivo 13 qualitative data analysis software to analyse interview transcripts, a three-step process was used to identify codes, subcodes (categories) and themes. Codes (Table 1 and 2), a unit of analysis by way of labelling, summarised key aspects from each interview question, and were derived from the focal points of equity, preparation, participation, and challenges facing Caribbean SIDS in the INC-1 process. From here subcodes (more specific categories of the codes) were created, before themes, defined as relevant connections to the research question, were extracted (LeBlanc, 2010). Word frequency analyses were also conducted based on the recurrence of similar descriptive words in each interview and their connection to each code and subcode.

Table 2 Code categories identified from semi-structured interviews with participants of OEWG-1 and INC-1. The codes are presented in alphabetical order along with their frequency

Code system	Frequency
Achieving meaningful preparation and participation	17
Bureau importance	6
Caribbean SIDS desires of treaty	1
CARICOM	20
Challenges	14
Country positions	5
Delegate composition	11
Delegation size	11
Differing country needs	1
Equity defined	23
Funding	11
Funding source	12
Human capacity	11
Hybrid meeting attendance	3
INC-1 challenges	7
Key stakeholders	9
Legal aid	11
Meeting prioritization	9
Multiple meetings happening	2
Negotiation training	16
Participation	1
Preparation time	4
Procedural equity	13
Regional engagement	8
Regional preparation	10
Scientific guidance	10
Solutions	20
Stakeholder engagement	8

Table 3 Code categories identified from semi-structured interview with CARICOM Secretariat. The codes are presented in alphabetical order along with their frequency

Code System	Frequency
BBNJ Preparation	5
Capacity building	4
CARICOM	3
Challenges with MEA preparation	4
COP 15 preparation	5
COP 27 preparation	4
Environmental issues of priority	1
Formulating negotiation positions	8
Funding mechanism	9
Future implementation	3
INC	4
INC access	1
INC challenges	6
INC coordination	5
Negotiation bloc	8
Negotiations	4
Political will	8
Prioritisation of INC Forum	7
Promoting equity	1
Scientific research	5
Secretariat responsibilities	3
St. John's declaration	2
Stakeholder engagement	5

5 Results and discussion

Overall, the work produced a string of publications providing empirical evidence that sought to fulfil the research objectives by providing thorough answers to the research questions.

The research was devoted to identifying the importance of data gathering and marine debris monitoring on beaches in Caribbean SIDS, and the actors driving the efforts. Additionally, the research aimed to support local, global and regional development of policies aimed at managing marine plastic pollution, which led to Papers 1 2 and 3.

This foundational research helped to create a pathway for Paper 4, which explored and discussed the role of equity in Caribbean SIDS' ability to participate in the global decision-making forum, the INC set up to manage plastic pollution. Here, the work unveiled various contextual equity barriers facing SIDS, including the need for coordination among Caribbean SIDS to both overcome equity issues faced and to bolster negotiating positions and outcomes.

This discussion led to the final publication, Paper 5, which examined the pre-existing coordination mechanism of CARICOM, its approach to preparation, participation within MEAs by its member states and the relevance of this for the current INC negotiations. The results of this work reveal the commonalities concerning the impeding factors that serve to limit Caribbean SIDS' ability to coordinate, participate and advocate for themselves in the scope of negotiation of a global plastics treaty. The research also proposes considerations necessary for achieving equitable, unified outcomes for them during the negotiation process. The following subsections summarise the relevant publications derived from the research questions.

Table 4 Interlinkages between research objectives, questions and papers

	Research objectives	Research questions	Papers
1	Analyse gaps and data collection methods for macro, meso and microplastics in the marine environment to support preparation and participation for the INC for the global plastics treaty agreement	a) Which barriers exist and what needs to be considered to support harmonised monitoring for marine plastic debris, including microplastics, in the marine environment of Caribbean SIDS? b) Who are the dominant actors conducting marine debris monitoring within Caribbean SIDS?	1, 2, 3
2	Analyse barriers and key drivers needed to achieve equitable participation and preparation in the INC by Caribbean SIDS	What barriers do Caribbean SIDS face in achieving equitable participation in the INC process and which key drivers are needed to overcome them?	4
3	Assess CARICOMs role as a coordination mechanism within and among Caribbean SIDS to support preparation and participation in the INC	How does CARICOM function as a regional coordination mechanism for Caribbean SIDS in multilateral environmental agreements and what are the implications for the INC process?	5

5.1 Which barriers exist and what needs to be considered to support harmonised monitoring for marine plastic debris, including microplastics, in the marine environment of Caribbean SIDS?

Who are the dominant actors conducting marine debris monitoring within Caribbean SIDS?

Paper 1:
Ambrose, K. K. (2021). Coordination and harmonization of a marine plastic debris monitoring program for beaches in the Wider Caribbean Region: Identifying strategic pathways forward. Marine Pollution Bulletin, 171, 112767. https://doi.org/10.1016/j.marpolbul.2021.112767

Paper 2:
Ambrose, K.K. and Walker, T.R. (2023). Identifying opportunities for harmonised microplastics and mesoplastics monitoring for Caribbean Small Island Developing States using a spatiotemporal assessment of beaches in South Eleuthera, The Bahamas. Marine Pollution Bulletin, 115140. https://doi.org/10.1016/j.marpolbul.2023.115140

Paper 3:
Stöfen-O'Brien, A., Ambrose, K. K., Alleyne, K. S., Lovell, T. A. and Graham, R. E. (2022). Parachute science through a regional lens: marine litter research in the Caribbean Small Island Developing States and the challenge of extra-regional research. Marine Pollution Bulletin, 174, 113291. https://doi.org/10.1016/j.marpolbul.2021.113291

For Caribbean SIDS participating in the negotiation process for the ILBI on plastic pollution, possessing empirical datasets on the state of plastics in the Caribbean's marine environment is fundamental to shaping negotiation positions, driving management solutions and measuring policy implementations within the region. However, for this to occur standardization of monitoring methodologies and reporting metrics are required to expand understanding in the areas of marine plastic dispersal, accumulation, composition, source and abundance on beaches and subsequently in other marine environments of Caribbean SIDS.

Coordinated and harmonised marine debris monitoring on beaches within Caribbean SIDS can be viewed as essentially non-existent, as unified monitoring efforts simply do not exist. Indeed, marine debris monitoring that has occurred on beaches within Caribbean SIDS are deemed inconsistent based on the high variation in protocols and methodologies used during monitoring events, resulting in incompatible data sets (Figure 9). Similarly, Caribbean SIDS account for less than 3 per cent of published microplastics monitoring conducted on beaches with studies conducted also utilising varying methodologies (Mesquita et al., 2022).

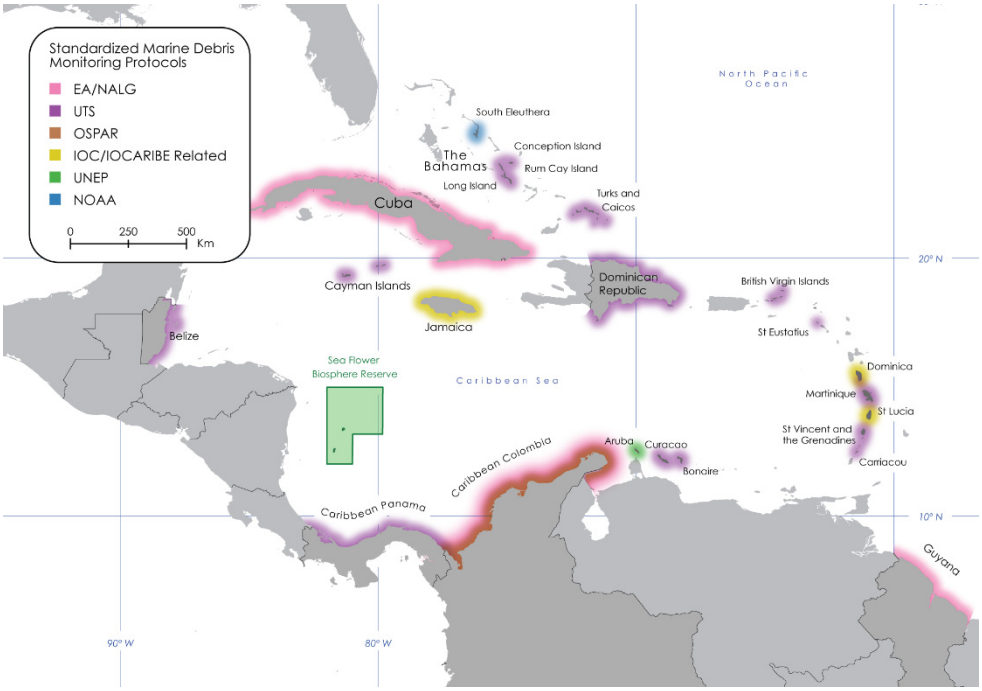

Figure 8 Marine debris monitoring protocols used within the Wider Caribbean Region, including Caribbean SIDS
(Source: the author)

Marine debris research and monitoring activities conducted within Caribbean SIDS are subject to a phenomenon known as “parachute science”. In the context of this research, this term is defined as a preponderance of research conducted by scientists based predominantly outside the target geographical region without the input or involvement of local experts (Stöfen-O'Brien, et al., 2022). A literature review of publications on marine debris monitoring events occurring within Caribbean SIDS showed that 85 per cent of publications and subsequently marine debris monitoring, were orchestrated by researchers from outside the Caribbean SIDS.

Appropriate solutions to marine debris management within Caribbean SIDS should ideally be driven by the knowledge and expertise of researchers already in situ in the region. Though partnerships with extra regional scientists can aid in building human and scientific capacity within the region, it is imperative that these scientists engage with local experts and governments to establish and implement equitable partnerships, with the data collected being used to shape local policies. Otherwise, this presents opportunities for science shared within negotiations to be skewed towards Western value systems and not at all adapted to the tropical realities of Caribbean SIDS (Polejack, 2021; Polejack and Coelho, 2021). Access to and use of science within negotiations by way of science diplomacy, can serve as a country’s

soft power, as opposed to the traditional hard powers of force and coercion (Nye, 2017; Polejack, 2021). For Caribbean SIDS, the production and use of localised, regional data can lead to equitable participation in decision-making forums via the support of evidence-based science that drives favourable treaty outcomes.

Key barriers negatively affecting Caribbean SIDs 'ability to collect coordinated and harmonised data on marine debris within its marine environment include:

a) variations in methodologies, including the need for site selection, identification of debris source, composition and type;

b) Insufficient governance, specifically the actors involved in conducting the research and managing data collection; and,

c) lack of funding and resources required to execute harmonised marine debris monitoring.

To address these barriers, several factors must be considered, as Caribbean SIDS face numerous challenges to conducting marine scientific research: they have limited human capacity, poor access to state-of-the-art technology, and lack adequate funding to support unified coordination of scientific monitoring events (Polejack and Coelho, 2021). Funding for monitoring events is typically excluded from national budgets, as universities, private entities and independent researchers serve as the driving force behind the execution of monitoring events. In this context, funding considerations and budget allocations must be acquired and allotted by governments within Caribbean SIDS to establish a harmonised and unified monitoring programmme. Additionally, the co-production and sharing of data collected will be key components for enhancing scientific coordination and cooperation among countries (Claudet et al., 2020).

Unified approaches to marine debris monitoring have been proposed by Caporusso and Hougee (2019), who published a report on *Harmonizing Marine Litter Monitoring in the WCR: A Hybrid Approach*. The report draws attention to the effects of marine debris in the WCR and proposes a hybrid approach, consisting of comprehensive surveys and rapid surveys that involve citizen science. Caporusso and Hougee (2019) acknowledged the challenges associated with orchestrating regional coordination and harmonisation of marine debris monitoring in the WCR but lacked specific elaboration of the key considerations needed for implementation, such as governance, financing, training and capacity building, data management and measuring monitoring effectiveness. The methodology proposed in the report was limiting as it excluded microplastics in its monitoring approach. However, the report was updated in 2021, and maintained its exclusion of microplastics monitoring in addition to other relevant considerations as mentioned (Caporusso and Hougee, 2021). UNEA Resolution 5/14 recognised that plastic pollution includes

microplastics (Walker, 2022). Additionally, the need for microplastics to be included in the development of the forthcoming ILBI has also been recognised internationally by academia, scientific bodies and NGOs (Rognerud et al., 2022).

A vast knowledge gap remains regarding the main sources of microplastics, its abundance and distribution within Caribbean SIDS; this must be addressed to advocate for preventive and mitigative actions at national, regional and international levels, particularly in the negotiating forum of the global plastics treaty agreement (Orona-Návar et al., 2022). Instituting a microplastics monitoring programme would require:

a) extensive funding to support data collection;

b) laboratory testing for samples and technological research needs

c) capacity building and training for actors involved; and

d) a clearing house mechanism to facilitate scientific cooperation and information exchange between Caribbean SIDS.

Given the condensed timeline of the treaty formulation, coupled with Caribbean SIDS having varied national capacities to support data gathering on the proliferation of macro and microplastics in the marine environment, it is improbable that a comprehensive, harmonised, regional dataset on marine plastics will be produced before 2024, the proposed concluding date of the treaty negotiations. As such, the intended treaty text being developed should incorporate monitoring obligations that reflect the need for capacity building and financial support necessary for developing states to gather adequate and relevant data (Rognerud et al., 2022). Coordination and harmonisation of marine debris monitoring within Caribbean SIDS will require collaboration among academia, NGOs, research institutions and policy makers within governments. With varying methodologies for marine debris monitoring available, research objectives must first be established among relevant stakeholders within Caribbean SIDS to determine the appropriate methodology to be applied (Velander and Mocogni, 1999; Besley et al., 2017; Mesquita et al., 2022).

5.2 What barriers do Caribbean SIDS face to achieving equitable participation in the INC process, and which key drivers are needed to overcome them?

Paper 4: Ambrose, K.K. (2023). Assessing and Addressing Contextual Equity: A Framework for Key Drivers Needed by Caribbean Small Island Developing States to Achieve Contextual Equity in the Global Plastics Treaty Negotiations. (In Review) Frontiers in Marine Science, conceptualised the fundamental inequities facing Caribbean SIDS during the INC-1 negotiating meeting. The findings from this paper are outlined below.

Contextual equity—which is concerned with equity in access to the decision-making process—calls attention to pre-existing imbalances in the form of financial resources, political power, human capacity, and negotiating skills, which creates an unlevel playing field for participants in the decision-making process (Martin et al., 2014; Law et al., 2017; Hass et al., 2019). Caribbean SIDS face contextual inequities in their preparation and participation in the INC-1 compared to developed countries, thus foreshadowing continued experiences for the remainder of the INC process. This is based on the inequities faced by developing countries, which are unable to negotiate more favourable outcomes due to the considerable disparities in resources and power dynamics compared to United Nations member states from developed countries (Schroeder et al., 2012; Takamura, 2003; Penetrante, 2011; Heyward, 2007).

Based on study findings, contextual barriers constraining achievement of equitable participation in the INC negotiation process by Caribbean SIDS include a lack of prioritization of the INC forum by governments within Caribbean SIDS and intergovernmental organizations representing them; inadequate funding to support the necessary needs and activities associated with preparation and participation in the INCs; limited capacity in the form of adequate staff and training for delegates, among others; and limited stakeholder engagement activities. Lastly, the absence of diverse and robust localised scientific data on plastics to aid in shaping national positions also plays a role.

Accessing and securing funds to attend such meetings from public treasuries within Caribbean SIDS is difficult as funds are unavailable, not prioritised within national budgets or allocated to more pressing national needs, such as food security, crime and economic growth and development. Voluntary funding mechanisms from the UNEP Secretariat are available to support at least two delegates from SIDS, and have supported all of the Caribbean delegates attending INC-1.

Limitations in human capacity hinder Caribbean SIDS' ability to equitably prepare for and participate in global plastic treaty negotiations. Delegates from Caribbean

SIDS are generally overwhelmed with administrative responsibilities that run parallel to their participation in negotiations. There are also significant limitations in terms of legal expertise and resources as compared to developed countries, which are equipped with more thorough understanding of the legal implications shaping the treaty and the obligations that may result from its formulation. In addition, addressing the full life cycle of plastics and plastic pollution in the marine environment from an international environmental law perspective is extremely complex, requiring multidisciplinary expertise, including legal understanding of definitions and translations of proposed elements to be incorporated into the treaty.

To overcome the issues of limited capacity and overextended personnel within Caribbean SIDS, communication and cross departmental training across various government ministries, along with staff recruitment, is needed to better prepare delegates. Participation in the negotiation process is incumbent on understanding United Nations systems and their legal and technical components for environmental decision making.

Equity, with regard to preparation for the INCs by Caribbean SIDS, must also extend to states' ability to engage stakeholders to ensure that the diverse interests and values of marginalised voices and key stakeholders be represented to contribute to the development of negotiating positions. Additionally, Caribbean SIDS require specific quantitative and qualitative scientific data demonstrating the severe and inequitable environmental, economic and health effects of plastic pollution, to bolster their negotiating positions throughout the INC process. Building scientific capacity among Caribbean SIDS is a critical step for policy development and measuring the effectiveness of policy interventions.

Prioritisation of the INC forum by governments within Caribbean SIDS in the form of clearly defined political will is necessary for addressing the inequities faced during the negotiating process. Additionally, this calls for a potential coordination mechanism to be established by regional intergovernmental organisations such as CARICOM to promote uptake of the INC meetings onto regional agendas to increase participation in the forum.

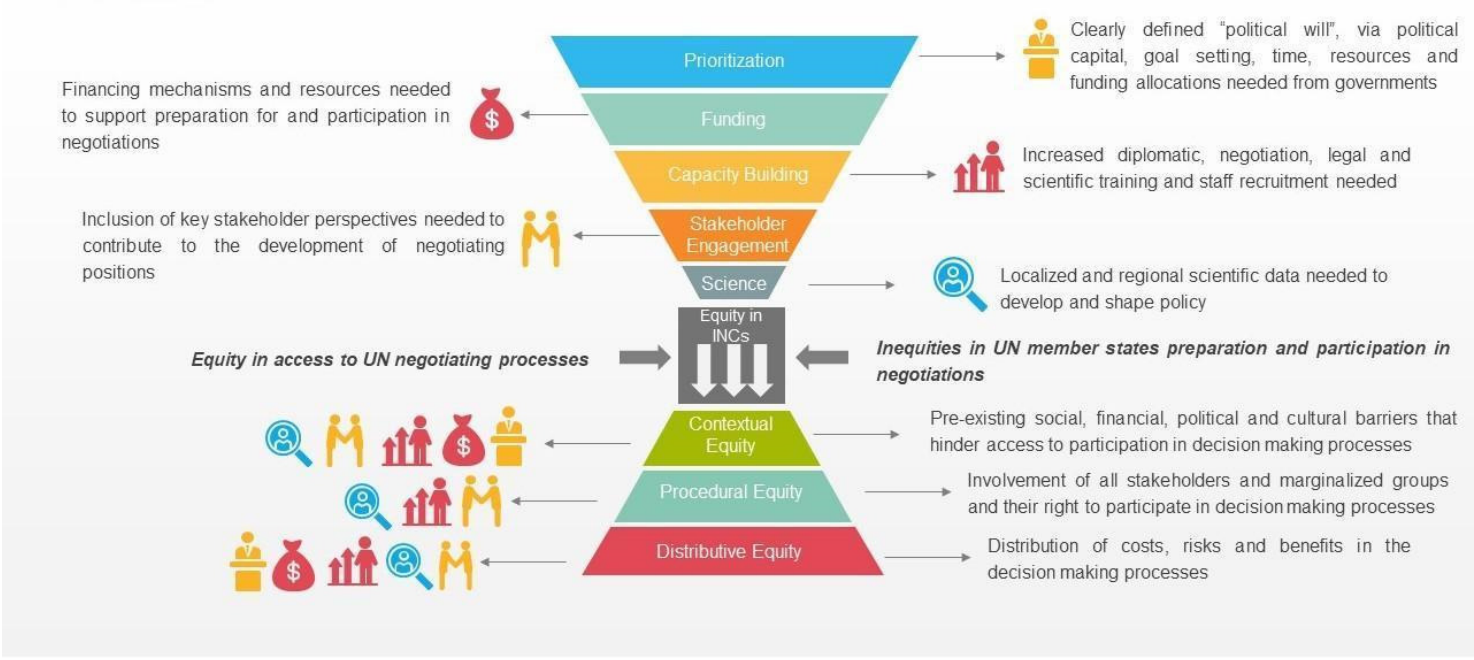

Figure 9 Framework for key drivers needed for achieving equity in preparation, participation and future implementation of a global plastics treaty for Caribbean SIDS (Source: the author)

The framework developed through this research (Figure 10) argues that the drivers necessary for achieving contextual equity along with other branches of equity, are interlinked and can result in equitable preparation and participation in the INC process by Caribbean SIDS. It also speaks to the challenges Caribbean SIDS may face for implementation of a global plastics treaty, as challenges outlined in their ability to equitably participate in the treaty negotiations also mirror their ability to implement a treaty of this scale.

Though the obligations under the global plastics treaty have yet to be decided on, this study perceives that for Caribbean SIDS, implementation and compliance of the treaty will require political will, financing mechanisms, capacity building, scientific research and an iterative stakeholder engagement process. The following drivers are necessary for ratification of the treaty: funding to support its implementation and capacity building opportunities that support compliance; stakeholder and public engagement to promote awareness of the treaty and its implications for business and the general public; and scientific data to measure the effectiveness of the treaty over time. Once the drivers for attaining contextual factors are applied and met, political and public acceptance of the treaty may be promoted, thus bolstering the success of the intended ILBI to end plastic pollution.

5.3 How does CARICOM function as a regional coordination mechanism for Caribbean SIDS in multilateral environmental agreements and what are the implications for the INC process?

Paper 5: Ambrose, K, K. (2023). The Caribbean Community (CARICOM) as the Coordination Mechanism For Caribbean Small Island Developing States Participating in The Global Plastics Treaty Negotiations? (Accepted) Ocean Yearbook, builds on **Paper 4**'s identification and proposal for the need of a regional coordination mechanism—in this instance CARICOM—and its role in preparing Caribbean SIDS for the INCs.

The Caribbean Community (CARICOM) is a longstanding institution for integration in the developing world and is founded on the pillars of economic integration; foreign policy coordination; human and social development; and security (Hassanali, 2020; CARICOM, 2023). This intergovernmental organization has historically demonstrated its commitment, cooperation and coordination on a range of issues, including environmental issues, through its participation in MEA meetings, further making CARICOM a significant negotiating bloc in the region

(Hassanali, 2020; Hassanali, 2022a). It comprises 15 Caribbean SIDS as member states [here defined as including Antigua and Barbuda, Barbados, The Bahamas, Dominica, Grenada, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago] which border the Caribbean Sea, along with 3 mainland coastal states: Belize, Guyana and Suriname (Chakalall et al., 1997; O'Brien, 2011; Hassanali, 2020).

To address the pressing environmental concern of plastic pollution, the St. John's Declaration of CARICOM was adopted during the 40th session of the CARICOM Heads of Government (HOG) meeting hosted in July 2019, addressing increasing levels of plastic pollution in the Caribbean Sea and its negative effects on sustainable development for the region (Nicholls, 2019; CARICOM, 2019). The declaration established plastic pollution as an area of priority among its member states, further declaring the need for the reduction and/or elimination of single use plastics and similar packaging materials; a commitment to addressing ecosystem damage caused by plastic pollution; and recognition of the need for effective policy, legislative and regulatory frameworks at the global, regional, national and local levels, among other relevant points (CARICOM, 2019).

CARICOM is not the only regional integration body, as equivalent organisations such as the Central American Integration System (SICA), Organization of Eastern Caribbean States (OECS) and the Association of Caribbean States (ACS) exist to support intergovernmental arrangements for integration and functional cooperation. Nevertheless, this study focused on CARICOM as it currently assumes the major coordination function in various environmental treaty negotiations. CARICOM's role as the coordination mechanism for MEAs such as the BBNJ agreement, the 27th Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) (COP27), and the 15th Conference of the Parties of the United Nations Convention on Biological Diversity (UNCBD) (COP15), make it a well-positioned entity to orchestrate coordination for the INCs for its member states. This research has shown that with regard to plastic pollution and the INC forum, political will is present among CARICOM governments; however it is potentially not as urgent as climate change MEA forums such as UNFCC COP 27. Thus requiring the INCs to be prioritised from CARICOM levels as an agenda item to promote increased attendance and unified negotiating positions during the INCs.

The results of this study clearly indicate that CARICOM has created a viable framework for establishing its negotiating blocs and preparing its member states for MEA meetings such as UNFCCC COP 27, UNCBD COP 15 and the BBNJ. This involvement in these negotiations has involved strategic coordination and preparation by CARICOM to establish a political mandate among its HOG, conduct capacity building workshops among its member states` delegations and negotiators, identify funding opportunities through available projects, apply relevant localized

scientific data to inform negotiating positions, and engage with a diversity of relevant stakeholders.

The study found that CARICOM has clearly demonstrated its coordination capabilities with regard to other MEAs, and suggests that similar approaches may be applied to the INC process. However, unified coordination and prioritisation of the INCs continue to be a challenge for CARICOM and its member states, as its member governments have not given it a clearly defined political mandate to influence decision making; set goals; or allocated time, resources and funding to participate in the global plastics treaty negotiations. Evidence from the study suggests that actualising a political mandate to support member state preparation and participation in the INC forum has been neglected, due to the recurring issues of limited human capacity and funding that plague Caribbean SIDS.

With, at the time of writing, roughly less than a year and a half left to ambitiously complete the plastic treaty negotiations, the risk of not placing this on the political radar for CARICOM member states looms, reducing the critical time necessary for CARICOM to coordinate and prepare its member states for the negotiations, and further increasing the likelihood of not all member states attending the remaining INC meetings. In this regard, attendance during at remaining INCs by its member states cannot stand as the sole metric of level of participation by CARICOM. In the period before a political mandate is established for the INCs, functional cooperation will be required between CARICOM, its member states, institutions and organisations to orchestrate its positions.

CARICOM has the potential to serve as the coordination mechanism for its Caribbean SIDS for the global plastics treaty negotiations, as they have the experience, expertise and a well-crafted model under which its elements can be applied to the INC process. However, this process is not without its complexities, as the INCs have been quickly constructed with an ambitious completion time. For example, ongoing MEA forums—such as UNFCCC COP 27, UNCBD COP 15 and the recently finalized BBNJ agreement—are well established forums that span more than two years, allowing adequate time for states to prepare and participate in negotiations (High Seas Alliance, 2023).

Collaboration with other regional entities which have established and implemented various initiatives for marine plastic pollution in the WCR—such as the OECS, which consists of SIDS within the Eastern Caribbean, most of which are also members of CARICOM, and organisations like UNEP-Caribbean Environment Project (UNEP-CEP)—is crucial to support coordination activities, funding development and capacity building to strengthen the policy-making interface (Schiff, 2014). Funding to support preparation and participation in this fora must also be identified and pursued by governments within member states to support the pooling of resources to uphold the negotiating bloc. CARICOM's fame as a both

important and symbolic negotiating bloc for the region can make it the ideal mechanism for advocating for its member states and influencing the multilateral processes of the INC to work in the region's favour. However, contextual issues that hinder its ability to participate in the treaty negotiations must be addressed.

5.4 Synthesis and application of theoretical framework and research outcomes

With the INC serving as the decision-making forum for global plastic pollution governance, this research sought to understand the barriers constraining Caribbean SIDS' ability to participate in the negotiation process, and subsequently implementation of a global plastics treaty agreement. Application of the GAF within this research allowed for the identification and characterisation of nodal points or problems/barriers that are often unrecognised within decision-making spaces such as the INCs, while providing a basis for solutions to be developed (Hufty, 2011). Populated with data garnered using social and applied science methodologies, the amalgamation of actors, norms and processes—as outlined within the GAF—interacted to produce nodal points, which resulted in the identification of contextual barriers facing Caribbean SIDS at nearly every phase of MEA negotiation (Chasek, 1997) (Figure 1). Here, the GAF unveiled and connected contextual barriers within the areas of monitoring, equity and coordination for the MEA negotiation phases of issue definition, statement of initial positions, drafting/formula building and ratification/implementation for Caribbean SIDS participating in the INCs. These contextual constraints call attention to pre-existing imbalances in the form of financial resources, political power, human capacity, and negotiating skills, which create an unlevel playing field for participants in the decision-making process (Martin et al., 2014; Law et al., 2017; Hass et al., 2019).

As the GAF methodology is typically centred on actors, their nature, power, interests, ideas, and history (Hufty, 2011), this study first analysed Caribbean SIDS' ability to define the problem of plastic pollution based on scientific data within a local context, and was conducted by way of assessing the state of harmonised regional marine debris monitoring among Caribbean SIDS. As outlined in research questions 1 (a) and (b); Papers 1-3, due to contextual barriers Caribbean SIDS lack robust harmonised data documenting plastic concentrations to support negotiation transactions that result in mitigative policies. The initiation of negotiations toward a global plastics treaty influenced the reassessment of the research trajectory towards understanding Caribbean SIDS engagement with the INC process. This required assessing the state of the best available science, delivered on the basis of monitoring efforts, which are a key tool used to shape negotiating positions within

the INC forum. This then created a pathway to understanding Caribbean SIDS' engagement within the INC process as compared to actors from developed countries and barriers they may face, as captured in research question 2; Paper 4. Here, the understudied concept of contextual equity arose, as Caribbean SIDS demonstrated inequities in human and financial capacity, prioritisation and coordination for the forum, and adequate skill and knowledge transfer among its delegates. As the lack of prioritization and coordination for the forum became recurring issues based on interview responses, this research engages with research question 3; Paper 5, which provided novel data on the specific processes involved in CARICOM's role as a coordination mechanism for its member states—comprising Caribbean SIDS participating in MEA negotiations—and its implications for the INCs.

The utilisation of the GAF offered a means to interrogate perspectives of science diplomacy, whereby science is used as a driver in global environmental decision-making forums (Fedoroff, 2009; Hufty, 2011; Moedas, 2019). Governments in Caribbean SIDS are ill-equipped to single handedly fill scientific knowledge gaps related to plastic pollution, thus requiring regional and international support for scientific collaboration (Fedoroff, 2009; Moedas, 2019; Polejack, 2021). In the context of this research, harmonised marine debris monitoring and the scientific information it would provide served as the building block for supporting Caribbean SIDS in the global plastic treaty negotiations.

Critically, this research indicates that building scientific capacity for plastic pollution that expands beyond the marine environment can shape negotiation positions by utilising scientific data that reflects the needs of Caribbean SIDS and the region at large. Furthermore, the production of an adequate dataset regarding plastic pollution is a critical step for policy development and measuring the effectiveness of policy interventions such as the global plastics treaty. For delegations from Caribbean SIDS, possessing localised, national and regional scientific data on the use, production, source, abundance, distribution and effects of plastic pollution on Caribbean SIDS can aid in informing negotiating positions that support equitable distribution of the costs, benefits and risks associated with treaty outcomes.

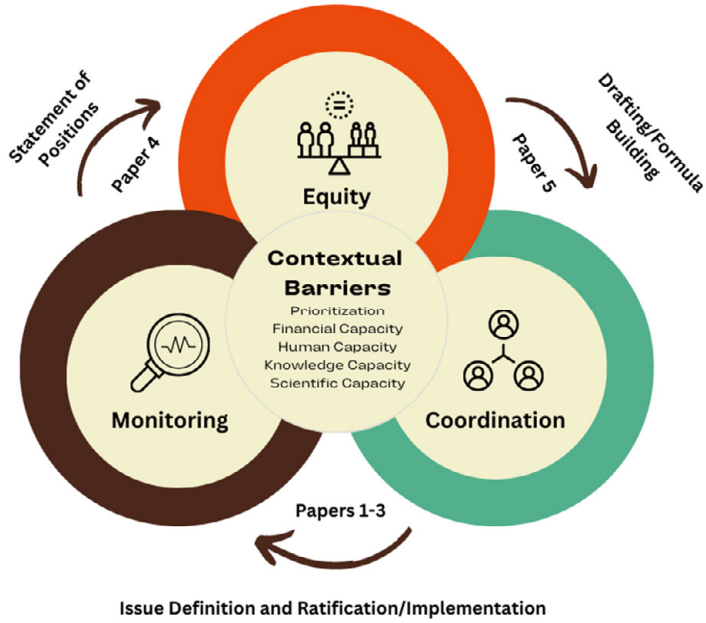

Figure 10 Commonalities in contextual barriers faced within thematic areas of research and relevant phases of the MEA negotiation phases
(Source: the author)

The connectivity of this work can be synthesised through the integration of the MEA negotiation phases and the nodal points generated by the GAF. As illustrated in Figure 10, the generation of comprehensive scientific data by way of monitoring is needed to support defining the issue for a collective problem, and also for formulating statements of positions for United Nations member states. Position statements are delivered by United Nations member states within the negotiating forum. Though this is open to all states, Caribbean SIDS face contextual inequities that limit participation in the INCs. Once in the forum, regional intergovernmental coordination mechanisms that would drive the drafting/formula building, final bargaining and details, ratification and implementation of the treaty for and by Caribbean SIDS are either absent or delayed due to contextual barriers. The core thematic areas of monitoring, equity and coordination, which are required by Caribbean SIDS to effectively participate in the INCs, all share identical commonalities in the contextual barriers faced.

As outlined in section 5.2, application of the GAF produced a framework of key drivers needed to overcome each contextual barrier facing Caribbean SIDS (Figure 9). Though such forums can never experience holistic and definitive equity due to each country's varying size, needs and resources, this research was able to identify

and synthesise approaches to overcoming contextual barriers that promote contextual equity in the negotiation process for Caribbean SIDS. For Caribbean SIDS, overcoming contextual barriers extends far beyond the negotiating floor but serves as the basis for their functional governance capabilities, as it relates to national, regional and international environmental law and governance. This research has succeeded in providing both a novel and a substantial contribution to the discourse on challenges facing SIDS in MEA negotiations and solutions thereto, and can be scaled to assess the experiences of developed and least developed countries within the ongoing INC forum.

6 Conclusions, limitations and future perspectives

The nature of global plastic pollution means an unprecedented degree of international cooperation and action—including scientific research and multilateral negotiations—is needed to mitigate its negative effects, and meet the collective interests of a variety of actors (Chasek, 1997). This thesis focused on three tiers that would support Caribbean SIDS' equitable participation in the global plastics treaty negotiation:

a) scientific research in the form of harmonised marine debris monitoring;

b) an evaluation of contextual equity within the INC process; and

c) an assessment of CARICOM as a coordination mechanism to support preparation and participation among its member states in the INCs.

Interdisciplinary in its approach, this thesis engaged with natural science and social science, along with a degree of political science and international law, through marine debris monitoring research, governance and regime theories. It has identified challenges facing Caribbean SIDS in real time and proposes applicable solutions. Though some solutions require time beyond the scope of this research to be actualised, this means that the present thesis leaves room for future research to be conducted and solutions to be developed and practised.

The need for harmonised marine debris monitoring among Caribbean SIDS serves as both a precursor and a driver for governments and their delegates to define the nature of the problem prior to negotiations (Figure 11). Data garnered through scientific research is then used to formulate negotiating positions for states, where governments articulate their stances on the environmental issues, causes, effects and solutions specific to the state (Figure 11). As positions are formally shared within the negotiating forum, this requires that states from within Caribbean SIDS are able to equitably access the negotiating floor and, in the event of their absence, a coordination mechanism such as a CARICOM bloc would be able to speak on their behalf for the remaining phases of negotiations (Figure 11).

Through the established research tiers, this study contributes to the literature specific to equity and coordination challenges faced by Caribbean SIDS within MEA meetings, namely the global plastics treaty negotiations. Moreover, it illustrated the positionality of the research tiers throughout the entirety of the MEA process (Figure 1; Figure 11) and produced a framework of key drivers needed by Caribbean SIDS to both equitably participate in the current treaty negotiations and to access equity throughout its development and implementation (Fig. 9).

With negotiations expected to continue into 2024, and the ratification and adoption of the treaty forecast for 2025, Caribbean SIDS, within their rights as sovereign states, will need to decide on signing and ratifying the global plastics treaty. In the event of ratification, CARICOM, in its function as a regional coordination mechanism, could be a suitable forum to continue its coordination and collaborative work to encourage its member states to meet the requirements of the treaty in an effort to reap the benefits that may result from implementation of the treaty (Hassanali, 2022b; UNEP, 2023b).

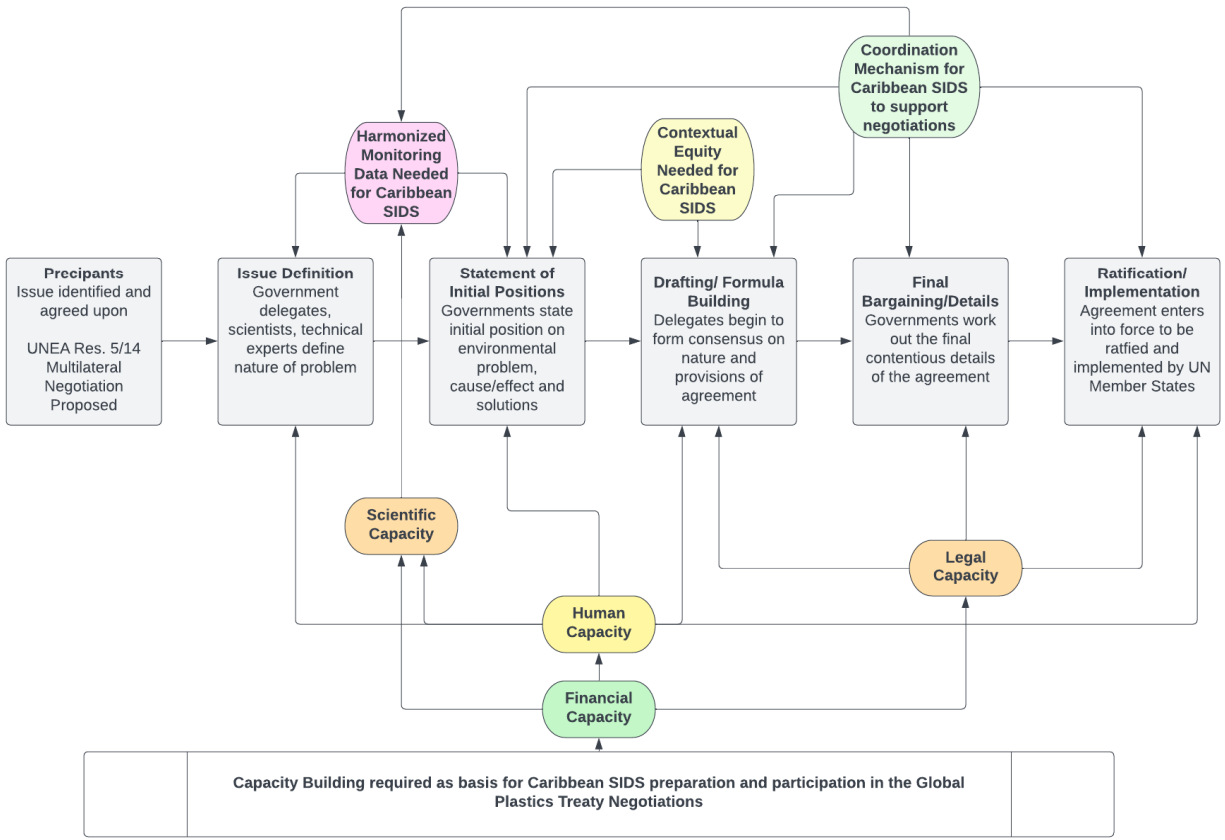

Figure 11 Injection of research tiers and capacity building into MEA negotiation process
(Source: the author; adapted from Chasek, 1997)

This research further illuminates the need for diversified capacity building as a foundational element for Caribbean SIDS to effectively gather data, participate in negotiations and implement the impending global plastics treaty (Figure 11). For Caribbean SIDS, considerations for capacity building must include human, technical, institutional, scientific, financial, social, legal and technological forms of capacity, to support engagement in unified scientific monitoring or actively participating in negotiations (Harden-Davies et al., 2022b). Resolution 5/14 acknowledges that some legal obligations arising out of the proposed global plastics treaty will require capacity building and technical and financial assistance in order to be effectively implemented by developing countries and countries with economies in transition. As the INCs progress, it is imperative that Caribbean SIDS prioritise advocating for specific arrangements for capacity building, such as those outlined in Resolution 5/14, to support obligations associated with implementation and monitoring of the treaty.

Though this research made novel contributions to the academic discourse surrounding contextual equity in environmental treaty negotiations experienced by Caribbean SIDS, the study was limited by its engagement in only one INC meeting in addition to the relatively limited sample size of interviews conducted with participants (though this stems directly from the limited number and small size of the negotiating teams in question).

To fully develop and actualise solutions for equitable participation and coordination for the INC forum, it would prove advantageous to follow the negotiations in their entirety; assess the role of other regional organisations beyond CARICOM and their role as coordination mechanisms; and interview both Caribbean delegates and government officials within Caribbean states to gain a thorough understanding of challenges they face in plastic pollution management, MEA meeting participation and policy implementation. Similarly, qualifying and quantifying the extent of capacity building needs would be helpful for understanding which specific resources—be it scientific, legal, human, technical or financial—are needed to support. In the event that unified or individualised ratification occurred among CARICOM member states, the inevitable capacity building needs facing Caribbean SIDS will prove challenging and will need to be addressed to actualise the purpose of the treaty (Hassanali, 2022b).

Despite limitations to capacity building and financing in the midst of MEA negotiations, Caribbean SIDS have exhibited impactful progress as they successfully negotiated the BBNJ agreement through the regional bloc CARICOM. Though the region currently possesses highly skilled and trained individuals who can lead both scientific data gathering and negotiations, the pool of candidates is miniscule, as typically the same individuals are consecutively cycled between MEA meetings and various projects (Hassanali, 2022a).

In order to preserve the existing human capacity, more must be done to recruit, train and prepare qualified individuals within government organisations, NGOs and academic institutions, among others, for scientific research, international relations and negotiation training, as well as to fund procurement and resource allocation. Once Caribbean SIDS relevant capacity building needs—such as human and financial resources, among others, are met—scientific monitoring and research are effectively harmonised, and CARICOM member states are coordinated to develop the objectives for this treaty, the region will be well poised to comprehensively experience equitable outcomes throughout the INC process.

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8 Publications

PAPER 1

Ambrose, K. K. (2021). Coordination and harmonization of a marine plastic debris monitoring program for beaches in the Wider Caribbean Region: Identifying strategic pathways forward. Marine Pollution Bulletin, 171, 112767.

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Coordination and harmonization of a marine plastic debris monitoring program for beaches in the Wider Caribbean Region: Identifying strategic pathways forward

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ABSTRACT

An aim of the United Nations Decade of Ocean Science is to quantify marine plastic debris in the marine environment. This study analyzes peer-reviewed articles on marine debris monitoring conducted on beaches in the Wider Caribbean Region, with a focus on marine plastic debris. Governance and funding regimes for monitoring events were assessed to determine strategies needed for coordinated and harmonized marine plastic debris monitoring in the Wider Caribbean Region. High variation in standardized survey protocols were observed during monitoring events. Standardization of sampling methodology and reporting metrics among other considerations, are needed to establish a regional marine plastic debris monitoring program that can inform policy for the Wider Caribbean Region.

1. Introduction

1.1. Transboundary dimensions to marine plastic debris and the WCR

The United Nations Decade of Ocean Science (2021–2030) (UN Ocean Decade) aims, among others, to attain a clean ocean through the management of plastic pollution, where pollution sources are identified, quantified, reduced and removed from the marine environment (UN, 2020; Ryabinin et al., 2019). Marine plastic debris, hereafter defined as any plastic material that is deliberately or inadvertently stranded on beaches, is the most obvious sign of marine plastic debris and monitoring provides the most straightforward and practical way to assess them (HELCOM, 2018; Ryan et al., 2020). Monitoring of marine plastics can inform regional and global policy instruments needed to mitigate its severe impacts (Lippiatt et al., 2013).

Beaches in the Wider Caribbean Region (WCR) are sinks for marine plastics transported to its coasts by the great Ocean Conveyor current and currents from the North Atlantic subtropical gyre, with concentrations of 2014 pieces of marine litter/km of beach, predominantly plastic, compared to a global mean of 573 marine litter items/km (Law et al., 2010; Ambrose et al., 2019; Woods Hole Oceanographic Institution, 2020; Diez et al., 2019; Clayton et al., 2020). The transboundary movement of marine plastics between coastlines within exclusive economic zones (EEZ) of the WCR, comprising the insular and coastal states and territories in the Caribbean Sea, Gulf of Mexico and parts of the Atlantic Ocean, creates complex governance problems as it crosses scales, sectors, socio-economic and cultural divisions (Cho, 2005; Hastings and Potts, 2013; UN Environment, 2021) (Fig. 1). Excessive concentrations of marine plastic debris on WCR beaches can jeopardize ecosystem and wildlife health and can compromise tourism dependent WCR economies that are reliant on clean, healthy oceans (Ambrose et al., 2019; Diez et al., 2019).

The monitoring of WCR coastlines for marine plastic debris can deliver a time series of spatial and temporal measurements that can be analyzed to yield estimates of plastic amounts, compositions, drivers and possibly sources (Lovett et al., 2007; HELCOM, 2018). This can allow a comprehensive and comparative analysis to inform legislative needs and serve as an evaluation tool for policy effectiveness (Lovett et al., 2007; Cheshire et al., 2009). Currently, monitoring efforts for marine plastic debris on beaches in the WCR lack adequate coordination and harmonization of standardized scientific protocols for data collection and corresponding governance mechanisms to support ongoing regional monitoring of marine plastic debris. A coordinated approach may help in creating a baseline on the sources, pathways and distribution of marine plastics to guide legislative interventions necessary for management. This study analyzes peer-reviewed articles on marine debris monitoring conducted on beaches in the WCR, specific to macro debris >0.5 cm and excludes microplastic surveys. Further it assesses

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monitoring methodologies, governance and funding regimes and considerations needed for the development and implementation of a coordinated and harmonized marine plastic debris monitoring program for beaches in the WCR that can support the goals of the UN Ocean Decade.

1.2. Marine plastic debris monitoring in the WCR

Legal agreements and policy measures for the WCR concerning marine plastic pollution have been established under the Cartagena Convention (1983) which was adopted to protect the marine environment of the WCR from land-based sources of marine pollution. In particular, the Regional Action Plan for Marine Litter (RAPMaLi) for the WCR (2014) was developed in response to the increased concerns of marine plastic debris in the WCR (UNEP-CEP, 2014; Clayton et al., 2020). Article VI of the Cartagena Convention on Monitoring and Assessments proposes that contracting parties formulate and implement monitoring programs that systematically identify patterns and trends in environmental quality, with monitoring data made available to scientific and technical committees of the convention (UN, 1999). The RAPMaLi recommended similar action points for marine plastic debris monitoring:- Action 1: Design and implement a strategy to develop national marine debris (inclusive of plastic, wood, glass, metal, tar, rubber, other) monitoring pilot projects in the WCR, including (UNEP-CEP, 2014) standardized methods for data collection and reporting within the framework of UNEP Regional Seas Global Marine Litter Monitoring Guidelines Action 2: Develop a regional, web-based database as a clearinghouse for marine litter information and research (UNEP-CEP, 2014; Caporusso and Hougee, 2019). However, both lack specified guidelines for development and implementation of monitoring needs.

Marine plastic debris monitoring on beaches within the WCR occurs episodically and unevenly, for example during the International Coastal Cleanup Day (ICC), annually held during the month of September (Ocean Conservancy, 2021). These events are often voluntary and organized by civic organizations as opposed to regional governments, with data collected contributing to the Ocean Conservancy's international database (Ocean Conservancy, 2021). Developing a standardized marine plastic debris monitoring program for the WCR is a critical step for building regional scientific capacity to support and measure policy interventions. Article IX of the Cartagena Convention emphasizes that the transboundary movement of pollution with adverse impacts to the marine environment, originating from land-based sources between states, within the WCR, requires states to consult with the affected to resolve the issue (UN, 1999). Such resolutions would be crucial and well-intentioned but may lack baseline scientific data needed to empirically assess comparability and accountability in and of marine plastic debris loads to determine the legislative interventions needed. Large datasets with adoptable frameworks that can be integrated within national and/or regional policies can play a key role in addressing the global impacts of plastic pollution. Further, current research regarding marine plastic debris on beaches in the WCR requires significant improvement and standardization and would benefit from the adoption of a common reporting framework to promote consensus and comparability within the WCR (Serra-Gonçalves et al., 2019).

2. Materials and methods

A literature review was conducted using only peer-reviewed articles focused on marine debris monitoring on beaches in the WCR specific to macro debris >0.5 cm. Microplastic surveys were excluded from the literature search due to discrepancies in definition and size classification. 15 peer reviewed articles were selected and each article was assessed against criteria developed on the basis of considerations needed

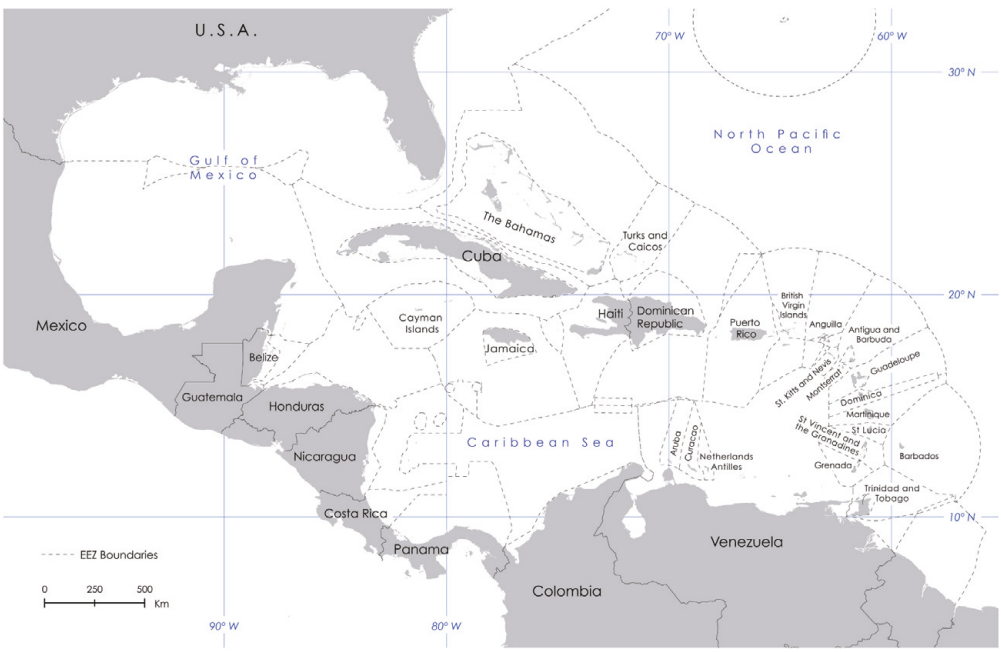

Fig. 1. Wider Caribbean Region and transboundary lines delineating exclusive economic zones (EEZ).

for establishing a marine plastic debris monitoring program, inclusive of:- a) study location, b) site selection, c) number of sites surveyed, d) methodology used, e) transect measurements, f) beach type, g) monitoring frequency, h) site replication, i) dominant debris type, j) debris totals, k) dominant debris source, l) dominant geographic location, m) administration, n) actors, o) data sharing and storing and p). funding schemes associated with monitoring events. Articles were sourced via academic research platforms Scopus (www.scopus.com) and Google Scholar (www.scholar.google.com) using the keywords "marine debris", "marine plastic debris", "marine plastics", "marine litter", "plastics", "ocean plastics", "marine environment", "coastal environment", "beach", "shoreline", "monitoring", "survey", all combined with Caribbean or Wider Caribbean Region. Article snowballing, by way of other relevant studies referenced within a selected article was also utilized. The study also reviewed a published report on Harmonizing Marine Litter Monitoring in the WCR: A Hybrid Approach, by Caporusso and Hougee, 2019, to identify gaps in knowledge and suggest pathways forward.

3. Results and discussion

Data extracted from a literature review yielding 15 peer reviewed articles from 1988 to time of writing, specific to marine debris monitoring conducted on beaches and or coastlines in the WCR, demonstrated inconsistencies in monitoring approaches and methodologies used (Fig. 2). Monitoring events extracted from the peer reviewed articles during this time frame were conducted on 28 islands and 3 coastlines situated in Caribbean South America, representing 13 countries, inclusive of territories of the United Kingdom, France and The Netherlands (S1).

3.1. Need for standardized marine plastic debris monitoring protocols

The formation of empirical data sets to drive management and policy implementations specific to marine plastic debris on beaches must be structured using data that is viable and comparable. However, this requires standardization of sampling methodology and reporting metrics to broaden the understanding of marine plastic dispersal, accumulation, composition and abundance on beaches within the WCR, with an intent to share data (Vegter et al., 2014; Serra-Gonçalves et al., 2019). Based on the complexities regarding the distribution and pathways of marine plastic debris in the environment, a transparent and definitive approach is required to characterize and assess the issue (Lippiatt et al., 2013). Key harmonization considerations for uniformity in marine plastic debris monitoring methodologies are standardized protocols and site selection.

High variation in standardized survey protocols used during monitoring events was observed in the peer-reviewed literature, accounting for 67%, inclusive of NOAA, UNEP, EA/NALG, OSPAR and IOC/IOCARIBE related protocols; 33% of methods utilized were unspecified transect surveys (UTS) (Figs. 2; 3(a)). Transect surveys were the basis of all methodologies. However, transect measurements varied greatly with belt transects ranging from 5 m–100 m long or 1 m–5 m wide, expanding from the back beach to the high tide line. Walking surveys were also employed with a walking or skirmish pattern adopted or walking five paces in any given direction. Additionally, researchers liberally amended transect measurements based on the state of a given site. Such

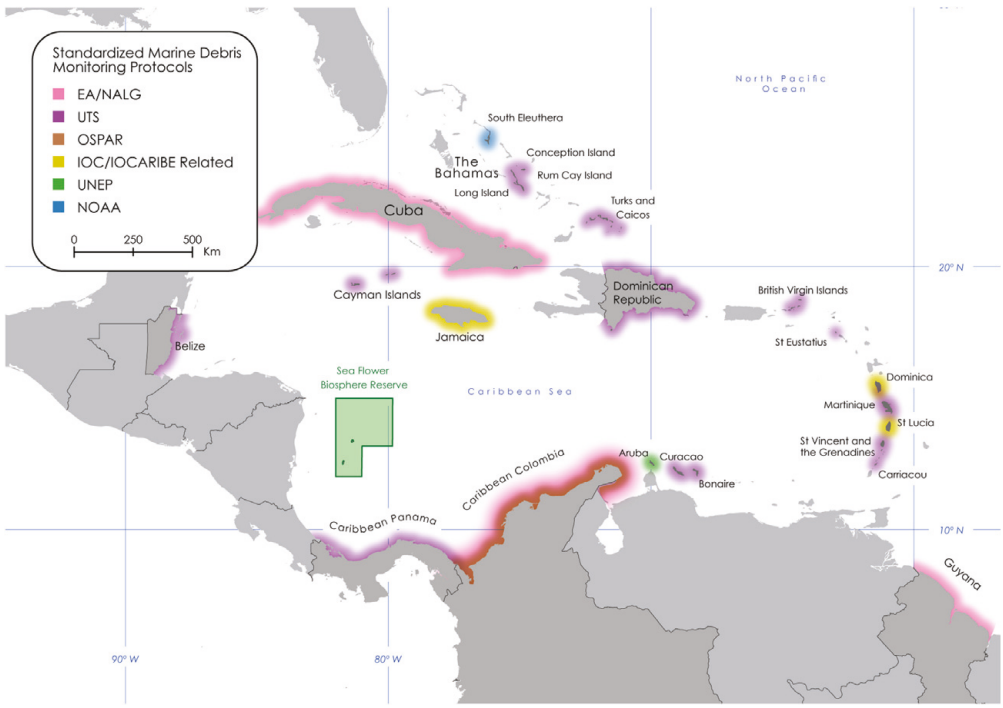

Fig. 2. Marine debris monitoring protocols used within the Wider Caribbean Region.

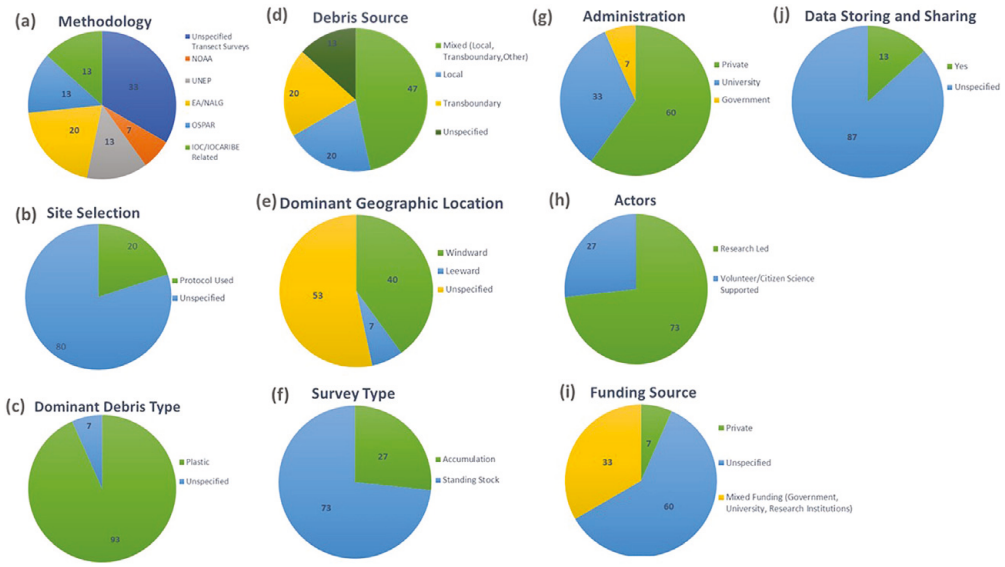

Fig. 3. Analysis of marine debris monitoring criteria extracted from peer-reviewed articles (%): - a) methodology b) site selection, c) dominant debris type, d) dominant debris source, e) dominant geographic location f) survey type g) administration, h) actors, i) funding source, j) data storing and sharing.

variation in data collection methods and reporting presents a discrepancy in unified information which is required to address said issues at national, regional and global scales, further making data incomparable (Serra-Gonçalves et al., 2019). Of the 360 sites surveyed between 1988 to time of writing, only 20% (n = 3) of the peer-reviewed articles adopted a standardized protocol specific to site selection (Fig. 3(b)). Effective site selection for monitoring events can enhance debris quantification and removal efforts and can identify key geographic features that may influence debris deposition (Haarr et al., 2019). Site selection must also assess the impact of monitoring surveys on endangered or protected species and habitats, such as nesting sea turtles (Lippiatt et al., 2013). Additionally, selected sites must preclude or note sites that are subject to regular cleaning events (Lippiatt et al., 2013).

Survey sites were predominantly undescribed beaches, with some listed as mixed substrate locations. Approximately, 90, 533 pieces of marine debris were collected from combined studies with plastic, 93% (n = 14) being the dominant debris type (Fig. 3(c)). Monitoring frequency appeared random with one or two sampling periods spread out over time periods of weeks to months to years between sampling.

Local and transboundary marine debris were simultaneously listed as the dominant debris source in 47% (n = 7) of the peer reviewed articles, while solely, transboundary debris accounted for 20% (n = 3) of the dominant debris source and locally sourced waste, 20% (n = 3) (Fig. 3 (d)). The remaining 13% (n = 2) was unspecified. Windward coastlines accounted for 40% (n = 6) of the dominant geographic location which experienced increased debris loads, with 7% (n = 1) leeward and 53% (n = 8) unspecified (Fig. 3(e)).

Stranded plastics are the predominant focus of most beach debris monitoring and provide a crude estimate of in-situ marine plastic debris, referred to as standing stock surveys (Ryan et al., 2009). Debris accumulation surveys provide similar information as standing stock surveys but assess beach dynamics to measure influx rates of debris from oceanic sources (Ryan et al., 2020). These surveys require all marine debris types to be removed from the surveyed shoreline, followed by regular surveys at the same location overtime to measure how fast debris returns to a site (Lippiatt et al., 2013). Standing stock surveys accounted for 73% (n = 11) of monitoring events conducted within the WCR, with the remaining 27% (n = 4) attributing to accumulation surveys (Fig. 3(f)). Both approaches yield useful information on the abundance and distribution of marine plastic debris. However, accumulation surveys can unveil long-term trends in debris accumulation rates and climatic and anthropogenic drivers, but these require a more thorough approach that demands increased time, resources and financial commitments (Lippiatt et al., 2013; Ryan et al., 2009; Sheavly, 2007; Ryan et al., 2020).

3.2. *Funding and provision of data storing and sharing mechanisms as factors in achieving coordination and access to information*

It is important to acknowledge that countries in the WCR face numerous challenges in relation to conducting marine scientific research and are limited by capacity, access to state-of-the-art technology, adequate funding and unified coordination of scientific monitoring events (Polejack and Coelho, 2021). Most of the conducted research in the peer-reviewed articles were administered by either private individuals or universities. Among the stakeholders conducting monitoring activities, 60% (n = 9) came from private entities 33% (n = 5) were solely led by a university and 7% (n = 1) was affiliated with government ministries (Fig. 3(g)). Actors, defined as those who executed the monitoring surveys, were 73% (n = 11) researcher led, with limited instances of volunteer, citizen science or military support (Fig. 3(h)). Within the acknowledgments section of each article, only 40% (n = 6) of articles reviewed mentioned the source of their research funding. Governments, universities and research institutions combined, accounted for 33% (n = 5) of funding support, while 60% (n = 9) was unspecified funding sources and 7% (n = 1) from private entities (Fig. 3(i)). The co-production and sharing of data are key components to enhancing scientific coordination and cooperation (Claudet et al., 2020). However, only 13% (n = 2) of the reviewed articles noted data storage and/or

sharing with a third party (Fig. 3(j)).

3.3. Harmonizing marine litter monitoring in the WCR: A hybrid approach

Caporusso and Hougee, 2019, published a report on Harmonizing Marine Litter Monitoring in the WCR: A Hybrid Approach. The report draws attention to the impacts of marine debris in the WCR and outlines monitoring and governance actions that have been undertaken and proposes a hybrid approach. A hybrid approach involves a commingling of comprehensive surveys, characterized as protocols with high resolution data to support development of mitigative and legislative strategies for ocean protection and rapid surveys, involving a simplified version of a comprehensive beach survey (Cheshire et al., 2009). The latter compliments a citizen science approach to marine debris management primarily aimed at developing public awareness about marine debris, whereas the former aims to inform policy makers on the amount, type, source and trends in beach debris over time (Cheshire et al., 2009). Both aspects are beneficial and can be achieved.

For example, environmental non-governmental organization, Bahamas Plastic Movement, adopted a hybrid approach to marine debris monitoring on beaches in The Bahamas (Ambrose et al., 2019). This boosted both public awareness and utilized citizen science monitoring of marine debris to establish a baseline dataset of spatiotemporal trends and composition of marine debris. Further, said data was used to influence a legislative ban on disposable plastics (straws, Styrofoam, utensils, plastic bags) use within the country, effected January 2020 (Ambrose et al., 2019).

The report contends that the OSPAR (Oslo-Paris Convention) Marine Litter Monitoring Protocol be adopted as the standardized comprehensive methodology for marine debris surveys on beaches in the WCR, and further suggests maintained use of citizen science-based tools such as ICC and Clean Swell. The OSPAR Convention is a legislative instrument regulating international cooperation on environmental protection in the North-East Atlantic (OSPAR, 2021). It possesses a systematic, high resolution, marine debris survey protocol, conducted by trained surveyors in the OSPAR region and has been adopted as the mandated methodology for the European Union's (EU) Marine Strategy Framework Directive (MSFD) (OSPAR, 2021; Caporusso and Hougee, 2019). This requires European Member States (MS) to develop and conduct large scale monitoring programs of the marine environment to measure, achieve and/or maintain Good Environmental Status (GES) in European Seas (Galgani et al., 2013). The implementation of the MSFD can also be ensured through recourse to infringement procedures adjudicated by the European Court of Justice, through which MS may be brought to justice before the courts for non-compliance with monitoring and reporting obligations (Stöfen-O'Brien, 2015).

The OSPAR Marine Litter Monitoring Survey Protocol was piloted in August 2018 on the Caribbean island of Bonaire, a territory of MS, The Netherlands, to test its feasibility as the standardized protocol for the WCR (Caporusso and Hougee, 2019). Functioning as an accumulation survey, the OSPAR protocol demands four annual surveys to be conducted, with a 100 m sampling unit, stretching from the back beach to the water's edge (OSPAR, 2010). This requires identification, quantification and removal of all litter items from the survey area (OSPAR, 2010). The pilot project trained 30 participants from various organizations in OSPAR's survey methodology with sampling amendments made to fit the needs and conditions of the local environment (Caporusso and Hougee, 2019). Caporusso and Hougee, 2019, state that implementation of the OSPAR method on Bonaire is feasible and can be adopted in the WCR. Bonaire's standing as a European MS, despite its Caribbean geography, increases monitoring feasibility using OSPAR requirements, making it readily enforceable with data reporting more streamlined compared to other WCR countries. The petition for the regional adoption of the protocol is based on OSPAR being fully compliant with UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter with few modifications; its longevity and success in constituent countries; and application of in-house statistical tools and ownership of data (Cheshire et al., 2009; Caporusso and Hougee, 2019).

3.4. Specific steps and recommendations to work toward coordination and harmonization of marine plastic debris monitoring in the WCR

Caporusso and Hougee, 2019, acknowledged the challenges associated with orchestrating regional coordination and harmonization of marine debris monitoring in the WCR but lacked specific elaboration on key considerations needed for implementation. These include governance, financing, training and capacity building, data management and measuring monitoring effectiveness. The underlying cause of constraints to the sustainable management of shared marine resources in the WCR is weak governance (McConney et al., 2016). The formulation of a functional science-policy interface that governs marine issues within the WCR is contingent upon adequate organization, coordination and communication of marine science data and information (McConney et al., 2016). Governing agencies that may support large scale, regional monitoring could include the United Nations Environment Programs-Caribbean Environment Program, the Cartagena Convention Secretariat or the Intergovernmental Oceanographic Commission- Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE) based on the contracting parties signed to the conventions and agencies experience with preexisting marine pollution monitoring programs (Atwood et al., 1987; Caporusso and Hougee, 2019). Funding is a necessary component for building infrastructure for marine plastic debris monitoring and must account for costs associated with labour, technological analyses and equipment needs associated with monitoring (Galgani et al., 2013; Rangel-Buitrago et al., 2020). The sole reliance on voluntary marine plastic debris monitoring programs on beaches in the WCR using OSPAR is ambitious and can be substantially weakened if monitoring is not mandatory and lacks financial support (Stöfen-O'Brien, 2015). Thus, adequate funding schemes must be designed and permanently secured to implement successful ongoing marine plastic debris monitoring of the marine environment in the WCR (Stöfen-O'Brien, 2015).

Long-term marine plastic debris monitoring programs must recruit field staff who receive adequate training that ensures data quality needs are met and surveying capacity remains consistent (Cheshire et al., 2009). WCR's capacity to undertake research and innovation initiatives and forge partnerships is narrowed due to its limited human capacity which requires more training and education in ocean sciences (Harden-Davies et al., 2020). This may be remedied with local or overseas training that can build and sustain a local workforce for environmental monitoring (Harden-Davies et al., 2020). A regional database, designed to address the diversity in data collection needs, must be established to ensure consistency, transparency and quality assurance on data acquisition (Cheshire et al., 2009). This will allow a comprehensive and comparative analysis of the data over space and time and can inform legislative needs for the WCR relating to marine plastic debris management (Lovett et al., 2007; Cheshire et al., 2009).

3.5. Selecting and adhering to a standardized protocol for marine plastic debris monitoring in the WCR

Though OSPAR offers a comprehensive, high resolution survey protocol, it exempts microplastics from its methodology, typically the dominant plastic type consistently reported on both leeward and windward beaches in the WCR (Ambrose et al., 2019). Further, its use in the WCR is obsolete if there is no regional governance to orchestrate monitoring events and curate data collection under that methodology to ensure data accessibility remains within the region. The variation in global standardized protocols and approaches to marine plastic debris monitoring on beaches can make it challenging for WCR countries to adopt a one size fit all model. Global marine plastic debris surveys on

beaches typically follow the structure of belt transect surveys, with a substantial number of standardized protocol guidelines existing from NOAA, UNEP, OSPAR and the Ocean Conservancy. A merging of elements from all monitoring guidelines combined could prove beneficial for the WCR once data is uniformly collected and reported following agreed upon data collection standards. Technological advancements, such as unmanned aerial vehicle surveys (drones) to accompany monitoring events in remote locations must be incorporated into program development to expand understanding of marine plastic debris geography. In the broader scope, monitoring must account for both land to ocean and ocean to land sources of plastic and other litter items. Harmonization of monitoring standards in the WCR will require a design thinking approach where intentional and appropriate questions are incorporated to mold functionality and intended outputs of a marine plastic debris monitoring program. Strategic questions that guide the development of a coordinated and harmonized marine plastic debris monitoring program for the WCR should be developed based on the need to understand:

1) What is the extent of the abundance, composition, distribution and sources of marine plastic debris washing onto coastlines in the WCR?
2) What is the transboundary nature and movement patterns of marine plastic debris within the WCR?
3) What river sources in the WCR may influence debris inputs into the Caribbean Sea and outputs back to WCR coastlines?
4) What is the extent of microplastics inundating WCR coastlines and what are best practice measures for identifying various size classes?
5) What is the status of Abandoned, Lost or Otherwise Discarded Fishing Gear (ALDFG) on WCR coastlines?
6) Can marine plastic debris deposition on WCR beaches be traced to countries outside of the WCR and what policies can be developed to drive accountability?
7) How can monitoring marine plastic debris on WCR beaches help support the development of international treaties for plastic pollution?
8) What are the accumulation rates of marine plastic debris on WCR beaches?
9) How can baseline data on marine plastic debris in the marine environment be used to measure the effectiveness of implemented single use plastic bans in the WCR?
10) How can monitoring drive removal efforts of marine plastic debris from WCR coastlines?

An interdisciplinary approach that engages relevant stakeholder groups, inclusive of academia, industry and public policy makers in marine plastic debris management is a crucial step toward building regional capacity for synchronized marine plastic debris monitoring.

4. Conclusion

Coordinated and harmonized monitoring schemes must be established within the WCR to drive data gathering that supports the UN Ocean Decade while addressing localized and transboundary trends of marine plastic debris on WCR coastlines. Limited exchange on transboundary marine science information within the region disconnects science from policy, resulting in misinformed decision making to support regional ocean governance. Further, increased variation in data collection methods and reporting creates challenges for comparing and understanding the state of marine plastic debris across jurisdictions in the WCR that require political interventions. Thus, a standardized approach for marine debris monitoring on beaches in the WCR must be established to reflect all debris types, inclusive of macroplastics and microplastics.

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CRediT authorship contribution statement

Kristal K. Ambrose: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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PAPER 2

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Baseline

Identifying opportunities for harmonized microplastics and mesoplastics monitoring for Caribbean Small Island Developing States using a spatiotemporal assessment of beaches in South Eleuthera, The Bahamas

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ABSTRACT

Increasing quantities of microplastics and mesoplastics in the marine environment underscore the need for marine microplastics to be included in the global Plastics Treaty to end plastic pollution. Caribbean Small Island Developing States (SIDS) lack harmonized microplastics monitoring protocols, leaving them data deficient at the science-policy interface required for treaty negotiations. This baseline study assessed spatial and seasonal abundance and distribution of microplastic (1–5 mm) and mesoplastic (5–25 mm) on 16 beaches with three coastal exposures (Atlantic Ocean, Exuma Sound, Bahama Bank) in South Eleuthera, The Bahamas and its implications for Caribbean SIDS. Microplastics were the dominant debris type sampled (74 %) across all beaches, with significant spatial ($p = 0.0005$) and seasonal ($p = 0.0363$) differences in abundance and distribution across study sites. This baseline study identifies opportunities required for developing harmonized microplastics and mesoplastics monitoring by Caribbean SIDS to collect data to help support global plastics treaty negotiations.

Microplastics (1–5 mm) and slightly larger plastic fragments, mesoplastics (5–25 mm) are plastic particles derived from primary (intentionally manufactured plastic pellets or plastic microbeads used in exfoliants) or secondary (ultraviolet (UV) fragmentation and degradation of larger plastics in the environment) sources (Andrady, 2011; Browne et al., 2011; Jabeen et al., 2017; Lee et al., 2017; Bosker et al., 2018). Accumulation of these tiny plastic particles have been documented in marine environments including estuaries, mangroves, coral reefs, and the ocean sea surface (Rakib et al., 2023a). Additionally, they have also been widely reported on beaches (Lebreton et al., 2017; Zhang, 2017; Garcés-Ordóñez et al., 2021). The chemical composition of microplastics and mesoplastics include chemicals incorporated during their production and those adsorbed from the marine environment including persistent organic pollutants (POPS) such as organic chemicals and metals which adhere to plastic surfaces in the ocean (Andrady, 2011; Bakir et al., 2014; Rognerud et al., 2022). Toxic chemicals associated with microplastics and mesoplastics may impact human and ecosystem health as microplastics and mesoplastics can be transferred along the food chain via ingestion through predator-prey interactions, resulting in bioaccumulation of toxins across trophic levels (Garcés-Ordóñez et al., 2021; Mesquita et al., 2022; Rakib et al., 2023b). An estimated 170 trillion plastic particles, mainly microplastics, are afloat in all the world's oceans, thus driving the need for urgent action and solutions at the global level (Eriksen et al., 2023).

In March 2022, the United Nations Environment Assembly (UNEA) adopted a resolution (Resolution 5/14) to combat plastic pollution with a global and legally binding plastics treaty by 2024 (Bergmann et al., 2022; Walker, 2022). There is also international recognition of the need for microplastics to be included in the development of the plastics treaty negotiations between UN member states (Rognerud et al., 2022; Ambrose and Hassanali, 2023 in review). As intergovernmental negotiating committee (INC) negotiations continue through 2024, the scope for microplastics to be addressed in the treaty will need to be highlighted. This will require both global and regional knowledge on the extent and magnitude of impacts of microplastics (Rognerud et al., 2022).

It has been reported that Caribbean Small Island Developing States (SIDS) account for <3 % of microplastics and/or mesoplastics on beaches within the Caribbean and Latin America based on monitoring data (Mesquita et al., 2022). This leaves Caribbean SIDS data deficient at the

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science-policy interface required to formulate their negotiating positions for the development of the global plastics treaty (Ambrose, 2021; Polejack and Coelho, 2021; Mesquita et al., 2022; Ambrose and Hassanali, 2023). Caribbean SIDS, [here defined as including Antigua and Barbuda, The Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname and Trinidad and Tobago], share distinct characteristics of their ecology, culture and economic reliance on tourism and ocean-based industries (Diez et al., 2019; Stöfen-O'Brien, 2022; Ambrose and Hassanali, in review). Their combined proximity to subtropical gyres results in the transboundary receipt of microplastics and other plastic and waste materials to their shorelines (Lachmann et al., 2017; Ambrose et al., 2019; Ambrose, 2021). Additionally, their reliance on imported goods and lack of infrastructure for waste management creates substantial barriers to the effective management of plastic pollution, compromising their tourism economies which are reliant on clean, healthy oceans and beaches (Starkey, 2017; Ambrose et al., 2019; Diez et al., 2019; Clayton et al., 2021).

Caribbean SIDS experience daunting challenges in their ability to conduct coordinated and harmonized monitoring of macroplastics, mesoplastics and microplastics in the marine environment due to

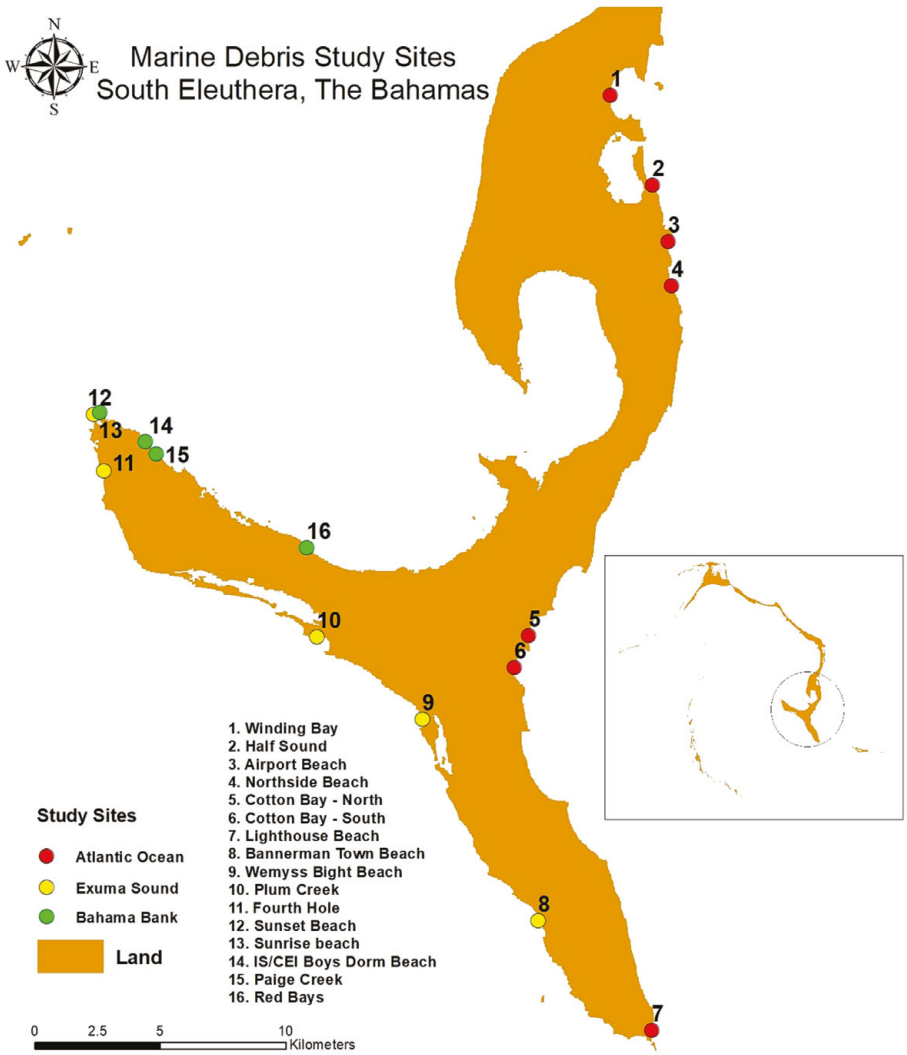

Fig. 1. Microplastic and mesoplastic debris study sites for South Eleuthera, The Bahamas (Source: Ambrose et al., 2019).

limitations in human capacity, access to technological resources and adequate funding (Ambrose et al., 2019; Polejack and Coelho, 2021; Ambrose, 2021; Stöfen-O'Brien et al., 2022; Ambrose and Hassanali, 2023). However, as they participate in ongoing INC meetings to develop the global plastics treaty, Caribbean SIDS will require specific local and regional scientific monitoring data on the abundance, distribution, economic and health implications of microplastics and mesoplastics in the marine environment to underpin their negotiating positions (Ambrose and Hassanali, in review).

This baseline study aims to provide a baseline understanding of the spatial and seasonal abundance, diversity and distribution of microplastics and mesoplastics on 16 beaches in South Eleuthera, The Bahamas, based on proximity to coastal exposures of the Atlantic Ocean (AO), Exuma Sound (ES) or Bahama Bank (BB). This study also seeks to identify opportunities for harmonized microplastics and mesoplastics monitoring for Caribbean SIDS by assessing the data collection methods used within this study. This study builds on Ambrose et al. (2019), a study which reported on the "Spatial trends and drivers of marine debris accumulation on shorelines in South Eleuthera, The Bahamas using citizen science" and maintains the same study site and site descriptions listed by Ambrose et al. (2019) as data for this baseline study was collected within the aforementioned study.

The island of Eleuthera is located within the central Bahamas (Fig. 1). Three coastlines, AO, ES and BB were assessed. The AO (east of Eleuthera) is characterized by deep waters and circulating currents of the North Atlantic sub-tropical gyre (Law et al., 2010). The Bahamas Archipelago consists of shallow-water carbonate banks like the BB and hosts deep channels and deep-water basins such as the ES, a largely enclosed basin >1000 m deep, with steep canyons (Colin, 1995). Sixteen beaches throughout South Eleuthera were monitored and grouped according to their exposure to three distinct coastlines (Fig. 1). AO beaches were: 1. Winding Bay; 2. Half Sound; 3. Airport Beach; 4. Northside Beach; 5. Cotton Bay North; 6. Cotton Bay South; 7. Lighthouse Beach. ES beaches were: 8. Bannerman Town Beach; 9. Wemyss Bight Beach; 10. Plum Creek; 11. Fourth Hole. BB beaches were: 12. Sunset Beach; 13. Sunrise Beach; 14. IS/CEI Boys Dorm Beach; 15. Paige Creek; and 16. Red Bays. Most beaches varied in beach dynamics, were remote from industrial, commercial or densely populated areas. Each beach was monitored twice, once in spring (dry season) (March–May 2013) and again in fall (wet season) (September–November 2013), at the same location, verified using a handheld Garmin GPSMAP® 76 GPS, except for Lighthouse Beach which was only monitored once during the fall, resulting in 4 less samples being obtained. Citizen scientist teams (at least four individuals), were mobilized during each monitoring exercise, where surveys were performed to assess marine debris concentrations using a modified methodology from the 5 Gyres Institute's microplastics beach sampling guide (5 Gyres, 2012). Extensive training was provided to all citizen science volunteers. Date, time, weather conditions, wind direction and speed, tidal information, beach dynamics and site usage were documented during each monitoring episode. Site usage was based on the first author's local experience of visitation frequency.

Four random 5 m wide transects within a 100 m section of shoreline were initially selected for a macro debris survey (Fig. 2). A measuring tape ran perpendicular to the shoreline from the back beach or first sign of vegetation to the high tide mark also known as the 'wrack line' (consistent with the high tide line where seaweed is deposited), to identify the length of each transect. Within each transect, four 1 × 1 m quadrats were randomly casted by volunteers, within the wrack line of each transect selected for the macro debris survey (Fig. 2). Using a small shovel, 3 cm of sand was scooped evenly across the grid and sieved through a set of nested sieve boxes with a mesh size 1 mm capturing microplastics and mesh size of 5 mm capturing mesoplastics.

Microplastic and mesoplastic particles were quantified along with additional categories of plastic foam, film, food wrappers, pellets, filaments, jugs or containers, cigar tips, cigarettes, personal care products and other miscellaneous plastics. Plastic particles were quantified and categorized before being extracted from each sieve and placed in its appropriately labeled sample bags. This study excluded microfibers and focused on microplastics readily visible to the naked eye and quantifiable within the sieve boxes. All data points collected between seasons were pooled together for analysis using JMP® Statistical Analysis Software. This represented a sample size of $n = 8$ per sampling site with the exception of Lighthouse Beach where $n = 4$. Due to non-normal distribution of the data, a non-parametric Wilcoxon test was used. Error bars within figures indicate standard error, denoted as SE within the text.

Spatial analyses of microplastic and mesoplastic deposits showed a significant difference between microplastics ($p = 0.0005$) found between exposures AO, ES, BB but no significant difference for mesoplastics ($p = 0.5$). Mean microplastics per square meter between exposures were AO: 9.75/m^2 (±12.8 SE), ES: 2.29/m^2/ (±3.8 SE), BB: 3.13/m^2/ (±7.4 SE) (Fig. 3). Whereas mean mesoplastics per square meter between exposures were AO: 1.55/m^2 (±3.7 SE), ES: 1.23/m^2 (±3.0 SE), BB: 1.1/m^2 (±3.3 SE), (Fig. 3). There was a significant difference between microplastics ($p = 0.006$) and mesoplastics ($p = 0.004$) found per square meter of beach. Beaches 1, 21/m^2 (±23.5 SE), 2, 9.75/m^2 (±3.8 SE) and 3, 10.5/m^2 (±8.6 SE) had the highest concentrations of microplastics per square meter of beach while beaches 1, 8 (±9.8 SE), 3, 4.75 (±5.9 SE) and 8, 5.75/m^2 (±6.7 SE) had the highest concentrations of mesoplastics (Fig. 4).

Seasonal distribution of samples collected between spring 2013 (dry season) and fall 2013 (wet season) across various exposures showed a significant difference in abundance for both microplastics ($p = 0.0363$) and mesoplastics ($p = 0.0055$). Seasonal concentrations of mean microplastics per square meter across all beaches combined during the fall were 3.91/m^2 (±8.1 SE) and spring 7.72/m^2/ (±11.6 SE). While mesoplastics during fall were 2.11/m^2 (±4.3 SE) and spring: 0.48/m^2/

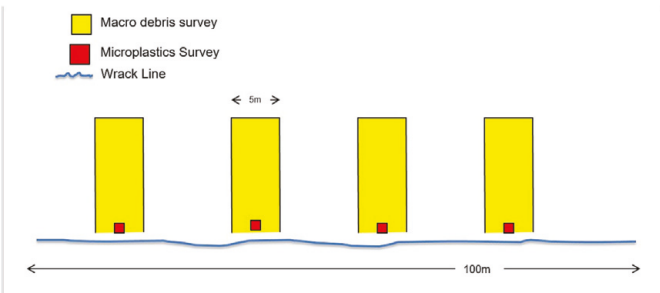

Fig. 2. Microplastic and mesoplastic debris survey area (Source: 5 Gyres, 2012).

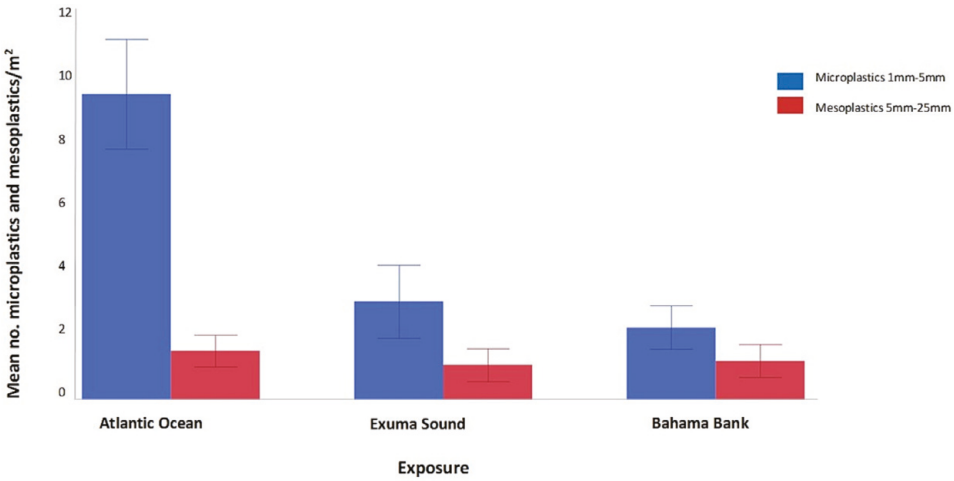

Fig. 3. Spatial distribution of microplastics and mesoplastics across exposures.

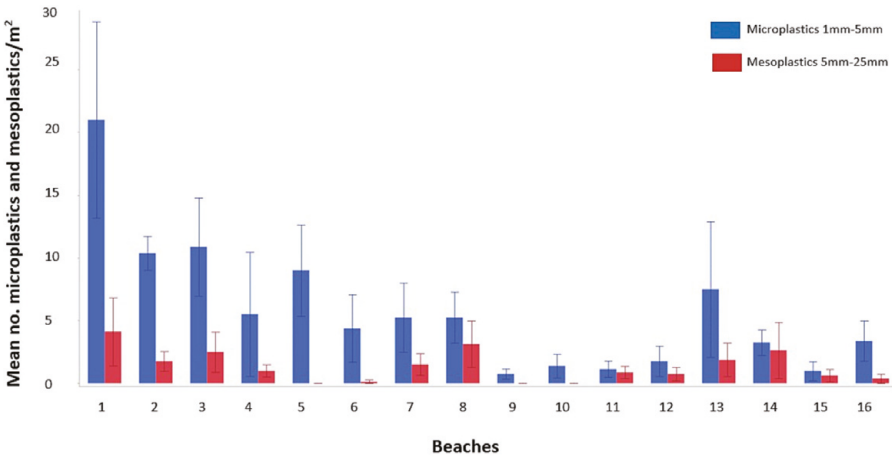

Fig. 4. Spatial distribution of microplastics and mesoplastics across beaches.

(±1.6 SE).

Microplastics collectively represented 74 % of debris collected during micro debris surveys, with mesoplastics representing 17 %, plastic filament, 4 % and plastic foam, pellets and film representing the remaining 2 %, 2 % and 1 %, respectively (Fig. 5). Fragments from plastic food wrappers and other miscellaneous plastics represented the remaining categories. There was no significant difference ($p = 0.1247$) between debris type and season. However, there was a significant difference between debris type and exposure ($p = 0.0021$). Plastic pellets (1 mm–5 mm), referred to as pre-production plastic pellets or "nurdles" showed a significant difference ($p = 0.00016$) in mean amount per square meter found across exposures, with the AO having the only concentrations of pellets with a mean of 0.61/m^2 (±2.0 SE).

The spatiotemporal distribution of microplastics and mesoplastics in this study indicate shorelines within ocean exposures of The Bahamas examined here are prone to the fragmentation and deposition of microplastics. Secondary microplastics were also identified on beaches within all exposures. However, AO beaches, which were windward facing, less frequented and further from habitation, experienced increased concentrations of primary and secondary microplastics. This phenomenon may be explained in part by AO beaches' exposure to major current systems of the AO such as the North Atlantic Gyre and dominant trade winds that influence debris movement onto AO sites (Law et al., 2010; Schmuck et al., 2017; Ambrose et al., 2019). Additionally, high relative exposure index (REI) values for AO sites studied link wind speed and direction along with high fetch (distance traveled

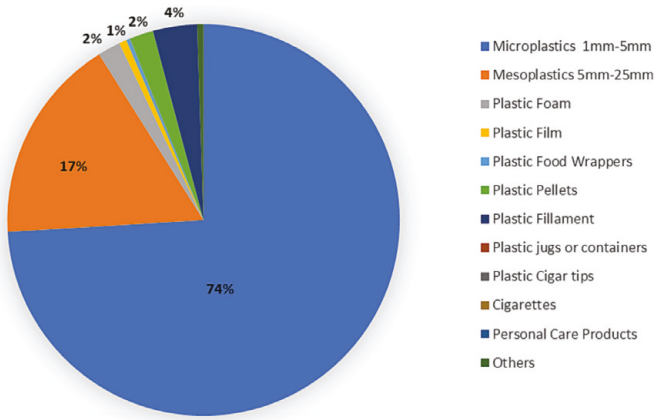

Fig. 5. Percent composition of microplastic and mesoplastic debris collected.

by wind or waves across water) values to the long-range transport of debris such as microplastics (Walker et al., 2006; Ambrose et al., 2019).

In contrast, leeward exposures of the ES and BB experienced significantly less microplastic and mesoplastic deposits. According to Ambrose et al., (2019), relatively fewer deposits on BB sites may be attributed to the location of the leeward, open carbonate bank margins of these sites and their orientation which shields them from dominant winds, further directing its sediments off the bank. It has further been postulated that western boundary currents of the Gulf Stream paired with sediment transport rates and plastics ability to sink based on changes in density once in the marine environment as an explanation for the reduction of microplastics within BB locations (Hine et al., 1981; Lusher, 2015; Ambrose et al., 2019). Moreover, a "mini" gyre has been observed within the ES where its surface circulation is dominated by eddies and jets with seldom movement of waters between the ES and AO, suggesting the movement of debris into the ES but rarely out (Colin, 1995; Ambrose et al., 2019). Subsequently trawl samples of floating microplastics ranging from 22,500 to 125,000 pieces of floating plastic/km^2 have been observed within various parts of the ES, with the largest trawl sample containing 1.95 million pieces of floating plastic/km^2 (Moore et al., 2015; Ambrose et al., 2019). Despite the compelling evidence of microplastics afloat within the ES, the self-contained nature of the Sound, coupled with the unique circulation of its surface waters therein may explain its retention of microplastics within its gyre and limited output onto its beaches (Ambrose et al., 2019).

Results from Ambrose et al. (2019) indicated that seasonal monitoring of macro plastic debris collected on the same date and location of each microplastic and mesoplastic survey showed no significant difference ($p = 0.8$) in seasonal sampling. However, results from this study suggest that seasons may play a role in the deposition of microplastic and mesoplastic distribution across various coastal exposures. Results from the study indicate that during the spring, microplastics are more prevalent across beaches while mesoplastics are more prevalent during the fall. This may be explained by oceanic activity occurring during hurricane season (June 1-Nov 30) (Finlayson, 2023), whereby winds and currents may drive debris, inclusive of microplastics, onto shorelines over time, with more observed deposits during the dry season. Conversely, it has been suggested that mesoplastics occurring more in the fall could be due to fragmentation of larger debris items left behind from anthropogenic activity from fishing, tourism or recreational activities occurring at various locations, in addition to plastic deposits from oceanic sources onto the beach (Ambrose et al., 2019). Such theories will need to be supported by specified research on meteorological influences such as historic wind data, sunshine duration and UV radiation indices on plastic debris deposition and fragmentation onto Bahamian shorelines, which may explain plastic degradation rates and its connection to microplastic concentrations.

Findings from this study were congruent with several regional and global studies indicating microplastics as the dominant debris type found on sandy beaches (Schmuck et al., 2017; Bosker et al., 2018; De-la-Torre et al., 2020; Chen and Chen, 2020; Fernander and Unwala, 2021; Mesquita et al., 2022). Ambrose et al. (2019) macro debris surveys collected mesoplastic samples visible to the naked eye from the back beach (or first sign of vegetation) leading into the high tide line. These surveys documented >50 % of debris collected throughout the study transects to be plastic fragments of some nature. It is possible that the lower occurrence of mesoplastics recorded within the present study be due to its varied distribution across the beach as plastic fragments may have occurred north of the high tide line where quadrats were conducted.

Plastic pellets, raw materials used for plastic production, are widely distributed throughout the world's oceans (Fotopoulou and Karapanagioti, 2012). These pellets are also known to escape through minute crevices during oceanic transport, resulting in their deposition into the sea. Within recent years there have been mass pellet spills occurring on beaches in Hong Kong in 2012 and Sri Lanka in 2021, with the latter deemed as the biggest marine plastic spill in history with a record 1680 metric tons of plastic pellets released on the Sri Lanka coast (The Washington Post, 2012; CEN, 2023; The Guardian, 2022). Plastic pellets, from unknown origins, were only discovered on AO beaches compared to other coastal exposures, suggesting long-range transport due to oceanic currents near AO study sites. These findings however, do not limit plastic pellets to one coastal location as studies done in Nassau, The Bahamas identified plastic pellets at leeward coastal locations studied (Fernander and Unwala, 2021). Though, it is important to note that the coastal exposures within Nassau and the island of Eleuthera vary so the presence of pellets on AO coasts may be exclusive to Eleuthera Island and other AO facing beaches throughout the country, but more studies are required to confirm this. With excess loads of plastic pellets afloat at the sea surface, it is plausible that ocean currents may transport them to beaches within the Atlantic Ocean or Caribbean Sea in the years to come. However, this will need to be confirmed with ocean modeling data.

Though this study provided important information on the abundance

of microplastics and mesoplastics specific to beaches in The Bahamas, its implications remain relevant for other Caribbean SIDS who experience similar deposition rates of microplastics within the marine environment and to building the scientific base for Caribbean SIDS negotiation positions for global plastics treaty (Bosker et al., 2018; Mesquita et al., 2022; Kanhai et al., 2022; Ambrose and Hassanali, in review). Microplastic ingestion within culturally, economically, and ecologically important fish species within Caribbean SIDS revealed that 97 % of fish species examined, such as Mahi Mahi (*Coryphaena hippurus*), Red Snapper (*Lutjanus baccanella*), Mutton Snapper (*Lutjanus analis*) and Red Hind (*Epinephelus guttas*) among others, contained microplastics in their digestive tracts (Morrall et al., 2018).

As coastal nations who are reliant on marine fish as a main source of food and protein (Akpalu and Okyere, 2022), the presence of microplastics in fish can potentially compromise human health within Caribbean SIDS, as harmful toxins from microplastics are known to accumulate in tissues of marine organisms (Garcés-Ordóñez et al., 2020). Moreover, its presence in staple marine food resources and key marine ecosystems that are utilized for subsistence, commercial and recreational activities can compromise fisheries and tourism economies, which are predominant economic drivers for Caribbean SIDS (Diez et al., 2019).

Baseline data collection for this study occurred in 2013, which roughly coincided with the study by Eriksen et al. (2014) who estimated that 5.25 trillion particles were afloat at the sea surface. These are now considered huge underestimates, as a recent study by Eriksen et al. (2023) reports that there has been a 32-fold increase of microplastics at the sea surface. Presumably this would also suggest possible increases of microplastic accumulation on beaches. Thus, the relatively simplified nature of sampling methodology used in this study requires adoption of a standardized and harmonized approach given the increase and prevalence of microplastics and mesoplastics but also microfibers within the marine environment.

This baseline study limited its sampling area to the high tide line where seaweed is deposited, allowing for quantification of incoming deposits of microplastics from the ocean to the beach. However, it excluded other beach compartments, i.e. mid and back beach. Increasing the spatial resolution of the sampling area within a singular study location can illustrate the plastic debris distribution and influx within a particular beach (Ryan et al., 2020). Visual observations of increased concentrations of microplastics occurring at the back beach of AO beach (6) Cotton Bay South have been observed by the authors. Besley et al. (2017) review of microplastic sampling methodologies indicated that location of sampling on the beach may not influence the overall outcomes of the results. Despite this finding, this study maintains that methodologies should consider how meteorological and geographic features influence distribution and degradation of microplastics within beach compartments.

This study maintained a sampling depth of 3 cm of sand being evenly scooped by shovel across the quadrat and immediately sifted into sieve boxes. However, variations in the sediment gradient between each study plot, paired with unverified measurements of sand being sampled could have possibly skewed the data. Studies indicate that sampling depths between 1 and 5 cm remain comparable with other microplastic studies, further advising the top 5 cm of sand as ideal for sample collection (Besley et al., 2017). Though this study's sampling depth remained congruent with global studies, it relied on microplastic counts conducted by the naked eye and excluded extractive processes involved with collecting, drying, distilling and filtering sand to quantify both microplastics and microfibers in a laboratory setting (Besley et al., 2017; Fernander and Unwala, 2021; Kanhai et al., 2022). These research limitations occurred due to the novelty of the research at the time, funding limitations to support the study, access to laboratory instruments and materials, along with limitations on microplastic monitoring methodologies at the time.

The Wider Caribbean Region (WCR), including Caribbean SIDS, lack coordinated and harmonized marine debris monitoring programs (Ambrose, 2021). Caporusso and Hougee (2019), published a report on Harmonizing Marine Litter Monitoring in the WCR: A Hybrid Approach. The report drew attention to the impacts of marine debris in the WCR and proposed adopting the OSPAR (Oslo-Paris Convention) Marine Litter Monitoring Protocol to promote scientific unification among the region (Caporusso and Hougee, 2019). Despite being updated in 2021 (Caporusso and Hougee, 2021), the proposed methodology was limiting as it excluded microplastics (Ambrose, 2021). The lack of methodological standardization and variation in units used to report microplastic distribution and abundance within Caribbean SIDS remains a major challenge (Kanhai et al., 2022; Mesquita et al., 2022). This extends to varying definitions of microplastics, diversity of sampling techniques and extraction methods used to quantify samples (Besley et al., 2017).

Monitoring microplastics in the marine environment can provide information on potential sources, composition, distribution, quantity, and fluctuations over time (Ambrose, 2021; Rognerud et al., 2022). For Caribbean SIDS, data considerations on the state of microplastics must extend beyond beaches to account for microplastics within ocean surface waters to understand pathways for deposition into ecologically and economically important ecosystems such as mangroves, seagrass, and coral reefs (Diez et al., 2019; Kanhai et al., 2022). Additional research emphasis should be placed on microplastics and microfibers occurrence in the intestinal tracts of marine fish, freshwater ecosystems, drinking water, wastewater, soil and sediments and its implications on human and ecosystem health (Orona-Návar et al., 2022). Moreover, an understanding of the bioaccumulative nature of POPS and other toxins in microplastics, their presence within marine organisms and ecosystems within Caribbean SIDS, and human health implications must be considered.

Knowledge gaps remain on the main sources, abundance, and distribution of microplastics within Caribbean SIDS and must be addressed to inform mitigative actions at national, regional and international levels, particularly within the negotiating forum of the global plastics treaty agreement (Orona-Návar et al., 2022). Implementing microplastics monitoring programs would require funding to support data collection, laboratory analysis and technological research needs, capacity building and training for relevant actors involved and a data repository to facilitate scientific cooperation and information exchange between countries (Ambrose, 2021). As Caribbean SIDS continue to experience challenges in their ability to fund and execute harmonized monitoring activities, partnerships should be pursued between universities, organizations and UN member states from developed countries possessing adequate infrastructure to support unified and diversified microplastic monitoring and analysis (Orona-Návar et al., 2022; Ambrose and Hassanali, in review).

It may be argued that the plethora of global evidence on microplastic pollution in the marine and natural environment, along with known threats posed to human health, is sufficient for Caribbean SIDS to adopt the precautionary principle in their negotiating positions during the INCs (Ambrose and Hassanali, in review). The precautionary principle proposes that the existence of a threat that leads to inevitable damages that lack scientific certainty should not be used as a barrier for preventative action for environmental protection (Gollier and Treich, 2012). For delegations from Caribbean SIDS, possessing localized, national and regional scientific data on microplastics source, abundance, distribution and impacts on Caribbean SIDS will help inform negotiating positions that support equitable distribution of the costs, benefits and risks associated with treaty outcomes (Ambrose and Hassanali, in review). For example, transboundary marine plastic debris, originating from as far as the west coast of the African continent have been documented on several beaches within Caribbean SIDS (Ambrose et al., 2019; Ambrose, 2021).

Robust monitoring data, to help identify countries responsible for transboundary sources of marine debris onto its shorelines can inform negotiations of international law such as polluter pays principles or

common but differentiated responsibilities within the context of the global plastics treaty (Ambrose and Hassanali, in review). Caribbean SIDS, among several delegations, are advocating for the inclusion of both principles in the treaty as the principles assume that the polluter be held responsible for the costs of environmental damages and mitigation efforts based on each country's capacity and contribution to the problem (Heyward, 2007). However, with the absence of robust, localized scientific data with adequate evidence, the application of polluter pays principle may remain difficult. This may lead to a situation in which, Caribbean SIDS remaining disadvantaged in their ability to advocate for equitable outcomes, also in relation to compensation of legacy pollution (Nwafor and Walker, 2020; Stöfen-O'Brien, 2022; Ambrose and Hassanali, in review).

Caribbean SIDS have varying national capacities to support data gathering on the proliferation of microplastics in the environment as most of the scientific data used in their preparation for INC-1 was derived from United Nations Environment Program (UNEP) or other external sources to shape their understanding and national positions (Ambrose and Hassanali, in review). Given the condensed timeline of the treaty formulation, paired with limited human and scientific capacity and funding mechanisms within Caribbean SIDS, it seems unlikely that a comprehensive, harmonized, regional dataset on microplastics will be produced before 2024. The treaty text should incorporate monitoring obligations with additional of capacity building and financial support necessary for developing states to gather adequate and relevant data (Rognerud et al., 2022). Coordination and harmonization of microplastics monitoring within Caribbean SIDS will require collaboration among academia, non-governmental organizations, research institutions and policy makers within governments (Ambrose, 2021). With varying methodologies for microplastic monitoring available, research objectives must first be established among relevant stakeholders within Caribbean SIDS to determine appropriate methodology to be applied (Velander and Mocogni, 1999; Besley et al., 2017; Mesquita et al., 2022).

CRediT authorship contribution statement

Kristal K. Ambrose: Conceptualization, Methodology, Data Analysis, Writing- original draft, Writing-review & editing. **Tony R. Walker**: Conceptualization, review and editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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PAPER 3

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Parachute science through a regional lens: Marine litter research in the Caribbean Small Island Developing States and the challenge of extra-regional research

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ABSTRACT

The Wider Caribbean (WC) comprises numerous diverse developing states and territories including Small Island Developing States (SIDS). In particular, the Eastern part of the WC with its 16 SIDS receives a disproportionate amount of marine litter. Addressing this serious and urgent environmental problem requires scientific evidence to support and inform policy formation and decision making. Yet, as this study demonstrates, marine scientific research on the issue of marine litter in the Caribbean SIDS is predominantly undertaken by extra-regional scientists and organisations which might weaken the science-policy transfer to develop suitable and tailor-made solutions. The view point paper highlights issues and the problems associated with parachute science for the Caribbean SIDS before offering a series of potential policy-ready response options to address the identified challenges.

1. Introduction

The Wider Caribbean (WC) is a region of more than three dozen diverse states and territories, with varying ecological and socio-economic priorities (Barnett, 1997; Kumar and Mishra, 2015). The Small Island Developing States (SIDS) of the WC, in particular, share certain common features and challenges, as they have a high dependency on tourism, limited land resources and high population densities (Wong, 2015). Importantly, SIDS are highly dependent on the surrounding oceans and ecosystem services from the ocean such as seafood for human consumption, pristine beaches for recreation and a thriving marine life which attracts cruise and dive tourism and contributes to livelihoods through fishing (Pelling and Uitto, 2001; Briguglio, 1995). This interdependence and close connection with nature makes SIDS ideally positioned to act as a "global barometer of change" (Kelman and West, 2009). Pollution of the marine environment by plastic waste stemming from oceanic currents and localized sources is only one of many pressures which impact the long-term environmental and economic prosperity of SIDS (Lachmann et al., 2017). Therefore, it can be argued that specific and tailor-made research addressing the challenges associated with marine litter has to be conducted for and in the region in order to meet their needs. However, this is not always the case and the phenomena of parachute science may occur. Parachute science for the purpose of this paper refers to a phenomenon whereby there is a preponderance of research conducted by scientists based predominantly outside the target geographical region without the input or involvement of local experts. However, the authors acknowledge that a discussion on parachute science is a high value-based issue which is closely interlinked to societal norms, academic traditions and access to resources in a region and may also change over time and within differing contexts.

The viewpoint paper aims to explore the issue of parachute science in the SIDS of the WC and analyses the means by which marine plastic pollution measures are developed. Based on this analysis, the paper provides the viewpoints of the authors on how to effectively increase research on marine litter in the region by researchers from the region.

2. Addressing marine litter pollution in the Caribbean Region

The Caribbean region is host to 16 SIDS (United Nations (UN), 2021). These are Antigua and Barbuda, The Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St.

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Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname and Trinidad and Tobago (see Fig. 1).

Due to the geographic location of most of these SIDS at the outer rim of ocean gyres and wind belts, they are heavily impacted by anthropogenic pressures from marine pollution, in particular marine litter (Ambrose, 2021; Clayton et al., 2020; Diez et al., 2019). Consequently, marine litter density in the Caribbean has been estimated to be three times higher than the global average (Diez et al., 2019). There is a certain understanding that waste management and mismanaged terrestrial waste is a significant source of marine litter in the Eastern Caribbean region (Clayton et al., 2020). Among the many complex questions posed by marine litter management in the region, it remains yet to be seen how specific measures and responses should be guided by science and scientific advice (Chen, 2015; Rochman, 2016).

2.1. Marine litter research in Caribbean SIDS

A variety of efforts to identify marine litter related research priorities have been undertaken in the past at national and regional levels, often through agency-led approaches that draw on eminent scientists for advice. Yet, this vital requirement has many complex facets (MacDonald et al., 2016) including the need for an understanding of governmental and scientific needs and priorities, as well as those of the broader public relating to agenda-setting and framing a science-policy approach involving several stakeholders within a given context (Rudd, 2015). This also relates to understanding the effects of pollution and cumulative impacts from other types of anthropogenic pressures in the Caribbean, as well as those related to climate change and extreme weather events.

Whereas a considerable volume of research has been conducted in certain areas of the world [e.g. in the European Union: Galgani et al., 2013; UN World Ocean Assessment, 2021] and a certain understanding of sources and distribution of marine litter is prevalent or at least emerging; sparse research has been conducted in the Caribbean region to date meaning that significant knowledge gaps persist, relating to sources and pathways of marine litter. Several international and regional organisations are increasingly working in the region and have contributed to policy coordination and the preparation of guidance documents on scientific monitoring and assessment. This includes the UN Environment Caribbean Programme (UNEP CEP), Global Partnership for Marine Litter-Caribbean (GPML-Caribe), the Gulf and Caribbean Fisheries Institute (GCFI) and the IUCN's Plastic Waste Free Islands Initiative (IUCN, 2021).

A distinction between monitoring of marine litter and research relating to the sources and impacts of marine litter in the region must also be considered. Monitoring for marine plastic litter on beaches in the region occurs only sporadically and independently by volunteers or citizen science, non-governmental organisation (NGO) initiatives (Ambrose, 2021). Monitoring of the marine environment for marine litter may be established formally via government programs that maintain a hybrid approach using citizen science (Zorzo et al., 2021), whereas, formal research may expand into biological, ecological and economic impacts of marine litter through assessments or experiments. Further, there is a tendency to draw on the results of volunteer clean-up activities to gain an understanding of the amount and distribution of marine litter in the Caribbean Region (Ocean Conservancy, 2017; Diez et al., 2019). This is in no way intended to detract from the importance of clean-up activities, in particular with regard to awareness raising. Such actions, while they serve to deepen the understanding of the extent of the problem of marine litter and frequently produce significant findings, might undermine reaching an evidence-based understanding of the state of pollution by marine litter on the marine and coastal environment and its sources due to the absence of structured and continuous

Fig. 1. Map of the Wider Caribbean Region including all Caribbean SIDS (highlighted in blue). Eastern Caribbean countries are highlighted in the inset map. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

monitoring and/or research activities in place.

Increasingly, a number of reports have been published and measures taken with regard to marine litter in the Caribbean region (see Table S2). An assessment of the knowledge base for the region makes apparent that the knowledge created with regard to the multifaceted challenges of marine litter is not equally distributed. Knowledge on distribution and sources of litter is limited in respect of several countries (Smail et al., 2020).

In particular, we argue that SIDS are not often the subject of peer-reviewed papers or are written by researchers from these countries. By way of example, Ivar-do-Sul and Costa reviewed 70 documents on marine litter in Latin America and the Caribbean region and merely two peer-reviewed papers were from the insular Caribbean (Ivar-do-Sul and Costa, 2007).

It is generally understood that peer-reviewed papers are seen as providing a robust and accessible source of information which are reviewed for their validity, significance and originality (Kelly et al., 2014). This makes them a suitable source for decision-makers to address specific point sources of litter, by way of example, or risk factors relating to infrastructure challenges and consumption and production patterns which might lead to marine litter (Nursey-Bray et al., 2014; Tengö et al., 2014). They can therefore be used to develop targeted measures in line with international and regional objectives (UNEP/NOAA, 2011). It has been established that a majority of research in the Wider Caribbean Region is documented in institutional reports, which are difficult to find and oftentimes not published for external users (Acosta et al., 2020).

3. Methodology

Using SCOPUS, LITTERBASE and Google Scholar, peer-reviewed journal articles which address or target all of the 16 SIDS in the Caribbean were identified (see Fig. 1, Table S1 and Fig. S2 Supplementary material). This was done by standardized keywords: "Marine Debris and Caribbean", "Marine Litter and Caribbean", "Marine Plastic and Caribbean" and "Marine Debris/Marine Litter" followed by each of the 16 Caribbean SIDS (see Table S1). The reference list of all relevant papers was then searched for additional articles. The country affiliation of the lead authorship and senior authorship of the articles at time of publication as indicated in the author affiliation information provided to the journal was analysed (see Table S2). It is acknowledged that researchers may move and that an affiliation to a certain university does not account for the actual citizenship of the individual researcher, thus country affiliation can only be used as an approximation on where the researcher may come from. For this reason, further investigations into the university webpages of each author was made to attempt to determine the origin country of each author within a reasonable degree. In addition, the gender of lead and senior authors was identified, where possible.

4. Results and discussion

Out of the 23 identified papers addressing any of these SIDS, 65% of the papers were not authored by lead authors affiliated to countries from the region at time of writing the papers in question. With regard to senior authors in case of multiple authorships, 85% of the authors did not come from the region. Females represented 57% of the lead authorship, with males representing 43%. Overall, these findings raise questions relating to the applicability of information provided and the knowledge on which decision makers may act to address the issue of marine litter in the region. In order to find adequate and appropriate solutions tailored to the specific governance structure, both in terms of level of decision-making (municipal, national and/or regional) as well as with regard to specific sources and pathways, the knowledge and information provided should ideally be based on the expertise of researchers already in situ in the region. In a recent paper on parachute science, Stefanoudis et al. (2021), provided insights into the concept which they frame as a practice in which international scientists, usually from higher- income countries conduct research in lower-income countries without necessarily engaging with local considerations and suggestions for suitable recommendations (Stefanoudis et al., 2021). Similar approaches to the marine litter research in the SIDS of the Eastern Caribbean can be therefore also categorized as being subject to parachute science or hegemonic research.

4.1. Understanding the research agenda for marine pollution/litter in Caribbean SIDS

Science is a key source for decision-makers when developing and creating policy (Polejack, 2021; Pielke, 2007). It is well known that conducting research is the basis of advancement in science (Acharya and Pathak, 2019). Research output and of course monitoring and assessment for marine litter can be costly when integrated in a national or regional monitoring strategy/framework and when several compartments of the marine environment are being monitored (e.g. beach litter, litter in the water column and litter in biota and sediments) (Smail et al., 2020). Given the efforts required to monitor and assess various aspects of marine litter, uptake of the best available research by decision makers is the ultimate goal. Within the context of the WC the mechanism that facilitates the uptake of research by policy/decision makers involves 'research providers' and 'research users'. Research users within the region have diverse backgrounds and work within several institutions such as: universities, marine laboratories, NGOs, private sectors and regional and national agencies. Research conducted by research providers is primarily taken up by advisors (e.g., Cabinet, Fishery Advisory Committees, National Coordination Committees and Ministerial Councils) who then engage with decision makers (Acosta et al., 2020). In order for the science-policy interface to be effective, the process needs to be iterative with research providers conducting science that is responsive to the needs of policy and research users basing their decisions on the best available science, however this is not always achieved (Acosta et al., 2020). The research agenda of scientists can be driven by several factors. This can include political commitments and obligations stemming from international, regional or national regulatory or policy frameworks. The UN 2030 Sustainable Agenda (UN, 2015) follows a universal approach which requires that every country possesses the necessary science and technology to develop responses to its specific characteristics, needs and priorities (van der Heijden et al., 2014 and O'Connor and Mackie, 2016). UN Sustainable Development Goal 14.a calls for an increase of scientific knowledge and the development of research capacities in order to improve ocean health to the benefit of developing countries, in particular SIDS and least developed countries (UN, 2015). Moreover, the UN Decade of Ocean Science for Sustainable Development, which runs from 2021 to 2030, aims, among other objectives, to understand the impacts of cumulative stressors and seeks sustainable solutions for benefits from the oceans and to share knowledge and enhance interdisciplinary marine research capacities leading to benefits […] particularly for SIDS and least developed countries (UNESCO IOC, 2017). These two policy objectives frame the understanding that SIDS are a particular subject in ocean governance and that the science-policy approaches should be targeted to meet their needs and address capacity gaps. This is somewhat juxtaposed with the fact that over 60% of the total scientific literature emanates from high-income countries (UN, 2019a, 2019b).

Improving the science-policy interface requires an in-depth understanding of both research agendas of scientists and the research agendas of decision makers. In a recently published GCFI Technical Report (Acosta et al., 2020), research agendas for pollution were identified from the perspective of decision makers who are responsible for implementing policies. To identify priority research areas, decision makers were presented with five crosscutting research topics: science, governance, monitoring, economic and communications. With regards to economic research needs, decision makers highlighted the need for improved solid waste management approaches to accompany the expansion of tourism since many SIDS within the WC are highly dependent on tourism (Wong,

2015). Under the communication research needs, decision makers felt that research is needed to develop effective advocacy approaches that result in decreased marine pollution (Acosta et al., 2020).

The Regional Action Plan on Marine Litter (RAP MaLi) adopted by the Contracting Parties of UNEP CEP (UNEP CEP, 2014) also provides incentives to dedicate research to aspects of the Plan. The geographic scope of the RAP MaLi also includes SIDS in the Caribbean region. Similarly, a recently published report by UN Environment (UN Environment, 2021) identified research priorities must also address gender and intersectionality, which may be factors such as age, marginalized and vulnerable groups, especially in relation to exposure, health effects, attitudes to new innovative technologies and ocean literacy, among others. Acosta et al. (2020) identified that beyond developing research needs from on-going processes and institutional agenda, the uptake of the research outcome and a strategy for linking the science to policy should be in place to secure effective management strategies. It would be important to understand what mechanisms can on the one hand provide for a framework to disseminate information and provide research funding and drive the research agenda by regional scientists.

4.2. Funding marine litter research

Acharya and Pathak (2019) identify the primary root causes for lower productivity in terms of research output in low-income countries as the high cost for necessary equipment, research infrastructure and strategic political planning. The Caribbean Region has limited access to investment in research and development (0.75% of GDP for research and development, world average 2.2.7% of GDP in 2017) as well as limited strategic political planning (World Bank, 2017). The high debt to GDP ratio of many Caribbean islands might also impact the ability to invest in research and development (OECD, 2019). Overall, a fundamental deterrent to proper advancement of science and research in the WC, is the level of poverty and lack of scientists in the region (IADB, 2007). Latin America and the Caribbean represent 8.42% of the world's population, however only 2.5% of the world's scientists come from this region (IADB, 2007). This 2.5% represents scientists from a broad field of scientific research and does not account for the number of scientists from SIDS who dedicate their efforts to marine related issues or even marine litter in the region.

One of the major criticisms of parachute science is the tendency for outside researchers to come into an area, conduct research and leave without engaging with local experts or acknowledging their input into the research. However, there are instances of extra regional led research that takes place within the region that engages locals while also providing a funding source. For instance, the ongoing work being undertaken in projects funded by the Norwegian government involving key regional and national players such as the Organisation of Eastern Caribbean States (OECS) Secretariat and national environmental agencies. The OECS's RemLit Project (OECS, 2020) aims to reduce and control marine litter in participating member states of the OECS. The project has received funding support from the Government of Norway and includes activities aimed at awareness raising on the issue of marine litter, enhancing public policy as well as legislative and fiscal insensitive frameworks, and the development of strategies for improving the transnational movement of plastic waste in the OECS. While at its core RemLit does not include specific objectives related to the advancement of scientific knowledge, the ongoing initiatives may provide useful information. Similarly, the Plastic Waste Free Islands Project (IUCN, 2021), also funded by Norway through the Norwegian Agency for International Development (Norad) and being implemented by the IUCN, includes a number of Caribbean SIDS as well as small island countries in the Pacific region. The project has adopted a knowledge-based approach to the development of practical solutions for increasing policy effectiveness, reducing plastic leakage and the creation of new value chains. This is being done with the input and involvement of key agencies from the partner countries and local knowledge. As in the case of the RemLit Project, the Plastic Waste Free Islands Project is not expressly centred on scientific research, however in both cases there exists the opportunity to advance knowledge on the challenge of marine litter within the participating countries.

5. Recommendations on how to strengthen the knowledge base on marine litter in Caribbean SIDS

5.1. Actively seek to engage local researchers and scientific institutions in the region before engaging on research in the region

Establishing a relationship with local/regional researchers prior to conducting field studies can be extremely beneficial for both international and regional scientists. This relationship serves as a mutual knowledge exchange as locals offer insights into the issues they face and how challenges vary over space and time. On the other hand, international scientists can provide solutions based on ongoing global research and work with locals to collect data and build local capacity. Should there be research conducted from scientists from outside the region, it would be strongly advised to ensure that local researchers are informed and indeed actively involved in this kind of research and that any information or results stemming from this research is channeled back to the region and researchers. EXXpedition, a community interest company which runs all-female sailing research expeditions at sea and virtually voyages on land to investigate the causes of and solutions to ocean plastic pollution may be seen as one example which may achieve this cooperation, notwithstanding its limited scope in terms of participants (eXXpedition, 2021). During the research sails in the WC, also local researchers were involved alongside international researchers.

Research directly undertaken in low-income countries is likely to be better suited to the needs and priorities within a society or nation's context and better accounts for the social, economic and governance structures and approaches within a specific society. In this regard, efforts should also be made to translate scientific knowledge into local languages and dialects, which may increase the translation of scientific knowledge into local and regional measures (Ban et al., 2020).

5.2. Research uptake by decision-makers

A possible pathway to ensure an increase of financial support to strengthen research from the region might be the uptake of provided scientific knowledge by decision-makers. Acosta et al. (2020) argue that whereas marine research has a long history in the Caribbean region, this has been mainly opportunistic in nature and not of a strategic nature as the scientists drove the research activities rather than decision-makers. Further, Wisz Mary et al. (2020) argue that the complexities associated with scientific evidence necessitates that this be "distilled to highlight core insights" so that it can be useful to decision makers.

The ongoing work being undertaken through regional initiatives such as RemLit and the Plastic Waste Free Islands Project as well as through regional intergovernmental bodies like UNEP CEP, are often supported by national governments through environmental agencies. Effort needs to be made to capture, synthesize and disseminate the data and information derived from these initiatives into academic writing.

5.3. Explore the opportunities of North-South and South-South knowledge transfer

In order to attain more inclusive and sustainable development in the WC, a renewal of international cooperation is essential (CEPAL, 2021). The cooperation in subject includes entities such as the North-South and South-South cooperation. North-South and South-South cooperation offer a complementary direction to renew and multiply the options to achieving sustainable development goals (IsDB, 2019; CEPAL, 2021). North-South cooperation (NSC) is the most traditional type of cooperation whereby developed countries (north) provide economic support or

other forms of financial aid and resources to the developing countries (south) in socio-economic and environmental domains (United Nations, 2019a, 2019b). Meanwhile, South-South Cooperation (SSC) together with Triangular Cooperation (TrC) are contemporary cooperation gaining more momentum over the last decade. TrC according to the United Nations Office for South-South Cooperation (UNOSSC, 2018) is the "collaboration in which traditional donor countries and multilateral organizations facilitate South-South initiatives through the provision of funding, training, management, and technological systems as well as other forms of support." It is often described as essential to developing nations as it continues to expand and connect various actors and provides opportunities to share and transfer skills, knowledge and technology in a more cost effective way compared with North-South arrangements (Wang and Banihani, 2015; IsDB, 2019). The 2030 Agenda for Sustainable Development (UN, 2015) calls for enhanced SSC and TrC to enhance policy coordination by particularly making science, technology, innovation and knowledge sharing more readily available. For the case of the Caribbean SIDS, SSC and TrC may support to bridge the challenges relating to the geographically distanced location of the Caribbean SIDS which may slow down the sharing of information concerning emerging concerns, assessments and/or suitable technology.

Although the WC has a varied and longstanding experience with SSC and TrC, it is not well-known in other regions and not sufficiently shared with the rest of the world (WHO, 2014). Perhaps because there is a lack of coordination among the multiple regional and global networks and initiatives. According to GEF (2020), there are over eighty regional and global networks and initiatives addressing marine plastics and plastic pollution in the Latin America and Caribbean (LAC) regions. However, there are just a few that are UN institutional agencies (UNOSSC, 2018) which supports South-South cooperation facilitating environmental themed projects including marine litter. UNEP-Regional Office for Latin America and the Caribbean (UNEP/ROLAC) acts as secretariat to the Forum of Ministers of the Environment of Latin America and the Caribbean (CEPAL, 2018). Moreover, the Forum also has an Interagency Technical Committee composed of UNEP, UNDP, ECLAC, IADB and the World Bank. Meanwhile, the Committee on South-South Cooperation is a subsidiary body of ECLAC (CEPAL, 2018).

Essentially, the organisations of the Interagency Technical Committee are individual Clearing House Mechanisms (CHM) (OAS, 1998), which may serve as a forum for the exchange of technologies, expertise, experiences, opportunities, best practices, methodologies, advisory services, and training. They are known to have facilitated a number of projects and programs over the years that are directed to marine litter management. Projects carried out by UNEP-Global Partnership on Marine Litter (GPML)-Caribbean Node, and research conducted by ECLAC (e.g. the Latin America and the Caribbean SDG 14 Implementation Assessment 2020) to name a few, are vital in contributing to the expectation of SSC. Thus, these organisations can benefit by having a joint CHM to achieve efficiency in SSC.

There is also a need for enhanced collaboration with other projects that may not fall directly under SSC directives. For instance, the GloLitter Partnerships Project launched in 2019 by the Food and Agriculture Organization (FAO) and the International Maritime Organization (IMO) and funded by the Government of Norway supports 30 developing countries in preventing and reducing marine litter from the maritime transport and fisheries sectors, which includes plastic litter such as lost or discarded fishing gear (IMO, 2021). Although one may categorize the project as a North-South arrangement, five southern regions are represented in the GloLitter project. According to IMO (2021), these include Asia, Africa, the Caribbean, Latin America and the Pacific. While the project promotes compliance with relevant international instruments (IMO, 2021), there is an opportunity for South-South Cooperation by the participating regions whereby they use this as a platform to allow for the exchange of ideas, technology, innovation and information on research and monitoring specific to marine litter.

To some extent, the perceptions of the added value of NSC and SSC differ. According to WHO (2014), key informant interviews revealed that developing countries stressed the value of learning, capacity building, solidarity, reciprocity and empowerment, while the informants from International Development Partner (IDP) organisations focused on efficiency, resource use and accountability. Acknowledging this perception while enhancing communication and collaboration among multilateral platforms is crucial to help avoid future fragmentation and confusing or conflicting support entities and to also help reduce the risk of overlapping and duplicating efforts.

6. Conclusion

Parachute science is a difficult topic to approach within any given context and relating to any marine environmental problem as it is steeped in a complex set of value-based approaches to research and evidence-based decision-making. Based on our findings, it has become clear that parachute science takes place with regard to the Caribbean SIDS. The root causes may be, among a very complex net of societal factors, a limited funding for monitoring or research and a poor science-policy framework. However, it may be equally challenging to encourage the uptake of decision-makers to make use of the results of research and monitoring and thereby increasing public spending on this. We find that a key to addressing this issue is collaboration and cooperation, among scientists and researchers, government and researchers, countries and donors, as well as international and regional intergovernmental organisations.

CRediT authorship contribution statement

Aleke Stöfen-O'Brien: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Kristal Kristene Ambrose:** Writing – original draft, Writing – review & editing. **Kristie S.T. Alleyne:** Writing – original draft, Writing – review & editing. **Tricia Allison Lovell:** Writing – original draft, Writing – review & editing. **Roxanne E.D. Graham:** Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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PAPER 4

Ambrose, K.K. (2023). Assessing and Addressing Contextual Equity: A Framework for Key Drivers Needed by Caribbean Small Island Developing States to Achieve Contextual Equity in the Global Plastics Treaty Negotiations (In review). Frontiers in Marine Science

Assessing and Addressing Contextual Equity: A Framework for Key Drivers Needed by Caribbean Small Island Developing States to Achieve Contextual Equity in the Global Plastics Treaty Negotiations

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Abstract

The "global plastics treaty" negotiations, to create an international legally binding instrument (ILBI) to end plastic pollution, including in the marine environment have commenced. Caribbean Small Island Developing States (SIDS) are disproportionately impacted by the transboundary nature of plastic pollution and face challenges in equitably participating in the global plastics treaty negotiations. This study examines contextual equity as experienced by Caribbean SIDS in preparation and participation for the first ad-hoc Open Ended Working Group (OEWG-1) and the first intergovernmental negotiating committee (INC-1) meeting for negotiations on specific terms of the treaty. This dimension of equity refers to equity in access in the form of financial resources, political power, human capacity, and negotiating skills. Semi-structured interviews conducted with delegates, non-governmental organizations and regional coordinators from Caribbean SIDS revealed that they have varying capabilities and resources, inclusive of financial and human capacity, to equitably participate in developing interventions like the global plastics treaty. This study contributes new knowledge on barriers inhibiting contextual equity for Caribbean SIDS within the INC negotiation process and offers a framework of key drivers needed to achieve equity throughout the development and future implementation of a global plastics treaty for Caribbean SIDS.

Keywords: Caribbean Small Island Developing States, Global Plastics Treaty, Negotiations, Equity, United Nations, Plastic Pollution

1. Introduction

Plastics' pervasive existence as a pollutant has become a cause of global concern due to its adverse impacts on marine organisms, ecosystems, economies and human health (Derraik, 2002; Kershaw, 2016; Villarubia-Gómez et al., 2018). Increasing trends in its production and pollution of the marine environment have led to a unified call by states, civil society, academia, policy makers and non-governmental organizations (NGOs), among others, for the development of a global plastics treaty to address plastic pollution (Eriksen et al, 2014; Geyer et al., 2017; UNEP 2022; WWF, 2022). During the 5th session of the United Nations Environment Assembly (UNEA)(UNEA-5.2) (March, 2022), UN member states adopted ***Resolution 5/14 End plastic pollution: Towards an***

international legally binding instrument (ILBI) (UNEA 5/14), aimed to combat plastic pollution with a global and legally binding plastics treaty by 2024 (Bergman et. al, 2022; WWF, 2022, UNEP, 2022). Informally known as the "global plastics treaty", this instrument intends to comprehensively address the full life cycle of plastic from production to disposal (UNEP, 2022, WWF, 2022). This also includes the extraction of feedstocks for plastics production, recovery and remediation of legacy or existing plastics contaminating the environment. The landmark adoption of UNEA 5/14 created a pathway to commence negotiations on specific terms and necessary measures to effectively and comprehensively manage plastic pollution globally (Filho and Velis, 2022; WWF, 2022). The resolution summoned an ad-hoc open ended working group (OEWG) and five sessions of intergovernmental negotiating committee (INC) meetings, composed of United Nations (UN) member States, to negotiate on material and procedural obligations contained in the treaty. The negotiations are set to conclude in a meeting of plenipotentiaries in early 2025 (UNEP, 2022; WWF, 2022; UNEA 5/14) (Fig. 1). It denotes that participation in the OEWG-1 and the INCs should be open to all member states of the UN and Members of its specialized agencies, regional economic integration organizations, as well as relevant stakeholders (UNEA 5/14, 2022).

All member states, inclusive of Small Island Developing States (SIDS), have the ability to access the negotiating forum to have their voices and positions heard. However, international environmental negotiations and current UN structures have been deemed highly inequitable by scholars who allude that its architecture systematically obstructs progress towards the development and implementation of international environmental policies (Schroeder et al., 2012). This includes a certain degree of inequity in environmental treaty making whereby developed countries are more equipped than other member States to negotiate more favorable outcomes due to the considerable disparities in resources and power dynamics (Takamura, 2003; Heyward, 2007; Penetrante, 2011; Schroeder et al., 2012). For example, SIDS, such as those from the Caribbean, begin at a disadvantage in international negotiations due to fewer dedicated resources, inclusive of financial and human capacity, to equitably participate in developing interventions like the global plastics treaty (Campbell et al., 2021; Hassanali, 2022).

Caribbean SIDS are comprised of 16 countries, [Antigua and Barbuda, The Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname and Trinidad and Tobago] (Fig.2) who experience similarities in their ecology, culture and economic reliance on tourism and ocean based industries (UN, 2022; Diez et al., 2019; Stofen-O'Brien et al., 2022). These countries represent roughly a 0.95% share of the global mismanagement of plastic waste (Meijer et al., 2021). However, within Caribbean SIDS, the inequities of marine plastic pollution are heightened through the transboundary movement and deposition of plastic litter to its coastlines, which are often disproportionate to the production and consumption levels of plastic in the region (Lachmann et al., 2017; Ambrose et al., 2019; Ambrose, 2021). The adverse impacts of plastic pollution to Caribbean SIDS jeopardizes ocean dependent industries such as tourism and fisheries that contribute largely to their gross domestic product (GDP) (Diez et al., 2019). In addition, it negatively impacts biodiversity and threatens human health as plastic toxins work their way up the food chain through trophic interactions which may result in bioaccumulation of toxins across trophic levels (Derraik, 2003; García-G´omez et al., 2020, Mesquita et al., 2022; Rakib et al., 2023; Ambrose and Walker, 2023). Such threats have led to SIDS collectively calling for the urgent, yet equitable development of a global plastics treaty. The desire is to hold the perpetrators of plastic

pollution accountable while also recognizing the special circumstances and needs of SIDS, this includes ensuring that marginalized voices are heard and that they have the capacity to contribute to the treaty's development and implementation (Alliance of Small Island States (AOSIS) Opening Statement, INC-1 Plenary, 2022).

Themes of equity are commonplace among environmental negotiations and can aid in identifying fair compromises given the collective interests and capacities of all players (Ashton and Wang, 2003). Such negotiations tend to prioritize distributive equity, which considers the distribution of costs, risks and benefits of the environmental issue being discussed, while overlooking procedural equity, concerned with the involvement of all stakeholders, including indigenous communities and marginalized groups such as women and youth, and their right to participate in the decision making process (McDermott et al., 2013; Martin et al., 2014; Law et al., 2017; Hass et al., 2019; Campbell et al., 2021; Ruoso and Plant, 2021). Contextual equity refers to equity in access and calls attention to pre-existing imbalances in the form of financial resources, political power, human capacity, and negotiating skills, which creates an unleveled playing field for participants in the decision making process (Martin et al., 2014; Law et al., 2017; Hass et al., 2019). This arm of equity has received little attention or research priority as most equity arguments are biased towards distributive equity, which is prioritized over procedural equity, with both overshadowing contextual equity (Friedman et al., 2018). Yet, contextual equity serves as the gateway to achieving all dimensions of equity within environmental decision making (Hass et al., 2019).

This study examines the contextual equity barriers facing Caribbean SIDS in the development of a global plastics treaty and explores its connection to distributive and procedural equity. Through semi-structured interviews, it aims to assess the experiences of delegations, NGOs and regional coordinators from Caribbean SIDS during their preparation and participation in the initial phases of the INC process, starting with the first meeting of the OEWG (OEWG-1), held from May 30-June 1, 2022 in Dakar, Senegal and the INC-1 held from November 28-December 2, 2022 in Punta del Este, Uruguay. This study contributes new knowledge on barriers inhibiting contextual equity for Caribbean SIDS within the INC process and offers a framework of key drivers needed to achieve equity throughout the development and future implementation of a global plastics treaty for Caribbean SIDS.

2. Methodology

2.1 Data Collection

During the plenary session of the OEWG-1 and INC-1 meetings, Caribbean countries in attendance and the size of their delegations were observed, noted and confirmed using United Nations Environment Programme (UNEP) List of Participants (LOP) data. Regional meetings hosted by GRULAC (Group of Latin America and Caribbean Countries) during the OEWG-1 and INC-1 were also observed, where subjects of the study were identified and interviews were requested. A snowball sampling method was used where various participants suggested others for the study. This study utilized semi-structured interviews and participant observation to learn about the activities of the people and events under study in its natural setting including their observing and participating in decision making activities for the ILBI to end plastic pollution (Kawulich, 2005). Meeting observations were conducted both virtually during the OEWG-1 and in-person during the INC-1 in Punta del Este, Uruguay. Twelve semi-structured interviews were conducted via Zoom

(n=2) and in-person at INC-1 (n=10) between 14 individuals representing Caribbean delegates, non-governmental organizations, a UN regional group coordinator, lawyers and policy advisors, with the latter accounting for a single interview (Table 1). All respondents attended either the OEWG-1, the INC-1 or both, worked in or with the Caribbean region and were actively engaged in the negotiation process. Study participants were asked questions related to equity in terms of their preparation for and participation in the INC meetings and challenges faced in achieving equity.

The author of this paper was granted observer status as an entry point into INC-1 and was not affiliated with any State(s) or delegations nor had any pre-existing relationships with study subjects.

2.2 Data Analysis

Following a modified methodology by Ison et al., 2021, all interviews were transcribed using the Otter.ai software. Using Nvivo 13 qualitative data analysis software to analyze interview transcripts, a three step process was used to identify codes, subcodes (categories) and themes. Codes were derived from the focal point of the interview questions (i.e equity, preparation, participation, challenges). From here subcodes (more specific categories of the codes) were created, before themes relevant to the research questions were extracted (LeBlanc, 2010). Word frequency analyses were also conducted based on the recurrence of similar descriptive words in each interview and their connection to each code and subcode.

3. Results

The results presented here are based on observation and interview data from Caribbean SIDS attendance at the OEWG-1 and the INC-1 meetings, challenges faced in their preparation and participation and their perceptions on contextual equity in the negotiation process. It is laid out in 7 sections based on key indicators of contextual equity including financial resources, human capacity, and negotiating skill. In section 3.1, the broad concept of equity as perceived by the study participants is presented. Section 3.2 explains attendance by Caribbean SIDS and G20 members during the both meetings and also details disparities in delegation size and composition. Section 3.3 presents contextual equity challenges faced by Caribbean delegations in their preparation and participation in both meetings and is divided into subsections 3.3.1 on human capacity, 3.3.2 on financial and time constraints and 3.3.3 on science formulating national positions. Section 3.4 discusses stakeholder engagement and 3.5 prioritization and coordination of INCs among Caribbean SIDS.

3.1 Study Participants Perception on Equity in Negotiations

Study participants were asked to conceptualize the term equity, its key elements and its relation to the negotiation process. A word frequency analysis based on the question revealed respondents perceived equity using the words equal/equally/equality (n=10), fair/fairness (n=7), access (n=6) and just (n=5) (Table 2). The conceptualization of equity as related to the negotiation process was regarded by study participants as, going beyond accessing the negotiation forum but having specific needs met for particular countries so that they are better equipped to access the negotiating opportunity. On achieving equity within negotiating forums, one participant argued that it would

require systemic changes that account for historical prejudices that perpetuate the disparities between developed and developing countries, which lend to inequities in environmental decision making, further stating:-

> "Reparatory justice, and those types of things are really important to the conversation, because if you're looking at it through the environmental sphere, the challenges a lot of developing countries face right now are a direct result of things that are linked to historical prejudices from developed countries. I think these are some of the principles that you want to see emulated in moves towards ensuring equity, because you have to have the tough conversations, but more than just conversations are solutions. So I think that's a huge part of discussions on really materializing true equity."

3.2 OEWG-1 and INC-1 Meeting Attendance, Delegation Size and Composition between Caribbean SIDS and G20 Member States

Disparities in delegation size between Caribbean SIDS and developed countries were observed within both the OEWG-1 and INC-1 meetings. To contrast Caribbean SIDS attendance at the fora compared to developed countries, five (5) countries and one (1) union from the Group of Twenty (G20) were selected. G20 members represent around 85% of the global GDP, over 75% of the global trade, and about two-thirds of the world population and comprises 19 countries (G20, 2023). Australia, China, the European Union, Germany, the United Kingdom and the United States were selected for comparison based on population size and economic resources. Only five (5) Caribbean countries attended the OEWG-1 with a maximum delegation size of two (2) delegates (Fig 2, Fig 3). All G20 members were in attendance, with member state China having a delegation size of 29 delegates (Fig. 3). The OEWG-1 LOP did not specify if all delegates listed were in-person or attended online.

The INC-1 LOP accounted for both in-person and online attendance. During the INC-1, Caribbean SIDS attendance increased from the OEWG-1 with 10 countries listed within the LOP. However, on ground observations concluded that only 9 countries were in attendance in-person with a mean of 2 delegates per delegation, inclusive of online and in-person attendance (Fig. 2, Fig. 4). Despite online attendance, study participants noted limitations of attending virtually as online delegates were not allowed to speak during the plenary sessions, only within regional meetings. Additional challenges included varying time zones from the meeting location and technical difficulties with the UNEP virtual platform, leaving many countries to petition for in-person participation for the remainder of the INC meetings, especially given the negotiation's crucial and historic stature. At INC-1, 19 Caribbean delegates were present in-person with 50% of delegations consisting of one person (Fig. 4). Antigua and Barbuda had the largest delegation (n=6). Similar to OEWG-1 attendance, All G20 members attended the INC-1 both in-person and online with the United States of America having a delegation size of 41 delegates, with 23 attending in-person, according to LOP data (Fig. 4). In-person attendance was not verified for G20 member states. The mean size of G20 delegations consisted of 10 delegates, composed of government ministries inclusive of foreign affairs, finance, solid waste, chemicals and recycling, academia, lawyers and policy advisors (UNEP, OEWG-1and INC-1 LOP). Caribbean delegations were mainly composed of two delegates; either from the Ministry of Foreign Affairs or from a technical ministry such as the Ministry of Environment, Sustainable Development or Waste Management.

3.3 Contextual Equity Challenges Faced by Caribbean Delegations Preparing and Participating in INC-1

3.3.1 Human Capacity

Study participants were asked to outline challenges that Caribbean delegations face in preparing and participating in the negotiation process for the INC-1. Based on the qualitative analysis of the interview data, the codes human capacity and funding were created with various themes which were specific to the research objective derived from each code (Fig. 5). A word frequency analysis of the codes showed that combined, delegation size, condensed from the words small, delegation, one, two, delegate and size, had a frequency of 74. Funding and human capacity had word frequencies of 23 and 22 respectively (Table 3).

Delegation size of Caribbean SIDS was associated with challenges with human capacity as each delegate linked the cause to exhaustive responsibilities within their ministries, where they serve as delegate(s) for all environmental meetings while concurrently administering the multiplicities of their job obligations in the midst of negotiations. One participant noted that due to being small countries, with small governments, you end up with the same person doing all of the jobs and it leaves little time to prioritize or adequately prepare for negotiations. The realities of this challenge faced was illustrated by one of the delegates interviewed, summarizing their recent experience within serving different negotiation fora, stating:-

> "Sometimes things are a bit unrealistic for smaller delegations versus big delegations, that are not necessarily equitable. So, there are some inherent challenges and disadvantages in preparation, because, you know, case in point I came from Egypt (Conference of Parties (COP) 27 on Climate Change), I had two days in between, and then I came straight here (Uruguay, Punta del Este, INC-1). So whereas others would have, for example, let's say the US, they are not the same negotiators I would've negotiated with on climate, and they would have had all that time when we were in Sharm el She'ikh, Egypt negotiating to read the scenario note and do this and that where, you know, sometimes you have to rush and get on a plane, or you can't even do it at all, and you're reading it while you're here (Uruguay, Punta del Este, INC-1) hearing people with their national statements, etc."

Study participants petitioned for a more varied delegation in terms of diversity of skill sets to aid in understanding the financial, social, environmental and legal implications of the intended ILBI to end plastic pollution. For example, some study participants expressed inequities faced when negotiating against countries that have not only larger delegations but a wealth of knowledge and expertise specific to plastic manufacturing, chemistry and waste management along with the financial means to pay experts and advisors within the plastics and legal fields to be a part of their delegations. Based on the INC-1 LOP, only two Caribbean delegates were listed as legal officers within their ministry. However, based on interview data, two other legal advisors were identified within another delegation. The limited legal capabilities were brought forward by study participants, with one participant emphasizing the need for a legal advisor or lawyer to be a part of Caribbean delegations, further explaining the integral need for understanding the legal language, undertones, financial and sovereignty implications involved in the treaty process. A team of lawyers and policy advisors involved in the study stated that;

> "The legal resources for Caribbean SIDS are not on an equitable basis. The Australians, the Americans, and the Chinese all have access to vast resources, and law firms that they can call on at need, because we know that SIDS and some lesser developed countries do not have those facilities."

The study participants further suggested that the financial means of acquiring legal support outside of the government ministries for Caribbean SIDS could be anywhere north of $3 million USD for full service representation throughout the remainder of the INC process and that without adequate legal representation and understanding of the treaty process, countries will be "completely unarmed" in negotiations as they face countries with sufficient access to legal resources. Additionally, the study participants stated that a limited understanding of treaty obligations under negotiation could result in Caribbean SIDS not being able to contribute to the negotiation, thus creating a closed door.

When it came to building capacity in the areas of treaty negotiations and diplomacy, nearly 90% (n=7) of delegates interviewed stated that they received no formal negotiation training from their governments and instead learned the negotiation process from colleagues or by gaining experience and knowledge through attending negotiation meetings. Several delegates interviewed stated that courses in diplomatic relations and negotiation training were available at a regional university or abroad but required public servants to absorb the costs of the training as Caribbean government's lack the budget to support capacity building. Alternatively, one delegate indicated that Azerbaijan and South Korea have diplomatic academies where they offer free training to at least one delegate from a developing country. However, these are with their partner countries and it is unclear how many Caribbean SIDS have partnerships with either country.

3.3.2 Financial and Time Restraints

Similarly, study participants emphasized financial limitations as a challenge for Caribbean SIDS to attend the INC-1. Based on interview data, roughly, 90% (n=8) of Caribbean SIDS attending the OEWG-1 and the INC-1, received external funding from UNEP to support travel and participation. Interviewees noted that mobilizing funds from national treasuries within Caribbean governments to attend environmental meetings is difficult as either there are no funds available or the events are not prioritized within national budgets. As such, many Caribbean delegations are unable to attend meetings unless external funding is available to support at least one or two delegates from SIDS or Least Developed Countries (LDCs).

Due to the limitations in human capacity, time to prepare for the event was also a challenge faced by Caribbean delegates preparing for INC-1, with only 1-2 months to prepare in the midst of pre-existing responsibilities as stated by study participants. Such time challenges were in the form of conflicting schedules and limited personnel to assist in revising documents, preparing briefs and participating in preparatory meetings hosted by various organizations. Additionally, the timing of the OEWG-1 and the INC-1 was quickly organized and condensed, with the INC-1 being sandwiched between two major multilateral environmental agreement (MEA) meetings , COP 27 on climate change and COP 15 on biodiversity, with one participant stating that,

> "The environmental stock calendar for the year 2022 was insane with an influx of multilateral environmental agreement (MEA) meetings, which created a conflict in interests and obligations for Caribbean SIDS to attend. There's literally COP 15 happening in Canada, in a week and a half and this is just after COP 27 just finished in Egypt. So like, it's back to back to back. There are people that have conflicting interests right now."

3.3.3 Science Formulating National Positions

During the opening plenary session of INC-1, all UN Member states, UN regional groups, intergovernmental organizations, NGOs and UN specialized agencies were given the opportunity to deliver opening statements outlining their positions on the development of the global plastics treaty and elements they would like to see included. Based on meeting observations and statements published on UNEP's website, it was observed that only 4 Caribbean countries (Cuba, Dominican Republic, St. Lucia and Trinidad and Tobago) delivered national statements. Regional groups GRULAC and AOSIS, which Caribbean SIDS belong to, also delivered statements, in which all Caribbean SIDS in attendance of INC-1 aligned their positions too. Opening statements addressed the extent of the issue of plastic pollution facing the country and/or region and detailed priority areas needed for inclusion in the treaty. Collectively, all statements shared drew attention to the following key principles (further explained in the discussion) of environmental law that should govern the INC meetings and treaty outcomes:-

1) Polluter Pays Principle
2) Common but Differentiated Responsibilities
3) Just Economic transitions
4) Equity Principle
5) Precautionary Principle
6) Principle 12, Rio Declaration

Additionally, statements called for the proposed instrument to:-

1) Provide remediation pathways for existing pollution
2) Allow flexibility taking into account national circumstances and respective capabilities; and to prioritize additional, predictable and adequate financial resources
3) enable capacity building and technology development, access and transfer
4) facilitate financial support of at least two participants per delegation to reinforce participation

Each statement delivered on behalf of Caribbean SIDS by its associated member state or regional group addressed the broad impacts of plastics on the environment and economy. However, all statements lacked specified localized plastic pollution data to support impacts felt within each country. Based on study participant responses, the generalized scientific data guiding the formulation of statements and positions were obtained from within scientific departments of government ministries, NGOs or largely from UNEP prepared documents. Study participants noted that Caribbean SIDS lack adequate data on plastic pollution and would need to source and produce quantitative and qualitative data for levels of plastic produced, number of local producers

of plastics and volumes produced, plastic waste streams, waste management mechanisms and local authorities responsible for plastic production, imports and sales.

3.4 Stakeholder Engagement

Nationally, stakeholder engagement, specific to preparation for the INC-1 was conducted within 3 Caribbean. A regional workshop for Caribbean SIDS leading up to INC-1 was hosted by Antigua and Barbuda with St. Kitts and Nevis, Jamaica, Trinidad and Tobago, Martinique, Guyana and Barbados in attendance along with NGOs. Respondents noted that aside from stakeholder engagement between regional governments, more work must be done to liaise with national and regional stakeholders on the ground working in the arenas of waste picking, plastic manufacturing, garbage disposal, collection and recycling among others to gain insights into their experiences and challenges faced. This must be inclusive of various government ministries within Caribbean SIDS such as Trade and Industry, Customs, Marine and Environment, and Commerce among others. On the importance of stakeholder engagement, one respondent stated:-

> "I think that's the best way to really understand how we can approach the design of the instrument in a way that resolves those grassroots level issues and what our specific issues are. So I think more consultations with those various stakeholders that are involved in the plastics issue and people from the informal sector, CSOs (community service organizations), environmental organizations, those that do coastal cleanups, asking them, What's your data looking like? What's your challenges? What do you think might work best to prevent leakage into the marine environment, but also to prevent waste coming onshore as well."

During both meetings, UNEP hosted multi-stakeholder fora, bringing together key stakeholders to discuss their positions on the formulation of the global plastics treaty. One (1) NGO and 1 CSO from Caribbean SIDS were present at both meetings and its stakeholder forums, having attended independently of government orchestrated delegations. Regarding funding to attend, UNEP provided funds for the CSO representative while the NGO representative was funded by their organization. One stakeholder suggested that governments within Caribbean SIDS discount the value of local knowledge systems and its input in the negotiation process, typically ratifying environmental agreements without stakeholder and community engagement and buy-in to support treaty obligations.

3.5 Prioritization and Coordination of INCs among Caribbean SIDS

Throughout the interview process, the general perception among study participants was that, based on low attendance from Caribbean SIDS, the INC forum was not being prioritized among its governments or regional intergovernmental organizations such as CARICOM (The Caribbean Community). Active and strategic coordination led by CARICOM, was widely proposed by respondents as a solution to overcoming preparatory and participatory barriers associated with coordination for the INC negotiations among Caribbean SIDS. Study participants argued that based on CARICOM's leadership in the Biodiversity of areas Beyond National Jurisdiction Agreement (BBNJ) negotiations, advocating for regional interests and the special circumstances of Caribbean SIDS, and in other multilateral environmental agreements, it was a well poised entity

to lead strategic coordination for INC meetings for Caribbean SIDS. However, it was noted by study participants that CARICOM also faces challenges with human capacity and funding which may have resulted in its absence from the INC-1 as plastic pollution has not yet been made a regional priority. One participant stated that,

> "Political will is there among governments of Caribbean SIDS but it is not as appealing as climate change, thus requiring this be prioritized from CARICOM levels so that it maintains on the agenda and that there's interest and a desire to send delegates in the meeting to provide meaningful input when we're (Caribbean SIDS) preparing our (Caribbean SIDS) position papers."

One participant suggested that many Caribbean SIDS remain unaware of the INCs while another stated that lack of prioritization could be due to a number of factors such as limited resources or conflicting events.

4. Discussion and Recommendations

Contextual equity considers the circumstances of stakeholders, in this case, delegations from Caribbean SIDS, capacity to participate fairly in the decision making process for an ILBI to end plastic pollution. Based on data gathered from observations and interviews, it is evident that Caribbean SIDS face contextual inequities in their preparation and participation in the OEWG-1 and INC-1 as compared to developed countries, thus foreshadowing continued experiences for the remainder of the INC process. Contextual factors such as delegation size, human capacity, negotiation training and skills, data gathering and funding proved to be barriers to contextual equity which impedes on procedural and distributive equity for Caribbean SIDS participating in the INC process. Results of this study were used to develop a framework (Fig. 6) demonstrating barriers or factors impeding equity and key drivers needed to achieve the three dimensions of equity needed for the development of a global plastics treaty. Subsequently, this framework may be used to guide implementation of the global plastic treaty once ratified by Caribbean SIDS and will be explained further in the discussion.

4.1 Funding Mechanisms Needed to support Delegations from Caribbean SIDS

Caribbean SIDS typically lack resources needed to support large delegations to attend UN negotiations as costs involved with visas, transportation, accommodation, daily subsistence and other associated expenses can prove prohibitive (Hassanali, 2022; CIEL, 2022). Accessing funds to attend such meetings from public treasuries within Caribbean SIDS prove difficult as funds are either unavailable, not prioritized within national budgets or allocated to more pressing national needs such as food security, crime and economic growth and development. External voluntary funding mechanisms are accessible to developing states, to facilitate participation in environmental negotiation processes (Hassanali, 2022; CIEL, 2022).The opportunity for Caribbean SIDS to fundraise for plastic pollution related projects, including policy development and negotiation processes, can be limited due to their status as 'wealthy', based on their GDP being very high by reason of tourism revenue (Study Participant). However, this fails to take into account the high cost of living within the Caribbean region, leaving SIDS at a disadvantage from accessing funds from global organizations that refer to the Development Assistance Committee (DACS) list

generated by the Organisation for Economic Co-operation and Development (OECD) (Study Participant). The UNEP Secretariat offers funding support for at least two delegates from SIDS and LDCs to attend negotiations, a means utilized by Caribbean delegations attending OEWG-1 and INC-1. In this case, the funding source of the Secretariat is unclear, however, in some instances for different MEAs, funding mechanisms are often external and mainly garnered through the goodwill of UN Member States; international financial institutions, donor agencies, intergovernmental organizations, NGOs and other relevant individuals (Hassanali 2022). The provision of funding by UNEP for SIDS acknowledges the financial inequities that limit their participation and should continue to provide means of support for meeting attendance. However, additional funding is still required to support capacity building, stakeholder engagement and data gathering necessary for meeting preparation.

4.2 Capacity Building needed to support Delegations from Caribbean SIDS

Delegation sizes and diversity of skill sets have increased over the years for developed countries, such as G20 members, compared to developing countries participating in international environmental negotiations (Schroeder et al., 2012). This study illuminates low attendance and participation in the OEWG-1 and INC-1 by Caribbean SIDS and echoes the limitations in human capacity that hinder Caribbean SIDS ability to equitably prepare and participate in the global plastic treaty negotiations. Delegates from Caribbean SIDS are generally overwhelmed with administrative responsibilities that run parallel to their participation in negotiations as expressed by study participants. To overcome the issues of limited capacity and overextended personnel working within siloed governance structures within Caribbean SIDS, communication and cross training across various government ministries along with staff recruitment is needed to better equip delegates. Participation in the negotiation process is incumbent on understanding UN systems and its components for environmental decision making. The United Nations Institute for Training and Research (UNITAR) offers core diplomatic training (CDT) to diplomats to enhance effective performance within a multilateral environment (UNITAR, 2023). Cross collaboration between UNITAR, UNEP and governments within Caribbean SIDS may be undertaken to host regional CDT workshops to train delegates across various government ministries in the basics of the treaty development process. Certainly, this should extend to LDCs who may experience similarities in inequities of participating in the negotiation process. Capacity building in the field of law is also needed to build legal literacy among delegations from Caribbean SIDS.

As evidenced in the data, developed countries have access to vast legal resources which equips them with a more thorough understanding of the legal implications shaping the treaty and the obligations that may result from its formulation. Addressing the full life cycle of plastics and plastic pollution in the marine environment from an international environmental law perspective is extremely complex as it requires legal understanding of definitions and translations of proposed elements to be incorporated into the treaty. For example, terms such as circular economy, elimination and even plastic, which are proposed treaty elements will require a legal definition to understand what it means in the context of the plastic treaty and UN member state obligations (Study participant). To support developing countries in need of legal support specific to the global plastics treaty negotiations, the Plastics Treaty Legal Advisory Service (PTLAS) was created to provide free legal support to developing countries and civil society organizations to ensure that all actors, particularly those most affected by plastic pollution, can fully participate in and influence

the negotiating process (PTLAS, 2023). PTLAS composes a global network of lawyers from law firms and universities, providing briefings on important and strategic issues arising during negotiations; legal interpretation and implications of proposals and draft treaty text; and guidance on treaty law, international environmental law and trade law within a 24-hour time frame (PTLAS, 2023). The service however, does not provide advice on negotiation strategy or policy matters, increasing the need for intentional capacity building in this area for Caribbean SIDS. The authors of this paper have no affiliation with the PTLAS organization and argue that such a resource may prove beneficial to Caribbean SIDS in light of both legal needs and budgetary constraints to support external legal counsel.

4.3 Procedural Equity Requires Stakeholder Engagement

Actualizing the ambitious goal to end plastic pollution must ensure that negotiations provide meaningful pathways for engagement, as success depends on stakeholders' full and active participation (CIEL, 2022). This is reliant on procedural equity being achieved throughout the entirety of the negotiation process to ensure that diverse interests and values of marginalized voices and key stakeholders be represented and defended (Friedman et al., 2020). UNEA 5/14 recognized the need for stakeholder engagement by encouraging action among all stakeholders via a multi-stakeholder forum open to all stakeholders to exchange information and activities related to plastic pollution (UNEA 5/14). Both OEWG-1 and INC-1 hosted multi-stakeholder dialogues, engaging the voices of stakeholders who would be impacted by the ILBI on plastic pollution and who ordinarily would not be directly involved in negotiations (UNEP, 2022). It provided a space to discuss solutions and innovations across the plastics lifecycle among representatives from the informal waste picking sector, Indigenous People and local communities, research institutions, private sector, inter alia (UNEP, 2022; CIEL; 2022). However, this was not without its challenges as stakeholders lodged complaints regarding the separation of stakeholder engagement from the INC-1 negotiations. There was also outcry over a powerful lobby from within the plastic industry, which created the impression of a perceived co-option of the INC stakeholder engagement forum (Author's Meeting Observations). Based on interview data, current stakeholder engagement activities occurring within 3 Caribbean SIDS up to the time of writing, have been between government ministries and local plastic producers or businesses who may be impacted by the future treaty. Though a great first step, efforts must expand to include varying actors at the grassroots level, including waste pickers, indigenous communities, NGOs, CSOs, academia and the general public who are major consumers of plastic products. Meaningful engagement and participation by stakeholder groups is crucial to gaining localized perspectives, technical knowledge and guidance on the social impacts of the intended global plastics treaty, while also empowering them to become legitimately involved in the decision making process (Zuercher et al., 2022; CIEL, 2022). Though stakeholders are not actively negotiating, as observers are not permitted to engage in negotiations, as this role is withheld for member State delegates, their voices contribute to the development of negotiating positions and can support the successful implementation of the treaty (Sterling et al., 2017). Therefore, it is imperative that Caribbean SIDS among other UN member States, iteratively engage stakeholders during the intersessional periods of the INCs. However, guidance on effective and meaningful stakeholder engagement may be required for some member states such as SIDS. As such, capacity building mechanisms in the form of social science training that expands on stakeholder analysis, social and community engagement strategies, active listening practices, cultural sensitivity and qualitative data analysis is required.

Coordinating training in the aforementioned arena could be offered by UNEP, but it will still require that UN member states facilitate in-house training within government departments, ministries or agencies to ensure sound stakeholder engagement is achieved. This level of engagement creates a pathway for negotiations to utilize robust indigenous, traditional and community expertise needed to support the science-policy interface within the treaty making process (Polejack, 2021; CIEL, 2022)

4.4 Localized Scientific Data Gathering Needed to Shape Caribbean SIDS Positions in Negotiations

Caribbean SIDS and their associated groups such as AOSIS and GRULAC have petitioned for the precautionary principle to guide the ILBI to end plastic pollution. This principle suggests that the presence of threats with grave or irreversible damage that lack scientific certainty should not be used as an excuse to disregard the prevention of environmental degradation (Gollier and Treich, 2012). Though, the impacts of plastic pollution on SIDS have been partially documented and provide substantive reasons for urgent action through the development of a global plastics treaty, Caribbean SIDS require specific quantitative and qualitative data demonstrating the severe and inequitable environmental, economic and health impacts of plastic pollution to bolster their negotiating positions throughout the INC process (Lachman et al., 2017; Ambrose et al, 2019; Diez et al., 2019; Ambrose, 2021).

Caribbean SIDS are calling for equity in the distribution of cost, benefits and risks associated with the treaty outcomes via the polluter pays principle and common but differentiated responsibilities. Both assume that the polluter should be held responsible for costs associated with environmental damages caused and that responsibilities for mitigating the issue should vary based on each country's capacity and contributions to the problem (Heyward, 2007; Szynkowska and Pawlaczyk, 2014). Transboundary marine plastic debris, originating from as far as the west coast of Africa and other locations, have been documented on beaches within Caribbean SIDS (Ambrose et al., 2019; Ambrose, 2021). However, Caribbean SIDS lack robust harmonized data documenting plastic concentrations and its transboundary sources to support which polluter, in this case country, should be responsible for paying for mitigation and remediation (Ambrose et al., 2019, Ambrose et al., 2021).

Building scientific capacity for plastic pollution data collection in all forms can shape negotiation positions by utilizing scientific data that reflects the needs of Caribbean SIDS and the region at large. This is a critical step for policy development and measuring the effectiveness of policy interventions and will be crucial in establishing effective national implementation plans to support the implementation of the treaty obligations domestically (Ambrose, 2021). Scientific research on the issue of marine plastic pollution in Caribbean SIDS is predominately executed by foreign scientists or organizations using varying data collection methods (Ambrose, 2021; Stofen-O'Brien et al., 2022). This creates non-viable, incomparable and oftentimes exclusive data sets that are not entirely helpful in strengthening the science-policy interface for Caribbean governments (Ambrose, 2021; Stofen-O'Brien et al., 2022). Scientific capacity building must include localized and/or regional data gathering in the areas of chemical composition of plastics; environmental and health impacts; marine debris and microplastics monitoring, inclusive of brand audits and the identification of transboundary waste and national and regional plastic production and disposal. The collection and possession of this kind of data is necessary to help fill the global governance

gap which lacks accountability for the global mismanagement and transboundary nature of plastic production which leads to plastic pollution (Graff, 2018).

4.5 INCs Prioritization and Coordination needed for Caribbean SIDS

While access to adequate funding and capacity building is intended to promote equity of Caribbean SIDS among their global counterparts, it may prove ineffective if governments within Caribbean SIDS fail to prioritize or see no value or benefits that may result from participating in the INCs (Sparks and Silva, 2019; Osterblom et al., 2020; Campbell et al., 2022). Throughout the interview process, the general perception among study participants was that, based on low attendance from Caribbean SIDS, the INC forum was not being prioritized among its governments or regional intergovernmental organizations like CARICOM. However, one participant did note that political will for this issue is present among governments within Caribbean SIDS, even though the INCs have not been made a regional priority up to the time of writing. The term 'political will' within itself, brims with ambiguity and imprecision (Post et al., 2010).. The 'political will' of Caribbean SIDS related to prioritization of participation in the development of the global plastics treaty must be assessed as up to the time of writing the issue of plastic pollution was prioritized among its governments, however it was unclear if the INC process was made a priortiy.

During the 44th Regular Meeting of The Heads of Government of CARICOM, hosted in Nassau, The Bahamas February 15-17, 2023, urgent areas of priority discussed were healthcare, crime, food and energy security (The Tribune, 2023). However, the two main items on the agenda were climate change and the political, economic and social turmoil occurring in Haiti, at that time (The Tribune, 2023). Indeed climate change and its adaptation and mitigation responses has long been prioritized by Caribbean SIDS. However, with a view to elevating the importance of INC participation, connections between climate change and plastic pollution must not be ignored. Climate change and plastic pollution are often viewed as separate competing issues but in essence they are fundamentally linked as plastic contributes to greenhouse gas emissions throughout its lifecycle and conversely extreme weather events associated with climate change drive plastic pollution into the natural environment (Ambrose et. al, 2019; Ambrose, 2021; Ford et al., 2022). For example, the aftermath of Hurricane Dorian, the most powerful storm on record to hit The Bahamas and the second strongest hurricane ever recorded in the Atlantic Ocean, left behind 1.5 million pounds of debris, inclusive of plastic in one township on the island of Abaco, The Bahamas (DTN, 2019; The Tribune, 2019). This does not account for transboundary plastic debris that high speed, excessive winds drive on to coastlines within Caribbean SIDS following extreme weather events or landfill failures due to waste mismanagement (Ambrose et al., 2019; Ambrose, 2021).

It must be noted that localized action in the form of plastic bag and/or single use plastic bans and policies have been implemented in a majority of Caribbean SIDS, further signifying a level of importance and priority for the issue itself (UNEP-CEP, 2019; Clayton et al., 2020). However, regarding priority of the INC forum, Caribbean SIDS were likely hindered by the short timeline of the OEWG-1 and the INC-1 coming together so quickly following Resolution 5/14. Additionally, the economic hardships facing the region due to the COVID-19 pandemic and the condensed environmental meeting calendar for quarter four of 2022 where priority for COP 27 took precedence were also factors. The amalgamation of these factors continue to point to the fact that increased funding and human capacity is needed for Caribbean SIDS to participate in MEAs.

Similarly, as noted by study participants, CARICOM also faces challenges with human capacity and funding, which may have resulted in its absence from OEWG-1 and INC-1. To curb speculation on the matter regarding CARICOM's perceived lack of engagement in the INCs, intentional dialogue must be pursued with representatives of CARICOM to understand their approach to preparing member states for participation in other MEAs similar to the INCs for plastics and to identify how equity may be achieved by Caribbean SIDS. Current coordination mechanisms that support Caribbean SIDS in their preparation for INC meetings include AOSIS, International Union for Conservation of Nature (IUCN), and GRULAC, who hosted virtual coordination activities, along with UNEP, who hosted general virtual preparatory meetings for all UN member states and meeting participants. This included technical briefings whereby meeting participants were informed of the provisional agenda and flow of the meeting and were able to ask questions and gain clarity on processes and procedures of the negotiations (UNEP, 2022).

The plastic treaty negotiations also has an in-house coordination mechanism known as the Bureau. The Bureau of the INC is composed of representatives from each UN regional group and is responsible for providing guidance to the Secretariat in organizing the meetings of the INC (UNEP, 2023). Historically, SIDS lacked a seat within the Bureau. However, to maintain an equitable stake in the negotiation process, the need for a SIDS representative on the Bureau was requested by AOSIS during the OEWG-1 plenary session (Author's observation notes; AOSIS OEWG-1 plenary statement, 2022). Many SIDS lack representation within UNEP headquarters in Nairobi and other offices in Geneva, where relevant information specific to the INCs are developed and disseminated. To ensure pertinent information regarding the INCs were received by SIDS, and in the interest of increasing transparency, the INC Bureau saw it fit to have a dedicated SIDS representative. Antigua and Barbuda was selected as the Bureau representative for SIDS. This level of representation may present opportunities for Caribbean SIDS to highlight challenges faced in their participation and preparation for the INCs and may lend room to specified intervention by UNEP to address such challenges.

5. Conclusion

5.1 Framework for Key Drivers Needed for Achieving Contextual Equity in Preparation, Participation and Future Implementation of a Global Plastics Treaty for Caribbean SIDS

For Caribbean SIDS to effectively petition for beneficial outcomes during the negotiations, priority must be given to contextual equity and its role as the gateway to Caribbean SIDS achieving distributive equity outcomes from the treaty which address equitable distribution of the costs, risks and benefits of the global plastics treaty obligations. This study yields a framework (Fig. 6) highlighting five major factors impeding contextual equity as experienced by Caribbean SIDS in their preparation and participation for the INC-1 and details the key drivers needed to support the dimensions of distributive and procedural equity discussed in this paper, for the remainder of the INC process.

Contextual factors which constrain the achievement of equitable participation in the INC negotiation process by Caribbean SIDS include a lack of prioritization of the INC forum by governments within Caribbean SIDS and intergovernmental organizations representing them. Inadequate funding to support the necessary needs and activities associated with preparation and participation in the INCs is also a notable challenge. Additionally, limited capacity in the form of adequate staff and training for delegates, among others, and limited stakeholder engagement

activities were also identified as barriers. Lastly, the absence of diverse and robust localized scientific data on plastics to aid in shaping national positions was lacking. Conversely, the aforementioned contextual constraints also serve as enabling factors for achieving equity once the appropriate drivers are applied.

Prioritization of the INC forum by governments within Caribbean SIDS must be driven by clearly defined "political will", via political capital which influences decision making, goal setting, time, resources and funding allocations needed from governments. Funding to support attaining equity must be driven by financing mechanisms and resources necessary to support preparation for and participation in negotiations for Caribbean SIDS. Currently, funding is available through UNEP but more diversified means of financing to support Caribbean SIDS and other member states in need of support must be pursued by its governments and UNEP. Increasing diplomatic, negotiation, legal and scientific training and staff recruitment are key drivers to building capacity among delegations within Caribbean SIDS. The inclusion of key stakeholder perspectives is needed to drive stakeholder engagement which contributes to the development of negotiating positions for Caribbean SIDS. Lastly, localized and regional scientific data on plastics environmental impact, plastic production within Caribbean SIDS, chemical analyses of plastics, plastic waste streams and social science data on attitudes and perceptions on the implementation of a global plastics treaty in Caribbean SIDS, inter alia, are needed to drive the development and shaping of the global plastics treaty.

The prioritization of contextual equity allows access to fulfilling procedural equity, which requires sufficient capacity building to pursue stakeholder engagement and social science research needed to support the involvement of all stakeholders and marginalized groups and their right to participate in the decision making process (McDermott et al., 2013; Law et al., 2017). Through the achievement of contextual and procedural equity, this provides Caribbean SIDS a fair and robust opportunity to petition their wants and needs for the equitable distribution of costs, risks and benefits associated with the outcome of the global plastics treaty, thus fulfilling distributive equity (Haas et al., 2019). Possessing contextual needs in the form of finances and human capacity, paired with experience and expertise in environmental decision making, can develop confidence in a member state's ability to participate in the process and can inform their success (Haas et al., 2019; Ruoso and Plant, 2021).

The framework (Fig. 6) developed through this research argues that the drivers necessary for achieving contextual, procedural and distributive equity are interlinked and can result in equitable preparation and participation in the INC process by Caribbean SIDS. It also speaks to challenges Caribbean SIDS may face for the implementation of a global plastics treaty as challenges outlined in their ability to equitably participate in the treaty negotiations also mirror their ability to implement a treaty of this scale (Ambrose, 2021). Though the obligations of the global plastics treaty have yet to be decided upon, this study perceives that for Caribbean SIDS, implementation and compliance of the treaty will require political will, financing mechanisms, capacity building, scientific research and an iterative stakeholder engagement process. Such drivers are necessary for ratification of the future treaty; funding to support its implementation and capacity building opportunities that support compliance; stakeholder and public engagement to promote awareness of the treaty and its implications for business and the general public; and scientific data to measure the effectiveness of the treaty overtime (Ambrose, 2021). Once drivers for attaining contextual

factors are applied and met, political and public acceptance of the treaty may be promoted, thus bolstering the success of the intended ILBI to end plastic pollution.

Data Availability Statement
The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics
Ethics approval to conduct this study involving human participants was approved by the World Maritime University's Ethics Committee. Participant consent was sought and obtained from each individual, who was also given the opportunity to decline or withdraw from the study at any stage. Participants will remain anonymous throughout the study.

CRediT authorship contribution statement
Kristal K. Ambrose: Conceptualization, Data Collection, Data Analysis, Writing – original draft, final draft.

Conflict of interest
The author declares 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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Figure Titles

Tables

Table 1. Semi-structured interview study participants

Role	No. Individuals
Delegate	8
Lawyers and Policy Advisors	3
NGO's	2
Regional Group Coordinator	1

Table 2. Word frequency analysis of challenges faced by delegations from Caribbean SIDS

Challenges faced by Caribbean Delegations	Frequency (n=12)
Small, delegation, one, two, delegate, size	74
Financial, finance, financing, funds, fundraising	23
Human, limited, capacity	22
Technical, expertise, knowledge	12
Time	5
Coordination	3
Equity	2

Table 3. Word Frequency Analysis of participant perceptions of equity

Perceptions of Equity	Frequency (n=12)
Equal/Equally/Equality	10
Fair/Fairness	7
Access	6
Needs	6
Participation	5
Just	5
Different	5
Ability	4
Power	2
Privilege	2
Opportunities	2

PAPER 5

Ambrose, K.K. (2023). The Caribbean Community (CARICOM) as the Coordination Mechanism For Caribbean Small Island Developing States Participating in The Global Plastics Treaty Negotiations? (Accepted). Ocean Yearbook

The Caribbean Community (CARICOM) as the Coordination Mechanism For Caribbean Small Island Developing States Participating in The Global Plastics Treaty Negotiations?

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Abstract

The specific processes involved in The Caribbean Community's (CARICOM) role as a coordination mechanism for its member states, composed of Caribbean Small Island Developing States (SIDS), participating in multilateral environmental agreement (MEA) negotiations are sparsely documented within academic literature. CARICOM member states have increasingly suffered from the transboundary movement and deposition of plastic litter on their coastlines. The Intergovernmental Negotiating Committee (INC) convened in November 2022 to develop an international legally binding instrument to manage plastic pollution, including in the marine environment. Known as the global plastics treaty, Caribbean SIDS face inequities in their ability to adequately prepare and participate in this negotiation forum. CARICOMs history of addressing environmental issues, notably through its participation in MEAs, has positioned CARICOM as a significant negotiating bloc in MEAs. This study classifies CARICOMs systematic coordination processes for preparing its member states for MEA negotiations and assesses opportunities, challenges and limitations for CARICOM to serve as the coordination mechanism for preparing its member states for the ongoing global plastics treaty negotiations.

Keywords: CARICOM, Caribbean Small Island Developing States, Global Plastics Treaty, Coordination, Intergovernmental Negotiating Meetings

Introduction

The Caribbean Community (CARICOM), comprises 15 Caribbean Small Island Developing States (SIDS) as member states[1] (Fig. 1). CARICOM is an institution devoted to integration in the Caribbean region and is founded on the pillars of economic integration; foreign policy coordination; human and social development and security.[2] This intergovernmental organization has a long track record with respect to regional cooperation, coordination and integration on a range of challenges. In particular, CARICOM has addressed environmental issues, notably through its participation in multilateral environmental agreement meetings (MEAs), a role that has helped to make CARICOM a significant negotiating bloc in MEAs.[3] Having been involved in international negotiations within the World Trade Organization (WTO), the Commonwealth, the United Nation Conference on Trade and Development (UNCTAD), and the UN Conference on the Laws of the Sea, inter alia, CARICOM is no stranger to negotiating bloc formation as in the past they have combined their resources by negotiating as one bloc either with larger countries, various blocs and organizations in the region.[4]

Within the academic discourse, there is a limited understanding and illustration of how CARICOM functions as a coordination mechanism for its member states participating in MEAs, specifically

[1] Chakalall, Bisessar et al. "Current issues in fisheries governance in the Caribbean Community (CARICOM)." Marine Policy 22, no. 1 (1998): 29-44.; O'Brien, Derek. "CARICOM: Regional Integration in a post-colonial world." European Law Journal 17, no. 5 (2011): 630-648.; Hassanali, Kahlil. "CARICOM and the blue economy–Multiple understandings and their implications for global engagement." Marine policy 120 (2020): 104137.
[2] See n. 1 above; CARICOM. "Who Are We." accessed August 1 2023, available online <https://caricom.org/our-community/who-we-are/>.
[3] See n. 1 above; Hassanali, Kahlil. "Participating in Negotiation of a New Ocean Treaty under the Law of the Sea Convention–Experiences of and Lessons From a Group of Small-Island Developing States." Frontiers in Marine Science 9 (2022): 902747.
[4] Byron, Jessica. "CARICOM in the post-cold war era: regional solutions or continued regional contradictions?." ISS Working Paper Series/General Series 178 (1994):1-26.; Schiff, Maurice. "Small states, micro states, and their international negotiation and migration." Journal of economic integration (2014): 430-449.

the process of achieving priority for an environmental issue among its member states and further analyzing the steps and measures involved in preparing its member states for MEA negotiations. One scholar[5] discusses some of the experiences and challenges faced by CARICOM, in the negotiation of the Biodiversity of Areas Beyond National Jurisdiction Agreement (BBNJ). However, details regarding the processes required prior to states participating in the negotiations were not examined. This work aims to illustrate the systematic processes involved with preparing CARICOM member states for MEA negotiations and will assess how CARICOM may serve as the coordination mechanism for preparing its member states for the current global plastics treaty negotiations.

CARICOM and the Need to Address Plastic Pollution

CARICOM member states experience commonalities in their reliance on the marine environment as a cultural, social and economic resource.[6] In recent years, the emergent threat of plastic pollution to CARICOM member states have increasingly suffered from the transboundary movement and deposition of plastic litter on their coastlines.[7] Such concentrations of plastic pollution received far outstrip the production and consumption rates of plastic among Caribbean SIDS.[8] Excessive loads of plastic pollution produced and received by Caribbean SIDS can prove detrimental to its ocean

[5] See n.3 above.
[6] Diez Sylvia, et al. "Marine pollution in the Caribbean: not a minute to waste." (2019). World Bank Group.; See n. 1 above.
[7] See n. 6 above.; Ambrose, Kristal K et al. "Spatial trends and drivers of marine debris accumulation on shorelines in South Eleuthera, The Bahamas using citizen science." Marine pollution bulletin 142 (2019): 145-154.; Ambrose, Kristal K. "Coordination and harmonization of a marine plastic debris monitoring program for beaches in the Wider Caribbean Region: Identifying strategic pathways forward." Marine Pollution Bulletin 171 (2021): 112767.; Ambrose, Kristal K., and Tony. R. Walker. "Identifying opportunities for harmonized microplastics and mesoplastics monitoring for Caribbean Small Island Developing States using a spatiotemporal assessment of beaches in South Eleuthera, The Bahamas." Marine Pollution Bulletin 193 (2023): 115140.
[8] Lachmann, Florina et al. "Marine plastic litter on small island developing states (SIDS): impacts and measures." (2017).; See n.7 above.

dependent industries such as tourism and fisheries which serve as primary economic drivers of their gross domestic product (GDP).[9]

To address this pressing environmental concern, the St. John's Declaration of CARICOM was established and adopted during the 40th session of the CARICOM Heads of Government (HOG) meeting hosted in July 2019, addressing increasing levels of plastic pollution in the Caribbean Sea and its negative impacts on sustainable development for the region.[10] The declaration established plastic pollution as an area of priority among its member states, further highlighting the need for the reduction and/or elimination of single use plastics and similar packaging materials. Additionally, the declaration included a commitment to address ecosystem damage caused by plastic pollution and recognized the need for effective policy, legislative and regulatory frameworks at the global, regional, national and local levels.[11]

Moreover, at the global level, during the 5th session of the United Nations Environment Assembly (UNEA)(UNEA 5.2), in March 2022, Resolution 5/14 End Plastic Pollution: Towards an international legally binding instrument (ILBI) (UNEA 5/14) was adopted by United Nations (UN) member states.[12] One hundred and seventy-five UN member states adopted the resolution, proposing that an Intergovernmental Negotiating Committee (INC) be convened to develop the text

[9] See n. 6 above; See n. 7 above.
[10] CARICOM Heads adopt St. Johns Declaration to address plastic pollution in Caribbean Sea, adopted on 6 July 2019, available online https://caribbeantradelaw.com/2019/07/06/caricom-heads-adopt-st-johns-declaration-to-address-plastic-pollution-in-caribbean-sea/; Fortieth Regular Meeting of the Conference of Heads of Government of the Caribbean Community (CARICOM), adopted 3-5 July 2019, available online <https://caricom.org/wp-content/uploads/DECISIONS-40-HGC-JUL-2019.pdf>
[11] See n.10 above.
[12] Walker, Tony R. "Calling for a decision to launch negotiations on a new global agreement on plastic pollution at UNEA5. 2." Marine Pollution Bulletin 176 (2022): 113447-113447.; Stöfen-O'Brien, Aleke. "The Prospects of an International Treaty on Plastic Pollution." The International Journal of Marine and Coastal Law 37, no. 4 (2022): 727-740.

of an ILBI on plastic pollution, including in the marine environment.[13] Unofficially titled the "global plastics treaty", the ILBI intends to inclusively address the full life cycle of plastic from production to disposal through five INC sessions aimed to build the specifics of the treaty between 2022-2024[14]

The first INC (INC-1) commenced on November 28, 2022 in Punta del Este, Uruguay, where UN member states and stakeholders convened to discuss key features of the impending ILBI such as its potential scope, objectives and broad options for the structure of the new agreement (UNEP/PP/INC.1/14, 2023). Caribbean SIDS were welcomed to access the INC-1 negotiating forum, along with other UN member states, to have their positions heard. However, a recent study[15] noted that despite their public pronouncements regarding addressing plastic pollution, attendance during the INC-1 was relatively low for CARICOM member states with less than 50% of them attending. Based on interview data with Caribbean delegates attending INC-1, the aforementioned study[16] concluded that Caribbean SIDS face inequities compared to developed countries, in their ability to participate in MEAs such as the global plastics treaty negotiations. This was attributed to small delegation sizes, along with limitations in negotiation training skills, as well as adequate localized scientific data to support negotiating positions and funding to support their participation.[17] Such inequities can be characterized as contextual equity, whereby equity in access to the decision-

[13] See n. 12 above.
[14] Resolution 5/14 End plastic pollution: Towards an international legally binding instrument. Resolution, adopted 2 March 2022, available online <https://wedocs.unep.org/bitstream/handle/20.500.11822/39812/OEWG_PP_1_INF_1_UNEA%20resolution.pdf>
[15] Ambrose, K.K and Kahlil, Hassanali. "Assessing and Addressing Equity: A framework for Key Drivers Needed by Caribbean SIDS to Achieve Equity in Preparation and Participation in the Global Plastics Treaty Negotiations". World Maritime University (2023) (In review).
[16] See n. 15 above.
[17] See n.15 above.

making process is impeded by pre-existing imbalances such as the aforementioned experiences faced by Caribbean SIDS, further creating an unleveled playing field for participants.[18]

Caribbean delegates interviewed within said study[19], perceived that low attendance by Caribbean member states during the INC-1 was in part to the forum not being prioritized by CARICOM, which would promote increased participation by its member states.[20] Though CARICOM is not the only regional integration body, as equivalent organizations such as the Central American Integration System (SICA), Organization of Eastern Caribbean States (OECS) and the Association of Caribbean States (ACS) exist to support intergovernmental arrangements for integration and functional cooperation, this study will focus on CARICOM based on their current involvement and coordination in various environmental treaty negotiations. The preceding study[21] makes reference to CARICOMs role as the coordination mechanism for MEAs such as BBNJ, the 27th United Nations Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) (COP27), and the 15th Conference of the Parties United Nations Convention on Biological Diversity (UNCBD) (COP15). Here, Caribbean delegates interviewed suggested that based on these experiences, CARICOM may be a well poised entity to orchestrate coordination for the INCs for its member states. Said study[22] further found that political will is present among CARICOM governments concerning plastic pollution and the INCs. However it was suggested that this issue was potentially not considered to be as urgent a concern as climate change MEA

[18] Martin, Adrian et al. "Whose environmental justice? Exploring local and global perspectives in a payments for ecosystem services scheme in Rwanda." Geoforum 54 (2014): 167-177.; Law, Elizabeth A. et al. "Equity trade-offs in conservation decision making." Conservation Biology 32, no. 2 (2018): 294-303.; See n.15 above.
[19] See n. 15 above.
[20] See n. 15 above.
[21] See n. 15 above.
[22] See n. 15 above.

forums.[23]. This, in turn, indicates that if CARICOM member states are to play a substantive role in the negotiation of a global plastic treaty, there is a corresponding and urgent need for the INCs to be prioritized from CARICOM levels as an agenda item to promote increased attendance and unified negotiating positions during the INCs.[24]

This paper builds on the aforementioned study[25] and aims to a) determine the state of prioritization of the INCs within CARICOM and its member states b) understand how political will for environmental issues are translated to priority agenda items among CARICOM member states and c) assess CARICOMs preparation and participation in MEAs using a framework[26] to understand its implications for the INC process for Caribbean SIDS.

Methods

Data Collection

Based on the aforementioned study's findings,[27] specifically suggesting the lack of priority of the INC forum by CARICOM, up to the time of writing, a semi-structured interview was conducted with the CARICOM Secretariat to understand CARICOMs approach to and challenges with preparation of its member states in MEAs. This work excluded interviews with CARICOM member states and other regional organizations considering a) CARICOMs participation in multiple MEA forums, b) its role as the primary coordination mechanism for its member states participating in MEAs and c) its positioning as an important negotiation bloc in MEAs.[28] The Secretariat, also

[23] See n. 15 above.
[24] See n. 15 above.
[25] See n. 15 above.
[26] See n.15 above
[27] See n. 15 above.
[28] See n. 3 above.

referred to as study participant, was asked questions related to a) challenges faced in coordination; b) achieving priority among member states, funding, MEA preparation and c) participation, capacity building, stakeholder engagement, science and crafting negotiating positions.

Data Analysis

Following a modified social science methodology[29] the interview was transcribed using the Otter.ai software. Nvivo 13, a qualitative data analysis software, was used to analyze interview transcripts and a three step process was used to identify codes, subcodes (categories) and themes. Codes, a unit of analysis by way of labelling, summarized key aspects from each interview question and were derived from the focal points of challenges, prioritization and capacity building among others. From here subcodes, more specific categories of the codes, were created, before themes, relevant connections to the research question, were extracted.[30]

Framework for Key Drivers Needed for Achieving Equity in Preparation, Participation and Future Implementation of a Global Plastics Treaty for Caribbean SIDS[31]

The INC negotiating process offers conflicting positions on equity regarding participation. On one hand, the UN promotes equal access to the negotiating forum by all its member states.[32] However, on the other hand, Caribbean SIDS face inequities in their ability to adequately prepare and participate in the INC negotiation forum. The aforementioned study[33] yielded a framework (Fig. 2) highlighting five major factors impeding equity as experienced by Caribbean SIDS in their

[29] Ison, Sierra et al. "Stakeholder influence and relationships inform engagement strategies in marine conservation." Ecosystems and People 17, no. 1 (2021): 320-341.
[30] LeBlanc, Patrice R. "A practical approach to qualitative interviews." The Qualitative Report 15, no. 6 (2010): 1621-1623.
[31] See n. 15 above.
[32] See n. 15 above.
[33] See n.15 above.

preparation and participation for the INC-1 and details the key drivers needed to achieve the core dimensions of equity for the remainder of the INC process. The five factors include prioritization, funding, capacity building, stakeholder engagement and scientific research. Using interview data, this study will assess CARICOMs application of the key drivers to preparation and participation in negotiating processes. This will assist in determining their capabilities for serving as the coordination mechanism for their member states for the INCs.

Results

The results presented here are based on interview data garnered from the CARICOM Secretariat. It is laid out in 6 sections based on the topical area of the interview questions and its association to CARICOMs role as a coordination mechanism for its member states. Starting with the first section the role and responsibilities of the CARICOM Secretariat are clearly outlined. The second section evaluates the prioritization and coordination of the INCs by CARICOM and its member states and documents challenges faced in participating in the INCs. The third section details a framework analysis of MEA negotiations preparation and participation done by CARICOM using the aforementioned framework[34] and is further divided into subsections based on factors of the framework which include :-Achieving Prioritization and Political Will for MEA negotiations among CARICOM Member States; Funding to support Participation in MEA Negotiations; Capacity Building and Stakeholder Engagement; and Scientific Research as the basis to Formulating Negotiating Positions.

CARICOM Secretariat

[34] See n. 15 above.

The CARICOM Secretariat serves as a support and coordination mechanism for its member states to improve the quality of life of its people and communities and promote the development of innovative and productive societies in partnership with institutions and groups working toward a people-centered, sustainable and internationally competitive community.[35] According to the study participant, the Secretariat primarily serves in an administrative role and has the duty of convening, coordinating, facilitating and supporting the decision-making arms of its community. This includes Ministerial Councils, the Community of Ambassadors and HOG.

The study participant was asked to define the role, responsibilities and composition of the Secretariat. They further noted that the Secretariat comprises two (2) individuals who cover various aspects of the organization's mandate, including all environmental and ocean issues such as climate change, disaster management, natural resources, water resources, biodiversity, plastics and pollution. Such responsibilities include serving simultaneously as Project Officers for Sustainable Development, Natural Resources and Environment; Director of Economic Integration and Innovation and newly developed projects and programmes.

With at least seven environmental thematic areas shared between two persons, each area is implemented through a dedicated process in the form of meetings or negotiations, with the study participant further stating that,

> "This creates challenges regarding human capacity as the work obligations may outweigh the labour force. In some instances, the Secretariat may hire technical consultants and

[35] See n. 2 above.

project coordinators to support ongoing projects and initiatives, however, this is based on available funding."

Prioritization and Coordination of the INCs and Challenges Faced

When asked about CARICOMs awareness and prioritization of the INCs, the study participant stated that,

> "The space or the capacity to deal with and fully coordinate does not preclude or indicate that it's not a priority. It is hard to say that it (INC-1) wasn't prioritized but it is an issue of priority based on things like the St. John's declaration. We (CARICOM Secretariat) were aware of the INC-1 but with limited political machinery, I don't think we (CARICOM Secretariat) ever had a council agenda item on it. So if we didn't have a decision on it, particularly with the date of the meeting sneaking up on us as we (CARICOM Secretariat and member states) were deep in climate change (COP27), BBNJ and COP 15 negotiations, there was no way to even think about going to INC-1, even INC-2 in May, 2023, I don't see how we are going to be able to attend that one (INC-2) either."

The study participant noted that there is an appetite for some level of coordination as some member states informally engaged with the Secretariat to propose that a coordination mechanism for the INCs be established by CARICOM. However, it was further stated that there is not always a one to one equivalency of prioritization, coordination and participation for the INCs due to challenges faced by the Secretariat.

Regarding challenges faced by the Secretariat in coordinating participation in the INCs among CARICOM member states, the study participant noted that scheduling time for the forum proved

to be a major hindrance in the face of an overwhelming environmental meeting calendar for 2022, stating:

> "It is hard now to find space on the calendar to do a lot else. So we had already decided for plastics INC that we can't even look at that until BBNJ was finished and that went on longer than anticipated but we had already agreed that we wouldn't be able to turn our attentions to the plastic INC while juggling COP 15, COP 27 and BBNJ. So now it's going to be a quick pivot to see how we can support countries with the plastics INCS. It's not going to be easy."

Additionally, the study participant noted that both human and financial capacity were a big challenge in terms of coordination and participation in the INC, further limiting full engagement in the meetings by CARICOM and its member states.

Framework Analysis for MEA Negotiation Preparation and Participation

Achieving Prioritization and Political Will for MEA negotiations among CARICOM Member States

Within recent years, the CARICOM HOG agreed to prioritize climate change as an area of immediate action leading to its inclusion on every agenda item for HOG (Study participant). The prioritization of climate change and its associated MEA meeting COP 27 (held in Sharm El-Sheikh, Egypt in November, 2022) by CARICOM HOG, was reflected in the attendance of CARICOM member states present during COP 27. Based on the timeline of COP 27 and INC-1 occurring

successively, this study only analyzed attendance for COP 27, hosted in November 2022. It is acknowledged that attendance for the climate COPs, beginning with the first meeting held in 1995, could have possibly began with low attendance by CARICOM member states before experiencing a notable increase. Though a valuable consideration, this study is framed around the active participation of the COP 27 MEA and its prioritization by CARICOM HOGs. Data gathered from UNFCCC and United Nations Environment Program (UNEP) List of Participants data for COP 27 and INC-1 was examined to assess in person attendance by CARICOM member states. As compared to INC-1, the average delegation size for CARICOM member states attending COP 27 was 19 delegates, with the largest delegation being The Bahamas with 57 delegates[36] (Fig. 3). Conversely, the average delegation size for Caribbean member states attending INC-1 was roughly 1 delegate with Antigua and Barbuda having the largest delegation composed of 6 delegates[37] (Fig. 3).

For an issue of importance to be prioritized as an agenda item for CARICOM HOG, it must be translated to a mandate that is supported by unified political will on behalf of the HOG (Fig. 4). This begins with a topical issue for example climate change, plastic pollution and biodiversity loss among others being recognized by CARICOM and its institutions such as Caribbean Regional Fisheries Mechanism (CRFM) and Caribbean Community Climate Change Center (5Cs). These topical issues of priority are then transferred to senior environmental officials within a member state or from regional institutions who liaise with the chair of the Bureau of the Council of Ministers

[36] UNFCCC Provisional List of Registered Participants. Conference of Parties. Twenty-seventh session, adopted 6-8 November 2022, available online https://unfccc.int/documents/622327; Provisional List of Participants. Intergovernmental Negotiating Committee to Develop An International Legally Binding Instrument on Plastic Pollution, Including in The Marine Environment-First Session, adopted on 28 November, 2022, available online <https://wedocs.unep.org/bitstream/handle/20.500.11822/41848/INC1FinalListofParticipants.pdf>

[37] See n. 32 above.

from member states who present the topical issue to the Ministers. Following this, Ministers will engage in a full discussion of the issue and will classify the issue as an agenda item. Once the topic is on the agenda, HOG will discuss the matter and will further produce a political mandate on the issue which establishes political will and supports the prioritization of the issue (Fig. 4). The political mandate is then returned to CARICOM Institutions and shared at the national level for implementation. The mechanical flow of issue prioritization was illustrated by the study participant who also stated that,

> "All support offered by CARICOM to its member states in terms of international negotiations, support and coordination have gone through this process."

This process was completed for the BBNJ, COP 27 and COP 15 negotiations, however the INC process failed to have a political mandate established among HOG. Despite this, the study participant noted that,

> "If CARICOM didn't specifically coordinate for the INCs, there would still be some level of organization and coordination in the region by 'somebody', but it would be important for the CARICOM grouping to begin conversations on this matter before it gets lost in the larger Latin American Caribbean structure."

Funding to Support Participation in MEA Negotiations

In regard to CARICOMs role in providing funding for its member states to attend negotiating meetings, this is not usually an option as the Secretariat relies on securing funds through projects

and grants to support its work, meaning unless a project or project funds are available, the Secretariat is unable to assist. The study participant stated that,

> "For negotiations it is normally a voluntary trust fund that the Global North would put money into that would support maybe one or two delegates from each developing country. So there's some support for every country to be able to access the negotiating room like at the COP, but beyond that, member state countries usually fund those things themselves."

The study participant also noted that there is supposed to be a CARICOM Development Fund that aims to support member states but it was unclear if that fund was capitalized. It was also stated that the Caribbean Development Bank (CDB) offers loans and grants to member states, potentially serving as a source to support participation in negotiations. Additionally it was mentioned that CARICOM has engaged in discussions with Global Affairs Canada and USAID to discuss committing funds towards various projects.

Capacity Building and Stakeholder Engagement

Through its administrative role, the Secretariat is also responsible for supporting capacity building among its member states. The study participant stated that,

> "If member states were to say CARICOM Secretariat, we really need capacity in this regard, then that's a mandate we (CARICOM Secretariat) have to fulfill and find the capacity somehow."

This was notable during member states preparation for the BBNJ negotiations where states requested support. The Secretariat hosted capacity building workshops for New York based negotiators from member states Permanent Missions to the UN, as well as capital experts, stakeholders, universities, fisheries and legal experts on marine genetic resources as that was an area of the BBNJ negotiations that the region had the least capacity on. Here, workshop participants got a sense of the technical issues at its core to understand the fundamentals of it and then understand the reasons for the positions established and taken by the negotiating bloc.

Similarly, capacity building was offered to delegates from member states participating in COP 15 where the Secretariat offered support in the global biodiversity strategy. Led by a hired consultant, this extended to a full suite of capacity building workshops, in the form of both in-country and regional workshops that supported the coordination of technical briefs, caucuses, bilaterals with third state parties and other negotiating blocs. This also occurred for COP 27 as a workshop on Article Six for climate finance was held as issues with climate finance, including carbon trading and carbon credits was an area where negotiators lacked a thorough understanding.

In preparation for various negotiating fora, the Secretariat orchestrates stakeholder engagement between member states, academia, regional institutions as well as external partners and donors to prepare for negotiations.

Scientific Research as the Basis to Formulating Negotiating Positions

For COP 27 negotiations, a well-established contingent of Caribbean scientists exist to both contribute to scientific reports such as the International Panel on Climate Change (IPCC) or to formulate relevant localized data to support negotiating positions for CARICOM member states.

For example, University of the West Indies (UWI)-Mona, hosts a climate sciences group composed of researchers who take reports like those of the IPCC and translate it into relevant models that reveal the implications of climate change at national and regional scales. This is paired with localized monitoring data on meteorological trends and sea surface temperatures. However the study participant noted that more human capacity is needed to support monitoring, suggesting that,

> "So to have a network of sea level stations, monitoring of coral reef temperatures and monitoring the climate to produce our own models, that capacity building in those areas for us is very important because we need to be able to understand for ourselves what the climate situation is, and not rely solely on global reports. It will be the same thing for any environmental agreement. If it's biodiversity, we have to measure our own biodiversity. We can't just rely on a global report that says that biodiversity has declined by 50%, we have to know what our situation is and the same goes for plastic pollution."

Data from scientific reports and outcomes from prior COPS and its subsidiary bodies are translated into policy language by the CARICOM Secretariat and 5Cs while simultaneously a draft road map of engagement and negotiation positions are presented to the HOG for endorsement before going to the Council of Ministers for approval before being disseminated to member states (Fig. 5).

CARICOM can hold a position on several issues, but will collaborate with the Alliance of Small Island States (AOSIS) to identify commonalities in negotiating positions before aligning with G77 with the study participant noting that,

> "It is really just a series of preparatory and refinement of positions but ultimately, the majority of our positions would be aligned with G77 and aligned with AOSIS for SIDS specific things."

The study participant further explained the rationale behind the alignment of positions, stating that,

> "Ultimately it's one vote for one party. So the more you can pool votes on a position, then the stronger your position would be across any UN platform, but really one of the things is avoiding inadvertently conflicting with other small states. So if the EU says I want to have a meeting with Barbados about this particularly contentious position, it will be very useful for Barbados to know the position of CARICOM because there's always going to be a strategy of divide and conquer. So the more united and coordinated we are then the smoother the negotiating process."

Discussion and Recommendations

Results from this study clearly indicate that CARICOM has created a viable framework for prioritizing MEA forums, establishing its negotiating blocs and positions and preparing its member states for MEA meetings such as COP 27, COP 15 and the BBNJ (Fig. 4 and 5). Such involvement in these negotiations have involved strategic coordination and preparation on behalf of CARICOM to establish a political mandate among its HOG; facilitation of capacity building workshops among its state's delegations and negotiators; identification of funding opportunities through available project resources; the application of relevant localized scientific data to inform negotiating

positions and engagement with a diversity of relevant stakeholders. The aforementioned factors are all components of the Framework for Key Drivers Needed by Caribbean SIDS to Achieve Equity in Preparation and Participation in the Global Plastics Treaty Negotiation.[38] Here, CARICOM demonstrates both the applicability of its coordination approach and its capabilities to effectively promote preparation and participation among its member states for the INCs. Be that as it may, unified coordination and prioritization of the INCs remain a challenge for CARICOM and its member states. Prioritization of the INC forum by CARICOM and its member states requires a clearly defined political mandate by its HOG to influence decision-making, goal setting, time, resources and funding allocations needed from governments to participate in the global plastics treaty negotiations.[39] However, actualizing a political mandate to support member states preparation and participation in the INC forum has been neglected due to the recurring issues of limited human capacity and funding that plague Caribbean SIDS.[40]

Perpetual gaps in capacity continue to limit the full potential of Caribbean SIDS to undertake, inform and utilize ocean science that supports global goals and policy development for plastic pollution.[41] Capacity building is a broad term whose definition requires framing based on the context it is used in. Generally, it can be defined as "the process by which individuals and organizations obtain, strengthen, and maintain the capabilities to set and achieve their own development objectives over time".[42] For Caribbean SIDS, considerations for capacity building

[38] See n. 15 above.
[39] See n. 15 above.
[40] See n. 15 above.
[41] Polejack, Andrei, and Luciana Fernandes Coelho. "Ocean science diplomacy can be a game changer to promote the access to marine technology in Latin America and the Caribbean." Frontiers in Research Metrics and Analytics 6 (2021): 637127.; Harden-Davies, Harriet et al. "Capacity development in the Ocean Decade and beyond: key questions about meanings, motivations, pathways, and measurements." Earth system governance 12 (2022): 100138.
[42] See n. 37 above.

must include human, technical, institutional, scientific, financial, social, legal and technological forms of capacity to support engaging in unified scientific monitoring or actively participating in negotiations.[43] UNEA Resolution 5/14, does not directly address the need for capacity building to precede the negotiation process to promote contextual equity among developing countries participating in the treaty negotiations. However, it acknowledges that some legal obligations arising out of a new international legally binding instrument will require capacity building and technical and financial assistance in order to be effectively implemented by developing countries and countries with economies in transition.[44] As the INCs progress, Caribbean SIDS should outline their specific capacity building needs, aligned with Resolution 5/14 to support obligations associated with implementation and monitoring for the treaty.

The diversity of issues within the international arena will continue to expand along with the need for regional cooperation among states.[45] With an expected rise in negotiating fora of various interests, the lack of human and financial resources will continue to constrain Caribbean states from achieving equitable and optimal results based on regional needs if left unaddressed.[46] Given the growing trend of regionalization within international negotiations, the role of CARICOM as a negotiating bloc within the INCs can pool resources together, support clearly defined positions,

[43] Harden-Davies, Harriet et al. "How can a new UN ocean treaty change the course of capacity building?." Aquatic Conservation: Marine and Freshwater Ecosystems 32, no. 5 (2022): 907-912.
[44] UNEA Resolution 5/14 entitled End plastic pollution: Towards an international legally binding instrument, adopted 10 May 2022, available online <https://wedocs.unep.org/bitstream/handle/20.500.11822/39812/OEWG_PP_1_INF_1_UNEA%20resolution.pdf1>
[45] See n. 4 above.
[46] See n. 3 above.

increase bargaining power, visibility and lower international negotiating costs among its member states.[47]

Though long-term sustainable solutions are needed to address issues of human capacity and funding to support negotiations for Caribbean states, CARICOM demonstrated its ability to secure funding, build human capacity among its negotiators, engage stakeholders and develop a common position and negotiation strategy for its member states during the recent BBNJ negotiations, which were finalized in February 2023.[48] The historic BBNJ agreement saw a strong negotiation team on behalf of CARICOM. This comprised of representatives from the region's Permanent Missions to the UN and capital based experts supported by scientific and legal experts drawn from the regional institutions such as CRFM and UWI, with the CARICOM Secretariat providing technical, logistical and administrative support as needed.[49] During this time, its delegates not only participated in the BBNJ negotiations but also served as leads within key thematic areas of the treaty on behalf of CARICOM and its member states.[50] It is important to note that despite its success, during the BBNJ negotiations CARICOM still faced copious challenges with negotiator turnover and securing reliable consistent funding to support the critical participation of its delegates throughout the remainder of the negotiations.[51]

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[47] See n. 4 above; Panke, Diana et al. "State and regional actors in complex governance systems: Exploring dynamics of international negotiations." The British Journal of Politics and International Relations 19, no. 1 (2017): 91-112.; See n. 3 above.
[48] See n. 3 above.
[49] See n. 2 above.
[50] CARICOM had Strong Team at ocean Biodiversity Treaty Negotiations, adopted on 23 March 2023, available online <https://today.caricom.org/2023/03/10/caricom-had-strong-team-at-ocean-biodiversity-treaty-negotiations/?fbclid=IwAR3E1Hs-SJAirVx9qlF9OlNgd4rReYqCvbZ0QqRvEhODs-cmzPkE8P1M-ck>
[51] See n.4 above.

With roughly 16 negotiating days (up to the time of writing) left to ambitiously complete treaty negotiations for the ILBI on plastic pollution, CARICOM and its member states will continue to face the same challenges if contextual barriers remain unaddressed. The risk of getting this on the political radar prior to 2024 for CARICOM member states looms, reducing critical time necessary for CARICOM to coordinate and prepare its member states for the negotiations, further increasing the likelihood of all member states not attending the remaining INC meetings. In this regard, attendance during the remaining INCs by its member states cannot stand alone as the sole metric of level of participation by CARICOM. In the interim of a political mandate being established for the INCs, functional cooperation between CARICOM and its member states, institutions and organizations will be required to organize its positions. For example, once CARICOM outlines its areas of priority for the treaty negotiations, member states can be briefed on them and for those states attending the INCs, the CARICOM Secretariat can furnish them with coordinating positions so that they are able to speak on behalf of the other member states. Additionally, member states in attendance would be able to disclose information on the state of discussions, trending directions of developed countries, areas of concerns, etc, which can be used to develop the CARICOM position. In the absence of CARICOM as a coordination mechanism for its member states, each country still has sovereign rights to pursue other goals that may not align with that of the CARICOM position. Further, should Caribbean SIDS belonging to CARICOM wish to align themselves with various groupings and blocs, AOSIS and Group of Latin America and Caribbean Countries (GRULAC) remain as options as they recognize the special circumstances and needs of SIDS to ensure that they have the capacity to contribute to the treaty's development and implementation.[52]

[52] Opening Statement on behalf of the Alliance of Small Island States (AOSIS) at the First Session of the Intergovernmental Negotiating Committee to develop a legally binding instrument to end plastic pollution, including in the marine environment, adopted 27 November 2022, available online

Several weeks following the study interview, the CARICOM Secretariat made progressive steps toward coordination for INC-2 by way of the virtual preparatory meeting: *Sav. No. 181/2023-Convening-CARICOM Meeting Preparatory to the INC-2 to Develop an International Legally Binding Instrument on Plastic Pollution, Virtual, 24 April 2023.* Meeting participants included 8 member states, 2 regional and 2 international organizations.[53] Discussion points of the meeting included a) a detailed briefing on the impacts of plastic pollution, b) national, regional and international responses to the issue, c) a timeline of the plastics treaty negotiations, d) SIDS priorities in a global plastics regime, e) challenges and limitations facing SIDS and f) considerations needed leading into INC-2, up to the time of writing.[54] The CARICOM Secretariat encouraged its member states to participate in the INC-2 meeting where possible and indicated that member states are calling for a political mandate to be established for the INCs. However, for any formal coordination to occur on CARICOMs behalf, meetings with ministers and HOG must be established to determine the extent and function of a coordination mechanism at this stage of the INCs. Additionally, the need for CARICOM to have its regional priorities outlined independent of AOSIS was suggested to ensure that the region's needs are adequately reflected in AOSIS's position and to support establishing CARICOMs negotiating bloc for the INCs.[55] Coordination activity was noted on behalf of UNEP-Caribbean Environment Project (UNEP-CEP), who have established and implemented various initiatives for marine plastic pollution in the Wider Caribbean Region (WCR). They are currently developing a regional appraisal of all marine plastic pollution data and relevant reports to support Caribbean delegations in building negotiating positions[56].

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https://resolutions.unep.org/resolutions/uploads/all_statements_made_by_aosis_during_inc1.pdf; See n. 15 above.

[53] Author's Meeting Observations from CARICOM Meeting Preparatory to the INC-2 to Develop an International Legally Binding Instrument on Plastic Pollution, convened, 24 April 2023.

[54] See n. 49 above.

[55] See n. 49 above.

[56] See n. 49 above.

The Second Session of the Intergovernmental Negotiating Committee (INC-2), was held in Paris, France from May 29-June 2, 2023. Here the propulsion of negotiations increased based on discussions of the main proposed elements of the treaty.[57] CARICOM member state attendance for INC-2 in comparison to INC-1 was maintained as nine member states attended INC-2, one more than INC-1.[58] During the meeting, Antigua and Barbuda was selected as vice chair and SIDS representative for the INC Bureau, whose role is to assist the chair with general conduct of business and discussions at the INC meetings along with approving draft provisional agendas for each session.[59] Such an appointment grants Caribbean SIDS an opportunity to liaise among each other as the information regarding the INCs are received from the UNEP INC Secretariat and President and shared among the Bureau, who then transfers pertinent information to their regional group for discussion.[60] Sharing of information occurred following INC-2 in June 2023, whereby the CARICOM Secretariat, in collaboration with the Government of Antigua and Barbuda as the SIDS Representative on the Bureau, convened *Sav. No. 330/2023-CARICOM Debriefing Meeting Of The Second Session Of The Intergovernmental Negotiating Committee (INC-2) To Develop An International Legally Binding Instrument On Plastic Pollution*. Though absent from INC-2, CARICOM orchestrated this meeting for its member states to discuss the outcomes of INC-2 and continue technical discussions.[61] Discussions regarding CARICOMs coordination and capacity needs for the third session of the intergovernmental negotiating committee (INC-3) and beyond,

[57] Second Session INC-2, adopted on 29 May 2023, available online < https://www.unep.org/inc-plastic-pollution/session-2>
[58] See n. 32 above; Provisional List of Participants. Intergovernmental Negotiating Committee to Develop An International Legally Binding Instrument on Plastic Pollution, Including in The Marine Environment-Second Session, adopted on 29 May 2023, available online < https://wedocs.unep.org/bitstream/handle/20.500.11822/42899/ListofParticipants.pdf>
[59] See n. 53 above.
[60] See n. 15 above.; See n. 53 above.
[61] CARICOM Secretariat, pers. comm. (14 June 2023).

were discussed within the meeting.[62] Here, the CARICOM Secretariat reiterated the need for member states to decide and formally declare if coordination on behalf of CARICOM for the INCs is something that is desired so that efforts towards prioritizing the event as an agenda item for its HOG's can be established.[63]

CARICOM can serve as the coordination mechanism for its Caribbean SIDS for the global plastics treaty negotiations as they have the experience, expertise and a well-crafted model whereby its elements can be applied to the INC process. However, this process is not without its complexities as the INCs have convened in a relatively condensed time frame.[64] UNFCC COP 27, UNCBD COP 15 and BBNJ are well established negotiating forums that have been ongoing for decades, providing significant time for states to prepare and offering multiple funding opportunities to support training and attendance and substance to formulate robust positions based on the provisions of treaty text, which up to the time of writing has not yet been provided for the INCs. With climate change negotiations continuing in parallel to the INCs, priority in regard to preparation and coordination is given to that forum as CARICOM and its member states begin preparations for the climate COP at least nine months in advance of each meeting.[65] Scholars[66], argue that threats of both climate change and plastic pollution on Caribbean SIDS require prioritization and urgent action by its governments as both issues are fundamentally linked. For example, from its production to disposal, plastic contributes to greenhouse gas emissions and contrary to this extreme weather events

[62] Author's Meeting Observations from CARICOM Debriefing Meeting of the Second Session of the Intergovernmental Negotiating Committee (INC-2) To Develop An International Legally Binding Instrument On Plastic Pollution, convened, 15 June 2023.
[63] See n. 58 above.
[64] See n. 15 above.
[65] See n. 57 above.
[66] See n. 15 above.

influenced by climate change are known to drive plastic debris into the marine environment.[67] However, adequate prioritization and coordination of the INC forum without sufficient human capacity and financial resources to support member state attendance will be inefficacious. Moving forward, CARICOM must determine what level of coordination is needed at this stage of the INCs to support its member states either through meetings, briefs or technical workshops. Collaboration with other regional organizations such as the OECS, which consists of states within the Eastern Caribbean, most of which are also members of CARICOM and UNEP-CEP, must be pursued. Such partnerships can support coordination activities, funding development and capacity building that aids in strengthening the policy making interface of MEA negotiations. Funding to support preparation and participation in this fora must also be identified and pursued by governments within member states to support the pooling of resources that uphold the negotiating bloc. Additionally, its negotiating positions must advocate for clearly defined capacity building, financing and monitoring schemes to be included within the treaty to support its implementation. CARICOMs notoriety as both an important and symbolic negotiating bloc for the region can serve as an ideal mechanism for advocating for its member states and influencing the multilateral processes of the INC to work in the regions favor. However, contextual issues that hinder its ability to participate in the treaty negotiations must be addressed in an effort to effectively participate in the negotiations. As discussions regarding coordination efforts have already begun between CARICOM and its member states, studies must continue towards documenting the challenges, limitations and successes that Caribbean SIDS may face throughout the INC negotiation process.

Acknowledgements

[67] Ford, Helen V. et al. "The fundamental links between climate change and marine plastic pollution." Science of the Total Environment 806 (2022): 150392.

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Fig 1. Map of CARICOM Member States.

Fig. 2. Thematic Framework for challenges faced in equitable participation (Ambrose and Hassanali, 2023, under review).

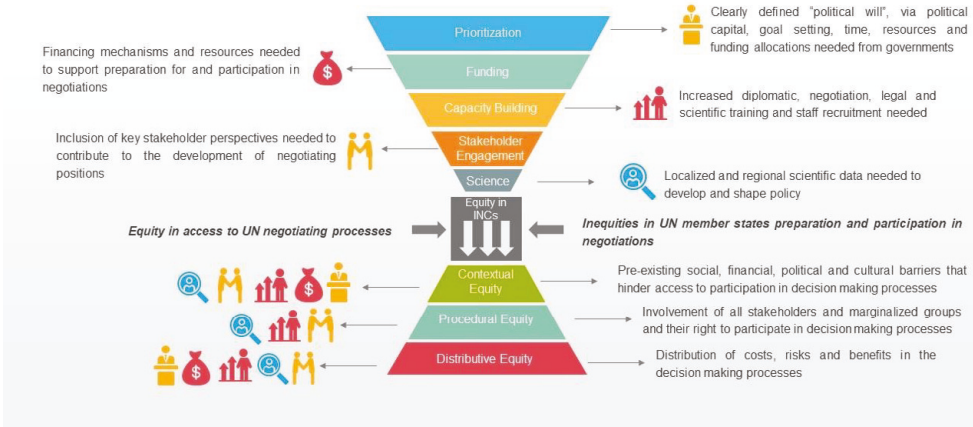


Fig. 3.COP 27 vs INC-1 attendance by CARICOM Member States.

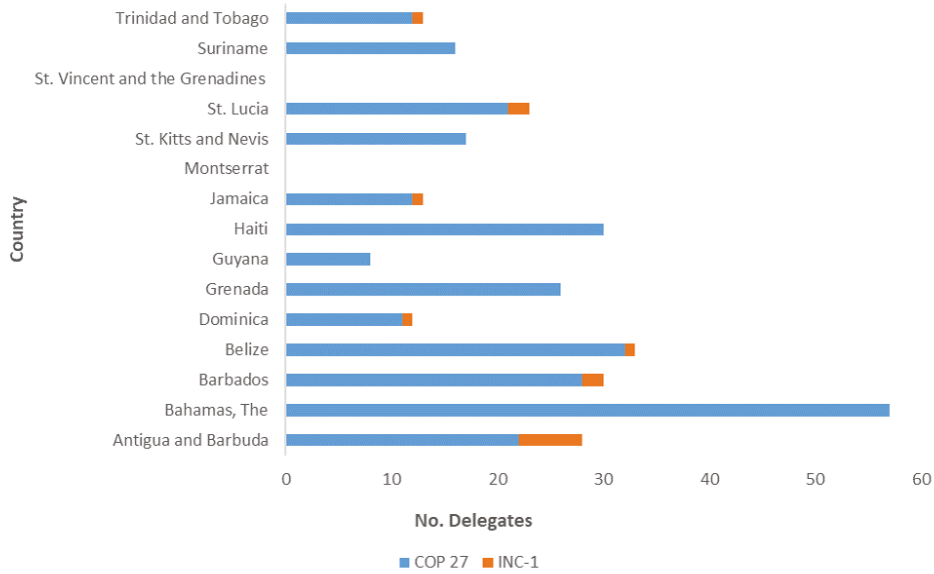


Fig. 4 Flowchart of Achieving Prioritization of Environmental Issues onto the CARICOM agenda.

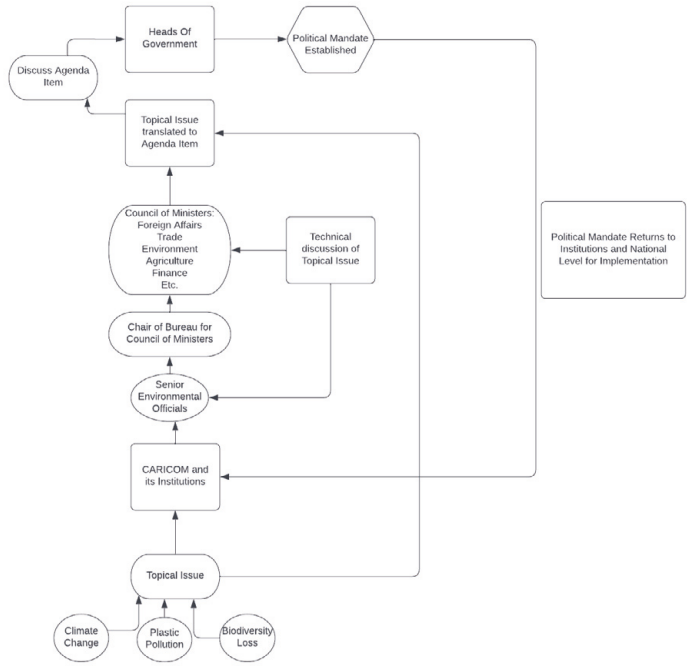
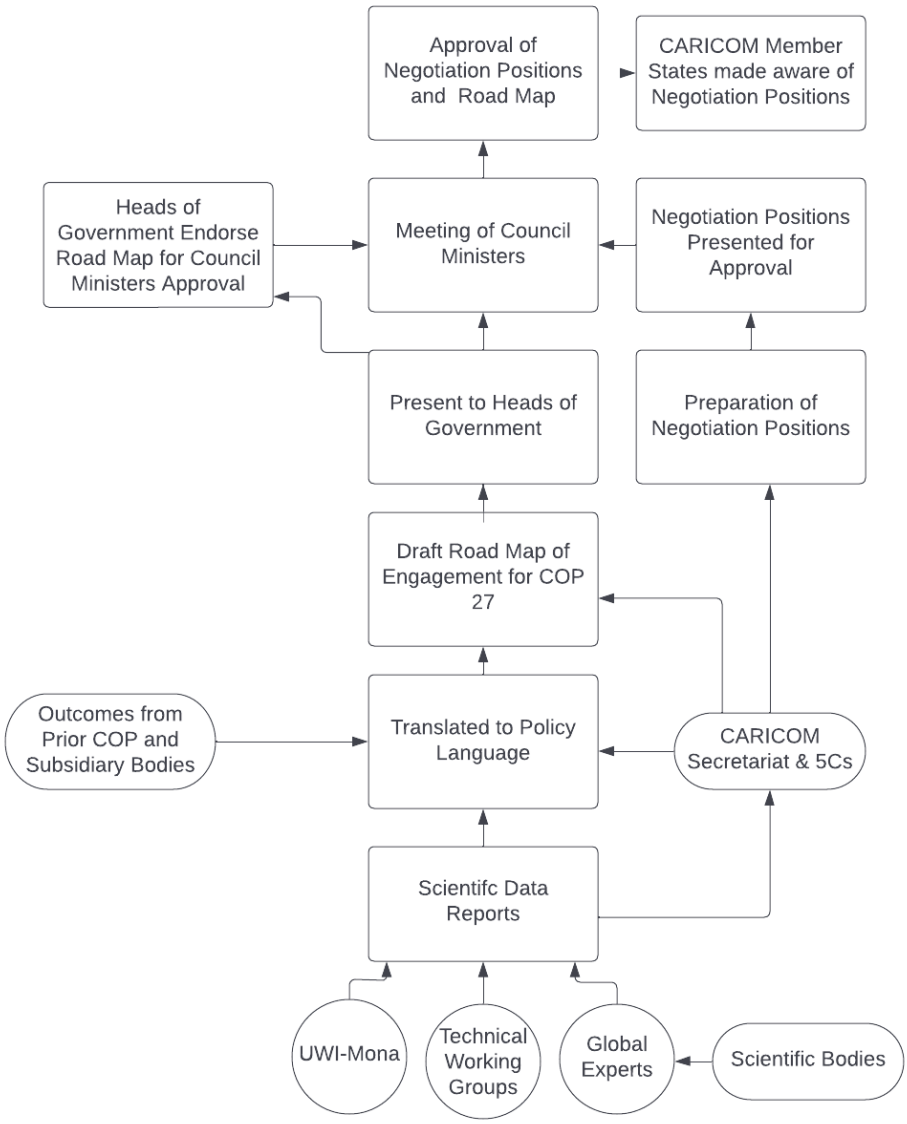


Fig. 5 Flowchart of Formulating Negotiating Positions for CARICOM States Participating in Climate Change COPs.


Approval of Negotiation Positions and Road Map
CARICOM Member States made aware of Negotiation Positions
Heads of Government Endorse Road Map for Council Ministers Approval
Meeting of Council Ministers
Negotiation Positions Presented for Approval
Present to Heads of Government
Preparation of Negotiation Positions
Draft Road Map of Engagement for COP 27
Outcomes from Prior COP and Subsidiary Bodies
Translated to Policy Language
CARICOM Secretariat & 5Cs
Scientifc Data Reports
UWI-Mona
Technical Working Groups
Global Experts
Scientific Bodies

Appendix

Appendix 1: Consent forms for participants

Dear Participant,

Thank you for agreeing to participate in this research questionnaire, which is being used in connection with a Dissertation which will be written by the PhD candidate, Kristal Ambrose in partial fulfilment of the requirements for her PhD in Maritime Affairs at the World Maritime University in Malmo, Sweden.

The topic of the Research is *"Assessing Preparation and Participation of Caribbean Small Island Developing States in the Intergovernmental Negotiating Committee's (INC's) negotiations to develop an international legally binding instrument on plastic pollution, including in the marine environment."*

The information you provide during this interview will be used for research purposes, and the results will form part of a dissertation, which will be published online and made available to the public. Your personal information will not be published. You may withdraw from the research at any time, and your personal data will be immediately deleted.

Anonymised research data will be archived on a secure virtual drive linked to a World Maritime University email address. All the data will be deleted 10 years after the degree is awarded. Participation in this research is voluntary and unpaid.

Your participation in the interview is highly appreciated.

Student's name	Kristal Ambrose
Specialization	PhD Candidate in Maritime Affairs at WMU
Email address	w2005277@wmu.se

* * *

I consent to my personal data, as outlined above, being used for this study. I understand that all personal data relating to participants is held and processed in the strictest confidence, and will be deleted 10 years after the degree is awarded.

Name: ……

Signature: ……

Date: ……

Appendix 2: Interview questions for INC-1

WMU-GOI Closing the Circle Programme

Semi-Structured Interviews For Marine Debris Governance PhD Research

Aim: In March 2022, United Nations member states adopted Resolution 5/14 End Plastic Pollution: Towards an international legally binding instrument (INC) (UNEA 5/14), intended to combat plastic pollution with a global and legally binding plastics treaty by 2024. Informally known as the "Global Plastics Treaty", this instrument was designed to comprehensively address the full life cycle of plastic, potentially from production to disposal.

This research seeks to examine how equitable preparation and participation can be achieved for and by Caribbean Small Island Developing States (SIDS) leading up to the Intergovernmental Negotiating Committee (INC's), negotiations towards an international legally binding instrument (ILBI) on plastics. This work will focus on ***procedural equity***, which is concerned with inequities of negotiating powers of vulnerable communities and their right to participate in the decision making processes.

Interview Date: …… Interviewee Code: …….

<u>Demographics</u>

Name:

Gender:

Country of origin:

Organisation and role:

Have you attended a multilateral environmental meeting before? (Y/N)

If yes, please specify which.

Are you a part of your country's or a regional delegation for the upcoming negotiations towards an international legally binding instrument (ILBI) on plastics? (Y/N)

Questions

1. How would you conceptualise the term equity?
2. What would you consider as the main elements of equity?
3. What is your understanding of the role of procedural equity in international decision-making processes?
4. What challenges related to procedural equity do Caribbean SIDS face ahead of the upcoming negotiations towards an international legally binding instrument (ILBI) on plastics?
5. Can you specify the composition of a typical Caribbean delegation that would participate in the upcoming negotiations towards an ILBI on plastics, and the responsibilities of the delegates therein? For example, Ministry of Environment, lead negotiator…
6. What challenges may Caribbean delegations face when preparing for meetings such as the upcoming negotiations towards an ILBI on plastics?
7. Which current funding schemes, both internal (national) and/or external (international), exist to support Caribbean delegations participating in past and upcoming meetings and events related to the ILBI on plastics?
8. What type of negotiation training opportunities are available for delegates participating in meetings and events related to the ILBI on plastics?
9. What current stakeholder engagement activities have been undertaken either nationally or regionally to support the development of the national/ regional position leading up to the ILBI negotiations on plastics?
10. Is there anything you would like to add that may be relevant for the research project?
11. Has your delegation and or state prepared negotiation positions prior to INC-1?

Appendix 3: Interview questions for CARICOM Secretariat

WMU-GOI Closing the Circle Programme

Semi-Structured Interviews for Marine Debris Governance PhD Research

Aim: In March 2022, United Nations member states adopted Resolution 5/14 End Plastic Pollution: Towards an international legally binding instrument (INC) (UNEA 5/14), intended to combat plastic pollution with a global and legally binding plastics treaty by 2024. Informally known as the "Global Plastics Treaty", this instrument was designed to comprehensively address the full life cycle of plastic, potentially from production to disposal.

In November 2022 the Intergovernmental Negotiating Committee (INC), commenced INC-1 negotiations towards an international legally binding instrument (ILBI) on plastics. With INC-2 on the horizon in May 2023 and three others to follow in the next two years, this research was designed to examine how equitable preparation and participation can be achieved for and by Caribbean Small Island Developing States (SIDS) leading up to the INCs, and will assess Caribbean SIDS' involvement in the INC process. For this interview, I will examine your organisation's role in preparing for the Conference of Parties for Climate Change (COP 27) hosted in November 2022, to examine your approach to preparation and participation and its application to the INC process. Additionally, I will be discussing the role of equity in Caribbean SIDS ability to prepare and participate in the forum.

Interview Date: …… Interviewee Code: …….

<u>Demographics</u>

Name:

Gender:

Country of origin:

Organisation and role:

Have you attended a multilateral environmental meeting before? (Y/N)

Questions

1. What challenges related to equity has CARICOM and its member states faced in preparation for and participation in environmental intergovernmental negotiating meetings?
2. What are CARICOM's priority areas regarding environmental issues that affect its member states?
3. How are environmental issues prioritised among CARICOM's member states? For example, how do you ensure political capital or uptake of these issues?
4. How does CARICOM prioritise multilateral environmental agreement meetings among its member states?
    a. How is political will for participation in these forums by member states measured?
5. Was CARICOM aware of the INC-1 negotiating meeting for the proposed global plastics treaty which was held in Uruguay in November 2022?
    a. It was noted that CARICOM representation was absent along with a majority of its member states. What are some reasons for this?
    b. Will there be representation by CARICOM at the INC-2 hosted in Paris in May 2023?
    c. Is this forum being prioritised within CARICOM? If so, what are some barriers to promoting participation among member states?
    d. Does CARICOM have a negotiating bloc for the COP 27? How does the bloc work?
    e. What are some advantages of CARICOM acting as a negotiating bloc for Caribbean member states during the INC negotions?
6. What is the status of CARICOM's St. Johns Declaration on plastic pollution, and how may that support CARICOM and member state participation in the INCs?
7. There was significant representation from Caribbean SIDS and CARICOM during COP27 than for INC-1. Why do you think this is?
8. What level of political will was there among CARICOM member states participating in COP 27?
    a. How was this made a priority among members?

9. Which broad negotiating positions on climate change were presented by CARICOM and its member states during COP 27?
    a. How were these positions formulated?
    b. What scientific research guided the positions?
10. Which preparation activities were used to prepare CARICOM and its member states for COP 27?
    a. What current preparation activities exist within CARICOM to prepare member states for the INCs?
11. What stakeholder engagement activities were undertaken by CARICOM and its member states to prepare for COP 27?
    a. Who were key stakeholders engaged leading into COP 27?
    b. Are any stakeholder engagement activities currently being undertaken by CARICOM or its member states to prepare for the INC-2?
    c. Which key stakeholders should be considered for the INC process?
12. What funding schemes, either internal (national) and/or external (international), supported CARICOM and Caribbean delegations participating in COP 27?
    a. What are some of the funding challenges facing CARICOM and its member states related to attending MEA meetings?
    b. What funding sources are available to support CARICOM and its member states to attend the INCs?
13. What type of negotiation training or capacity building opportunities were available for CARICOM and Caribbean delegates participating in COP 27 meetings?
    a. How can this be applied to the INC process?