GPML Caribe

Regional Marine Litter Management Strategy

for the Wider Caribbean Region

UN environment programme

CARIBBEAN ENVIRONMENT PROGRAMME

GCFI GULF AND CARIBBEAN FISHERIES INSTITUTE

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List of Acronyms

Acronym	Description
ALDFG	Abandoned, Lost or Otherwise Discarded Fishing Gear
CLME	Caribbean Large Marine Ecosystem and Adjacent Regions
CLME+	Caribbean and North Brazil Shelf Large Marine Ecosystems
CYEN	Caribbean Youth Environment Network
EOAA	Education, Outreach, Awareness, Advocacy
EPA	Environmental Protection Agency
EPR	Extended Producer Responsibility
EU	European Union
GCFI	Gulf and Caribbean Fisheries Institute
GPA	Global Programme of Action
GPML	Global Partnership on Marine Litter
GPML-Caribe	Global Partnership on Marine Litter - Caribbean Node
ICC	International Coastal Cleanup
IMO	International Maritime Organization
LAC	Latin America and the Caribbean
LBS	Land-Based Sources
MARPOL	The International Convention for the Prevention of Pollution from Ships
NOAA	National Oceanic and Atmospheric Administration
PE	Polyethylene
PET	Polyterephthalate
POPs	Persistent Organic Pollutants
PP	Polypropylene
PS	Polystyrene
PUR	Polyurethane
PVA	Polyvinyl Alcohol
PVC	Polyvinylchloride
RAPMaLi	Regional Action Plan on Marine Litter
RSCAP	Regional Seas Conventions and Actions Plans
SDG	Sustainable Development Goal
SIDS	Small Island Developing States
SOCAR	State of the Cartagena Convention Area Report
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP - CEP	United Nations Environment Programme - Caribbean Environment Programme
UWI	University of the West Indies
WCR	Wider Caribbean Region
ZikV	Zika virus

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Executive Summary

The Wider Caribbean Region (WCR) is home to numerous endemic species and biodiverse ecosystems which provide food and livelihoods for humans. The Caribbean region is especially dependent on these ecosystems for fisheries and tourism. However these islands face many challenges because of their small land mass, their vulnerability to storms and hurricanes as well as poorly developed waste management infrastructure. Due to the mismanagement of waste in open dumpsites, millions of tons of plastics and other materials enter into the coastal waters of the WCR. This waste, termed marine litter, involves solid material entering into marine and coastal environments via land and sea-based activities and includes items that are intentionally discarded or unintentionally lost in the environment.

The Regional Action Plan for Marine Litter (RAPMaLi) for the Wider Caribbean Region was originally developed in 2007 (RAPMaLi 2014) as a project under the directive of the United Nations Environment Programme (through its Regional Seas Program) in response to significant amount of litter accumulating in our oceans. In order to achieve the objectives of the RAPMaLi and the Global Partnership on Marine Litter, this strategy builds on the substantial amount of work already underway at the local and regional level by adding greater coordination of efforts.

To develop this strategy, stakeholders representing government agencies, civil-society organizations, the private sector, and regional institutions in the Wider Caribbean region and others who are engaged in marine litter-related governance, monitoring and awareness-raising programs were brought together in Miami, Florida in March 2019. Collectively, these stakeholders identified goals, objectives, and action items across four themes (Research and Monitoring, Governance, Communication and Capacity Building, and Training. Following this, a prioritisation activity was conducted where participants established whether actions were a priority at the national and/or regional level or not a priority at all.

The participants identified the following regional priorities according to identified themes:

A. Research and Monitoring

- Develop a region-wide spatial database on areas impacted by marine litter
- Conduct a GAP analysis of overlap of high density marine litter areas with areas of high sensitivity
- Identify research to assess the role of sargassum as a transfer mechanism for marine litter
- Identify best use of technology to enable and support marine litter initiatives
- Identify or create accessible database for contributions for regional marine litter data

B. Governance

- Develop/Identify institutional mechanisms for coordination at the regional level
- Convene partnership forums to identify institutional mechanisms for coordination at the regional level

C. Communication

- Attend and present at relevant regional and international environmental meetings
- Establish and maintain a publicly available regional marine litter repository

D. Capacity Building and Training

- Facilitate exchanges of research and monitoring resources in the region
- Develop personnel exchange programs and peer to peer collaborations for research and monitoring
- Provide a regional platform for communicating proven and effective EOAA approaches

The development of this management strategy could be viewed as a whole-system approach to identifying and prioritizing gaps and possible responses. While it is unrealistic to expect that all the identified actions can be implemented due to their vast scope and the technical and financial resources required, there is still great potential to address priority areas at the national and/or regional level. This task is especially more achievable when combined with the identified case studies, best practices, and lessons learnt from the WCR provided in this strategy.

1 Introduction to Marine Litter

1.1 What is Marine Litter?

Pollution of the marine environment is a global growing concern and encompasses the introduction of substances into the environment which results in deleterious effects to living resources and hindrance to marine activities (Article 1(4), United Nations Convention on the Law of the Sea [UNCLOS]). The issue of plastic in the marine environment is gaining increased recognition as an important issue in marine and biodiversity conservation in recent years. Unfortunately, there is often confusion related to its definition. In general, marine litter (commonly referred to as marine debris) includes manufactured or processed solid material entering into marine and coastal environments via land and sea-based activities (Hastings and Potts 2013). It may include items that are intentionally discarded or unintentionally lost in the environment. Some of these may include items such as plastic, wood, metal, glass, rubber, clothing or paper (Gall and Thompson 2015). Some jurisdictions use marine debris interchangeably with marine litter.

Because marine litter can be dispersed great distances by wind and ocean currents, it has become a pressing, transboundary problem. Marine litter can have devastating effects on wildlife through ingestion and entanglement (Derraik 2002) and then ultimately sink to the seabed thereby creating significant management challenges (Hastings and Potts 2013, Raubenheimer and McIlgorm 2018).

" Because marine litter can be dispersed great distances by wind and ocean currents, it has become a pressing, transboundary problem. "

1.2 Distribution, Persistence and Transboundary Nature

Mass production of plastics first began in the 1950s (Villarubia-Gomez et al. 2018). Since then, production has increased from 0.5 tonnes to more than 300 million tonnes of plastic per year (Heap 2009, Wabnitz and Nichols 2010, Avio et al. 2015, Gall and Thompson 2015, Lachmann et al. 2017); the doubling time of plastic production is now estimated at 11 years (Wilcox et al. 2015). Cumulative production of plastics amounts to over 8,000 million metric tons of which about 9% has been recycled or 12% incinerated with 79% continually accumulating in landfills (Carney Almroth and Eggert 2019). This growth in production over time has resulted in a corresponding increase in plastics being deposited in marine environments (Wilcox et al. 2016). Due to its nature, versatility, durability, and affordability, plastics have been in high demand in a wide variety of manufacturing and packing industries (Wright et al. 2013). Because of its practicality, plastics are being increasingly used globally. However, these defining characteristics that make plastic a convenience are the same that make them a threat (Vegter et al. 2014) and has resulted in their status as the most common litter item found on coastlines and within the marine environment globally (UN Environment 2018). Furthermore, their high durability and slow degradation allows them to persist for many years (Pettipas et al. 2016) whilst their low density and buoyancy facilitates their dispersal by water and wind to distances thousands of kilometers from their point of origin (Wabnitz and Nichols 2010, Ryan ND). The persistence and wide dispersal of marine-plastic litter is alarmingly illustrated through an incident where an albatross was found with ingested plastic that originated from a fallen aircraft more than 9,000 km away (Weiss et al. 2009, Wabnitz and Nichols 2010). The issue of marine litter is a global one which traverses cultural, geographical, and jurisdictional boundaries (Raubenheimer and McIlgorm 2018).

1.3 The Caribbean Context

The Wider Caribbean Region (WCR) consists of the insular and coastal states and overseas territories with coastlines on the Caribbean Sea and Gulf of Mexico as well as the adjacent waters of the Atlantic Ocean (UNEP CEP 2020). This area encompasses 28 island and continental countries as well as 19 overseas territories of four nations (UNEP CEP 2020).

The complex hydrography of the Caribbean region enables the dispersion of marine pollutants in the region which makes marine litter a truly transboundary problem (Diez et al. 2019. The combination of the North Equatorial Current, South Equatorial Current, and the North Brazil and Guiana Currents create the "Caribbean Current" which circulates water northwestward. When combined with other meso- and micro-scale currents in the region, this circulation facilitates the dispersion of pollutants throughout the region (Diez et al. 2019).

The islands and coastal states of the WCR are characterized by a tropical climate that encourages year-round water and beach related commercial and recreational activities. A by-product of this is that more waste and marine litter is produced (RAPMaLi 2014). In 2015, the resident populations of the WCR produced 79 million tonnes of solid waste; this is estimated to increase to 84 million tonnes in 2020 (UNEP CEP 2020). Due to limited space, minimal recycling options, and restricted markets for solid waste, many countries within the WCR are unable to sufficiently deal with the quantities of waste produced. Furthermore, for many locations, solid waste collection is largely concentrated in more urban areas. There is limited ability to expand this waste collection service due to minimal infrastructure and insufficient funding (UNEP CEP 2020). Households that are not provided with collection services often resort to dumping their waste on land where it washes into drainage systems or sometimes directly into waterways. It is estimated that as much as 145,000 tonnes of solid waste per day are dumped at open dumpsites, which receive 17,000 tonnes of plastic per day (UN Environment 2018). The mismanagement of waste in open dumpsites resulted in as much as 1.3 million tons of plastics entered into coastal waters of the WCR in 2015 (UNEP CEP 2020).

Figure 1: Map of the Wider Caribbean Region (courtesy of the CLME+ Project)

1.4 The Issue of Plastic Pollution

Plastics possess multiple unique characteristics such as being inexpensive, strong, durable, lightweight, and corrosion resistant along with high thermal and electrical insulation properties (Wabnitz and Nichols 2010). As a result of their properties, daily activities have been revolutionized with improvement to the health and safety of society; furthermore, information technology and electrical goods have become significantly more available (Wabnitz and Nichols 2010). Plastics are synthetic polymers which can be molded into multiple solid objects of varying shapes (Iñiguez et al. 2016). There are thousands of different types of plastic polymers, however the most common items found in marine litter stem from the following substances: polypropylene (PP), polyethylene (PE), polyvinylchloride (PVC), polyvinyl alcohol (PVA), polyurethane (PUR), polyterephthalate (PET), and polystyrene (PS), which collectively account for approximately 80 percent of total plastics production (Avio and Regoli 2017, PlasticsEurope 2017). However once any of these polymers enters the ocean, their density dictates their environmental fate (Avio and Regoli 2017). Buoyancy specifically affects the subsequent position in the water colum as well as its interaction with biota. Those that are denser than seawater (e.g. PVC) will sink, whilst lighter density substances (e.g. PE and PP) will float. However additional processes such as biofouling (where organisms colonise surfaces and increase particle weight) can hasten the sinking process (Lobelle and Cunliffe 2011) whilst fragmentation and degration can change densities and thus their position in the water column (Avio and Regoli 2017).

A key issue with plastic production is that a significant percentage is used to make short-lived, single use and other disposable packaging that end up discarded shortly after manufacturing (Wabnitz and Nichols 2010). Although countries have made considerable progress in limiting some forms of pollution, others forms, such as marine litter, continue to persist. Even though there have been considerable efforts to remove marine debris from the environment and also restrict dumping at sea, the incidence of plastics continue to increase in some areas (Gall and Thompson 2015). From a governance perspective, more than half the ocean lies beyond national jurisdictions (Morrissey 2019). Nonetheless, preventing and mitigating the issue of marine litter locally will be dependent on the source of pollution, available infrastructure, consumer preferences, and behaviours and varies by nation and region due to resource availability (Morrissey 2019). The accumulation of marine litter on beaches and coastal areas has substantial negative impact on ecosystems and aesthetics and plastics are the most dominant form of litter (Ellen MacArthur Foundation 2017). Multiple studies have confirmed that the amount of marine debris accumulating is dependent on characteristics and location of the area, seasonal conditions, and environmental conditions including the degree of precipitation and wind action (Iñiguez et al. 2016). Marine litter is now found in all ocean compartments: biota, coastline, sediments, water column, sea surface, seafloor, and sea ice (Law 2017, Schneider et al. 2018).

The greatest issue associated with marine litter involves 'mismanaged' plastic waste including items that were 'leaked' either purposefully or wrongly disposed (e.g. deposited at open and uncontrolled landfills) (Turpie et al. 2015). Plastic leakage can occur at any stage during the manufacture and consumption processes, especially when there is inadequate infrastructure for capturing waste (Mathews and Stretz 2019). In general, the amount of marine debris on coastal shorelines can be indicative of debris loads in coastal waters; however, it is significantly more complicated to assess debris loads in the open ocean due to the size of the spatial area needing to be surveyed along with the associated financial costs (Thiel et al. 2013, Vegter et al. 2014). Furthermore, when waste management is improperly executed, there can be tremendous negative social and environmental impacts which are difficult to quantify (UN Environment 2018). Once mismanaged waste is leaked into the environment, it is very costly and difficult to remove because of its longevity, transboundary nature, and resistance to degradation (Jambeck et al. 2015, Raubenheimer and McIlgorm 2018). Estimates suggest that as much as 32% of the 78 million tons of plastic packaging produced globally leaks into the environment (Mathews and Stretz 2019). Globally, even in the most remote parts of the world, all categories of plastic litter are found associated with coastlines and terrestrial ecosystems (Vince and Stoett 2018). The transboundary nature of marine litter coupled with the multiple sources, pathways, and impacts require global collaboration and international action (Lachmann et al. 2017).

1.5 Sources of Marine Litter

Although most marine debris comes from terrestrial sources (Pettipas et al., 2016, Landon-Lane, 2018), once in the marine environment, the movement of marine debris is very uncertain and is heavily affected by the behaviour of individuals on land as well as environmental factors such as tides or weather events (Morrissey 2019). The main causes of marine pollution are direct or indirect dumping or discharges of solids and liquids from land-based sources including rivers, marine outfalls, waterways, runoffs, and infrastructure (Figure 2) (GESAMP 2010). However, sea-based sources such as from vessels and abandoned, lost or otherwise discarded fishing gear (ALDFG) are other main sources of litter (UN 2016).

ALDFG has become a significant problem worldwide (Gilman et al. 2015). ALDFG consists of any recreational or commercial fishing gear (including nets, lines, traps or other materials) that is either lost, abandoned or discarded into the marine environment. Annually the quantity of ALDFG in the marine environment continues to rise especially because of the intensified use of plastic and nylon fishing gear. Most forms of ALDFG tend to persist for extended periods of time due to their slow degradation rates which results in a gradual, but consistent accumulation in marine and coastal ecosystems. Some forms of ALDFG will continue 'fishing' and go on to catch target and non-target species through 'ghost fishing' (Carr 2019). Fishing gear has been recognized as one of the most ecologically damaging forms of marine litter and can also have significant impacts on human health and safety, aesthetics and tourism as well as other economic consequences. Estimates suggest that >640,000 metric tons of fishing gear are lost at sea annually (Carr 2019). ALDFG not only affects habitats, but it can also lead to the death of wildlife such as marine mammals, seabirds, turtles, fish, and shellfish through ingestion and entanglement. The causes of ALDFG are often inadequately understood and documented but are numerous in nature. Factors such as weather, cost of gear retrieval and other operational fishing costs, theft and gear conflicts are often the most significant causes, but the term ALDFG denotes that these sources are both intentional and unintentional. In order to design effective management measures to reduce ALDFG, there is first a need to understand why ALDFG occurs in the first place (i.e. why might fishing gear be abandoned, lost or discarded).

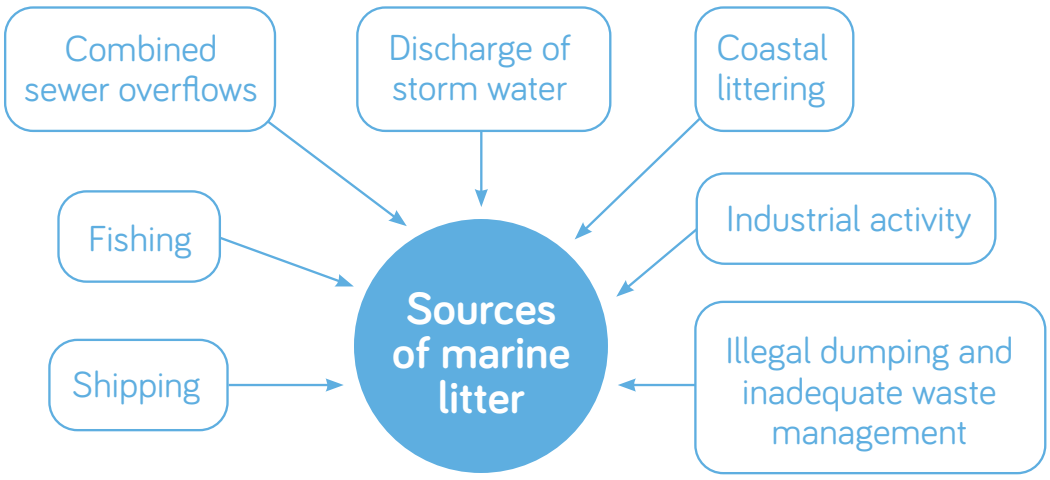


Figure 2: Main sources of marine litter (Modified from Van Sebille et al. 2016).

Human negligence and weather-related events are often the cause of waste entering the marine environment but there are cases, especially in small island developing states (SIDS) where waste enters from dumpsites located alongside or adjacent to waterways (UN Environment 2019). Waste may also escape during collection or transport to landfills especially when insufficent waste management procedures are implemented (Van Sebille et al. 2016). Moreover, sometimes SIDS tend to be the recipients rather than the generators of the significant amounts of litter washing up on shores. Uninhabited remote islands in the Pacific Ocean are reported to have their coasts overwhelmed with plastics that are believed to have originated from Russia, Europe, Japan, China, the United States, and South America (UN Environment 2019).

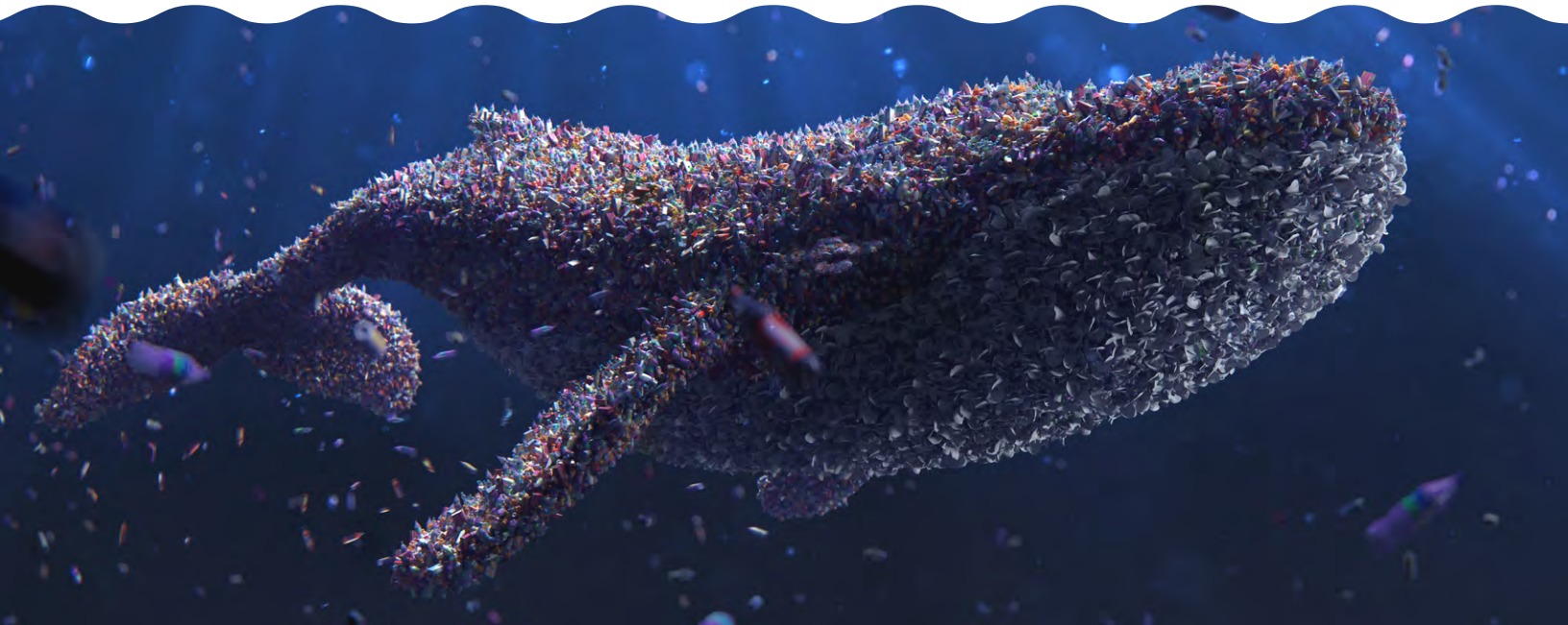
There is a direct relationship between the volume of pollution entering the region's oceans and how many people live along the coasts and the watersheds that drain into the oceans. Plastic tends to be dumped primarily because of a lack of awareness and insufficient waste infrastructure. However, when this plastic waste is insufficiently controlled on land, a large proportion enters into the marine environment where it can persist for extended periods of time (Mathews and Stretz 2019). Thus, effective management of marine litter requires a comprehensive understanding of the scale of the issue and the sources. Ultimately, effective mitigation of marine litter is dependent upon understanding how it interacts with the marine environment from inland sources, offshore, and along the coastal shorelines as well on coastal shorelines (Williams and Rangel-Buitrago 2019). Furthermore, upon entering waterways and the marine environment, marine litter conveniently escapes the direct responsibility of the local authorities and individual citizens whilst affecting the coastal and marine environment.

1.6 Impacts of Marine Litter

The impact of marine litter spans local, regional, and international scales and affects human health, the economy, marine life, general aesthetics, and public perception (Williams and Rangel-Buitrago 2019). Furthermore, impacts of marine litter are not restricted to only the physical effects they may have on the environment or marine life but also includes indirect issues such as bioaccumulation, vectors for disease or invasive species, and damaging seafloor species and coral reefs (Lamb et al. 2018, UNEP 2018).

Impacts on Wildlife and Habitats

The impacts of marine litter is of great concern and dates back to the 1960s where there were reports of birds, turtles, fish, and marine mammals dying as a result of plastic pollution (Gall and Thompson 2015). Wildlife can be directly affected by marine litter



via ingestion, entanglement, and other impacts on the food web (Derraik 2002) whilst habitats can be physically damaged, smothered, or indirectly affected over time. Research has suggested that entanglement of wildlife occurs less frequently than ingestion although entanglement is one of the most visible impacts of plastic pollution (Laist 1997, Robards et al. 1997). Ingestion of plastics can result in both internal and external wounds, impaired feeding capacities, blocked digestive tracts which can lead to satiation, starvation, and even death (Wabnitz and Nichols 2010). More specifically, microplastics can not only block intestinal tracts but also lead to inflammation, oxidative stress, hormone disruption, metabolic and behavioural changes as well as impacts on reproductive output (Wright et al. 2013, Carney Almroth and Eggery 2019). Furthermore, as the abundance of microplastics continue to increase in the marine environment, its bioavailability also increases resulting in an increased chance that organisms will encounter it (Wright et al. 2013). Sea birds have also been found to be ingesting plastics with increased frequency which may eventually negatively affect their reproduction or survival (Wilcox et a. 2015). Entanglement can result in drowning, suffocation, lacerations, and amputations with a subsequent decreased ability to feed as well as avoid predators (Derraik 2002, Gall and Thompson 2015, Avio et al. 2016). For sea turtles especially, entanglement in fishing gear or other plastic materials can affect their mobility and overall ability to dive, feed or return to the surface to feed (Wabnitz and Nichols 2010).

Impacts on Humans

Marine litter has substantial potential to become a health and safety hazard to humans as improperly disposed medical waste can cause injury or disease or put persons at risk for infection. Discarded litter can serve as a breeding ground for mosquitoes that spread diseases such as dengue fever, malaria, zika, and chikungunya (RAPMaLi 2014). Human health can be directly affected through contact with pollutants or ingestion of contaminated marine life or other toxins that accumulate in the food chain (UN 2016 and MEA 2005). Furthermore, discarded cigarette butts which are one of the most abundant types of marine litter found during the International Coastal Cleanup (Ocean Conservancy 2016) contain carcinogens and other toxins that can leach into the water and are poisonous when ingested (Novotny and Slaughter 2014). Microplastics are increasingly being found in water sources and edible food items, including seafood and can go on to affect human health via particle toxicity (Carney Almroth and Eggert 2019). Furthermore, marine litter can also affect food security (UN Environment 2018) through the reduction of available marine life for consumption. For many coastal communities, fish, and seafood are an important, and often the only source of protein.

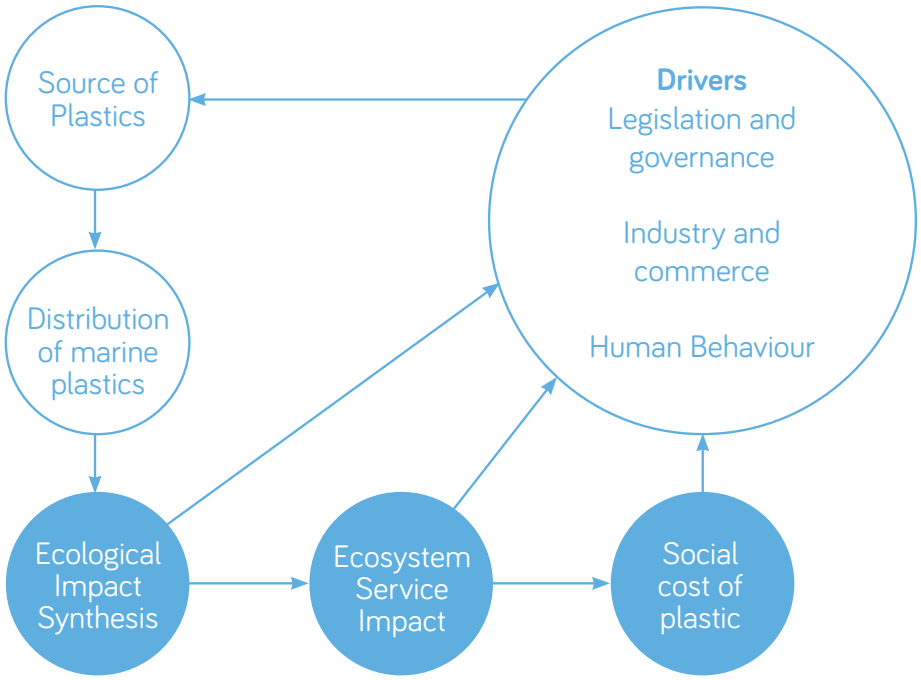


Figure 3: Approach used to assess the societal impacts of marine plastic pollution (Beaumont et al. 2019)

Economic Impacts

When considering what marine litter actually costs society (Figure 3), one has to consider the costs of production (including the extracting and processing raw materials) as well as the consequent environmental costs in terms of greenhouse gas emissions or costs associated with air pollution from the incineration of marine debris or other disposal methods (Carr 2019). Other costs may include actual expenditures to either prevent or recover from marine pollution e.g. cleanup and remediation costs (Calleja 2019), costs of repairing or replacing vessels or fishing gear damaged by marine debris (Van Sebille et al. 2016) as well as any medical costs incurred through marine litter related incidents (Carr 2019). Studies suggest that at-sea retrieval programs that recover ALDFG have the potential to be very costly and can cost as much as 25,000 USD per ton depending on factors such as labour costs and environmental conditions (Carr 2019). Additional costs may include losses of output or revenue to tourism, recreation, or fishing industries (Calleja 2019). Many small island developing states (SIDS) are heavily dependent on pristine beaches to attract tourists and studies have found that marine litter on beaches actually reduces the likelihood that tourists may return (UNEP 2019). More often the industries and individuals who are responsible for pollution are not actually the ones that bear the cleanup costs (Raubenheimer and McIlgorm 2018).

1.7 Potential Actions

Undoubtedly, prevention of marine pollution altogether is the preferred approach; however, truly effective prevention entails a long-term process that must start at the ground level, with smarter, more informed consumer choices along with greater commercial consciousness and responsibility (Vince and Stoett 2018). Considering that marine debris can take multiple decades or even centuries to completely degrade (Andrady 2015), taking action to reduce marine litter now would actually be an investment by society (Beaumont 2019).

For the long term, in order to effectively address the issue of marine litter, an essential component of any implemented strategy must include sufficient education on the issues surrounding marine litter and waste management in order to enable future generations to make more responsible decisions (Vince and Hardesty, 2018). Furthermore, until there are behavioural changes through education, awarenesss, and action, advances in scientific knowledge or changes in policy will be insufficient to address an issue like marine litter (Veríssimo, 2013). Another potential solution lies in extended producer responsibility (EPR) which is an environmental policy that shifts the responsibility of producers further upstream (i.e. from the taxpayers to the producers) and requires that producers finance the collection, recycling, and disposal of products (UNEP 2019). This concept also provides additional incentives to producers and encourages them to consider the environmental impacts of their product design (Carney Almroth and Eggert 2019). To achieve an overall reduction in the quantity of plastic debris entering oceans, multiple measures can be implemented and encouraged through the circular economy approach (Figure 4) (Van Sebille et al. 2016).

1.8 The Circular Economy

The concept of the circular economy has been predominantly promoted by the Ellen MacArthur Foundation as 'an industrial economy that is restorative or regenerative by intention and design' (Geissdoerfer et al. 2017). The use of the word 'restorative' is noteworthy since the circular economy strives to repair previous and existing damage through the innovation of better systems and infrastructure within industry, and maintaining products and materials at a high utility and value (Webster 2015, Murray et al. 2017, Ranta et al. 2017). Since plastics with a higher after-use value have a lower probability of being discarded, there is need to improve the design and the raw materials used as feedstocks in order to minimise further leakage (World Economic Forum 2016). Imperative to the development of the circular economy is the notion to 'design out waste' (Reike et al. 2018). The circular economy can be achieved through implementation of the principles of reuse, repair, refurbishment, remanufacturing, and long-lasting design (Geissdoerfer et al. 2017, Korhonen et al. 2018).

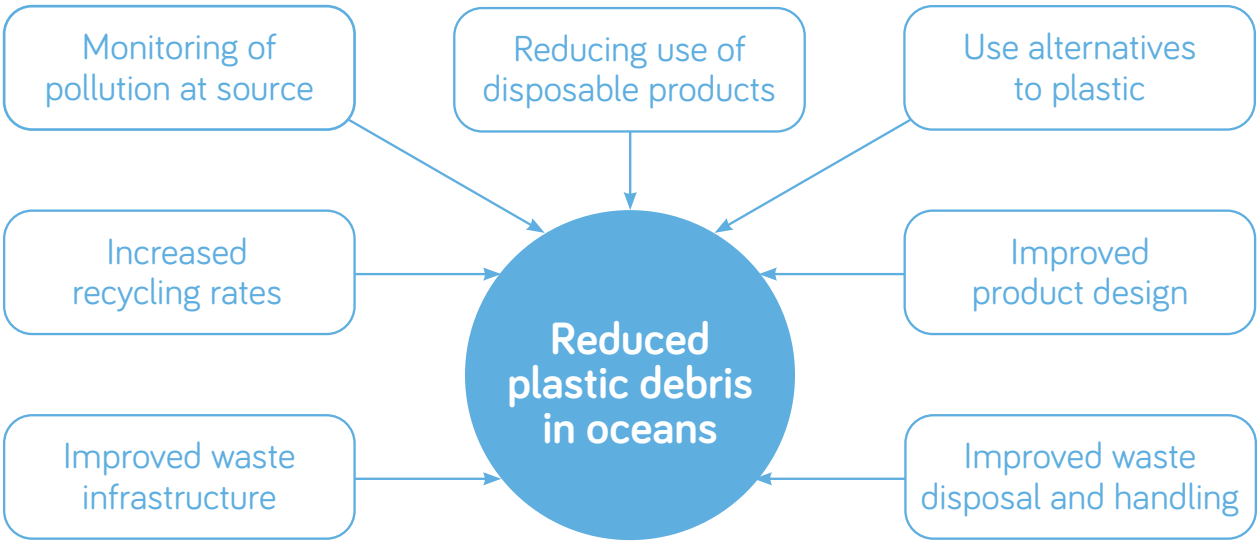


Figure 4: Measures to reduce plastic debris in oceans (Modified from Van Sebille et al. 2016)

To achieve 'circularity' there is need to transition to renewable sources, close loops through reuse and recycling and generally reduce consumption (Haas et al. 2005).

The concept of the New Plastics Economy supports and aligns with the principles of the circular economy and the overall goal is that instead of becoming waste, plastics will re-enter the economy as valuable economical or biological products (Mrowiec 2018). The New Plastics Economy (2016) also strives to minimise negative environmental and economic impacts by:

1. Establishing an effective after-use plastics economy which can be achieved by promoting more and efficient reuse, recycling as well as biodegradation.

2. Reducing the leakage of plastics into the environment

3. Decoupling plastics from fossil fuel sources and promoting and subsidising the innovation of feedstocks from renewable sources

As a result, this will lead to a reduction in the quantity of valuable material lost, encourage the use of renewable materials, create financial incentives to prevent leakage, and overall enhance productivity (New Plastics Economy 2016). Transitioning to a circular economy has a focus on sequestering plastic waste products, transforming them and reintroducing them back into the production cucle, thereby eliminating plastic waste whilst maintaining its value as a new resource (Mathews and Stretz). However the financial challenges from developing and maintaining integrated waste management programmes necessary for a circular economy approach often serves as a significant obstacle. Often governments are able to pass legislation but lack the finances needed to sustain implementation thus there is a need to ensure effective and realistic budget allocations (UNEP 2019).

" To achieve 'circularity' there is need to transition to renewable sources, close loops through reuse and recycling and generally reduce consumption"

2 Responding to Marine Litter

2.1 Global Policy, Initiatives and Activities

International Conventions

The transboundary nature of marine litter reaffirms the need for a global response; yet, action worldwide suggests that this is still not enough since the issue has worsened with lack of targeted legislation being suggested as the main reason (Raubenheimer and McIlgorm 2018). Policy addressing marine litter continues to emerge yet there is still an identified need for the development of an international convention that specifically addresses marine plastic debris (Villarrubia-Gomez et al. 2018). Thus far, there are multiple international instruments that address sea-based and land-based sources of pollution including UN Convention on the Law of the Sea, London Convention/London Protocol, MARPOL, Stockholm, Rotterdam and Basel Conventions (Villarrubia-Gomez et al. 2018).

The UN Convention on the Law of the Sea is a legal framework that governs marine activities and other land-based activities that may cause marine pollution. Whilst this convention does provide a mandate to prevent marine debris on a global scale, it does not extend to terrestrial environments where most marine debris comes from (Raubenheimer & McIlgorm, 2018). The International Convention for the Prevention of Pollution from Ships (MARPOL) is the major convention from the International Maritime Organisation (IMO) which addresses pollution from ships by specifically preventing the disposal of any form of plastic (UN Environment 2018). The London Convention and London Protocol is similar to Annex V of MARPOL in that it prohibits the discharge or intentional dumping at sea of plastic waste in all global maritime zones (Raubenheimer and McIlgorm 2018).

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their disposal has substantial merit for the international governance of plastics; however, the current framework does not classify plastics as hazardous unless they contain persistent organic pollutants (POPs) as defined under the Stockholm Convention on Persistent Organic Pollutants (Raubenheimer and McIlgorm 2018).

Global Initiatives

Adopted in 1995 by more than 100 countries and administered by UN Environment Programme (UNEP), the Global Programme of Action (GPA) addresses the impacts of land-based activities on coastal and marine environments. The GPA is the only global intergovernmental organisation that promotes collaboration amongst parties and focuses on the connectivity between multiple ecosystems (coastal, marine, freshwater, and terrestrial) (UNEP 2018). It is designed to assist states in taking actions individually or jointly by leveraging their respective policies, priorities, and resources which will lead to the prevention, reduction, control, and/or elimination of the degradation of the marine environment. Marine litter, along with nutrients and wastewater, were highlighted as the three priority focus areas by the parties of the GPA. Together with the relevant stakeholders and partners and through the three global partnerships on nutrients, wastewater management, and marine litter, governments are provided assistance and advice on how best to achieve their priorities (UNEP 2019). The Global Wastewater Initiative is part of the GPA and hosted by UNEP, has an area of focus on the entry of microplastics into the marine environment (UN Environment 2018). This Initiative is a voluntary, multi-stakeholder partnership that focuses on addressing wastewater-related issues, as well as promoting investments in wastewater management (UN Environment 2018).

UNEP also launched the *#CleanSeas* Campaign in February 2017, with the aim of engaging relevant stakeholders (e.g., the public, civil society, governments, and the private sector) in the fight against marine litter. Sixty governments have signed onto the #CleanSeas Campaign since the launch with nine belonging to the Wider Caribbean region (i.e., Antigua and Barbuda, Barbados, Colombia, Costa Rica, Grenada, Panama, Dominican Republic, Saint Lucia, and Trinidad and Tobago) (updated: April 2019).

By connecting all these stakeholders, UNEP strives to change habits, practices, standards, and policies around the globe to reduce the prevalence of marine litter and the harm it causes. Several of the governments have already started making specific commitments to protecting oceans by encouraging recycling and cutting back on single-use plastics. This CleanSeas campaign aims to tackle the causes of marine litter by focusing on the production and consumption of single use (and non-recoverable) plastics (Clean Seas 2019). By getting multiple stakeholders involved and aware, and enacting change in their daily lives and beyond, the Clean Seas Campaign hopes to be a catalyst for change (Clean Seas 2019). The campaign also contributes to the goals of the Global Partnership on Marine Litter

The Global Partnership of Marine Litter (GPML)

is a multi-stakeholder partnership that provides a unique mechanism to bring together all actors working on marine litter to share knowledge and experience and to advance solutions to this global issue. This 'voluntary open-ended partnership' has an overall goal of reducing and managing marine litter and is guided by the Honolulu Strategy (Pettipas et al. 2016). The Honolulu Strategy was developed by NOAA and UNEP and was launched in 2011 and aims to reduce the quantity and impact of land-based and sea-based sources of marine litter on shorelines, pelagic waters, and benthic habitats (Pettipas et al. 2016, Borelle et al. 2017). The major objectives of this global partnership are (UNEP 2018):

- Preventing, managing and reducing the impacts of marine litter
- Promoting resource efficiency to reduce waste
- Education on marine litter
- Assessing emerging issues associated with marine litter

2.2 Regional Policy, Initiatives and Activities.

Regional conventions

Regional Seas Conventions and Action Plans are the most relevant instruments at local scales to reducing plastic pollution from land-based sources (UNEP 2018). They are either administered directly or in collaboration with UNEP or independently via relevant regional bodies, but are all based on the principles of the GPA. The overarching aim of these Regional Seas Programmes is to not only halt the sources and activities causing marine litter, but also to eliminate litter already existing in marine environments (UN Environment 2017). Thus far, 143 countries have joined 18 Regional Seas Conventions and Action Plans for the sustainable management of marine and coastal resources (UN Environment 2019). Typically, these Action Plans are supported by legal frameworks such as regional Conventions with associated Protocols focusing on specific liter-focused aspects.

The Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention is the only agreement governing marine litter issues specific to the Caribbean region. This is achieved through the Protocol Concerning Pollution from Land-Based Sources and Activities (LBS Protocol) (RAPMaLi 2014). The Cartagena Convention and its LBS Protocol has been ratified by 25 United Nations Member States in the WCR and is a legal structure; signatories are required to engage in activities to prevent, control, and reduce pollution of the Convention area. The Convention area covers the marine environments of the Gulf of Mexico, the Caribbean Sea and the adjacent areas of the Atlantic Ocean. The Land Based Sources (LBS Protocol) Protocol enables the WCR states to meet the goals and obligations of the UNCLOS and the GPA (UNEP, 2019) and facilitates the development and adoption of future annexes to address priority areas related to land-based sources of pollution.

The RAPMaLi for the wider Caribbean Region serves as a comprehensive tooklit to set priorities, address

the challenge of plastics pollution, and achieve the objectives of the LBS protocol (RAPMaLi 2014). The RAPMaLi for the WCR was originally developed in 2007 and first adopted in 2008 as a project under the directive of UNEP (through its Regional Seas Program) as a regional policy response to the growing global concerns of litter accumulation in the Caribbean Sea. The Caribbean Regional Coordinating Unit of UNEP undertook the task of compiling and developing the RAPMaLi. The RAPMaLi was designed to serve as an important resource to assist SIDS in incorporating components of proper waste management across all sectors. These sectors included but were not limited to governmental legislation, enforcement, monitoring and research, community engagement, and the business sector.

The primary action categories include:

- Legislation, Policies and Enforcement
- Institutional Frameworks and Stakeholder Involvement
- Monitoring Programmes and Research
- Education and Outreach
- Solid Waste Management

2.3 Introduction to Caribbean Node of the Global Partnership on Marine Litter

The GPML Caribbean Node (GPML-Caribe) was formed in 2015 and represents a partnership for national and regional organizations, governments, research and technical agencies, and individuals that work to reduce the quantity and impact of marine litter in coastal zones of the Wider Caribbean Region. The objectives of the node are defined by its goal and mission:

The Goal of the Node is to achieve the objectives of the GPML and the Regional Action Plan on Marine Litter (RAPMaLi), which was endorsed by the Contracting Parties to the Cartagena Convention.

The Mission of the Node is to provide leadership, information, and resources in the efforts to reduce marine litter in the Caribbean Sea.

The Roles of the Node include:

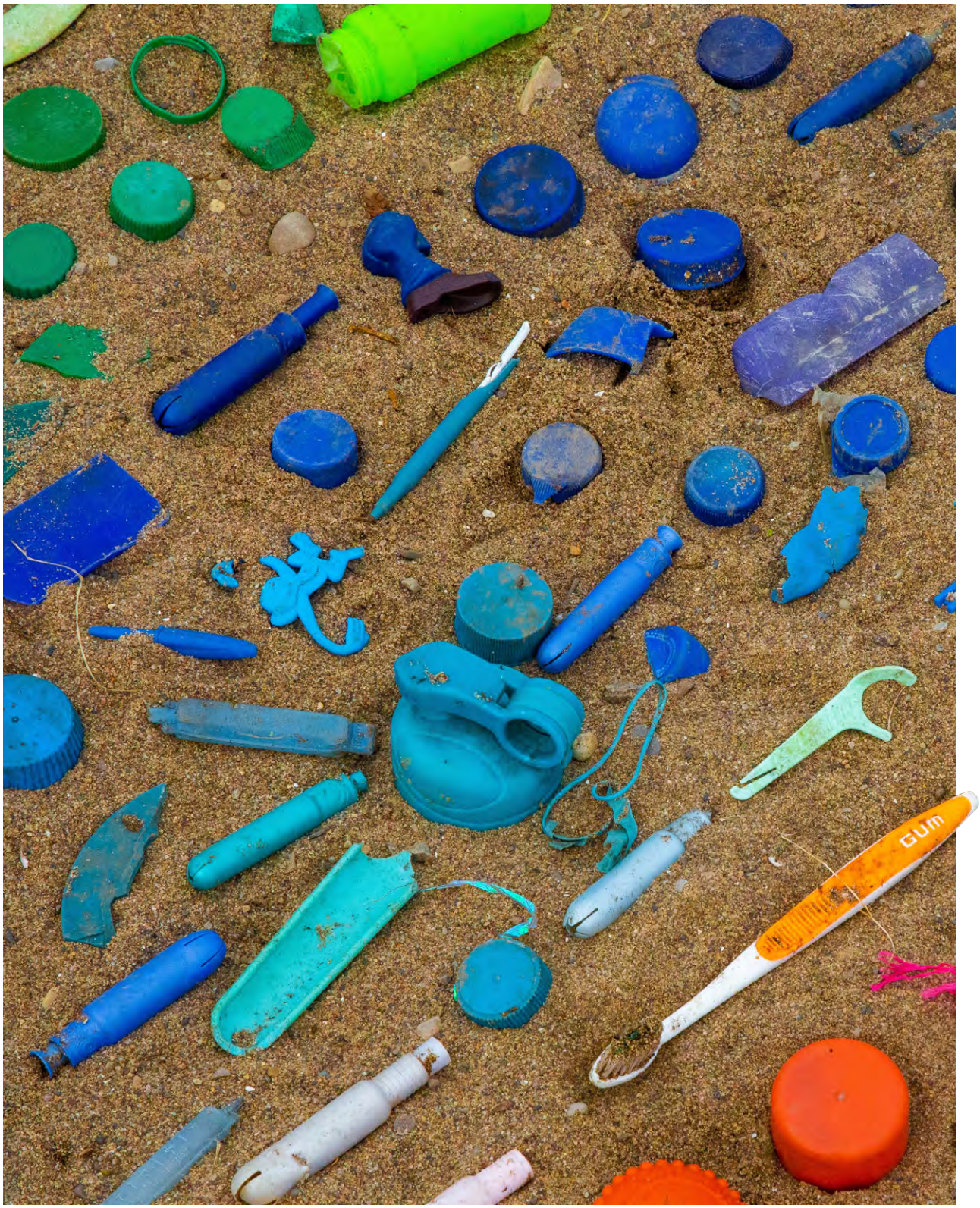
- Share best practices and case studies
- Update key actors on state of knowledge of technical marine litter issues
- Facilitate discussions on barriers and solutions, especially online
- Encourage regional-level proposals to compile best practices, gap analyses (e.g., socio-economic aspects), assimilate guidance on technical methods and protocols

Leadership of the Node:

The Gulf and Caribbean Fisheries Institute (GCFI) and the Secretariat for the Cartagena Convention (UNEP/CEP)_are the co-hosts of the GPML-Caribe. GCFI organizes activities including workshops and technical sessions both within and external to the annual GCFI conference. GCFI provides capacity-building opportunities, and provides information to stakeholders related to marine litter activities in the region. The Secretariat for the Cartagena Convention ensures synergies with the obligations of its Contracting Parties and supports implementation of the Land-Based Sources of Marine Pollution (LBS) Protocol and the Caribbean Regional Action Plan for Marine Litter. This includes support for national and regional marine litter projects as well as promoting national policy and legal reforms. These activities are implemented through technical and high level meetings of the Cartagena Convention and its Protocols, a dedicated webpage, social media platforms, factsheets, infographics, development and implementation of solid waste and marine litter related projects, and sharing of information on new grant opportunities.

2.4 Need For The Marine Litter Strategy

Developing a marine litter strategy for the Wider Caribbean Region is essential in order to define priorities and implement measures to reduce the quantity of litter being released into marine and coastal environments and minimise the risk of harm to humans and wildlife. The Wider Caribbean Region is one of the most geopolitically complex regions in the world (Chakalall et al., 2007, Mahon et al. 2010, Fanning and Mahon 2017) with all of the islands being previous colonies of Europe (Lausche 2008). As a result their political systems and cultural traditions were affected by their diverse historical backgrounds which created varying legal and administrative approaches (Lausche 2008). This diversity and complexity is further strengthened by the variation in physical size, levels of development, types of governments and geopolitical arrangements across five languages (Lausche 2008, Fanning et al., 2009, Fanning and Mahon 2017). Thus, it is important to develop a regional, unified approach to dealing with a transboundary issue such as marine litter.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3 Overview and Implementation of the Marine Litter Strategy

3.1 Overview

Aims and Objectives: to achieve the objectives of the GPML and the RAPMaLi, which was endorsed by the Contracting Parties to the Cartagena Convention. This strategy builds on the substantial amount of work already underway at the local and regional level by adding greater coordination of efforts.

Mission: to identify achievable, priority actions at the national and regional level focused on reducing marine litter in the Wider Caribbean Region. The overall vision is a healthy Caribbean Sea without risk from marine litter.

Strategic Goals: The vision links to nine strategic goals of the Marine Litter Strategy and associated actions. The strategic goals are to:

1. Reduce the risk to human well-being and the environment
2. Increase monitoring and assessment activities related to pollution
3. Enhance inputs from scientific research in monitoring activities related to pollution
4. Increase stakeholder participation in research and monitoring activities related to pollution
5. Identify and develop improved solid waste management approaches
6. Create or enable policies and legislation that contribute to the reduction in marine litter
7. Engage private sector to achieve policy and management-based solutions to pollution
8. Ensure effective communication to ensure pollution mitigation and reduction
9. Provide capacity building support

Strategy implementation and review:
Responsibility for implementing the measures recommended within this strategy will be shared amongst multiple stakeholders ranging from government and non-governmental organisations, academic and research institutes, civil society, resource users amongst others. The strategy will require regular review, in partnership with stakeholders. A review of the strategy's effectiveness will be undertaken through to 2022 with a further review proposed for 2025. A monitoring framework to evaluate the success of the strategy will also be developed.

3.2 Implementation Of The Marine Litter Strategy

Development of goals, objectives, and actions

A strategic planning workshop was convened in Miami, USA from 26 to 28 March 2019 where the goals, objectives, and actions presented in this strategy were discussed and agreed. The structure of this workshop relied heavily on the relationship between a specific theme and associated goals, objectives, and actions. In general, each goal was an overarching desired result associated with the theme. Objectives were management-focused and represented approaches that would help to achieve the associated goal whilst actions were activities that would help achieve the objective. In this way, actions were tied directly to a management response.

Based on the RAPMaLi and previous mandates provided to the Secretariat, the following themes were proposed and endorsed:

1. Research and Monitoring
2. Governance: Including Institutional, Policy & Regulatory Frameworks and Enforcement
3. Communication: Including Outreach, Education, Awareness & Advocacy
4. Capacity Building & Training

3.3 Identification of Priority Actions

Following the identification of goals, objectives, and action items, a prioritisation activity was conducted where participants established whether actions were a priority at the national level; regional level; both the national and regional level or not a high priority. From this exercise the following actions became evident as a priority at varying levels across the identified themes.

Research and Monitoring

In order to develop effective policies, governments and policy-makers must have the best available relevant information from research and monitoring. The Research and Monitoring Theme focused on the scientific research and monitoring needs that were identified to achieve the outcomes related to the overall reduction of marine litter in the WCR (Table 1).

Table 1: Identified priority actions in the Research and Monitoring Theme

Goal 1: Reduce the risk to human well-being and the environment	Priority level
Identify and facilitate the transfer of knowledge, best practices and appropriate technology aimed at pollution prevention and reduction by conducting a survey countries in the region to identify specific reduction / prevention pollution programs in place	Regional & National
Investigate innovative approaches and technologies for improving marine litter management including monitoring, recovery and removal	Regional & National
Identify appropriate tools to examine alternative future scenarios	Regional & National
Develop a region-wide spatial database on areas impacted	Regional
Conduct a GAP analysis of overlap of high density marine litter areas with areas of high sensitivity (endangered species, key habitats, etc.) in order to prioritise clean-up and mitigation efforts	Regional
Goal 2: Increase monitoring and assessment activities related to pollution	
Identify potential partners and sources of funding for ongoing and new projects and activities in particular unfunded projects	Regional & National
Identify and share opportunities for improving marine litter monitoring and assessment programmes, laboratory strengthening and monitoring capacity, and technical training and assistance	Regional & National
Goal 3: Enhance inputs from scientific research in monitoring activities related to pollution	
Develop harmonised monitoring protocols by integrating existing programs (Trash Free Seas) with comprehensive beach monitoring protocols (OSPAR) at targeted sites	Regional & National
Identify research to assess the role of sargassum as a transfer mechanism for marine litter	Regional
Appoint national and/or sub-national co-ordinators for monitoring activities	National
Identify and secure funding for monitoring activities	National

Table 1 continued

Goal 4: Increase stakeholder participation in research and monitoring activities related to pollution	Priority level
Develop an enabling environment for increased civil society and private sector investment in the prevention and reduction of marine litter (including microplastics)	Regional & National
Identify potential partners and sources of funding for ongoing and new projects and activities in particular unfunded projects	Regional & National
Identify the domain of stakeholders involved in pollution reduction decisions, actions and financing	Regional & National
Reduce the economic impacts from pollution pollution	Regional & National
Identify or create accessible database for contributions for regional marine litter data from citizen scientists	Regional
Identify social barriers to long-term commitments by volunteers	National
Goal 5: Identify and develop improved solid waste management approaches	
Identify alternatives to existing products and technologies	Regional & National
Identify approaches for effective management of ship-generated waste	Regional & National
Support efforts to reduce excess and/or unnecessary consumer product packaging	Regional & National
Survey country representatives to determine existing public-private partnerships	National
Identify and quantify social impacts from pollution to multiple sectors	National
Conduct research on most appropriate types of messaging for effective communication at various levels to effect attitudinal and behavioural change	National
Identify best use of technology to enable and support marine litter initiatives and remove counterproductive technology	Regional

Governance

The Governance Theme focused on identifying the actions needed to achieve effective governance of marine litter issues at the local and regional scales. As with all the research themes, the overall focus was on achieving the goal of the efficient and cost-effective reduction of marine litter in the WCR. In general, this theme focused on policy, legal, and enforcement research needs and gaps as well as approaches that ensure that society and its associated governance structures are sufficiently equipped to respond to the impacts of marine litter (Table 2).

Table 2: Identified priority actions in the Governance Theme

Goal 1: Create or enable policies and legislation that contribute to the reduction in marine litter	**Priority level**
Conduct stakeholder mapping at national and regional levels	Regional & National
Conduct an assessment of existing policies, identification of gaps, and preparation of guidelines for integrating marine litter issues	Regional & National
Develop/Identify institutional mechanisms for coordination at the regional level	Regional
Convene partnership forums to identify institutional mechanisms for coordination at the regional level	Regional
Conduct research on taxes, subsidies (import, export, stressors)	National
Assessment of existing policies, identification of gaps, and preparation of guidelines for integrating marine litter issues	National
Identify and assess the barriers to implementing pollution mitigation	National
Goal 2: Engage private sector to achieve policy and management-based solutions to pollution	
Assess existing fiscal incentives, taxes, fines and subsidies (import, export, stressors) towards providing guidelines for fiscal policy reform and investment	National
Analyse governance arrangements to incentivize private sector	National
Develop recognition programs for eco-friendly products/ services that promote litter-free products/ services targetting the tourism, agriculture, and manufacturing sectors	Regional & National

Communications

The Communications Theme focused on the research needed to achieve effective communications to a diverse group of stakeholders including the societies and communities impacted by pollution as well as the decision-makers and government officials. In this sense, the research topics address both advocacy and information transfer. This theme was primarily driven by the recognized need to effectively communicate policies, priorities, and the results of scientific endeavors that can achieve the goals of marine litter reduction (Table 3).

Table 3: Identified priority actions in the Communications Theme

Goal 1: Develop effective communication tools to ensure pollution mitigation and reduction	Priority level
Implement communication plans to inform stakeholders and public about marine litter	Regional & National
Identify existing and potential sources for communications funding	Regional & National
Develop and implement media efforts to targeted audiences	Regional & National
Create, compile and share best practices for communications and messaging	Regional & National
Work with GCFI to host a Marine Litter special session at it's annual meeting	Regional
Attend and present at relevant regional and international environmental meetings	Regional
Establish and maintain a publicly available regional marine litter repository	Regional
Target community and national events to incorporate marine litter reduction strategies	National
Include marine litter related events on community and national calendars	National

Capacity Building

In order to implement the actions of the research and monitoring, governance and communication themes and also for overall implementation of this strategy, there needs to be sufficient capacity. To address this issue, the primary focus of the Capacity Building theme is to identify the technical, financial and logistical areas where capacity building is required to reduce marine litter in the WCR (Table 4).

Table 4: Identified priority actions in the Capacity Building Theme

Goal 1: Provide capacity-building support for achieving research and monitoring activities	Priority level
Identify platforms of opportunity for data sharing	Regional & National
Provide training opportunities for scientists	Regional & National
Identify stakeholders including fishers to assist with marine litter research and monitoring	National
Develop training programs for citizen scientists	National
Facilitate exchanges of research and monitoring resources in the region	Regional
Develop personnel exchange programs and peer to peer collaborations for research and monitoring	Regional
Goal 2: Provide capacity building support for achieving effective governance activities	
Facilitate workshops focused on developing effective governance approaches	Regional & National
Provide assistance to prepare or improve effective marine litter management plans	Regional & National
Provide training for judiciary/ magistrates/ enforcement officers and sensitization of politicians on marine litter issues	National
Facilitate vertical and horizontal management interactions	National
Develop cooperative exchange and communications programs among enforcement agencies	National
Goal 3: Provide capacity-building support for achieving communication (E,O,A,A) activities	
Provide access to communication tools and resources (e.g., webinars. social media, podcasts, informational materials)	Regional & National
Provide a regional platform for communicating proven and effective EOAA approaches	Regional
Present information on the marine litter issue at key environmental meetings and conferences in the Region	Regional
Facilitate linkages among disparate sectors	National
Translate critical EOAA documents into local languages for dissemination	National

Table 4 continued

Goal 4: Provide capacity building support for implementing priority activities	Priority level
Develop a roster of local, regional and international experts in the field of marine litter	Regional & National
Identify funding sources to allocate for the implementation of identified priority activities	Regional & National
Provide diverse training opportunities to facilitate the implementation of identified priority activities	Regional & National
Identify, compile, create and share knowledge, information and recent advances in the field of marine litter	Regional & National
Create, compile and share best practices from the region to increase success of project implementation	Regional & National
Provide information and support for development of business cases for investment	Regional & National

Subsequent to the prioritisation activity for the development of this Marine Litter Management Strategy, GPML-Caribe has also considered priorities from LBS Focal Points and reflected them in the Strategy. Furthermore there is a strong desire to strengthen partnerships, namely with GPML-Caribe, the IMO Glolitter Project, FAO and the Basel Convention Regional Centre in the Caribbean and include a stronger focus on the management of hazardous waste and ship-generated waste.

3.4 Barriers to Implementation

Preventing or controlling marine litter in the Wider Caribbean Region is likey to be met with some opposition in the form of barriers and gaps. When implementing any strategy, there are always barriers which may manifest as policy instruments being limited or prevented from being implemented or being overlooked with strategies becoming less effective. The most typical barriers to implementation include:

1. Legal and institutional barriers: such as inadequate (or uncoordinated) policy, legislative and institutional frameworks (Corbin 2013)

2. Financial barriers: such as inadequate budget alloacations in the public sector and a lack of appropriate business cases to encourage private sector investment in waste and plastic recycling (RSCAP)

3. Political and cultural barriers: such as lack of political or public acceptance or attitudes to enforcement (Corbin 2013)

4. Development barriers: when there are multiple, competing national priorities such as food security, public health, law and order, education and development, environmental issues often are often downgraded as a priority for government funding (UN Environment 2008)

5. Practical and technological barriers: such as with limited recycling and markets for solid waste, and space constraints in the small islands, countries in the wider Caribbean are struggling to deal with the vast quantities of waste produced (UN Environment 2019)

6. Education barriers: limited or lack of awareness especially at decision making levels can lead to low political will to sufficiently address these issues (UN Environment 2008).

Other barriers to implementation

- Lack of human, financial and technical resources (Corbin 2013}
- Insufficient time to implement on-the-ground concrete activities e.g. mobilisiing national partners (RSCAP)
- Governments often lack the capacity for action in waste issues and are under-resourced (UN Environment 2019 – SIDS)
- Many agencies have partial responsibility for select components which leads to a division of resources and ineffectiveness in overall marine litter management (RAPMaLi)
- Lack of harmonised monitoring for marine litter at national and regional levels including a robust data base/information platform (RSCAP)
- Maintaining integrated waste management programmes that lead to a circular economy are a hindrance to progress as funds are only sufficient to pass legislation and are inadequate for implementation (UN Environment 2019 – SIDS)
- Increased tourism brings along waste that are not easily managed on islands (UN Environment 2019 – SIDS)
- Lack of private sector involvement in addressing the issue of marine pollution (UN Environment 2008)

Governance is often the main barrier to implementation and it encompasses policies, laws, legislation, regulations, management plans and procedures which will dictate how individuals, organisations and government should act (Mathews and Stretz 2019). Current governance systems in the WCR often lack sufficient legal and regulatory frameworks, resources for enforcement and the capacity to provide the necessary conditions for proper plastic management (Mathews and Stretz 2019). To fully address plastic pollution and prevent marine litter from entering the environment, governance system should target behaviours at a national, regional and international level (Mathews and Stretz 2019). At the national level, governments provide the necessary legal frameworks for various sectors whilst also addressing allocation of resources. International norms and pressure can provide the necessary stimulus for local governments to act, but can also serve as external motivation for companies to reassess their strategies to incorporate more of a circular economy approach to production (Mathews and Stretz 2019). Behavioural change will only be successful if there is sufficient waste management services available and education on the impacts and pathways of pollution. The manner in which individual buy, use and discard their plastics is essential for addressing plastic leakage and often this behaviour is affected by their environment which either incentivizes specific behaviours or deters them (Mathews and Stretz 2019). Thus, to change individual behaviour, Mathews and Stretz (2019) recommend that governance supports:

- Reduced consumption
- Increased opportunities for waste collection, reuse, recycling
- Increased enforcement
- Production of more durable, repairable and recyclable products

Nonetheless, in order to efficiently and effectively target marine litter, there also needs to be adequate **education** on marine litter management and other practices in order to enable responsible decision making for future generations (Vince and Hardesty 2018). Transferring scientific knowledge and legislation changes to positive action will only occur if behaviours change as a result of outreach and education (Veríssimo 2013). There is need for a co-ordinated approach to ensure standardised yet targeted messaging and avoid duplication of efforts which leads to greater impact and engagement (CliP 2019). Some of the potential barriers to communication activities (including outreach, education and awareness) include

- Inadequate financial resources to sustain effective outreach and awareness campaigns
- Inadequate coordination of campaigns leading to duplication of efforts and mixed messaging
- Inadequate public awareness of the negative impacts of marine litter resulting in unwillingness to change behaviours
- Lack of targeted / specialised messaging which leads to unsuccesful campaigns due to unrelatable content
- Lack of awareness from law enforcement officials which can undermine the success of campaigns
- Lack of political support or addressing of environmental issues on national political platforms

4 The way Forward

4.1 Financial Innovation

To ensure sustained and effective waste management, collection, treatment, disposal and recycling services, there needs to be sufficient financial resources for infrastructure, maintenance and operations (Mathews and Stretz 2019). Often these can be secured through fees or taxes on services or products, national budgets or even international support operations (Mathews and Stretz 2019). In a circular economy approach, creating a market and giving value to plastics that would other otherwise be discarded can provide revenue. Within the circular economy, companies should nurture new business models, which would generate revenue from services rather than products and consumers can use products and dispose of them in such a way that they can be reused or if unfeasible, transformed into secondary materials to supply a new production-consumption cycle (Figure 5) (van Veen 2019).

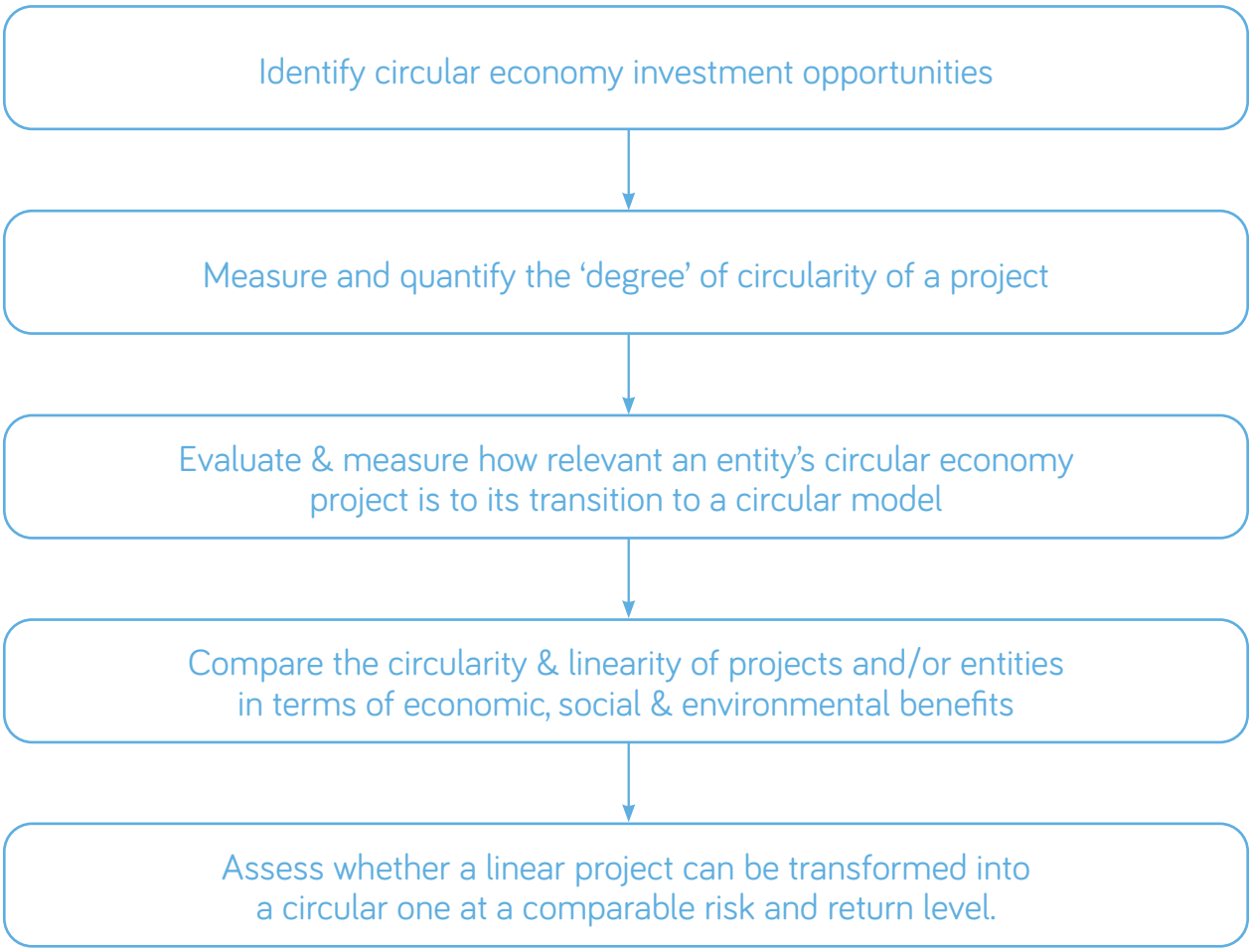

Figure 5: Methodology for transitioning to a circular economy business model (Modified from: van Veen 2019)

When it comes to financing circular economy projects, there are often differences of opinion between the business and financial sectors. The business sector can argue that the financial sector is unable to sufficiently conduct a cost benefit analysis of the circular approach and therefore the risks associate can be overstated whereas the financial sector can argue that utilizing new technologies and business models are too uncertain and thus not bankable (van Veen 2019). To improve the potential for financing circular economy projects, the European Union set up an Expert Group on Circular Economy Financing that assessed the main barriers and identified where incentives should be provided (van Veen 2019):

- Level playing field: to allow circular businesses a more competitive chance of succeeding in the market
- Value-chain collaboration: to optimize circular solutions to ensure that materials and resources are maintained in a constant loop
- Long-term value creation: to reward product longevity in business models
- Market participation: to change behaviours to make products circular by ensuring participation by consumers and end-users
- Integration of the public good: to consider the benefits of positive externalities and the cost of negative externalities
- Finance knowledge build-up: to ensure that financiers and investors are fully educated to correctly value business models
- First mover's action: to act as a magnet for new or existing entities to change their business models

4.2 Best Practices and Lessons Learned

When plastics leak into the ocean and other ecosystems, they can persist for centuries which can cause great harm to these systems whilst also causing great economic costs (World Economic Forum 2016). In general there are four main ways to reduce plastic pollution (Figure 6).

1. Reducing the use and manufacture of plastic products
2. Increasing the reuse and recycling of plastic products
3. Reducing the mismanagement of plastic products by addressing plastic leakage
4. Removing plastic products from the ocean and coastal environments

Economic instruments such as bans and financial disincentives have been introduced to target marine pollution and especially single-use plastics especially in countries where effective waste infrastructure is lacking. (UN Environment 2018). Over the last 10 years there has been increased discussion on the implementation of plastic and styrofoam bans in the WCR in order to regulate the manufacture and use of disposable plastic items (See Case Studies in Annex C). In instances where there is difficulty of recovery of materials for recycling or where there are alternatives, these restrictions or bans tend to be an effective short-term solution (UN Environment 2018). Reducing the use and manufacture of single-use plastic carrier bags has been achieved globally and regionally through a combination of multiple approaches:

- Taxing consumers by charging a nominal fee (0.05 – 0.25USD per bag)
- Taxing manufacturers
- Restricting the production, distribution and use by banning imports/exports
- Regulating their disposal via deposit and return schemes

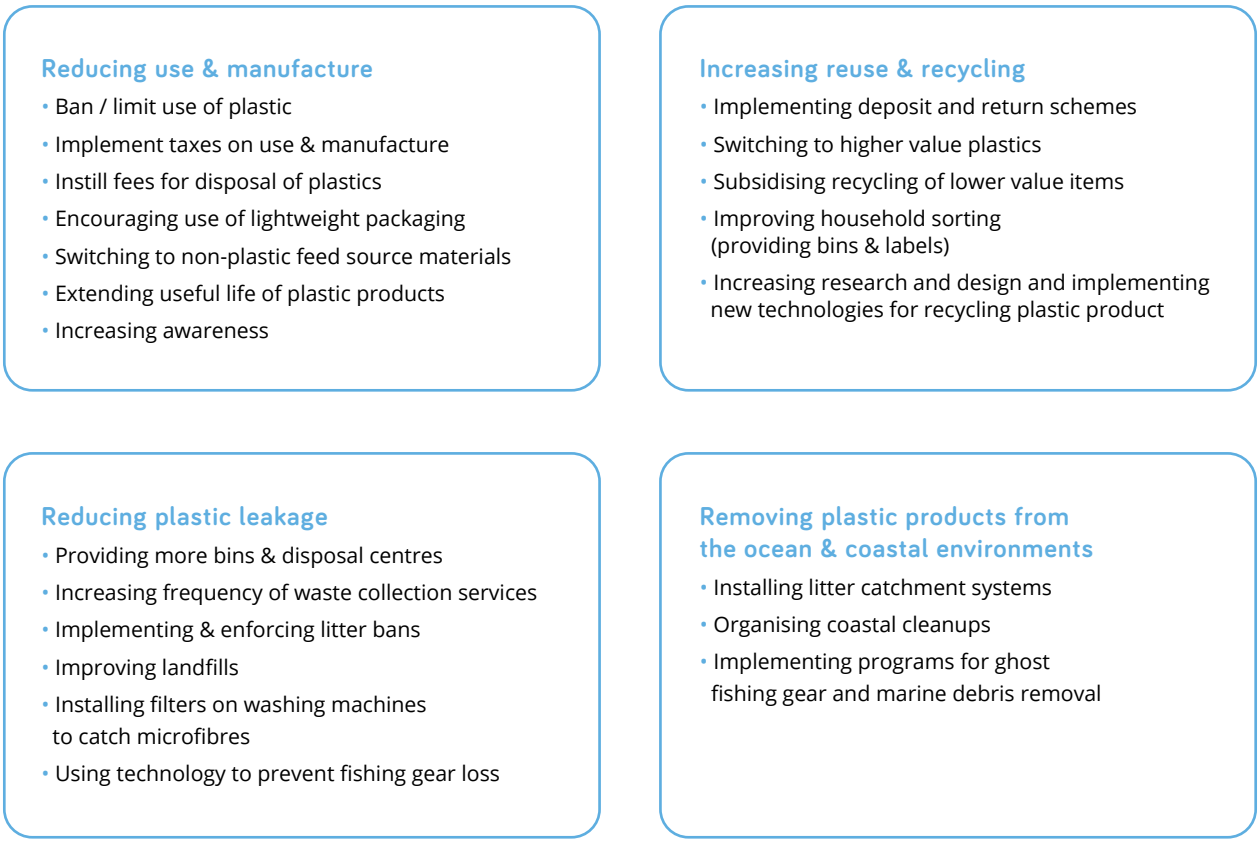

Figure 6: Four main strategies to to reduce plastic pollution

4.3 Implementation

In an effort to mitigate the impacts of plastic pollution, many government, non-government, and private sector organisations rely on policies, bans and outreach efforts as well as waste abatement infrastructure (Willis et al. 2018). Outreach activities are essential for increasing awareness and changing behaviours amongst producers and consumers (See Case Studies in Annex C). Policies target waste before it has entered the environment by attempting to minimise plastic production, consumption, and use, whereas waste-abatement outreach efforts and enhanced infrastructure focuses on waste both before and after it has entered the environment (Willis et al. 2018). Waste abatement infrastructure targets waste before or while being transported within the environment (e.g. bins for persons to dispose of their waste or gross pollutant traps which capture larger litter items in waterways) (Willis et al. 2018).

UNEP and the GPML-Caribe has taken a collaborative approach to waste management in the Whitehouse & Bluefields Solid Waste Reduction Project in Jamaica managed by the Sandals Foundation, (Annex C). These communities generate large volumes of garbage that either end up on the coast or in the sea. The project introduced the separation of waste through the implementation of recycling and compost bins in order to divert waste from the landfill and reduce pollution. Key to the success of this project was the implementation of community-based waste management whereby leaders in the community were encouraged and empowered to manage and take ownership of the project. These leaders facilitated increased 'buy-in' from consumers and also provided consistent enforcement of the project leading to enhanced success results (Annex C). Nonetheless, any efforts to improve collection and infrastructure only mitigates against plastic entering into the environment rather than completely halting it (World Economic Forum 2016).

Table 5: Summary of lessons learnt in the Wider Caribbean Region (Modified from Nicholls 2018)

Lesson Learnt	Case Study Example
To guarantee full compliance with any new policies and regulations, effective enforcement and monitoring is essential	In Guyana, the Environmental Protection Agency was given powers to be able to perform inspections and encourage compliance
Penalties need to be high enough to deter non-compliance (i.e. the penalty needs to be higher than the profit). These penalties can range from fines to community service or even imprisonment	In the US Virgin Islands, any businesses found to be non-compliant could be fined US$500-1000 per each day
Any finances gained from fines should be channelled into either an environmental fund or a waste management program	In the US Virgin Islands, any money collected is shared between the Virgin Islands Waste Management Authority (75%) and the General Fund of the Treasury of the Virgin Islands (25%)
Delays in the implementation of bans occur mainly due to opposition from consumers and/or business owners in the form of financial losses or mere inconvenience. Thus a phased approach is preferred as it allows business to get rid of their stock and transition to more environmentally-friendly products, and also time for stakeholders to educate the public about the new measures	In Antigua and Barbuda, a phased approach was key to the success of the implementation of their ban
For bans to be successful, there needs to be a combination of policy and/or market based approaches; public awareness campaigns, changed cultural behaviour and attitudes to plastic use and disposal. The goal of this is to educate the public about the negative harm caused by plastic products whilst also making them aware of the plethora of environmentally friendly alternatives. There is also need for encouragement at all levels to reduce waste production, recycle where possible and overall find more sustainable ways to manage waste	In Guyana and St Vincent and the Grenadines, the new regulations require that the relevant agencies should "offer guidance on, promote and encourage the utilisation of recyclable, biodegradable and other environmentally friendly products as containers, or packaging for food products".
To assess the success of implemented measures and determine what modifications need to be made, there is need for ongoing monitoring. A baseline study should be established prior to the new measures being implemented subsequent to which additional data should be collected at frequent intervals	

Plastic and Styrofoam Bans

There have been various actions taken by the public, private sector entities and governments in order to minimise the production and use of plastic bags and Styrofoam items. In the private sector especially, there have been substantial efforts to green the tourism industry (See Case Study in Annex C). Although bans on plastic and Styrofoam can target plastic overuse, improved waste management can lead to longer-term solutions. By introducing financial incentives that may change consumer, retailer and manufacturer habits whilst implementing policies that adopt a circular economy approach, goverments can improve waste management in the region (UN Environment 2018). Furthermore by working together with industry, governments can also support the development and promotion of sustainable alternatives in order to phase out single-use plastics and styrofoam products. But, to enact change in the attitudes, awareness and behaviour of the public, there needs to be sufficient awareness. Public pressure has proven to be instrumental in countries like Bali and New Zealand where youth have been able to influence the implementation of national bans.

If properly planned and enforced, these bans have potential to target the cause of plastic overuse. Thus far, more than 60 countries globally have enacted some sort of ban or levy to reduce single-use plastic waste. The target by these governments have mostly been single-use plastic bags and bottles as well as styrofoam which are some of the most prevalent forms of plastic pollution (UN Environment 2018). Within the Wider Caribbean Region there has been some variation as to the status of plastic and styrofoam bans implemented (Figure 7). Thus far, 18 territories have already definitively banned single-use plastic and/ or Styrofoam products, 2 have announced bans for 2020/2021, 14 territories are discussing the ban at a government level, 4 territories have voluntary bans developed by private sector, NGOs, and other stakeholders. In 2016, Antigua and Barbuda became the first territory in the WCR to implement a ban on single-use plastic bags and has been a pioneer in the fight against marine plastic pollution. The initiative launched to eliminate plastic bag usage in Antigua and Barbuda was successful due to a very detailed planning process (Annex C).

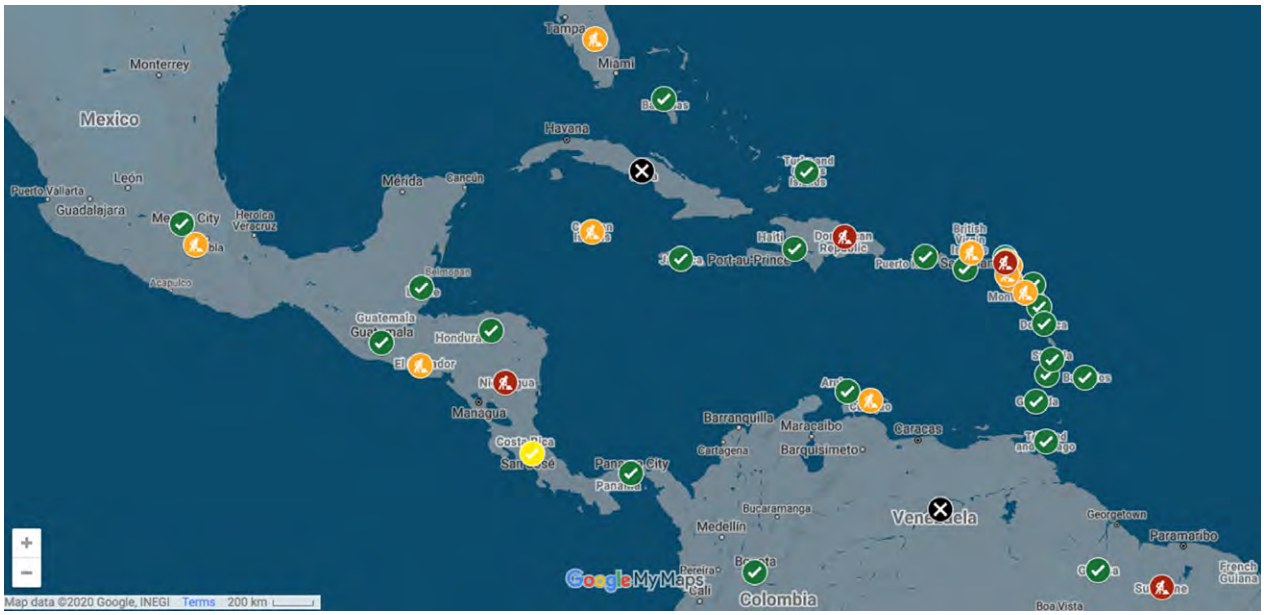

Figure 7: Status of styrofoam bans in the Wider Caribbean Region as of 2020

Based on the experiences of more than 60 countries that have implemented bans and other restrictions on single use plastics (mostly plastic bags and styrofoam products), UN Environment (2018) developed a 10-step roadmap to guide governments and other decision makers on a policy approach to dealing with single-use plastics (Annex D).

Cleanups, Citizen Science and Monitoring

The primary focus of physical removal efforts is to remove waste already present in the environment but they also have the added benefit of changing human behaviours and creating a sense of altruism and custodianship (Williams and Rangel-Buitrago 2019). Beach cleanups tend to be concentrated in sink areas (i.e where waste is deposited and accumulates) rather than where waste enters the environment (the source) and thus only have superficial aesthetic results and only capture a small percentage of macro litter (Willis et al. 2018, Williams and Rangel-Buitrago 2019). Moreover, even though beach cleanups are time and labour intensive, there is an immediate positive impact through the direct removal of litter on shorelines before they enter into waterways and a useful means to acquire data for further use in monitoring marine litter prevalence and impacts (Williams and Rangel-Buitrago 2019).

Monitoring trends in marine litter loads, density, abundance, and composition is essential for assessing their impact and designing effective preventative and mitigative measures (Haarr et al. 2020). Often in-depth monitoring programs are very costly, especially to collect data to achieve sufficient replication and over an extensive time period (Haarr et al. 2020). As a result, monitoring efforts utilising citizen science have increased in usage and often serves as the main source of national and regional data. Reports show that the main data source for marine litter in the WCR is from surveys by the Ocean Conservancy including the International Coastal Cleanup (ICC), Project Aware's Dive Against Debris, and Ocean Conservancy's Clean Swell App (Caporusso and Hougee 2019).

One of the largest and most successful examples of using citizen science to remove and monitor marine debris in the environment is the ICC. Since it's inception in 1986, more than 11.5 million citizen science volunteers have participated to remove more than 225 million individual litter items weighing more than 100 million kilograms (Zettler et al. 2017). In 2019, a Regional Clean Seas Campaign was launched for the WCR which built on the annual ICC activities with support from the Caribbean Youth Environment Network (CYEN) (Annex B).

Through the campaign, capacity-building support was provided to various stakeholders for outreach, advocacy, and resource mobilization to reduce marine litter whilst cleanup activities were used to field test a harmonized marine litter monitoring methodology (Annex B). The harmonized approach to monitoring marine litter allows for engagement with citizen scientists for monitoring while ensuring good-quality data collection, cost effective and efficient means of data collection, and maximizing litter removal on pre-selected sites (Annex B).

Evidence currently shows that the majority of macroplastics stem from products originating from domestic households, commercial activities as well as tourism. Thus there is need to change consumer habits whilst also developing novel reusable business models and products that have higher material value at the end of their life cycle (UN Environment 2018). Microplastics on the other hand are much more difficult to trace back to source and thus there is need for a legislative and consumer education approach to management (UN Environment 2018). In general, the issue of plastic pollution has become a household topic due to viral images on social media along with numerous global campaigns and initiatives. However, there to capitalise on this momentum, there needs to be adequate coordination and leadership, so that sustainable strategies and solutions can be designed with local and regional considerations in mind (UN Environment 2018).

4.4 Final Reflections

The development of this management strategy could be viewed as a whole-system approach to identifying and prioritizing gaps and possible responses. It is unrealistic to expect that all the identified actions can be implemented due to their vast scope and the technical and financial resources required. However, addressing these priority areas at the national or regional level is certainly achievable, especially if addressed strategically. Furthermore, due to climate change, marine conditions and ocean circulation patterns are likely to be affected, which reinforces the ever-evolving need for research to be responsive to changes whilst acknowledging that novel issues are likely to emerge.

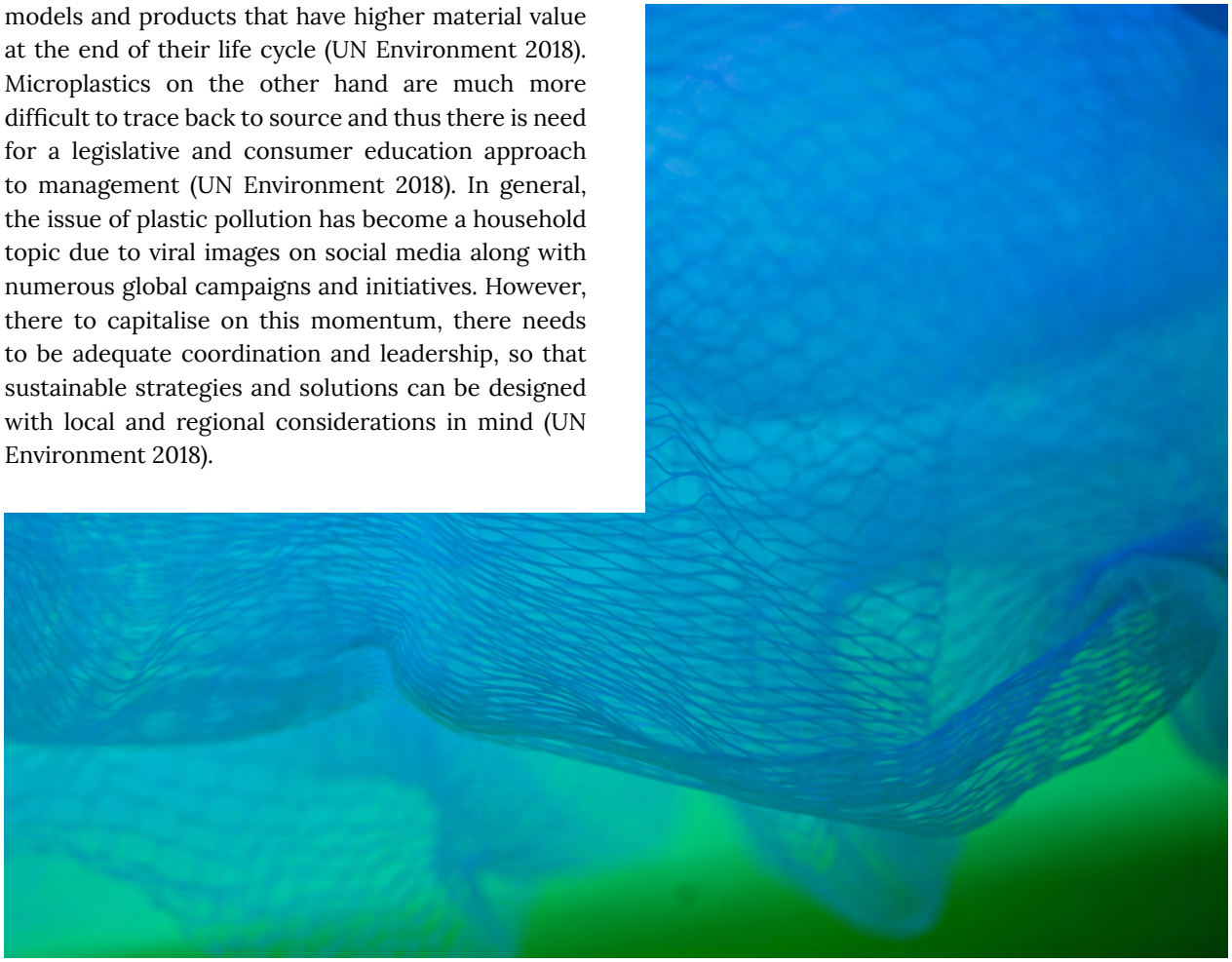

Table 6: Recommendations for marine litter management

Research & Monitoring	Governance	Communication	Capacity Building and Implementation
Improving the baseline on marine pollution and water quality in the region through standardised monitoring methods (Diez et al. 2019)	Strengthen and harmonise existing structures, policies and legislation to reinforce regional governance mechanisms and achieve international mandates and commitments (Diez et al. 2019)	Increase public awareness about the impacts of marine pollution and the importance of marine ecosystems in order to induce behavioural change (Diez et al. 2019)	Improve local expertise and technical capacities related to marine pollution and water quality (Diez et al. 2019)
Improving assessments on the economic impacts of marine pollution including cost-benefit analyses under multiple scenarios (Diez et al. 2019)	Integrating pollution prevention and control policies into national policy and planning frameworks (Diez et al. 2019)	Strengthen information systems so that information like issues, best practices and other recommendations can be shared amongst government agencies efficiently and effectively (RAPMaLi 2014)	Strengthen multi-sectoral mechanisms and establish partnerships to address marine pollution (Diez et al. 2019)
Establishing the best available technologies for monitoring marine pollution (LAC Waste Outlook)	Promote a sustainable set of policies, regulations and economic instruments (LAC Waste Outlook)	The authority tasked with outreach and awareness should have capital available for long-term communication and awareness-raising campaigns	Prioritise, dedicate and increase funding within national budgets for marine pollution prevention and control (Diez et al. 2019)
	Identify relevant institutions for issuing legal provisions and ensure their willingness to adhere and commit to this activity (RAPMaLi 2014)	In any awareness or outreach campaign, the cultural aspects of the audience being addressed must be taken into account and should include coordination with law enforcement agencies (RAPMaLi 2014)	Define the authority in charge of implementation and ensure there is sufficient resources and capacity to enforce (UN Environment 2018)
			Strengthen linkages between government agencies and the private sector to improve efficiency of marine litter management (RAPMaLi 2014)

Annexes

Annex **A**

Development of the Marine Litter Strategy

Strategic Planning Workshop

Marine Litter experts from the wider Caribbean region gathered in Miami, Florida from March 26 – 28, 2019 to develop a strategic outline for marine litter management in the wider Caribbean region to support the further implementation of the Caribbean Regional Action Plan for Marine Litter (RAPMaLI). This workshop was supported by the Canadian Government's Environment and Climate Change Division and organized by the UN Caribbean Environment Programme as Secretariat to the Cartagena Convention (CEP) and the Gulf and Caribbean Fisheries Institute (GCFI). Participants included representatives from government agencies, civil society organizations, private sector and regional institutions in the Wider Caribbean region and others who are engaged in marine litter-related governance, monitoring and awareness-raising programs.

Workshop Objectives

The aim of the workshop was to bring together national and regional marine litter experts to assist the GPML-Caribe to develop a strategic outline for Marine Litter Management including identifying priority actions which could be used as the basis for developing new project proposals and assist in resource mobilization efforts. This workshop also built on the findings of the Regional Experts Workshop on Harmonised Marine Litter Monitoring Programmes held in Miami in October 2018. This GPML-Caribe Marine Litter Management Strategy will support the continued implementation of the Regional Action Plan for Marine Litter Management in the Wider Caribbean Region (RAPMaLi) and implementation of the LBS Protocol.

Annex **B**

Activities of the GPML-Caribe Node

Marine litter reduction strategies for cultural events in the Caribbean

This concept note outlined a small project related to the reduction of marine litter associated with a major Caribbean cultural event – Carnival in Trinidad and Tobago. When people come together to enjoy Carnival, a tremendous amount of waste is generated, even though 70% is recyclable. Greening Carnival and other cultural events in the region can lead to a reduction in the generation of solid waste. Furthermore, introducing measures to accelerate the cleanup and disposal process helps to prevent a significant amount of that waste washing down into drains, waterways and eventually reaching the marine environment.

Marine litter reduction strategies for major cultural events in the Caribbean

A PILOT STUDY ON CARNIVAL IN TRINIDAD & TOBAGO

Introduction

Carnival in Trinidad and Tobago attracts thousands of people to the country annually, and significant amounts of plastic and glass waste from food and beverage consumption is generated as a result. Due to poor waste management, these single-use items are disposed at dumpsites but a lot of this ends up in the ocean.

Objectives

This pilot study aims to reduce marine litter through the use of effective communication strategies and economic incentives for stakeholders involved in the Carnival business.

To serve as a pilot project to share with other major Caribbean event organisers.

Methodology

A needs assessment was conducted by gathering existing information on waste management and identifying key stakeholders. These were event organisers, relevant government authorities, Carnival promoters and businesses centered around Carnival events.

Findings

In 2015, a waste study was undertaken where recycling bins were placed throughout an event for patrons. The majority of recyclable material was not sorted. In order to be effective, the responsibility of waste management had to fall on organisers versus guests.

There are no communication strategies to deal with waste management, and furthermore marine litter reduction.

There are many players involved in waste management, but no additional resources are made available to the responsible agencies to manage Carnival waste.

Carnival Masqueraders in Port of Spain, Trinidad
Source: http://www.lehwego.com

Background

The Gulf and Caribbean Fisheries Institute and UNEP's Regional Coordinating Unit for the Caribbean, are co-hosting a Regional Node for the for the Global Partnership on Marine Litter in the Wider Caribbean Region. The purpose of the GPML node is in part to identify opportunities to support marine litter reduction and deterrence activities in the region. The Caribbean is rich in cultural, music and sporting events, with many year-round landmark tourism sites. All stand to benefit from on-land litter reduction strategies to reduce waste ending up in our oceans. Here we consider a premiere regional event – Carnival in Trinidad and Tobago.

Discarded waste post carnival parade
Source: http://www.rioonwatch.org/?p=25156

Conclusion

Through findings from Carnival events in Trinidad and Tobago, on-land activities were developed to reduce marine litter from entering the ocean. A detailed budget estimate is available for the implementation of each activity, with the total cost averaging between $75-$100K. Implementation of all activities is forecast to require a 12 month period.

Activity 1
Gather existing information, identify key stakeholders and undertake preliminary consultation

Activity 2
Create a communication strategy and identify a celebrity marine litter ambassador to assist with implementation

Activity 3
Work with Carnival organisers and relevant agencies to seek corporate and/or private sector sponsors

Activity 4
Strengthen solid waste mechanisms to capture and recycle litter before it enters the ocean

Activity 5
Create a Monitoring & Evaluation system to determine marine litter reduction

Activity 6
Share lessons learned with others through a conference on 'greening' events in the Caribbean

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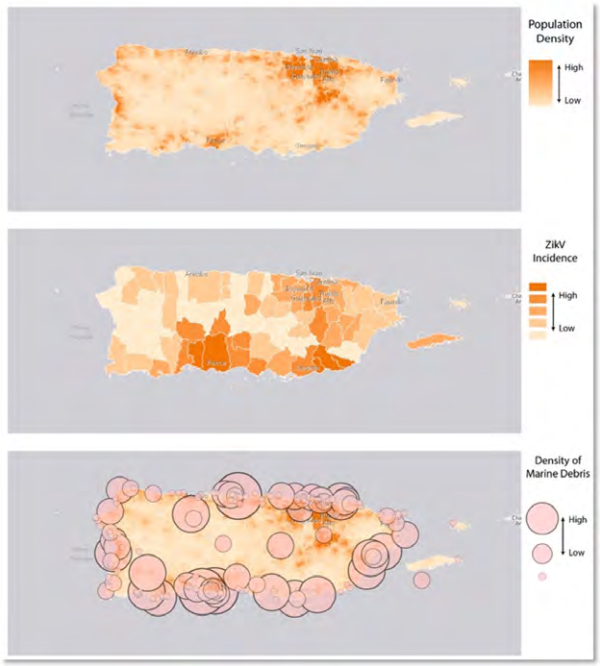
GCFI Gulf and Caribbean Fisheries Institute, Inc. UNEP Caribbean Environment Programme GPML

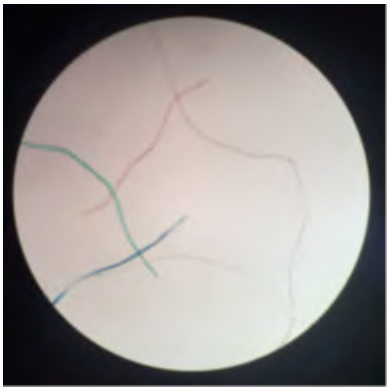
Link between marine litter and mosquito borne diseases

This study mapped the incidence of mosquito borne public health concerns in the Caribbean to compare this with plastics consumption and to put the findings into the context of the zika virus. By overlaying GIS data the study was able to investigate potential correlations and analyse various environmental, health and demographic data to evaluate issues of poverty and gender as they may be related to incidence of disease and risk. This study revealed that there was a relationship between the cases of ZikV and marine debris density, especially of large marine debris (i.e. Tires). These results also suggest that coastal communities may want to prioritize clean up of large marine debris to limit *Aedes aegypti* habitat and subsequent ZikV transmission.



Microplastics in commercially important fish in Grenada

In collaboration with St George's University in Grenada, this study was able to document microplastics in fish species from Grenada. Occurrence of microplastics in the intestinal tracts of marine fish is a concern to human and ecosystem health as pollutants and pathogens can associate with plastics. Over 97% of the fish examined in this study contained microplastics. The study was subsequently extended to assess sediments, water samples (including bottled water) and other fish products consumed in Grenada.



Regional Clean Seas Campaign

Through the campaign, capacity-building support was provided to various stakeholders on outreach, advocacy, resource mobilization and development of new project proposals for reducing marine litter and plastics. The Caribbean #CleanSeas Campaign was initially launched in October 2019 in Barbados, Trinidad and Tobago, and St Kitts and Nevis and later in Grenada and St Vincent and the Grenadines in November 2019. Efforts are ongoing to expand the campaign to the rest of the WCR in 2020. The cleanup activities conducted as part of the campaign were used to field test a harmonized marine litter monitoring methodology which was developed through the Node at the end of 2018.

Harmonizing Marine Litter Monitoring in the Wider Caribbean Region

The OSPAR Convention for the North East Atlantic and the Cartagena Convention Secretariat forged an agreement to support the implementation of Sustainable Development Goal 14 (#OceanAction17198). Through this cooperation, funds were mobilized in 2018 from the Governments of Sweden and the Netherlands to support marine litter activities in the Wider Caribbean Region. In October 2018, GPML-Caribe hosted a workshop in Miami focused on harmonizing litter monitoring in the WCR. The workshop was a direct result from a commitment made by the OSPAR Commission and CEP at a United Nations (UN) Conference held in New York in June 2017, about the implementation of Sustainable Development Goal 14 (#OceanAction17198).

As a result of this workshop, the report "Harmonizing Marine Litter Monitoring in the Wider Caribbean Region: A Hybrid Approach" was published in 2019. This study compared three initiatives in the Caribbean region and the OSPAR marine litter monitoring methodology against a set of predetermined criteria. Findings from this research also helped to contribute to the development of a monitoring scheme for marine litter in the WCR, with a focus on monitoring visible marine litter on the shoreline - litter that derives from rivers, ocean currents, waves and wind, or left behind by tourists. The harmonizing approach to monitoring marine litter allows for engagement with citizens for monitoring while ensuring good quality data collection, cost effective and efficient means of harmonizing data collection and maximizing litter removal on certain pre-selected sites. This report aims to assess leading initiatives and provide recommendations to policymakers and experts in the WCR.

This project has since been successfully piloted and implemented by Clean Seas Bonaire and will be introduced to Barbados, Grenada, St Kitts and Nevis, St Vincent and the Grenadines and Trinidad and Tobago via the Caribbean Youth Environment Network (CYEN).

Annex C

Country and Project Case Studies

Case Study: Antigua and Barbuda

In 2016, Antigua and Barbuda became the first nations in the WCR to implement a ban on single-use plastic bags and has been a pioneer in the fight against marine plastic pollution. The initiative launched to eliminate plastic bag usage in Antigua and Barbuda differed from other attempts due to the level of detail of the planning process. The ban was implemented in three stages through a planned strategy over more than 3 years:

- **Stage 1: July 1st to December 31st, 2017:**
  Ban on importation and use of food service containers to include: clamshell and hinge containers, hot dog containers, bowls, plates, and hot and cold beverage cups. Depletion of stock on hand to be followed by monitoring and confiscation.

- **Stage 2: January 1st to June 30th, 2018:**
  Ban on importation and use of plastic utensils (spoons, forks and knives), straws, fruit trays, meat trays, vegetable trays and egg cartons. Depletion of stock on hand to be followed by monitoring and confiscation.

- **Stage 3: July 1st, 2018 to January 1st, 2019:**
  Ban on importation and use of "naked" Styrofoam coolers. Depletion of stock on hand to be followed by monitoring and confiscation.

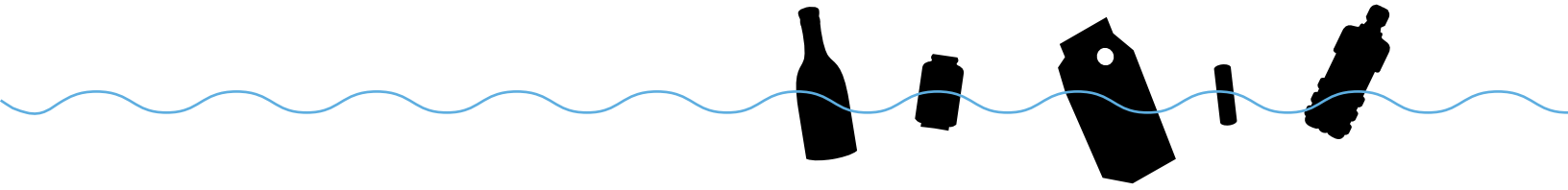
Some of the main lessons learned from the ban implementation process in Antigua and Barbuda were the importance of:

1. **Implementing the ban in phases:**
   Leading from first having a restriction on importation and then eventually the issuance of products, was integral to preparing all for the eventual eradication.

2. **Message clarity:**
   Ensuring that all messaging was easy for all audiences to understand, enhanced the buy-in and support

3. **Active and continued dialogue:**
   Maintained with all stakeholders, including policy makers, users, and suppliers to enhance their participation and compliance

4. **Government support:**
   The provision of alternative items enhanced participation of the community. The Minister of Health also championed the initiative and elevated the profile and coverage of the campaign.



Case Study: Plastic Ban Aruba

Factors encouraging the adoption of the ban:

1. **The law:** In a public meeting held on June 28, 2016, Aruba's Members of Parliament unanimously voted in favor of the proposal to ban single-use plastic bags and the law took effect as of January 1, 2017.
2. **Environmental values:** There was an element of self-enforcement where citizens began reporting grocery stores that were providing the outlawed plastic bags by posting pictures on social media. Many Caribbean islands are looking this approach to initiate their own plastic bag bans.
3. Self confidence
4. Positive attitude
5. Benefits and feasibility

Case Study: Whitehouse & Bluefields Solid Waste Reduction Project, Jamaica

The Whitehouse and Bluefields Solid Waste Reduction Project targeted the communities of Whitehouse and Bluefields, as well as surrounding areas - Robins River, Mearnsville, Beeston Spring and Cave - all located on the south coast of Jamaica in the parish of Westmoreland. These communities, comprised of over 5000 residents, generate large amounts of garbage that either end up on the coast or in the sea, affecting the health of community members and the local environment. The project introduced the separation of waste through the implementation of recycling and compost bins in order to divert waste from the landfill and reduce pollution

A collaborative approach to waste management was beneficial and various stakeholders were assessed in terms of their strengths and influence on their community. A key strategy in Sandals Foundation's management of this project was the implementation of community based waste management, whereby leaders in the community were encouraged and empowered to manage and take ownership of the project. Identifying key leaders is a vital part of getting community "buy in". These leaders also provided consistent enforcement of project, leading to more successful results. Other recommended best practices for engaging and communicating with participants included:

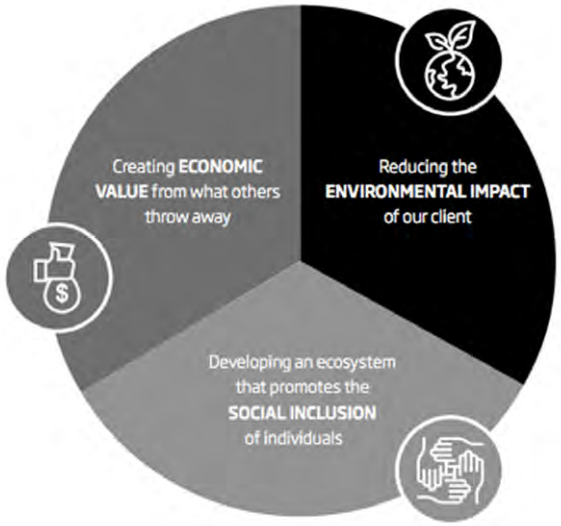
- Conducting a community analysis, i.e. understanding the community perspective on the pollution problem to guide education and awareness activities
- Establishing what forms of media are most accessible in the community and what types of media are most effective
- Using multiple methods of communication
- Following up on participant suggestions, recommendations and feedback

Case Study: Pulpo S.A., Argentina

Pulpo has 2 business units:

1. ECOPULPO aims to create positive impact by creating economic value from scrap (paper, cardboard and plastic) that would otherwise be thrown away or incinerated. They have achieved 95% reinsertion into the production process to create many products (pipes, hangers, chairs) and thus preventing the use of virgin oil-derived raw materials.

2. PULPAK is an alternative to polystyrene packaging and is made from cardboard pulp, recycled paper and water and has a quicker biodegradation (8-12 months) rate (>100 years for polystyrene).



Case Study: Ananas Anam, UK – Spain – Philippines

Ananas Anam Ltd developed Piñatex ® as a natural, plant based material that can be an alternative to leather and plastic packaging. Using pineapple leaf fibres, they are able to create a non-woven material and with the discarded portions fertiliser is created to create additional economic value for waste. The company is also looking into using the discard as compost, or a source material for biogas which could in the long term be used as the primary energy source for the processing plant, thereby giving value to waste whilst minimising their carbon footprint.

Case Study: CaribShare, Jamaica

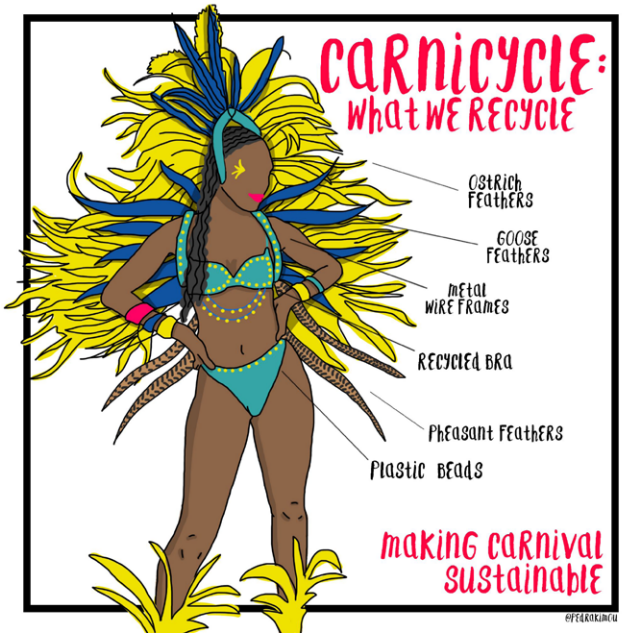
The CaribShare Company Limited is an innovativenot for profit social enterprise in Jamaica dedicated to promoting and developing biogas technology and other climate resilience building solutionsin Jamaica and the Caribbean. Its social mission is to strengthen the livelihoods of farming communities. For three years, its pilot initiative,CaribShare Biogas collected and recycled food waste on adaily basis from eight Montego Bay hotels. The food waste was converted to biogas and organic fertilisers and any excess food waste was provided to farmers to feed their pigs. This has helped these hotels to reduce their environmental footprint whilst facilitating Jamaica's achievement of SDG Goals 12 and 13.

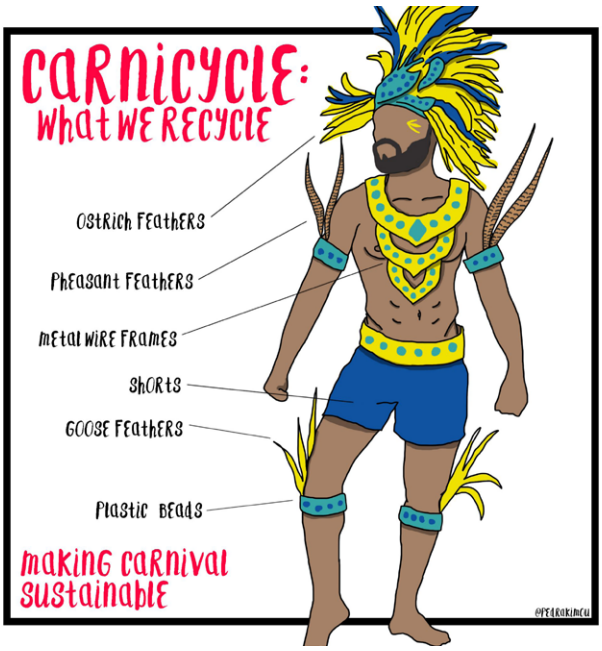
Case Study: Plastic Free St Kitts

Since 2017, the St. Kitts Sustainable Destination Council together with the St. Kitts Ministry of Tourism, has developed a movement for a "Plastic Free St. Kitts". Through various community engagement activities, the island-wide initiative combats plastic pollution and marine debris by raising awareness and empowering residents and businesses to reduce their consumption of single-use products. Since its inception, the initiative has aimed to shift local mindsets and improve waste management in St. Kitts through television and radio appearances, social media communications, an annual march, screenings of marine plastics documentaries, and presentations to community organizations and local schools. Additionally, the initiative provides actionable tips and recommendations to encourage waste reduction, re-use, and recycling and also raised discussion and interest around plastic alternatives, such as compostable and reusable items. The initiative has also promoted the repurposing plastics as an innovative means ofraising awareness through public art pieces, Carnival floats and displays at the mall.

Case Study: Carnicycle, Trinidad and Tobago

Carnival is a cultural event that attracts hundreds of thousands of people each year and is an important economic activitiy for many countries in the Caribbean despite the significant amount of waste produced. Carnicycle has taken a circular economy approach to developing a more sustainable Carnival by recycling costumes. This creation of a network of recycled materials such as feathers, wire, beads and gems can reduce the need to import material thereby reducing the carbon emissions associated with the act. Additionally, this provides an added economic benefit, as items within the network will be available to local artists and designers at a discounted price. Furthermore, recycling costumes helps to divert waste away from landfills but also creates jobs such as transportation, collection, breaking down and sanitation of costumes.





Case Study: Bucuti and Tara Beach Resort, Aruba

Bucuti & Tara Beach Resort is a boutique resort in Oranjestad, Aruba that has a strong commitment to sustainability and community awareness and was named the most sustainable resort in the world by Green Globe Certification. The success of Bucuti & Tara's waste management systems lies in their multiple methods to reduce waste and divert as much as possible from landfill by reducing, reusing and recycling wherever possible whilst having forward planning and purchasing.

Some of the methods applied include:

1. Purchasing in bulk and minimal packaging or container take back policies with suppliers: e.g. using a dispenser system for toiletries rather than single use bottles and using refillable products to reduce waste entering the resort

2. No single use plastics or styrofoam: e.g. reusable cups, plates, cutlery and dishware is used throughout the resort including in the employee cafeteria, bars and restaurants. Guests are also provided with a branded, reusable insulated canteen which can be used at water stations throughout the resort. Additionally washable food covers are used to replace plastic wrap for food covering

3. Recycling and reuse initiatives: recycling bins are available in guest rooms and throughout the resort with signage. Furthermore items such as cardboard, glass, kitchen oil, food waste and garden waste are recycled locally, turned into biogas or used as pigfeed or mulch. Other materials such as UPS batteries are recycled.

4. Food waste training: in partnership with WWF, the resort conducted a training session with staff on the environmental and financial implications of food waste as well as tips on how to minimise waste (such as reducing food portions). This training resulted in a 30% reduction in food waste.

5. Repurposing and donation of items: linens and towels are either repurposed as laundry bags or towels for the fitness centre or donated to local foundations and during renovations, all furniture, fixtures and appliances are either sold or donated to local foundations

6. Minimise paper waste: by converting items to a digital format (e.g. checklists) they are able to minimise paper wastage

Annex D

Policy Approach Guide for Governments and Decision makers for dealing with Single-use Plastics

Table 7: Ten steps to consider when introducing restrictions on single-use plastics (Modified from UN Environment, 2018)

1	Know the baseline	• Identify the most problematic single-use plastics • Assess current causes • Assess extent and impacts • Evaluate consumers' willingness to pay
2	Evaluate possible actions	• Regulatory, voluntary or economic • Combination
3	Assess impacts of preferred option	• Social • Economic • Environmental
4	Engage stakeholders	• Government • Industry and retailers • Waste management authority • Tourism associations • Citizens
5	Raise awareness	• Education programmes and TV adverts • Campaigns which explain: why the policy is being introduced; what are the expected benefits and what are the punitive measures.
6	Promote alternatives	• Eco-friendly and affordable • Fit for purpose
7	Incentivise industry	• Allow time to transition • Offer tax rebates • Keep specific eco-friendly materials tax-free
8	Ring-fence revenues to support	• Waste minimisation and recycling • Environmental projects • Financing of awareness initiatives
9	Enforce	• Set roles and responsibilities • Ensure sufficient resources for enforcement and communication of the enforcement process • Prosecute offenders according to policy mandates
10	Monitor and adjust policy	• Conduct audits, surveys, studies and interviews • Keep public updated on progress

Annex **E**

Alternatives to Plastics and Styrofoam

Although existing plastic packaging possesses many advantages, there is a major flaw in its design: usually it is utilised only once or for a few months at most but the material exists for centuries (World Economic Forum 2016). Furthermore, unless there is significant redesign and innovation, as much as 30% of plastic packaging will never be reused or recycled (World Economic Forum and Ellen MacArthur Foundation 2017). As a result, there has been the implementation of bans on multiple forms of plastic packaging and an overall shift to reducing the use of plastic products. Given the increasing demand for plastics and the dependence of society on plastic materials whilst understanding that raw materials are a prevailing factor affecting sustainability, replacing petroleum-based plastics with bioplastics is viewed as a potential solution (Alvarez Chavez et al. 2012, Karan et al. 2019). However the economic and environment feasibility of these products has not been fully established.

" Describing bioplastics as compostable is often misleading since these items will not compost at domestic composting systems for organic food waste and instead require industrial type composting which is often not widely available "

There is an array of definitions for bioplastics, but in its simplest form, bioplastics are plastics based off renewable resources like corn-starch and cellulose (Alvarez Chavez et al. 2012, Jabeen et al. 2015, Brockhaus et al. 2016). These bioplastics can be produced from different types of feedstock (World Economic Forum 2016):

1. First generation: biomass from plants which can be used as food for humans or other animals (e.g. sugar cane, corn, wheat etc).

2. Second generation: biomass from plants that cannot be used as food for humans or other animals. This can be in the form of non-food sources like cellulose ot waste materials or by-products e.g. bagasse, waste vegetable oil etc.

3. Third generation: biomass from algae

Having a shorter degradation time could reduce the probability that ingestion of biodegradable plastics by marine organisms might occur (Van Sebille et al. 2016). Describing bioplastics as compostable is often misleading since these items will not compost at domestic composting systems for organic food waste and instead require industrial type composting which is often not widely available (Arikan et al. 2015). Currently most bioplastics are quite expensive and to facilitate the upscaling of production, incentive based strategies or subsidies will need to be implemented (Bhattacharya et al 2018). Furthermore, terms like 'bioplastics', 'compostable', 'biodegradable' and 'environmentally friendly' are often misused by manufacturers as a means of greenwashing and making their products more attractive (Arikan et al. 2015).

Table 8: Types of bioplastics (Arikan et al. 2015)

Bioplastic type	Description
Photodegradable	Where a light sensitive group is incorporated as an additive to the polymer backbone so that extensive UV radiation can degrade the structure making it susceptible to bacterial decomposition
Compostable	Where biological decomposition occurs at a similar rate to other compostable materials during the composting process and there are no toxic by-products
Biodegradable	Where products are fully degraded by microorganisms with no toxic by-products
Bio-based	Where 100% of carbon in plastics is attained from renewable sources

Compostable packaging that is susceptible to being mixed with organic matter is more likely to have a positive impact in the environment as these types of packaging can help return additional nutrients to the soil (World Economic Forum 2016). However, like other forms of plastics alternatives these can be mislabeled in an attempt of greenwashing. More research needs to be conducted on the cost effectiveness and environmental impacts of these alternatives especially since many of these are being encouraged by governments in light of styrofoam and plastic bans.

There are also recommendations to develop a global plastics protocol, which would specify standards for the innovation process including guidelines for materials, design, labelling, markets, systems and infrastructure (World Economic Forum 2016). Potential future research questions could include:

- How can less material or additives be used to improve plastic packaging design and what would be the consequent economic costs and benefits?
- How can plastic packaging be designed to phase out items with high leakage potential such 'small-format' or 'low-value' packaging?
- What is the economic feasibility of developing harmonised labelling and marking of plastic packaging to facilitate subsequent separation and sorting?
- What are the most successful drivers of a market for recycled plastic?
- How can waste abatement systems be redesigned to be more effective?

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