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Fifth Meeting of the Scientific and Technical Advisory Committee (STAC) to the Protocol Concerning Pollution from Land-Based Sources and Activities in the Wider Caribbean.

Virtual

15 to 17 March 2021

Compendium of case studies on solid waste management

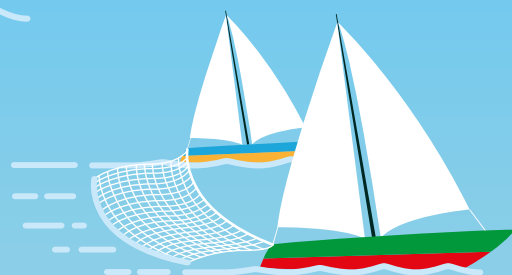
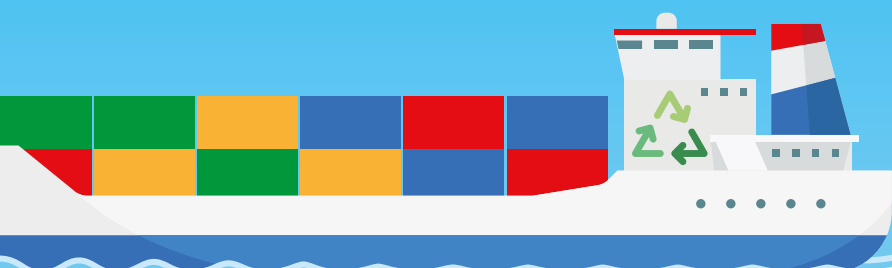
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Compendium on Waste Management

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ACKNOWLEDGEMENTS

The Caribbean Tourism Organization (CTO) and the United Nations Environment Programme (UNEP), through its Caribbean Sub-Regional Office and Secretariat for the Cartagena Convention, are pleased to announce the launch of a partnership that will have as one of its first outputs, the development of a 'Compendium showcasing regional and national initiatives and best practices in waste management.'

In 2019, two articles were released to the global media which highlighted that 10 Caribbean countries were among the top 30 plastic waste producers globally. One article via Forbes.com asserted that on an annual basis, "ten island nations generate more plastic debris than the weight of 20,000 space shuttles." Additionally, another article from the World Bank brought attention to the issue of plastic waste and environmental degradation in the Caribbean.

The World Bank's 2019 publication *Marine Pollution in the Caribbean: Not a Minute to Waste* noted that there are as many as 200,000 pieces of plastic per square kilometer in the north-eastern Caribbean that eventually break down into microplastics. Furthermore, 2,014 items of litter on average, per kilometer, have been discovered on beaches and coastal areas in comparison with the global average of 573.

This is significant because it poses a threat not only to resident populations but also to the tourism sector of the Caribbean which is the most tourism-intensive in the world, with over 30 million stay-over/tourist visits in 2018, and coastal areas accounting for US\$57 billion in gross revenue from marine and coastal tourism alone in 2017 (World Bank, 2019).

Despite this challenge, many Caribbean Governments have made commitments through regional and global campaigns such as the "Clean Seas Campaign" to control, prevent and reduce pollution from solid waste and plastics. Several governments have already implemented bans on single-use plastic and Styrofoam containers. Stakeholders in the hospitality sector have been actively embarking on efforts to comply with these policies by identifying and adopting more appropriate alternatives to plastic products, such as straws and toiletries, and reducing the impact of their overall environmental footprint on vital coastal and marine resources.

This compendium presents submissions from different stakeholders in the Caribbean and their initiatives to reduce pollution from waste and plastics. They are presented under the following categories: Waste Management and the Accommodation Sector, Waste and the Circular Economy, Waste Management and the Maritime Sector, Reducing Marine Litter Pollution, and Best Practices in Waste Management.



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FOREWORD

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Chapter 1

Introduction



WHY SHOULD WE CARE ABOUT WASTE MANAGEMENT?



AUTHOR: Mrs. Sian Cuffy-Young

Contributed Photo: Sian Cuffy-Young.
Founder/CEO - Siel Environmental Services Ltd.,
Trinidad and Tobago

1. Its effect on the natural environment.

There is now a global push with respect to the management of waste and more specifically, that of plastics. Plastics were created in the 1950s as the solution to the uncontrolled deforestation happening at that time; however, it has now become the problem since it takes such a long time (450 years for that plastic bottle) to degrade. From our local context, open dumping of waste, namely plastics and its derivatives such as Styrofoam, only add to our flooding issues as the pathways for water become blocked as a result.

2. Its effect on our health and well-being.

Although many people may not have made the connection between improper waste management and health, it does not take away from the fact that the link exists. Toxic chemicals contained within waste in its various forms can leach into our soil and groundwater sources causing contamination and water-borne diseases as our potable water supply in Trinidad and Tobago comes from either surface

“There is no such thing as ‘away.’ When you throw anything away, it must go somewhere.”

Annie Leonard

or groundwater extraction. With respect to food, the term bioaccumulation come to the fore as these chemicals accumulate in various organisms that we eat. Open burning of waste leads to the releases of greenhouse gases which increase the effects of climate change. Harmful compounds such as dioxins, furans and even carcinogens are also released into our atmosphere. Green spaces, for example nature walks and forested areas, have been known to have calming effects, aid in the reduction of stress levels and increase productivity. However, dirty green spaces can have opposite effects.

3. It has value.

Last I checked, I didn't like throwing away money, but what we do when we pay no attention to our waste is just that. Waste should no longer be seen as just items to be discarded, but rather, as an economic value that isn't as utilized as it should. Using strategies such as waste segregation not only allow us to see what forms of waste we generate but we can now place them into one of these three categories: Reduction, Reuse or Recycling. In this way, we are incorporating the teachings and practices of a circular economy which is simply taking what may have constituted as waste and adding it to a process so that it serves as an input therefore lengthening the life of items before it absolutely must be become waste and saving money in the long run. Our landfills are overflowing with lost cash that we chose to leave behind.

What we have seen is that for those countries where Tourism is high on the country's agenda and even a means of boosting its Gross Domestic Product (GDP), waste management has taken a positive turn which the implementation of laws, policies and programmes. The output of which is clean streets and an engaged public. Trinidad and Tobago remains behind in that regard and since waste collection is still free to the general public, the value in waste is goes unnoticed but there is a silver lining for us, since companies and the general public are becoming more attune to what is happening in the world and are pushing those around them to make better decisions. I must close by saying that we need to return to that love of place where nothing and no one can tarnish what we hold dear because if you love something, you should treat it with the utmost care. Now is the time because it is not always about doing things better, but sometimes we simply need to do better things.

Chapter 2

Waste Management and the Accommodation Sector



WASTE STUDY. SINGLE-USE PLASTICS WITHIN THE ACCOMMODATION SERVICES INDUSTRY IN SAINT LUCIA

AUTHOR: United Nations Environment Programme and JUA KALI LTD

ABSTRACT

The project entitled Phasing out of Single-use Plastics: Towards Clean Seas and Sustainable Tourism in the Caribbean, is led by the United Nations Environment Programme (UNEP) and funded by the Government of Norway. It is part of the broader project Transforming Tourism Value Chains (TTVC) in developing countries and Small Island Developing States (SIDS) for more resource efficient and low-carbon development. This is a global effort that is aimed at reducing carbon emissions and improving resource efficiency in the Accommodation Services Industry in three tourism value chains, namely: i) food and beverage, ii) accommodation, and iii) meetings, incentives, conferences and events (MICE). Activities are focused in countries where tourism plays an outstanding and active role for the national economy of the Dominican Republic, Mauritius, the Philippines and Saint Lucia.

In order to achieve the aforementioned objectives set out for Saint Lucia, the Saint Lucia Solid Waste Management Authority (SLSWMA) in coordination with the Travel Foundation (TF), is supporting the implementation of the project by improving the capacity of hotels within the Accommodation Services Industry in Saint Lucia to phase out single-use plastics and introduce sustainable procurement and eco-innovation solutions. As such, the SLSWMA has contracted the services of JUA KALI LTD., a local, social enterprise offering technical and professional services in the field of Resource Recovery, to execute several activities associated with the project.

MAIN BODY

According to the United Nations World Tourism Organization (WTO), tourism is the third largest export globally, after chemicals and fuels. Last year (2018) saw 1.4 billion tourists travel the world – two years ahead of what was projected, and this is expected to climb to 1.8 billion by 2030, (UNWTO, 2019). This is great news for a tourism hotspot like Saint Lucia. However, in parallel and at the global scale, is a growing environmental movement against plastic pollution and single-use plastics (SUP) more specifically. Growing awareness about the catastrophic impacts of SUP waste has triggered bans against the importation and use of specific SUP items like straws, single-use grocery bags and take-away food containers. In Saint Lucia, the Government most recently passed the Styrofoam & Plastics Food Service Containers (Prohibition) Act 2019, starting with the ban on the importation of Styrofoam containers and extending this to a full ban on the use of these by the end of 2020.

Given the ubiquitous nature of SUP within the tourism sector, the accommodations services industry in particular is at a watershed moment recognizing the need to safeguard the very environment it depends on to attract visitors, while contending with operational changes required to transition away from SUP. UN Environment Programme under the project on Phasing Out Single-use Plastics – Towards Clean Seas & Sustainable Tourism in the Caribbean, aims to assist hotels in making this transition and to achieve the following overall targets as part of the Low Carbon and Resource Efficient Action Plan for Accommodations in Saint Lucia by 2030:

1. A thirty percent (30%) reduction in the amount of waste generated by the Accommodation Industry; and

2. A one hundred percent (100%) reduction in SUP procured by the Accommodation Industry.

Objectives of the study

Meeting these targets would therefore require undertaking a waste study to understand the current state of affairs in terms of plastic waste generally and SUP more specifically. The specific objectives are outlined below.

- Objective 1: To increase the knowledge of Saint Lucian authorities and the tourism sector about the waste streams generated by hotels, especially plastic waste, to determine the major single-use plastic products discarded and the current waste management and disposal practices in the Accommodations Services Industry.
- Objective 2: To improve the capacity of hotels within the Accommodation Services Industry for proper management and reduction of plastic waste.

Key Findings

The total mass of solid waste collected from the eight (8) participating hotels within a 24-hour period was 2,728.7kg. The waste audit revealed that Organics represented the single largest component of the hotel solid waste at 56.7% by weight. However, food scraps comprised 79.3% of this organic matter, while green waste comprised the remaining 20.7%. The second largest waste stream was Plastics at 11.7%, followed by Cardboard at 9.1%, Glass at 8.6% and Tissue at 6.4%. The average waste generation rate per guest per day was calculated at 4.2 kg/guest/day, while the individual hotels ranged from 1.1 kg to 12 kg.

A total of thirty-two (32) types of single-use items were identified during the waste audit amounting to seven thousand, three hundred and sixty-eight (7,368) individual pieces of plastic waste generated in 24- hours. The individual SUP generation per guest per hotel ranged from 4.3 pieces to 32.8 pieces. Additionally, the average cling wrap waste generated was 2.3 kg per hotel.

In the absence of a formal national waste diversion system, some hotels have still been able to divert the following materials: 1. Food scraps to pig farmers; 2. Organic vegetable and fruit peels, green waste and print/office paper for on-site composting; 3. Return of breakable bottles to local suppliers (Brewery & distillery).

With regard to SUP, seven out of the eight hotels were actively or had transitioned away from using them or introduced alternatives. The two most popular items of focus were straws and take-away containers, despite the fact that back-of-house SUP waste generation was more significant. SUP reduction and elimination programmes were generally focused on front-of-house source generation, and for only three hotels were these programmes tied to a broader sustainability agenda. Moreover, some of the sustainable alternatives transitioned to by hotels for example paper straws and compostable bin liners, are in fact unsustainable.

Therefore, given the disjointed approach to phasing out SUP, the need for information and expertise on sustainable alternatives, and the integration of more sustainable procurement practices, an 8-Step Pathway to Action was developed to complement this Study and provide tools to hoteliers to help them successfully transition away from SUP.

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WASTE MANAGEMENT AT BUCUTI AND TARA BEACH RESORT, ARUBA

AUTHOR: Nathaly Stanley

ABSTRACT

Bucuti and Tara Beach Resort is the Caribbean's first and only certified carbon-neutral hotel. Located on the small island of Aruba, today, the property is pursuing carbon negative status. Since its inception, Bucuti and Tara Beach Resort (Bucuti & Tara) has had a high standard and placed the utmost importance on sustainability and care for the environment. This shows true until today; most notably within the resort's extensive sustainability program which also entails waste management. The resort's waste management approach extends from items such as single use plastics, to cardboard and food waste. The program has enabled the resort to successfully divert over 60% of its waste from landfills on a continuous basis. In the following pages you will learn about the different strategies Bucuti and Tara has employed to manage waste.

Introduction to Bucuti and Tara Beach Resort

Bucuti and Tara Beach Resort is a boutique resort, located on Eagle Beach in Oranjestad, Aruba. With an unwavering commitment to sustainability and community awareness, the resort continuously strives to find creative solutions. Aruba is driven by tourism and tourists, many of whom visit the island to enjoy the sea, sun, sand and thus predominantly our nature. For this reason, Mr. Ewald Biemans, owner and CEO of the resort, often says, "tourism is not the pillar of our economy, nature is – because without nature we would have no tourists". When Mr. Biemans opened the resort, he had a vision to have a sustainable resort, and today the resort has a comprehensive sustainability program. As a result, Bucuti and Tara has been recognized by leading sustainability and environmental

organizations and has succeeded in winning many prestigious awards for sustainability. To support its dedication to environmental preservation in operations and the community, Bucuti & Tara was named the most sustainable resort in the world by Green Globe Certification (Green Globe, 2016 <https://greenglobe.com/latest-news/bucuti-tara-beach-resort-aruba-certified-most-sustainable-hotel-resort-in-the-world/>) - a global third party sustainability program for travel, tourism and business operations.

Waste Management

The success of Bucuti and Tara's waste management are the several methods employed to reduce waste and divert as much as possible from the landfill. This is accomplished essentially through the basic steps of reducing, reusing and recycling wherever possible. Another important factor is forward planning and purchasing. Looking at the make-up of waste streams and conducting audits to understand what you are producing and bringing in through your purchasing is critical to managing and reducing the waste inputs within your operations. Measuring and reporting on a consistent and correct basis enhances the program and procedures, along with training and awareness amongst staff and basic information to guests, serves to increase performance. The resort manages all waste from cardboard to food waste. Here are the methods used:

- Purchasing in bulk. This works by reducing waste resulting from portion-controlled bottles. For example: Bucuti & Tara employs a dispenser system for toiletries that are refilled instead of purchasing countless tiny bottles that will be discarded.
- No single-use plastics or Styrofoam.

- In the employee cafeteria jam jars from the restaurant are used as drinking cups and all plates and cutlery come from the restaurant as its dishware is replaced.
- All drinks from the bar are served in either glass or reusable hard plastic at the beach with beach attendants collecting them after each use.
- Recycle bins are located in rooms and throughout the resort for guest use with signage.
- UPS batteries are recycled.
- The resort gives all guests a Bucuti-branded reusable insulated canteen and provides water stations throughout the resort.
- Cardboard is recycled with a local waste management company or reused throughout the property for signage.
- Glass is recycled with a local waste management company.
- Kitchen oil is picked up by a company that turns this into biodiesel.
- Food waste is picked up by a local farmer to use as pig feed.
- Food portions have also been reduced in order to minimize food waste.
- Food waste training. In a partnership with WWF, the resort recently conducted a training with staff on the environmental and financial implications of food waste and how to minimize waste (utilizing tools on hotelkitchen.org). This training resulted in a 30% reduction in food wasted before and during service to guests and the resort gives constant training to staff on how to minimize waste (utilizing tools on hotelkitchen.org) and explains what these types of waste represent, environmentally.
- Washable food covers are in place to reduce plastic wrap as food covering.
- Minimal packaging or container/crate take back policies are in place with suppliers (where possible) for packaging and refillable products to reduce unnecessary waste entering the resort.
- Linens are repurposed to laundry bags for guest use or donated to local foundations.
- Towels are repurposed to towels for the fitness center or donated to local foundations.
- During renovations, all furniture, fixtures, and appliances are sold or donated to local foundations.
- Garden waste is mulched to be reused as fertilizer.
- Many checklists converted to digital checklist to minimize paper waste.

As the resort pursues carbon negativity status, one of its next goals is to become 100% paperless, thus eliminating paper waste.

CARIBSHARE: RECYCLING FOOD WASTE FROM HOTELS INTO SOCIAL GOOD IN JAMAICA

AUTHOR: Carol Lue, The CaribShare Company Limited

ABSTRACT

In the absence of food waste recycling regulations and laws, the CaribShare Company Limited has been pioneering food waste recycling in Jamaica's hotel sector to take proactive action on climate change and sustainable waste management. For three years, CaribShare collected and recycled food waste from Montego Bay hotels into biogas and organic fertilizer.

The CaribShare Company Limited is an innovative not for profit social enterprise in Jamaica dedicated to promoting and developing biogas technology and other climate resilience building solutions in 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 a daily basis from eight Montego Bay hotels. These hotel beneficiaries are Sandals Montego Bay, Sandals Royal, Iberostar, RIU Montego Bay, RIU Palace, RIU Reggae, Hyatt Ziva Zilara, and Half Moon Resorts. Operating its large-scale digester, the food waste was turned into biogas (a type of biofuel) and organic fertilizer through the natural process of anaerobic digestion. Excess food waste was also provided to several farmers to help feed their pigs. In the process, these hotels had been minimizing their environmental footprint, while helping Jamaica to directly achieve the UN Sustainable Development Goal 12 (Responsible Consumption and Production) and SDG Goal 13 (Climate Action).

Program Offerings:

- Its Waste to Energy program produces biogas for use as a clean fuel alternative.
- Its Waste to Fertilizer program offers premium organic fertilizer at a highly discounted price to motivate farmers to switch from synthetic fertilizers and to help promote a circular economy. Currently, CaribShare donates its organic fertilizer to the small farming community of Braco, Trelawny.
- Its Waste to \$ Benefits program collects and recycles food waste from hotels, improving the hotel's bottom line by significantly reducing their environmental waste disposal cost and greenhouse gas emissions.

To support its unique sustainable waste management solution and circular economy objectives, CaribShare has received funding from the Inter-American Development Bank, the United States Agency for International Development, Development Bank of Jamaica, Environmental Foundation of Jamaica, Digicel Foundation, Jamaica Conservation Partners, and ArkVark Foundation

Due to the coronavirus pandemic, CaribShare has temporarily stopped its daily food waste recycling service but plans to resume its daily recycling service and to further push for the development of a local organic waste recycling industry. Thanks to funding support from the US Embassy-Kingston, it will be hosting an interactive Food Waste Management Conference entitled "**Food Waste Management as a Viable Community-based Sustainability Solution in Jamaica's Tourism Sector,**" in collaboration with the Center of Responsible Travel and World Wildlife Fund. The objectives



Exhibit 1: CaribShare's pilot digester plant



Exhibit 2: CaribShare's organic fertilizer production

of the conference are (i) to further make the business case for hotels to reduce and recycle their food waste, and (ii) to push for policies and regulations that mandate the recycling of food waste. Both outcomes are vital for the development and long-term sustainability of a local organic waste recycling industry, which is absent in Jamaica today.

Partnerships and collaborations; local, regional, and international, are welcome and have been pivotal in CaribShare continuing to achieve its strategic goals of promoting sustainable waste management and the circular economy.

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ECO/SUSTAINABLE ACCOMMODATION

AUTHOR: Jamaica Inn

The Jamaica Inn Foundation was established in 2016 as a non-profit organization by The Inn with a mandate to provide support to our local community. The foundation functions to facilitate the education and well-being of our youth and to aid with the Inn's ongoing efforts to preserve the surrounding marine environment.

As the pressing concerns of the area fishermen were brought to our attention, The Jamaica Inn Foundation spearheaded the task of gathering partners to set up The White River Fish Sanctuary. The area spans 150 hectares or 372 acres encompassing the East to the West of Ocho Rios. With the support of other concerned business operators, area fishermen, the Government and the wider community, we have been able to make significant progress toward actualizing this goal. To date, the project has been successfully implemented with laws having been passed to support our efforts, providing meaningful sanctions which bolsters enforcement.

Though this has been the major project of the Foundation for the past three years, Jamaica Inn as a resort, has over the past seven years, established and sustained many initiatives which are eco-friendly and promote awareness, conservation and environmental sustainability. These have now become the way of life at the Inn - "The Green Way!" They include:

- Tree Planting Initiatives
 - Certification by Green Globe for the past seven years
 - Use of Eco-Friendly chemicals in all departments
 - Eliminated use of Styrofoam products and other F&B disposables on property
 - Converted to use of Paper Straws and cups
 - Minimizing the use of plastic bags to only can liners. We have fully eliminated plastic bin liners, shopping bags and take out bags
 - Establishing a Green Committee – 'The Green Transformers'
 - Implementing Departmental 'Green Mandates'
 - Presenting the ever popular 'Energy Hog Award' for delinquent departments
 - The quarterly 'Most Environmentally Aware' Award
 - Actively Celebrating 'Earth Day' with new and diverse initiatives every year
- The use of renewable energy
 - Installation of all LED bulbs in every area of the property
 - Composting
 - Recycling Waste
 - Recycling Grey Water
 - Establishing a Turtle Conservation Programme

SOME OF THE INITIATIVES:

Baler Recycling System

In January 2018, The Jamaica Inn signed a contract with The Jamaica Recycling Company to lease a Mini Baler to compact and bale all cardboard, tin, plastics and paper waste. The bales are sold back to the company by weight and are sent off for recycling. Furthermore, to increase the volume of waste and promote operational sustainability, the hotel has recycle bins placed strategically throughout the property to separate plastics and cardboard items for recycling purposes. This has cut the volume of waste sent to the landfill by

approximately half, substantially reducing the quantity of harmful products that find their way to our rivers and sea.

We have been able to extend collection services to adjacent communities including: Sombra, St. Mary Country Club and other hotels such as Royal Plantation and Couples Sans Souci. Employees are also encouraged to separate their garbage at home and bring in plastic, cardboards and paper.

Composting

Eight onsite compost pods produce fertilizer and mulch from kitchen scraps, seaweed, garden cuttings, dried leaves and other organic matter, for the property's extensive lush gardens.

Pig Feed

Very little at The Inn goes to waste. After separating kitchen refuse into composting material and recyclables, the remaining waste is taken to the onsite skip. There, for three years, Jamaica Inn has diligently provided scraps and foodstuff for pig feed for local farmers. The items are collected on a daily basis and the farmers are also supported by the purchase of their product at the hotel.

Grey Water

In October 2017, the culmination of a concerted effort to harness rainwater run-off from buildings as well as tying into the output of the hotel laundry's wastewater all came together. Extensive roof guttering and three 2,000-gallon tanks were installed alongside an existing underground water treatment tank, to harness and process grey water for the irrigation of the grounds. Piping the areas, installing and positioning sprinkler heads and establishing a timer-controlled system was the next phase.

Now, we have 90% coverage of all lawns and garden beds, fed by nitrate rich water. The byproduct of this exercise is major cost savings on water consumption and perennially lush, green acreages.

Conclusion

Most people can recognize a problem, talk about the problem and offer verbal solutions off the top of their head. It is easy to point out what 'they' should do – rarely including themselves amongst the solution finders. We at Jamaica Inn consider that 'admiring the situation'. It bears the same result as 'ignoring the situation'. We know that it is those persons who say 'what can I do?' and put in the effort to solve the problem that should be acknowledged and lauded.

Effort is required to make progress. In so many unmeasurable ways, the interest, vision, time and funds were generously invested by the Jamaica Inn Team to solve our mutual concern, as it relates to this problem. We hope that many will be encouraged to carry on with this long-term project.

**As Jamaicans
so often say:
“Encouragement
Strengthens
Labour!”**

8-STEP PATHWAY TO ACTION. A HOW-TO GUIDE FOR HOTELS IN SAINT LUCIA ON PHASING OUT SINGLE-USE PLASTICS

This project entitled Phasing out of Single-use Plastics: Towards Clean Seas and Sustainable Tourism in the Caribbean, is led by the United Nations Environment Programme (UNEP) and funded by the Government of Norway. It is part of the broader project Transforming Tourism Value Chain (TTVC) in developing countries and Small Island Developing States (SIDS) for more resource efficient and low-carbon development. This is a global effort that is aimed at reducing carbon emissions and improving resource efficiency in the Accommodation Industry in three tourism value chains, namely i) food and beverage, ii) accommodation, and iii) meetings, incentives, conferences and events (MICE). Activities are focused in countries where tourism plays an outstanding and active role for the national economy such as the Dominican Republic, Mauritius, the Philippines and Saint Lucia.

In order to achieve the aforementioned objectives set out for Saint Lucia, the Saint Lucia Solid Waste Management Authority (SLSWMA), in coordination with the Travel Foundation (TF), is supporting the implementation of the project by improving the capacity of hotels within the Accommodation Services Industry in Saint Lucia to phase out single-use plastics and introduce sustainable procurement and eco-innovation solutions.

The SLSWMA has contracted the services of JUA KALI LTD. to execute several activities associated with the project. JUA KALI LTD. is a local, social enterprise that offers technical and professional services in the field of Resource Recovery.

The current legislative ban on Styrofoam food containers and other SUP¹ coupled with travelers' increasing awareness of and concern for the negative impacts of single-use plastics

has prompted many hoteliers to pledge to reduce their plastic footprint on property. However, making meaningful and measurable progress remains a challenge for some. The lack of expertise, information and guidance for a clear and holistic approach means that efforts are haphazard at best and green-washing at worst. While there is no "one-size-fits-all" solution, there are steps that can be taken to create a more streamlined, holistic and effective approach in targeting plastic waste specifically but also to support a broader sustainability agenda more generally. Based on interviews with five (5) local hotels and survey responses from nine (9), with additional secondary research, the 8-Step Pathway for Action was developed as a guide for all hotels – large and small in Saint Lucia to take those first steps towards eliminating SUP.

The 8-step pathway to action for phasing out single-use plastics and futureproofing your hotel:

1. Re-define your hotel product by creating or adopting a Sustainability Policy for the hotel.
2. Create a governance structure to ensure that there is at least one staff member with responsibility for moving forward your hotel's anti-SUP campaign
3. Engage and share with you two most important stakeholders - STAFF and GUESTS - as early as possible your new sustainability agenda and how they fit within it.
4. Conduct a waste audit to establish a baseline for your SUP consumption, waste generation and cost. Ensure that all information is captured in an information system/data-base that will allow you to track and measure your progress.
5. Do your research to create a roadmap of actionable objectives that will guide you to achieve your hotel's goals.

¹ SUP is a watershed subject for the hospitality industry. As guest preferences and expectations change, any lag will not last very long; hotels that do not make the switch will start to feel shamed and risk being left behind.

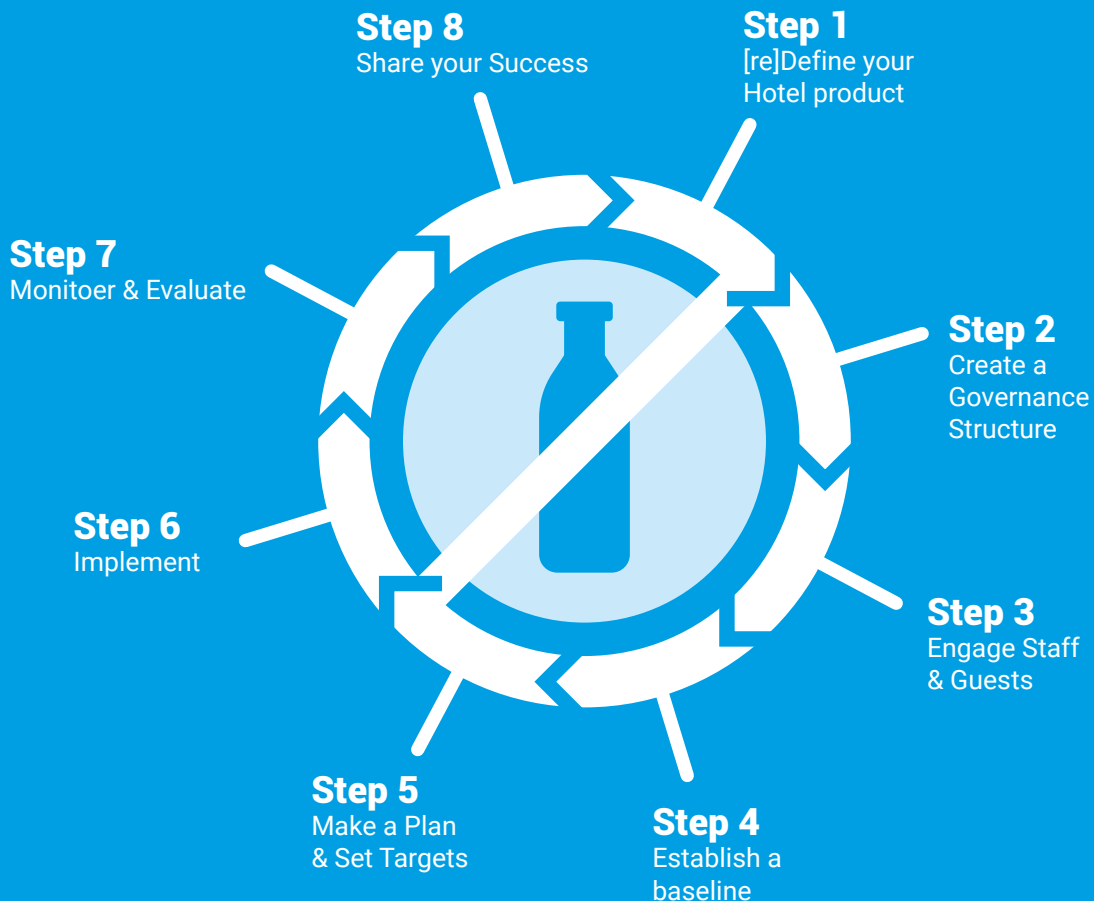
6. Adopt sustainable procurement policies and practices into your hotel's procurement process and prioritize local suppliers where possible.
7. Ensure that you are monitoring your progress on a consistent basis, and utilizing the feedback received to make meaningful changes towards achieving your goals.
8. Share your hotel's journey through the lens of your anti-SUP campaign and use it as a tool to entice, empower, engage and collaborate with your stakeholders.

The concept of sustainable luxury hospitality is breaking new ground as the current environmental crises awakens travelers to the catastrophic impact of their day to day choices. Travelers want to feel good about where they go and are increasingly choosing locations and accommodations that share their values.

This is an opportunity for your hotel! In a tourist hotspot like Saint Lucia, hotels have a vested interest in conserving the natural environment on which they depend while also catering to the expectations of their guests. By bringing together sustainability and luxury, you are in a position to pioneer bold, ingenious and locally appropriate solutions that not only help mitigate your operational impacts but also enhance the local community and guest experience.

While the pursuit of a circular plastic economy may not resonate as deeply with hoteliers and guests as tossing plastic straws, it is nevertheless a crucial undertaking for the industry at large. Our hope is that this guide will serve as an entry-way towards utilizing your hotel as a tool to address some critical environmental issues like plastic waste.

Fig. 1 - XXXXXXXX XXXX XX



Chapter 3

Waste and the Circular Economy



GRUPO RETORNA ASSOCIATION, POST-CONSUMPTION WASTE MANAGEMENT AND THE CIRCULAR ECONOMY IN COLOMBIA

AUTHOR: Edgar Fernando Erazo Camacho

AFFILIATION: Retorna Group

ABSTRACT

Grupo Retorna, a Non-Profit Entity, is the first alliance for the environmentally safe management of post-consumer waste in Colombia and Latin America. Represents companies from different economic sectors, helping to comply with the principle of Extended Producer Responsibility, integrating and optimizing operational processes, for the benefit of the country.

Retorna is an initiative made up of six post-consumption systems, in order to promote compliance with the legal framework and public policy regarding the implementation of collection systems and comprehensive management of post-consumption waste, based on the application of environmental education, alliances, communication, among others, to generate behavioral changes regarding environmental awareness.

MAIN BODY

The Grupo Retorna Association is the first alliance for post-consumer waste management established in our country; It brings together more than 130 companies from the domestic pesticides, household appliances, electronics and automotive industries. The strategic axis of the association is framed in the promotion of collective efforts in the field of Extended Producer Responsibility, to comply with the guidelines set forth by the OECD (Organization for Economic Cooperation and Development), the ONU (Organization of Nations United) and the Government of Colombia, at the head of the Ministry of Environment and Sustainable Development.

This initiative is aimed at meeting the growing expectations of the various interest groups regarding environmental protection, complying with Colombian public policies and regulations. This shows the commitment of the sectors involved to manage the waste generated by their operation in an environmentally safe way;

prevailing the union interest over the private interests and articulating collective actions.

It is made up of the Corporations: Cierra el Ciclo, EcoComputo, Pilas con el Ambiente, Red Verde, Recoenergy and Rueda Verde; supported by the National Association of Colombian Industry - ANDI; which function as groups, made up of companies that import and/or market the products corresponding to each of these collection and management systems.

The Grupo Retorna has allowed to deliver a comprehensive value offer to the generators of this waste, allowing them to properly dispose and manage: Containers of household insecticides, computers and peripherals, used batteries, domestic electrical ("white goods"), used lead acid batteries and used tires, which could have effects on the environment and on health as proper management is not carried out in its final stage.

The circular economy strategy has been, since its creation, the main axis of work of the Grupo Retorna. The results that the Association and its associates are producing today reveal a responsible and continuous work for the sustainability of Colombia.

The amount of waste that inadequately reaches the sanitary landfills has been reduced, soils have been protected by mitigating the pressure of discharges of such waste and, additionally, it has contributed to the reduction of Greenhouse Gases (GHG) by reintegrating back to the economic cycle the materials that can be used, thus reducing the extraction of new resources from the earth.

Grupo Retorna has reached more than 191 municipalities in the 32 departments of the country, benefiting more than 13 million inhabitants with collection, logistics, education and participation activities. In addition, the Group has more than 5,600 collection points arranged throughout the national territory, allowing Colombian citizens to properly dispose of their post-consumer waste.

Achievements of the corporations belonging to Grupo Retorna:

by-products within the production process and minimizing the generation of waste remnant of the final process.

The Corporación EcoCómputo has become the pioneering system of technological waste collection and management and a national and international benchmark in the treatment of waste electrical and electronic equipment. Since the beginning of its operations, it has collected nearly 5.3 million units and more than 15,300 tons of computer and peripheral waste in the country in eight years of operation.

Since 2014 Red Verde has voluntarily managed more than 10,200 white goods units, of which approximately 76% correspond to the category of refrigerators. During its years of operation, it has accompanied the design and implementation of international cooperation projects and national initiatives aimed at contributing to the goal of reducing GHG emissions.

Pilas con el Ambiente, a corporation in charge of treating used batteries, has collected more than 1.7 million kilos, preventing them from reaching landfills. The by-products generated from the management are integrated as raw material in industrial, agricultural processes, foundry material, among others.

Rueda Verde, in its seven years of operation, has managed the management of more than 12 million tires, representing around 271,630 tons of rubber and steel, which again enter the flow of materials available to the industry, contributing direct to the goals set by the country in recovery and use of waste.

The Corporación Cierra el Ciclo has at the consumer's disposal more than 550 collection points located in 106 municipalities of the national territory. Since 2011, 22 tons of household insecticide containers have been managed.

Recoenergy has currently managed more than 139,000 units of used lead acid batteries. The bet is aimed at working together with companies in the automotive sector that produce and / or import lead-acid batteries, in order to meet the sector's main REP challenges.

The Grupo Retorna association seeks to work in line with the actions of the circular economy in the management of the different categories of post-consumer waste through the treatment and / or use of its materials, reincorporating

CIRCULAR ECONOMY AND INTEGRATED WATER RESOURCE MANAGEMENT IN THE BOGOTA RIVER BASIN

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ABSTRACT

In 2019, Universidad de los Andes launched the Integrated Water Resource Management program (GIA) for enterprises, based on circular economy concepts, improving businesses' competitiveness and productivity, and water security in the territory. Twenty-two multi- sectorial companies participated in the program and formulated 10 projects collectively. These projects sum an investment of \$953.5 million COP and will intervene 65.5 hectares of key ecosystems improving the regulation of 515,000 m³/year of water in the watersheds, preventing 6,850 tons/year of sediments to reach water bodies, capturing 8,125 ton of CO₂ and avoiding nearly 1,045 million COP of contingency costs during extreme climatic events.

INTRODUCTION

The National Strategy for Circular Economy (NSCE) was formulated in Colombia in 2019. It has six priority lines, one of which is related with water resources. It establishes goals related with the productivity of water so that by 2030, Colombia goes from 18.9 USD/m³ to 20.5 USD/m³. To achieve this goal, all economic sectors must improve their practices for efficient use of the resource. However, the Integrated Water Resource Management (GIA in Spanish) program, developed in 2019 by Universidad de los Andes, broadens the perspective, moving away from individual actions and into collective actions. Rather than having single companies focusing on their water efficiency, the program aims at projects formulated collectively that involve the restoration, protection and conservation of ecosystems and water related services in the territory.

This program was implemented with the triple helix alliance between the Environmental Authority of Cundinamarca (CAR), the academia-Universidad de los Andes and companies.

METHODOLOGY

The GIA program is based on three pillars that have demonstrated the generation of economic, environmental and organizational benefits in enterprises. These are: (i) skill-building and empowering staff through learning-by-doing, (ii) network collaboration and, (iii) a change strategy, based on the application of Integrated Water Resource Management (IWRM) practices, aligned with the NSCE, to improve business competitiveness and productivity.

Companies that participated in the program were selected within the area of jurisdiction of CAR. These enterprises were selected based on two main aspects. First, that they had a common watershed and second, that their demand and consumption of water was high, and not limited to a single economic sector. In other words, the program involved multiple industrial activities and different sized organizations.

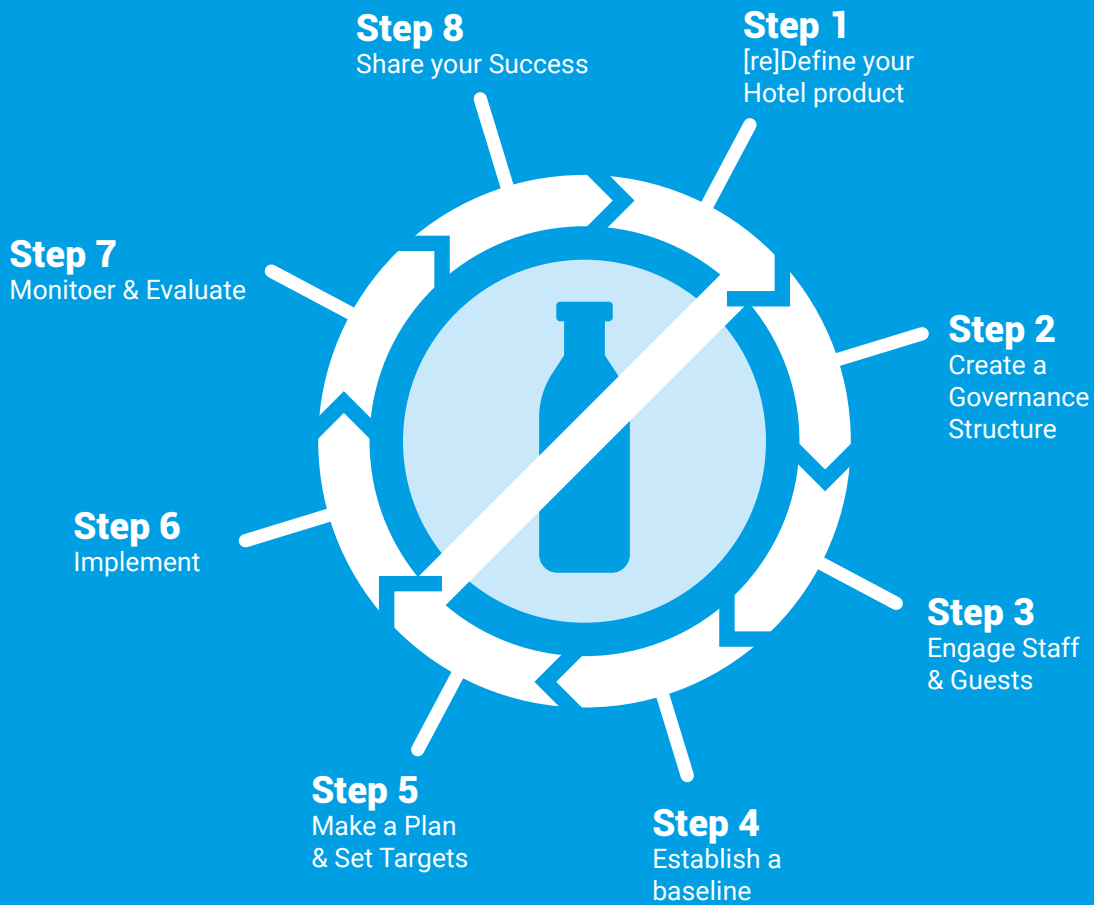
Nine workshops were developed to guide participants to formulate an Integrated Water Resource Management project. The workshops were divided in three modules: (I) Introduction to Integrated Water Resource Management and Ecosystem services, (II) Water Risk and Water Security and (III) Economic and Environmental Benefits Calculation.

RESULTS

Twenty-two companies from multiple economic sectors such as the flower, food, alcoholic and non-alcoholic beverages, mining, chemical, pharmaceutical, cosmetics, and furnishing industries participated in the program. Ten projects were formulated among the 22 companies and 43 persons attended to the workshops and were certified.

Three types of projects were formulated by the companies. The first one is an initiative led by companies where they agreed to restore key ecosystems in their territory. The other two

Fig. 2 - GIA's multiple industrial sector participants in the watershed.



types of initiatives were alliances with other organizations. One was a joint collaboration with Civil Society Natural Reserves (RNSC in Spanish) to restore/protect/conservate key ecosystems and the other one was a cooperation with CAR and the Wetland Adoption Program (PPH in Spanish) to restore/protect/conservate key wetland systems. These projects aim at improving ecosystem services that regulate water quantity, quality and resilience, enhancing water security in the territory. Table 1 summarizes the investment and the economic and environmental benefits of the projects.

CONCLUSIONS

The GIA program was able to promote different goals related to water resources. First, it boosts water programs as the one of Wetland Adoption Program of CAR, the Civil Society Natural Reserves, and the National Strategy for Circular Economy. Second, land-use and watershed planning policies by local governments were

used and made available to businesses, which enhances the implementation of such plans. Third, a multi-sectorial network of companies was built, with new trust relationships that facilitates IWRM projects and opens the door to new business opportunities among the participants. Finally, water security for companies and the territory will be improved when projects are implemented.

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Table 1. Summary of economic and environmental benefits from the IWRM formulated

Total Investment	\$953.5 million COP
Economic benefits	\$1,043.3 million COP during extreme climatic event*
Hectares restored/protected/conserved	65.5 ha
Water regulated in the watershed	515,000 m3/year
Avoided sediments drag	6,850 ton/year
Captured CO2 emissions	8,125 ton

Note: 1 USD = ~ 3,500 COP

* This was calculated by the 22 companies that participated in the program. Real value is much greater as the project would benefit all companies in the area of influence.

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ADOPTION OF CIRCULAR ECONOMY STRATEGIES THROUGH SUSTAINABLE ENTERPRISES NETWORK PROGRAM (REDES) IN COLOMBIA

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ABSTRACT

The Sustainable Enterprises Network (RedES) drives changes towards sustainable production systems in companies and value chains in order to improve efficiency and competitiveness. Since 2013, RedES has been applied in Cundinamarca, Colombia through the RedES-CAR program. In this program, 550 companies have adopted the circular economy strategies of Cleaner Production and Industrial Symbiosis. These companies formulated 507 initiatives with total savings of \$55,534 million COP. The projects avoid the generation of 47,857 tons of residues per year, and the emission of 81,907 tons of CO₂ with annual savings of 2,018,765 m³ of water and 30,396,820 KWh per year of electrical energy.

INTRODUCTION

In recent years, Latin American countries have advanced in policies and strategies that promote the implementation of Circular Economy (CE). According to Ellen MacArthur, CE is a cycle of sustainable development that optimizes the use of resources and minimizes risks (Ellen McArthur Foundation, 2014). Particularly, Colombia has adopted policies that promote CE as the Sustainable Production and Consumption Policy (2011) and the National Circular Economy Strategy (2019). The materialization of these policies in concrete initiatives in the private sector is challenging. Within this framework, the Universidad de los Andes developed the Sustainable Enterprise Network (RedES in Spanish) methodology.

RedES drives changes towards sustainable production systems in companies and value chains to improve efficiency and competitiveness. The model is based on three pillars: learning by doing, change strategies and network collaboration. RedES builds

capacities in companies that are translated into improvement initiatives with economic, environmental and productive benefits.

The RedES model applies circular economy strategies such as Cleaner Production (CP) and Industrial Symbiosis (IS). CP promotes the optimization and the efficient use of resources through good practices, process redesign and technological innovation. While the IS shows opportunities for collaboration between companies from the same or different productive sector. These opportunities include exchange of by-products, shared use of infrastructure and services, and closing the material loop.

Since 2013, the RedES methodology was applied in Cundinamarca, Colombia in the RedES- CAR Program as a result of the triple helix partnership among private companies, public environmental authorities with the Environmental Authority of Cundinamarca (CAR) and the academic sector with Universidad de los Andes.

METHODOLOGY

To achieve its objectives, the RedES methodology includes: (i) formation of chains of companies and (ii) training company participants in CE tools.

The formation of chains of company changes with the CE strategy (CP or IS). In CP, the process begins with an anchor organization that promotes the articulation of suppliers and customers in its value chain. Generally, between 10 and 15 companies are selected based on technical criteria and in conjunction with the leader company. In SI, groups between 15 and 20 companies with opportunities to exchange by-products, share infrastructure and services and close the materials cycle are formed. The groups focused on the closing of the cycle are made up of actors along the

value chain of the material. In 2019 RedES-CAR focused on closing the plastic loop, the group included producers of raw materials, processors, customers and collectors.

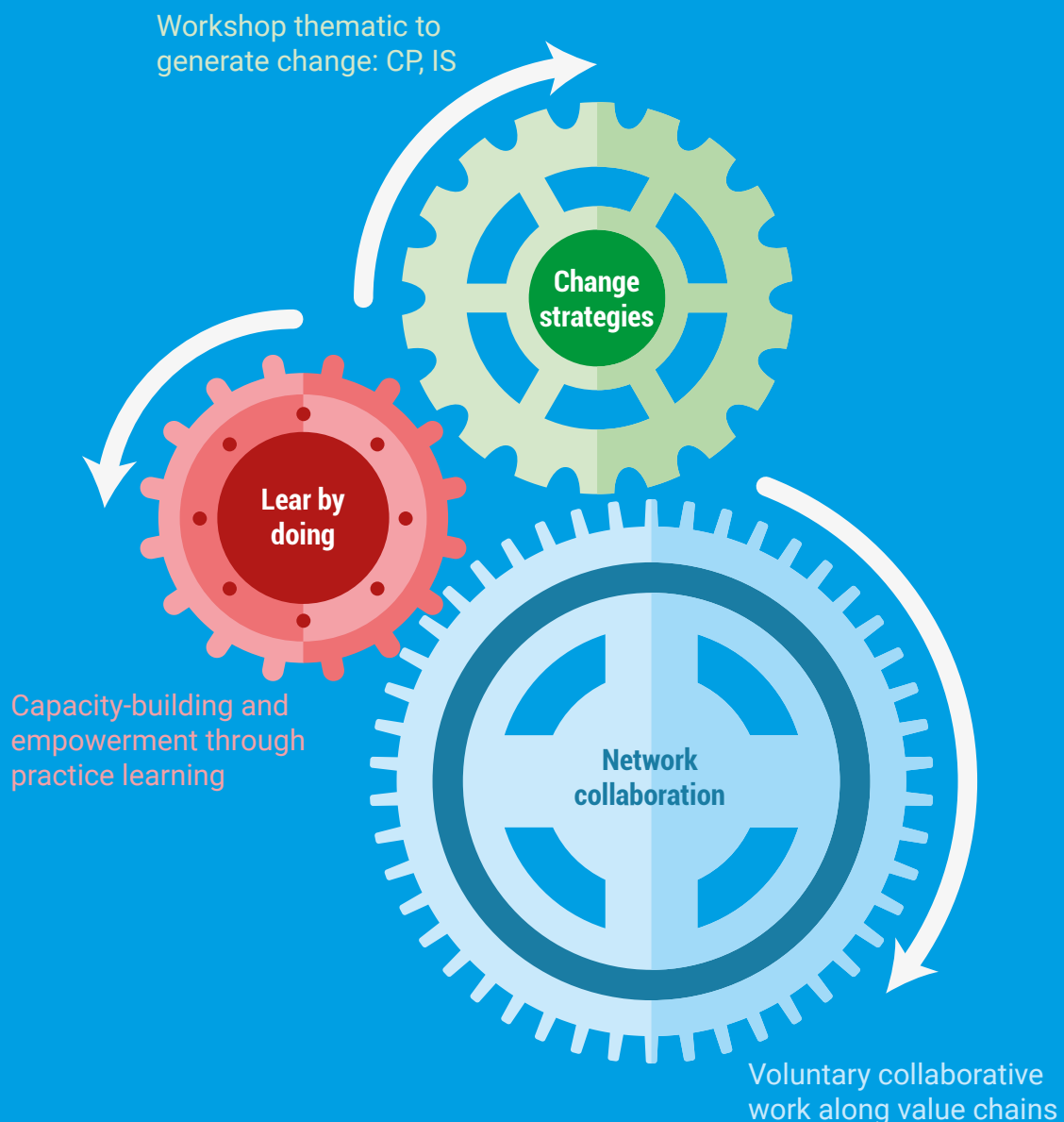
Capacity building in the RedES methodology is based on learning by doing. In CP, participants learn practical circular economy tools and apply its in their companies. The training is carried out in 10 sessions and two modules: (i) Business competitiveness and CP (3 sessions) and (ii) Application of CP in companies (7 sessions). This allows analyzing the company and formulating sustainability initiatives with economic and environmental benefits. In IS,

companies apply IS concepts, analyzing inputs, outputs and circularity of their productive operations in 8 training sessions. The IS strategy also promotes communication with the aim at formulating collaborative projects with economic and environmental impacts.

RESULTS

The CP strategy has been applied since RedES- CAR Program began in 2013. About 447 companies have participated in this strategy and 474 projects has been formulated. The types of projects can be divided into

Fig. 3 - RedES's program pillars.



best practices (31%), new activities (27%) and technological innovation (42%). Best practices are adjustments in operational procedures and parameters. New activities result from adjustment of components and system changes. The remaining typology consists on modifying and updating existing technology. Table 1 summarizes the economic and environmental benefits achieved in the CP strategy.

Table 2. Summary of economic and environmental benefits from the CP projects.

Economic benefits	\$48,354 million COP
Water Savings	1,864,245 m ³ per year
Avoided Residues	28,321 Ton per year
Power Savings	29,773,397 KWh per year
Agrochemicals Reduction	1,122 Ton per year
Avoided CO2 Emissions	73,575 Ton per year

The IS strategy has been applied in 73 companies that have formulated 60 business collaboration initiatives since 2016. The types of IS projects are closing of the materials loop (50%), exchange of by-products (40%) and sharing of infrastructure or services (10%). Closing of materials loop promotes the use of materials in other applications through practices such as recycling and reuse. While the exchange of by-products allows to value materials flows. The output material of one company is used as raw material for another. Finally, some companies agree to share infrastructure for water treatment, sludge or waste management. This is an example of exchanging products to services.

Table 3. Summary of economic and environmental benefits from the IS projects.

benefits	\$7,180 million COP
Water Savings	154,520 m ³ per year
Avoided Residues	19,536 Ton per year
Power Savings	623,423 kWh per year
Avoided CO2 Emissions	8,332 Ton per year
Avoid ed CO2 Emissions	73,575 Ton per year

CONCLUSIONS

The RedES methodology is an effective model for the adoption of circular economy strategies, such as CP and IS. RedES drives changes towards sustainable production systems in companies and value chains in order to improve efficiency and competitiveness. In Colombia, the model was applied with the RedES-CAR program with quantified environmental and economic benefits in formulated initiatives. In the CP and IS strategies, 507 projects were formulated of which almost 60% of the initiatives were implemented. Moreover, RedES-CAR showed the multiplication of the methodology. The program started in 2013 with the participation of 42 companies and in 6 years, the CP and IS methodology escalated to more than 550 companies.

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USING CARNIVAL AS A MECHANISM TO REDUCE CLIMATE CHANGE AND CREATE A CIRCULAR ECONOMY IN THE CARIBBEAN

AUTHORS: Danii Mcletchie, Luke Harris

ABSTRACT

Carnival parades, fetes, competitions and other parties are important to the economic growth of many islands in the Caribbean. Carnival is a cultural event that attracts hundreds of thousands of Caribbean natives and tourists from different countries each year. However, despite the positive economic and social benefits derived from Carnival, Caribbean islands that host such events are most at risk due to the unsustainable effects that Carnival production can have on a country. In this article, the work of Carnicylce will be explored, particularly the positive role of recycling carnival costumes on the economy through job creation and increased morale towards a sustainable society.

MATERIALS COMMONLY USED IN COSTUME PRODUCTION AND THEIR ENVIRONMENTAL IMPACTS

Ostrich Feathers

A variety of feathers are used in the creation of carnival costumes including, but not limited to: Pheasant, peacock, goose, and ostrich feathers. The use of ostrich feathers in costumes has grown increasingly popular over the last decade. Ostrich feathers are commonly used in various parts of the costume such as the head piece, backpack (wings), and even arms and leg pieces.

Ostrich feathers are primarily sourced from South Africa where over 70% of the world's ostrich farming exist. Feathers are a by-product of Ostrich farming as the birds are harvested primarily for their meat and leather which are currently in high demand. We will focus on the carbon emissions associated with importing feathers into the Caribbean.

Carbon Emissions

Carbon emissions are created through the farming, processing and transportation of ostrich feathers. Processing includes: "degreasing, intermedium, fading, blanching, whitening, dyeing" and drying the feathers. The ostrich feathers which originate in South Africa are sent to China to be processed inexpensively. The feathers are then sent to the USA where a licensed feathers retailer/wholesaler sells feathers to different Caribbean countries. Strict importation rules prevent many Carnival bands or craft stores from importing feathers directly from China.

Gems/ Rhinestones

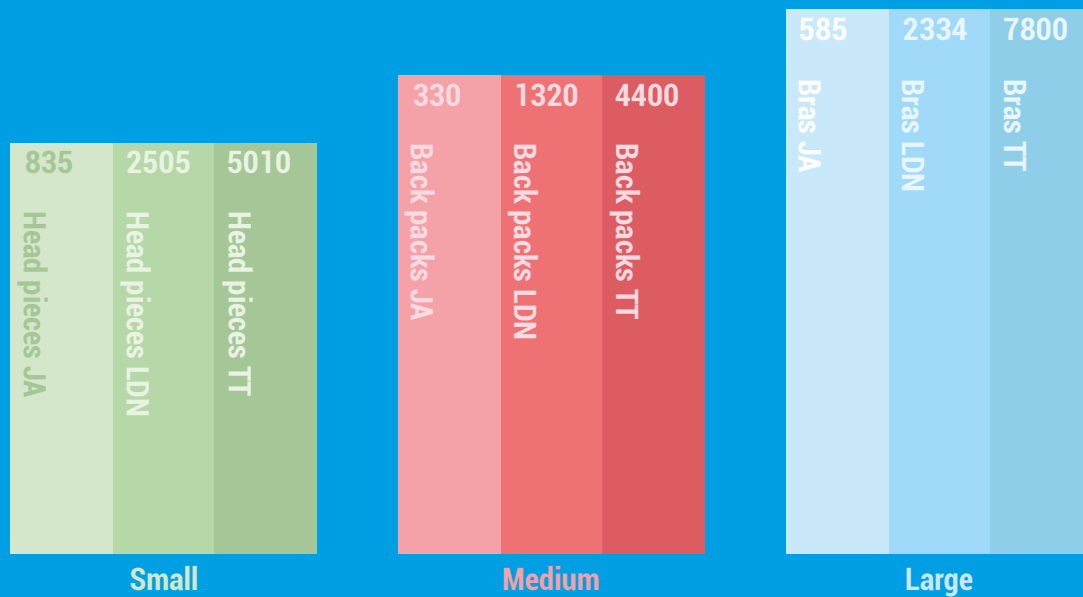
Gems/ Rhinestones are typically made from plastic or acrylic resin. They are used to decorate the entire costume but the majority of these jewels can be found on the body of the costume (bras, bodysuits, panties). Most often the body of the costume is discarded, along with the plastic decor. The environmental impact of discarding the plastic material is associated with carbon emissions from importation and effects of the plastic jewelry in landfills or oceans.

REDUCING CLIMATE CHANGE WITH COSTUME RECYCLING

Circular Economy

Creating a network of recycled materials used in costume production such as feathers, wireframing, and beads and gems can reduce the need to import material from foreign countries and thus reduce the carbon emissions associated with the act. Additionally, there is an added economic benefit, as items within the network will be provided at discounted prices.

Fig. 4 - Number of costume pieces discarded for small, medium and large band



Reducing Waste to Landfills

Landfills that are improperly managed produce deleterious effects on the environment by polluting the air with methane gas, groundwater with toxic chemicals and displacing surrounding animals. Diagram 1 shows the amount of costume waste that is discarded by persons post Carnival. Recycling costumes instead of discarding them diverts waste away from landfills which will alleviate the negative effect of landfills on the environment.

ADDITIONAL BENEFITS OF A MORE SUSTAINABLE CARNIVAL

Increase in Tourism

Consumer demand for responsible travel is increasing. Every year, there have been a larger percentage of persons that not only travel to have fun but when travelling, they want to know that they are taking part in activities that maximizes the benefits to local communities and that it minimizes negative social or environmental impacts. Table 1 shows that 47% of global travelers were inspired by seeing the positive effect that sustainable tourism can have on locals. Making Carnival sustainable will target audiences that seek responsible travel therefore broadening our market of Carnival.

Job Creation

Recycling costumes requires labor done to get costumes from the point of collection to a form in which it is ready to be donated or sold. The following outlines various forms of employment that must be utilized for every collection:

- Transportation of costumes to cleaning facility
- Collecting and breaking down costumes.
- Sanitation of costumes pieces

Also, Carnicycle operates in multiple countries and it is not feasible to execute our process at every Carnival. As a result, Brand Ambassadors representing different countries must be employed to organize logistics of costume recycling in their host country. With the addition of Brand Ambassadors we hope to encourage more local initiatives in the recycling program and reduce carbon emissions associated with primary members travelling to each country.

Table 4. Percentage of global travelers who found varying aspects of sustainable travel inspiring

The factors that inspire sustainable travel	% of global travelers who found this inspiring
Being impressed by natural sights during their own travels (e.g. coral reefs, rain forest)	60%
Noticing a visible impact of tourism at the destinations they have visited	54%
Seeing the positive effect that sustainable tourism can have on the local people	47%
Seeing the unsustainable effects of tourism in their home country	42%
Feeling guilty about the impact their vacation has had on the environment	32%

Carnival bands come in small, medium and large sizes. Based on calculations across 10 carnivals, we asked masqueraders what happened to their costumes post Carnival. The results showed that an estimated 17% , 22% and 39% of head pieces, backpacks, bras were thrown away respectively. While these numbers look small, when translated to the varying carnival sizes (JA- 5000 players, LDN- 10,000 players, TT- 50,000 players). The following material were estimated:

COLOMBIA, TOWARDS THE SUSTAINABLE MANAGEMENT OF SINGLE-USE PLASTICS

AUTHOR: Carlos Jairo Ramírez Rodríguez, 14, Coordinator of the of Productive Sectors Sustainability Group, Ministry of Environment and Sustainable Development. Linda Breukers, Advisor, Ministry of Environment and Sustainable Development

ABSTRACT

In 2018, Colombia formed the National Board for the Sustainable Management of Plastic, with government entities, private sector, academia, recyclers, NGOs and research

institutions; within this context, the National Plan for the Sustainable Management of Single-Use Plastics, which included “lines of action per product” directed towards improving the environmental characteristics of plastic products, the rational use of plastics, the culture in commercial establishments. It includes cross-cutting actions in research, reverse logistics, communications and citizen culture and resource management, among others, which are already being implemented.

Colombia makes progress towards the sustainable management of single-use plastics:

Plastics are currently one of the most widely used materials to manufacture and wrap many of the products that we buy and consume in our daily lives. The National Administrative Department of Statistics (DANE) recorded that in 2017 the production of plastic bags, which include branded and unbranded plastic bags and those that are vacuum packed, exceeded 60 thousand tons.

Plastic is used because it is easy and cheap to manufacture, and because it lasts a long time. Unfortunately, these same advantages have converted it into the number one contributor to pollution after the consumption of products, due to the lack of recycling systems and the lack of knowledge and culture among citizens on how to separate it. Studies show that marine litter directly affects living organisms, especially through entanglement with macroplastics

and ingestion of microplastics (Neufeld, et al., 2016), and considering that many plastic products are used for just a few minutes or even a few seconds and then discarded.

The National Board for the Sustainable Management of Plastic

The Government created the above mentioned National Board for the Sustainable Management of Plastic in 2018, with the participation of the public and private sector to articulate and execute actions in all phases of the plastic life cycle for the improvement of environmental, economic and social sustainability, to achieve efficiency in the use of materials, under the principles of the circular economy.

The Board is a platform that brings together key actors from the public and private sectors, academia, recyclers, NGOs and research institutions and has enabled the formulation of the Plan for the Sustainable Management of Single-use Plastics, with actions that are aimed at the gradual replacement of some single-use products that are considered harmless, such as mixers, cigarettes, bags and cups, and promoting a culture of using reusable products. It also establishes incentives for the reverse management of waste through measures such as the extended producer responsibility and promoting eco-designing which consists of incorporating environmental features such as the possibility of reuse, recyclability and compostability, among others, into production.

The plan presents the background on the problem and the international commitments established by the United Nations Environment Assembly, the Pacific Alliance, Colombia’s progress and commitments, to contribute to solving the problem of ocean pollution caused by the inadequate management of plastics, as the foundations to establish a vision in which Colombia manages plastics in a sustainable

way by 2030. In the first instance the Plan establishes “lines of action per product” with initiatives aimed at improving the environmental characteristics of plastic products, to promote the rational use of single-use plastics, adding reusable materials to the market and changing the culture in commercial establishments and residential services.

The Plan also includes cross-cutting actions that are fundamental to facilitate management, highlighting labelling, eco-design, communication and culture towards sustainable living, sustainable public purchases, coordinating public sanitation services, as well as restrictions for the use of plastic in protected areas. Likewise, actions are included that address basic and applied research for new substitute materials and the creation of reverse logistics mechanisms. The complementarity and harmony established for the development of the proposed actions facilitate the fulfillment of the objectives and goals.

Likewise, it promotes the implementation of the principle of extended producer responsibility – EPR for waste containers and packaging, including those made from plastic, as established in Colombian regulations, according to which producers must formulate, implement and keep updated their environmental management plans for waste containers and packaging. In addition, there is a need to broaden the extended producer responsibility to single plastic products, different from containers and packaging, the management of resources and the strengthening of the information systems.

Likewise, it develops mechanisms to promote change towards sustainable living in such a way that the consumer incorporates environmental criteria into purchases for goods and services.

Medium term goals for the replacement of single-use plastic products are established in the plan and the use of plastics by at least 50% by the year 3030.

In this way, the 9R hierarchy, of the National Circular Economy Strategy: Discard, Rethink, Reduce, Reuse, Repair, Restore, Remanufacture, Re-propose, Recycle and Recover will be applied to single-use plastic products.

Ministry of Environment and Sustainable Development 2019, “Plan for the Sustainable Management of Single Use Plastics.”

EKO RED, A GREEN COMPANY

AUTHORS: Juan Carlos Gutiérrez Cano, Manager. Germán Darío Vanegas Sánchez, Commercial Director

ABSTRACT

The theme of the Eko Red project, a green company, is “The circular economy: reuse, reuse and recycle” given that we are a company focused on the design and operation of a sustainable model that allows us to recycle post-industrial products into the supply chain through a circular economy model that includes recyclers, warehouses and factories; enabling the reduction of environmental impacts and generating a social transformation.

As a subsidiary of Enka de Colombia, we have national recognition for contributing to sustainable progress, through the collection, separation, compaction and commercialization of recycled material, contributing to the decrease in the exploitation of natural resources and the generation of jobs.

Our Project

At Eko Red, we work each day to continue being the leader in the supply, processing and marketing of recycled PET bottles, thanks to the formation of a recycling network that generates alternatives to contribute to the economic, social and environmental strengthening of the country.

Thanks to the experience acquired during the last 12 years, we have received national recognition for contributing to sustainable progress, through the collection of 3 million bottles a day, contributing to the conservation of the planet.

Likewise, we have ventured into the recycling of other materials such as paper and cardboard for factories, generating a sustainable culture and increasing the recycling indicators.

PET bottles process

Objective:

To establish the necessary activities to process recycled material at Eko Red and guarantee optimal delivery to the customer.

Scope:

The process begins with the disposal of material received at the warehouse and ends with the shipment of compacted material to customers.

Definitions

Sack: in which items are packed.

Mechanical recycling: Mechanical process that consists in subjecting a previously used material to a total or partial processing cycle to obtain a raw material. The activities involved in this process are recovery, classification, compressing the material.

Material to Benefit: PET container that has a contaminating label for the PET production process.

Material benefited: PET container that has had its label or lid removed, a contaminant for the PET transformation process.

Prepared bales: PET material that is packed in bales and meets the PET transformation requirements, and is tied perfectly. Meets the client's requirements.

Material to work: Bales or PET bottles that contain in a small proportion material that does not meet the PET transformation requirements, and must be classified. Material that needs to be compacted and packed.

Strategic direction

Mission

Eko Red is dedicated to the supply and commercialization of recycled material through a logistic network of use, maintaining the balance between economic growth, the environment and social welfare.

Vision

To be a competitive and sustainable company at national and international level, innovative in its processes and capable of dialogue in the environmental, social and economic fields.

Table 5. Description of the procedure or activities.

ID	Activity	Description	Responsible Personnel	Monitoring
1	Reception of Material	<p>Suppliers deliver the recycled material daily, the person in charge of receiving the material is the Supervisor supported by Operators, as indicated in the Material Reception Instructions.</p> <p>In the event of failures in the scale system, the Operator and Supervisor who receives material must complete the F-PR-011 Material Entry form in order to trace quantities and bill the supplier.</p>	Supervisor, Operator	<p>Scale Ticket</p> <p>F-PR-011 Entry of Materials.</p> <p>Material Reception Instructions.</p>
2	Storage of received material.	<p>The material received is placed in the corresponding area: Prepared packages are in the dispatch area, work materials in the storage area. The processing of materials returned by the customer is done in accordance with the Non-Conforming Product Procedure. P-PR-002.</p> <p>The prepared bales are inspected according to the Product Control format F-PR-001. If non-conformity is established, processing takes place under the Non-conforming Product Procedure.</p>	Operator	<p>F-PR-001 Product Control. Procedure Non-conforming Product. P-PR-002</p>
3	Band material download	<p>The material to be inspected is unloaded for inspection by the supplier. In the F-PR-004 Classification Control format, the in-band operation is recorded.</p>	Operator	<p>F-PR-004 Classification Control.</p>
4	Material classification	<p>The material is inspected and classified according to the content in the supporting document on bottles unsuitable for the process.</p> <p>The container identified as unsuitable in the classification is stored in a container identified with the name of the supplier in order to be returned. After classifying the supplier, the Supervisor is informed of the weight of the unsuitable material and the container is placed in the return area and then delivered to the supplier. The weight of non-conforming material found in the classification is recorded on the scale ticket in the P.N.C</p>	Operator, Supervisor	<p>Scale ticket</p>

5	Compression	<p>The available material is fed into the packaging machine.</p> <p>The machine is operated according to the instructions in the packaging machine operation manual provided by the machine supplier.</p>	Operator	Machine operation manual
6	Securing the bale	<p>The bale is tied according to the Bale Securing Instructions.</p> <p>Once tied, a cart is located at the bale exit point of the packaging machine. If bottles with air are found, they are punctured with the knife.</p>		Bale securing instructions
7	Quality control of the material	<p>When the bale is ready, it is weighed and the Product Control registration is made in the format F-PR-001. In case of identifying a non-conforming product, proceed according to the Non-Conforming Product procedure P-PR-002.</p>	Supervisor	F-PR-001. Product Control Non-Conforming Product P-PR-002
8	Identification and traceability	<p>The bales are identified according to the Paca Marking Instructions.</p> <p>The traceability of the bales manufactured and shipped to the customer from EKO RED warehouses is determined by the number on the label. The bales delivered to the customer directly by the supplier, the traceability data is the date registered on the bale and the outbound shipment F-PR-014 Outbound PET shipment.</p>	Supervisor	F-PR-014 Referral PET Departure
9	Sending the material to the client	<p>For the dispatch of material to the client, the loading of material is coordinated with the transporter.</p> <p>The dispatch registration is made in the format F-PR-013 PET Remission and the transporter is given the outbound referral and the trip is recorded in the F-PR-007 Freight Control format.</p>	Supervisor	F-PR-013 Remission PET F-PR-007 Freight Control
10	Material income	<p>Daily monitoring of the daily income of material is carried out, this information is reflected in the format F-PR-010 Monitoring in Production of daily income.</p>	Supervisor, Collection Manager	F-PR-010 Monitoring of daily income production.

11	Garbage	The garbage generated in the plant is registered each month in the Garbage Adjustment format and the amount is reported by email to the Collection Manager.	Supervisor, Collection Manager	F-PR-015 Garbage Adjustment
12	PET inventory	Monthly the inventory supervisor of PET material is carried out by the Warehouse Supervisor and Administrator, through the Count Worksheet.	Supervisor, Collection Manager	Count Worksheet

Integrated management policy:

Eko Red is dedicated to the supply and commercialization of recycled material, it is aimed at satisfying the needs of customers and stakeholders, continuous improvement of processes and compliance with legal requirements applicable to the company, with the support of a staff competent and trained, an adequate infrastructure for the provision of the service.

We are committed to the management and prevention of environmental impacts, sustainable use of resources and social responsibility. The management of eko red, annually, will review the Management Policy, to ensure that it remains relevant and appropriate; with the purpose of improving the Integrated Management System, committing to provide the necessary means for it.

Values:

At Eko Red we have values that reinforce our ethics and corporate philosophy, focused on good service and preservation of the environment: Respect, solidarity, responsibility, commitment, honesty, compliance and kindness.

Environmental education:

We have a training program, visits and consultancies that allow us to strengthen relationships and spread the environmental message to different sectors of the country in an optimal way.

We make trips to different departments, to contribute to the constant growth and development of each of our suppliers and allies, motivating them so that their financial interests go hand in hand with a real commitment to the environment, its employees and the community in general.

Additionally, we inform them about regulatory changes, market movements and future challenges in exploitation issues. We receive visits from universities and companies interested in caring for the environment.

Environmental impact:

Through the implementation of the Sustainable Production and Consumption Program, we are committed to optimizing natural resources and taking advantage of solid waste.

Fig. 5 - Captación anual

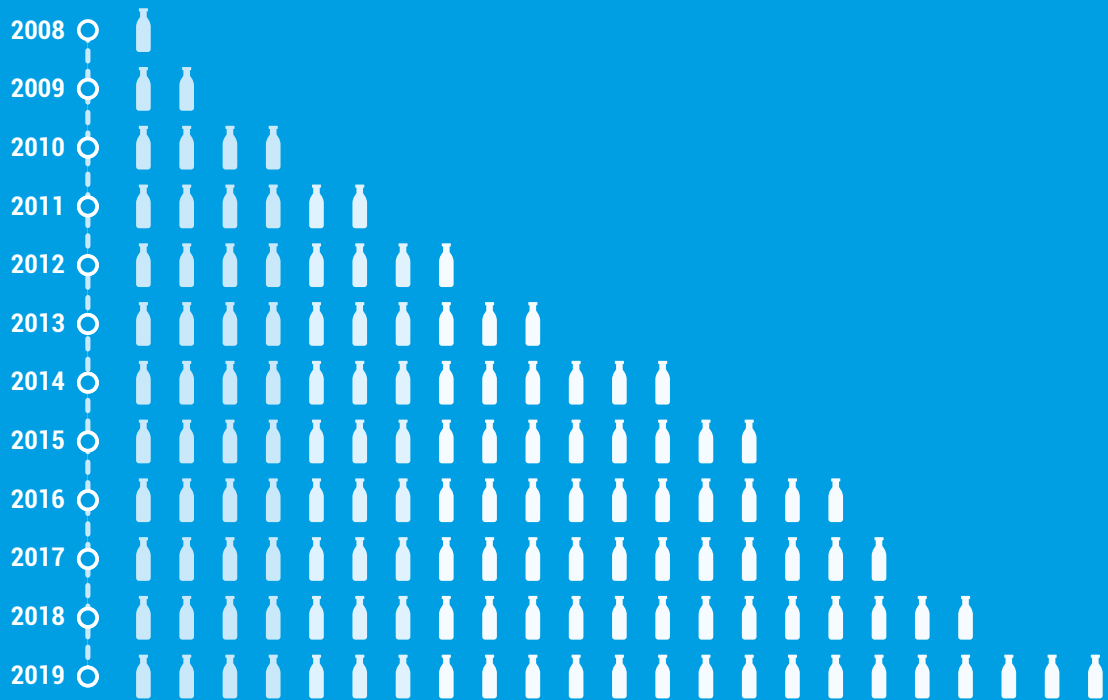


Fig. 6 - Circular economy process



Fig. 7 - Presence in the country

We continue to maintain a presence in 28 of the 32 departments throughout the country. In 2019, the uptake grew 12% compared to 2018 while the PET market for packaging was constant, this was due to our efforts to strengthen our network of suppliers and partners, through a loyalty plan focused on continuously improving processes through training and visits.



Fig. 8 - Commitment to sustainable development goals

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<p>11 SUSTAINABLE CITIES AND COMMUNITIES</p> 	<p>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation ullamcorper suscipit lobortis nisl ut aliquip ex ea commodo consequat. Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum</p>
<p>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</p> 	<p>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation ullamcorper suscipit lobortis nisl ut aliquip ex ea commodo consequat. Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum</p>
<p>13 CLIMATE ACTION</p> 	<p>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation ullamcorper suscipit lobortis nisl ut aliquip ex ea commodo consequat. Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum</p>
<p>14 LIFE BELOW WATER</p> 	<p>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation ullamcorper suscipit lobortis nisl ut aliquip ex ea commodo consequat. Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum</p>

RECYCLING AT THE UNIVERSITY OF THE WEST INDIES: IMPLEMENTATION, ATTITUDES, AND PERCEPTIONS

AUTHORS: Aria Pena, Katherine Blackman, Robin Mahon, Martin Warrington and Janice Cumberbatch.

AFFILIATION: Centre for Resource Management and Environmental Studies (CERMES). University of the West Indies, Faculty of Pure and Applied Sciences, Cave Hill Campus, Barbados

ABSTRACT

The University of the West Indies (UWI) Cave Hill Campus launched its Recycling Initiative on 8 April 2009. Although there was an interest in recycling on Campus among a few who were leading the process, information on the Campus Community's perception of, attitudes towards recycling and degree of support for such an initiative was lacking. Therefore, prior to the implementation of the recycling initiative, a study to determine this information funded by the Solid Waste Project Unit was conducted. This preliminary research will be used in further monitoring of the recycling initiative post-implementation and further research will document quantities recycled, projected savings in waste disposal and any changes in attitudes towards recycling in a subsequent report.

The purpose of this report is to summarise the planning, organisation and implementation of recycling on Campus as well as to present the findings of the preliminary surveys conducted to determine attitudes to and perceptions of recycling.

MAIN BODY OF PAPER

1. Implementation of Recycling at the UWI

Centre for Resource Management and Environmental Studies (CERMES) implemented recycling of plastics, glass, paper and printer cartridges within its Department to determine its applicability to the Campus as a whole. Staff and students quickly engaged in, and embraced, the recycling effort to such an extent that recyclables from home usage were brought into CERMES for collection by recycling companies – B's Bottle Depot (now B's Recycling), Ace Recycling and the Ink Link.

Additionally, the student cafeteria also engaged in some recycling also via B's Bottle Depot.

1.1 Recycling bins, recyclables and recyclers

The stations selected for use are sturdy, weather resistant 35-gallon, three-slot plastic units with a 20-25 year life span made of 100% recycled plastic. The recycling stations compartments are specifically labelled for plastics, glass and aluminium cans (Figure 1). Total cost of these bins was approximately USD 44,000. These stations are located in 18 areas around Campus that are most highly used by the Campus community.

In November 2009, 21 departmental offices/faculties/schools were specially outfitted with 130 Hexcycle IV bins (50 22-gallon and 80 29-gallon) for similar recyclables and in addition paper. Twenty-one DeskMate desk recyclers for ink cartridges were also provided to departmental offices/faculties/schools receiving the Hexcycle IV bins (Figure 1). These bins were sourced from Recyclingbin.com, New Jersey, USA at an approximate cost of USD 8,000. The recyclers involved in the recycling initiative are B's Bottle Depot (now B's Recycling), Ace Recycling and the Ink Link.

1.2 Functioning of the initiative

The initiative has been operating reasonably well, however chronic problems such as garbage contamination of recyclables and diversion of departmental recyclables have been occurring. Recycling stations in open-use areas are emptied three times per week (every Monday, Wednesday and Friday). Departmental bins are emptied by Office Attendants once full and filled bags are placed outside departments for collection. The plastic, glass and aluminum recyclables are stored in a holding bay within Properties and Facilities for collection by the recycler, B's Bottles.

2. Raising Recycling Awareness and Monitoring the Impact of Recycling at the UWI

Due to the lack of information on the Campus Community's perception of and attitudes towards recycling, prior to the implementation of the recycling initiative, a study to determine this information funded by the Solid Waste Project Unit was conducted.

2.1 Goals and objectives for monitoring

Table 6. Goals and objectives for monitoring the UWI recycling initiative

Goal	% of global travelers who found this inspiring
To monitor the impact of the UWI recycling initiative and to provide insights into attitudes towards the evolution of this initiative to one of complete greening of the UWI	1. Document perceptions and attitudes of students and staff towards the implementation of recycling on Campus
	2. Raise awareness about recycling on Campus
	3. Promote recycling island-wide via the UWI recycling initiative
	4. Monitor the impact of recycling

2.2 Methodology

- Documentation of attitudes towards and perceptions of recycling

Questionnaires targeting a wide cross-section of the Campus community – staff, students and restaurant managers – were administered to determine the attitudes towards and perceptions of recycling on Campus

- Student surveys
- Staff surveys
- Campus restaurant managers survey

2.2.2 Awareness raising on campus

2.2.3 Island wide promotion

In order to inform the public of the University's Recycling Initiative as well to promote the

practice of recycling island-wide, press releases and invitations to attend the launch were sent to two newspaper companies, The Barbados Advocate (Advocate Publishers Inc.) and The Nation (Nation Publishing Co.); and three broadcasting companies, STARCOM Network Inc. and MX 96.9 FM and the Caribbean Broadcasting Corporation (CBC)

3. Discussion

3.1 Attitudes towards and perceptions of recycling (Surveys)

The objective of documenting attitudes towards and perceptions of recycling was not fully

achieved due to problems experienced with surveying. In particular, the student survey activity was poorly conducted. Due to the data collection problem, the baseline data collected on student perceptions of and attitudes to recycling are not substantive and cannot be viewed as statistically representative of the Campus student population.

Greater success was achieved with the staff surveys. Since mailed questionnaires are often ignored, the relatively high response rate is encouraging and indicates that recycling is important to UWI staff.

Generally, both students and staff have a firm understanding of recycling. All students and staff members surveyed were able to provide a definition for recycling. A large majority of respondents already practise some form of recycling at home (50% of students and 78% of staff). Recycling will be further reinforced by the positive attitudes towards recycling

possessed by the majority of respondents (72% of students and 86% of staff).

Knowledge of recycling companies operating in Barbados was found to be quite poor with only 13% of students and 25% of staff capable of naming three recyclers on the island. Generally, knowledge of items that are currently being collected for recycling is high. The most common items listed by the majority of respondents (66% of students and 86% of staff) were bottles (plastic and glass), paper, metal and plastics.

Posters were identified as the most appropriate means for increasing public awareness on Campus about recycling (37% of students and

36% of staff). Nearly half of the staff (46%) and students (49%) indicated that the UWI website and e-journal were also means by which recycling awareness could be raised.

The percentage of respondents who bring food to work three to five days per week is quite substantial (75% in the case of staff and 57% for students). Since 91% of staff stated they use reusable containers as compared with only 60% of students, this may indicate that food-related waste generation by staff is fairly low. Food on Campus provided by cafeteria and restaurants is predominantly sold in Styrofoam containers. It is hoped that the recycling initiative will evolve into one of complete 'greening' of the Campus and with the implementation of biodegradable materials in the future will reduce and/or eventually replace the use of Styrofoam Campus-wide.

Provision of adequate bins, easy access to them, regular disposal and frequent educational programmes for the Campus community, were the three main requirements identified by both students and staff for their participation in the UWI Recycling Initiative.

Support for the recycling initiative was high with the majority of students (86%) and staff (85%) indicating recycling would have positive impacts on the Campus.

3.2 Awareness raising on campus

It is difficult to say definitively whether the awareness raising efforts prior to, during and after the launch of the recycling initiative have had any impact on the Campus community since this has not been monitored specifically.

3.3 Island-wide promotion

Due to the coverage of the recycling initiative received via the print and audio-visual media, numerous inquiries about the recycling programme were received and are still being received.

REFERENCES

Pena, M., K. Blackman, R. Mahon, M. Warrington and J. Cumberbatch. 2010. Recycling at the University of the West Indies: Implementation, attitudes and perceptions. CERMES Technical Report No. 35. 59pp

Chapter 4

Waste Management and the Maritime Sector



WRECK REMOVAL IN MARINE BAY (2019)

AUTHOR: Jean-Baptiste MAISONNAVE (Chef de service)

Two shipwrecks, about 6 meters long for one and 4 meters for the other, were removed on Tuesday July 9 in the waters of Marine Bay for two reasons: maritime safety on the one hand; and environment on the other. This operation was carried out as part of the mooring management action plan.

The operation has a twofold objective: to free the cyclone holes in order to restore these areas to their primary vocation of refuge in the event of a cyclone alert, and also to fight against the pollution induced by the presence of these wrecks.

Of the 350 vessels listed in these “cyclone holes” between 2017 and 2018, 25 wrecks for which no owner has been declared to be removed. Nearly 60 ships, some of which are under threat of sinking, have been also abandoned.

This operation mobilized the prefecture, the Coastal Conservatory, the Directorate of the Sea, the nautical brigade of the gendarmerie, customs and municipal police of the City of Marine. Removal of wrecks.

MARTINIQUE'S MARITIME INTERVENTION BRIGADE

ASSO-MER

(A Budget is provided in the original submission)

ASSO-MER, an association under the 1901 law, was created in 2016 with the aim of managing and protecting Martinique's marine heritage. For more than three years now, the association has taken a prominent place in the associative landscape for the protection and enhancement of the sea.

Our association now has many volunteers involved, motivated members and diverse skills, including scientific and technical. The richness of the work carried out is largely based on the network of institutional and private partners which L'ASSO-MER has set up.

THE MARITIME INTERVENTION BRIGADE 2

ASSO-MER created BIM (Maritime Intervention Brigade) in 2017 who's main objective is to collect underwater and coastal waste from all over Martinique in order to reduce their impact on the marine environment (including fishing gear abandoned or lost at sea). With this new project, we want to move from one-off operations to a more regular, more successful and above all more operational mission of collective interest through several aspects.

- **Phase 1:** Concert around a local scientific protocol ranging from tracking to recycling of waste,
- **Phase 2:** Organize the arrival of a trainer in Martinique
- **Phase 3:** Prevent and communicate,
- **Phase 4:** Locating waste at sea,
- **Phase 5:** Recover waste / minimum 6 big collection operations over the duration of the project,
- **Phase 6:** Create a waste collection network in Martinique / signature of a partnership agreement with stakeholders and public partners,
- **Phase 7:** Recovering waste, nets and fishing gear recovered by an artistic operation for educational purposes.

Chapter 5

Reducing Marine Litter Pollution



SOUTH COAST MARINE AND COASTAL REHABILITATION ADAPTATION PROJECT TO IMPROVE ECOSYSTEM HEALTH AND BUILD RESILIENCE TO CLIMATE CHANGE. PROJECT REPORT

AUTHORS: Dive St. Vincent / National Parks, Rivers and Beaches Authority

INTRODUCTION:

The purpose of this contracting service is to clean and remove approximately 6 cubic yards of solid waste at 4 bays, namely Indian Bay, Villa Bay, Blue Lagoon and Great Head Bay in the South Coast Marine Conservation Area. This will include the systematic removal of solid waste and debris along the beach at Great Head Bay and facilitate under water cleanup of reefs. On August 30th Dive St.Vincent 1977 Ltd. signed a contract with the National Parks, Beaches and Rivers Authority for Cleaning and removal of solid waste and debris from Great Head Bay and (4) reef at the SCMCA namely Indian, Villa, Blue Lagoon/Canash and Great Head Bay. This project was financed through funding from the Federal Republic of Germany through the German Development Bank (KfW) with the assistance of the Caribbean Community Climate Change Centre (5Cs) toward the cost of the South Coast Marine and Coastal Rehabilitation Adaptation Project to Improve Ecosystem Health and Build Resilience to Climate Change.

CONCLUSIONS: TOTAL WEIGHT 14,058LBS PLUS TREE TRUNKS AND OTHER LARGE MATERIAL.

Great Head Bay

Distance covered from the shore, 238 meters
Maximum depth – 34ft
Debris 4874 lbs in ex-large garbage bags
120 tires removed (average weight of car used tire 20lbs) 2400lbs
6 loads of 4 ton truck of material removed
3 loads by pickup truck
½ of Waste Masters skip

Indian Bay

Distance covered from the shore, 247 meters
Maximum depth 46ft
12 tires removed (average weight of car used tire

20lbs) 240lbs
½ of Waste Masters skip
Debris 440 lbs in mesh bags

Villa Bay

Distance covered from the shore, 600 meters
Maximum depth 50 feet
Debris 4446 lbs in mesh bags
25 tires removed (average weight of car used tire 20lbs) 500lbs
2 Waste Masters skip

Canash /White Sands

Canash /White Sands - Distance covered from the shore, 60 meters
Maximum depth 5ft
1 tire removed 20lbs
Debris 682lbs in mesh bags,1 tub.

Fort Douvernette/Young Island

Distance covered from the shore, 600 -700 meters
Maximum depth 30ft
0 tires removed
1 Fish pot
Debris 456lbs in mesh bags

A MONITORING SCHEDULE

Great Head Bay

One week after the rainy season, then weekly every 4 months for the next year. This area will need regular underwater cleanup and weekly beach clean up to prevent this area from going back to the previous condition.

Villa/Rock Fort/Young Island cut

2 week to complete the cleanup ASAP. There are more glass bottles and other debris in the water at Young Island cut; these should be removed in

the earliest possible time. Then weekly every three months for the next year. Regular patrols by SVG Coast Guard and park rangers to prevent abuse of this area will provide a protected nursery for creatures in the sea.

Indian Bay

Weekly every 6 months for the next year.

White Sands

Weekly every 6 months for the next year.

RECOMMENDATIONS FOR CONTINUED UP-KEEP AND MAINTENANCE OF CLEAN AREAS:

- Signs - To prevent and fines for persons disposing of bottles in the sea.
- Marine environment education - As part of Primary school curriculum.
- Influence Changes in the Arnos/Calliaque/ Glen and other Communities that borders rivers - on proper disposal of methods.
- Work with local tire sale and repair shops on disposal of tires.
- Enact and enforce laws on the books to prevent illegal dumping.
- Manage the stone and sand mining industry at GHB
- Consideration should be given to employ a regular beach management crew at GHB
- The jetty at Aquatic Club is a danger to the public and has resulted in beach erosion along the Villa strip. This should be demolished to allow free wave action along the shore line.
- Application should be made seeking permission to create mooring in SCMCA
- The placement of garbage disposal bins at Villa Beach without delay.
- Invite a REEF team to do a biodiversity survey in the Marine Park (basically a fish count). This would establish how many fish species are in the park and establish a baseline.
- Stop with immediate effect, the picking up and dropping of passengers at Villa Beach by the big catamarans. The propellers are dredging the sand which has created large holes close to shore and are danger to beach goers (especially the person who is unable to swim).

MARINE LITTER IN FRENCH CARIBBEAN

France : Policy framework:

- Action Plan for the Marine Environment (Marine Strategy Framework Directive - MSFD)
- Biodiversity plan: Target - "0 plastic reaching the sea in 2025"
- National Roadmap against Marine Litter 2019-2025

Measures (+ achievements)

On-land actions:

- forbid plastic carrier bags (prohibited)
- reinforce extended producer responsibility schemes and develop new ones (development still going on + extension of the scope of separate collection of plastic packaging for all households, so that the recyclable-bin accept all kind of plastic packaging instead of just bottles and jars)
- fight against littering in relation with local authorities
- contribute to European negotiations to prevent microplastics in products
- establish a roadmap for circular economy (100% of plastics to be recycled in 2025, targets for a better collection of plastics, targets for a better recyclability of plastic products, etc.); study of a nation-wide deposit system for plastic bottles and other beverage containers
- forbid the single-use plastic items listed in the European directive + cotton-bud and microbeads
- prevent the leakage of preproduction plastic pellets through an involvement of the industries.

Actions on rivers and waste and rain water:

- integrate objectives concerning marine litter in inland waters planning documents;
- quantify the litter carried through rivers (done)
- quantify litter carried through waste water (done)
- identify the areas where litter accumulates in rivers
- identify the actions/tools to prevent or recover litter in rivers and waste and rain water and experiment them (done)
- evaluate the discharge of litter by rain water and elaborate strategies for action
- define a common methodology to monitor riverine litter and microplastic pollution (organization of a workshop to identify the different methodologies to monitor riverine macroplastic pollution in the OSPAR area)
- prevent the leaks of plastic filtering sieves from water treatment plants.

Actions on the seashore and at sea

- monitor litter on beach sediments and at sea (monitoring done thanks to the NGOs: beach clean-ups, development of big litter bins and of an application to monitor the litter on the beach, etc.)
- determine the areas where litter accumulates at sea and on the coastline and the possibility of actions
- launch awareness raising actions to the benefit of fishing and aquaculture activities (actions toward fishermen to fight against pollution and initiate the collection of fishing gears and aquaculture waste)
- identify and put in place actions to improve litter collection in ports in link with the European directive (a study has been conducted on the port reception facilities. An

action plan will follow)

- implement the collection and recycling of fishing gears and aquaculture waste in link with the European directive
- encourage and develop passive fishing for litter actions (fishing for litter initiatives are occurring)
- launch a call for projects to tackle plastic pollution in the oversea territories.

Awareness raising actions

- put in place a citizen science platform on marine litter to identify the clean-up actions that take place, monitor the data and share best practices (operating - www.remed-zero-plastique.org)
- support the associations that launch awareness raising actions and clean-ups (ministry supports them)
- put in place a “zero plastic on the beach” chart in link with local authorities
- develop awareness raising and actions to inform citizens of the pollution, its impacts and the good practices to have (twice a year a meeting is organized among the NGOs and public and private actors to share information and raise issues + advertising campaign every year)

Research: federate and give better voice to the scientific community (the scientific community meets once a year through the group of research “polymers and oceans” + the ministry provides guidelines for research subjects).

International collaboration

- participation in regional sea conventions
- participation in international fora, negotiations and guidelines: JRC, UNEP, GESAMP, European Task Group on Marine Litter, Basel convention, etc.

Some data:

- Plastic packaging recycling rate: 26% ; recovery rate: 65%. (source: ADEME)
- In 2018, in the Mediterranean, 13 064 persons

have picked 774m3 of litter during cleanups

- List of the 5 items found in Western Mediterranean sea: plastic/polystyrene bits or items, lids/caps, cigarette butts, wraps

Other actions : overseas:

The ministry will also support the associative network for the following actions:

French Guiana:

- Organize clean-up actions and provide the equipment
- Awareness raising

- Create a charter of commitment

- Cooperate with the fishing industry to improve waste management

- Mark fishing gear with satellite tag

Guadeloupe:

- Identify, recover, characterize and get rid of lost or abandoned fishing nets

Martinique:

- Identify the areas at sea or on coast where waste accumulates; organize clean-up actions and recycle this waste

- Locate, recover and recycle lost or abandoned fishing gear and nets

- Create a network of waste collector

- Deploy awareness raising and communication actions

Saint Martin / Saint Barthélemy:

- Organize clean-up actions; then recycle through crushing and compressing to make objects

- Map the areas of accumulation, recover and recycle waste through artistic creations

- Awareness raising with fishermen and amateurs

IFREMER – Main activities and results:

1. Colonizing species

- Mapping of the microplastics contamination realized in the roadstead of Brest.
- Colonizing species characterized on microplastics, with a metabarcoding and PCR method
- Shows that two kinds of bacteria (Litoreibacter, Vibrio) are biomarker of the collected microplastics, with two Vibrios potentially pathogen for marine species. (source: Frère, 2017 ; Frère et al. , 2018)
- Another type of Vibrio is capable of hanging on to polystyrene microballs (in vitro) (Foulon et al., 2016).
- Still working on the question: Can they give diseases?

2. Physiological impacts

- Some vertebrates and invertebrates, being small and close to planktons by their behavior, end up ingesting microplastics. Once ingested, microplastics can block the digestive system or just pass through it.
- Nanoplastics can go through digestive membrane and migrate in the circulatory system or other organs.
- Even just transiting, microplastics cause great modifications:
- Alimentation disturbed by a modification of digestion (Gardon et al. 2018)
- Causing cellular stress (with consequences on growth, defense and reproduction).
- Study on mussel: modulation of inflammatory reactions and defense, affecting potentially mussel's detoxification of harmful substances (Paul-Pont et al., 2016).
- Study on oyster: energy imbalance affecting key functions (Sussarellu et al., 2016). About reproduction: less eggs produced and sperm less mobile. Gametes (of oysters exposed to microplastics) collected show 41% fewer young larvae; and a 20% decline of growth (Sussarellu et al., 2016). 2 hypotheses: entry of energy through alimentation is limited + endocrine disruption.

- Study on gametes, embryos, larvae of oysters which have been exposed to micro and nanoplastics : unlike macroplastics, nanoplastics have caused a significant reduction of successful fertilization and embryo-larval development.
- Negatively charged polystyrene nanoballs are the most toxic for gametes and embryos (Tallec et al., 2018). One hypothesis is the nanoplastics capacity to interfere with cellular mechanisms, causing oxidative stress (González-Fernández et al., 2018).
- There is a lack of assessment of small microplastics and nanoplastics concentration offshore. These expositions are conceived to match with in-situ environmental mass concentrations for larger microplastics, so concentrations may be in fact overrated.

3. Interactions macro-nanoplastics (MNP) and phytoplanktonic cells

- Our study shows phytoplanktonic cells potential to form hetero-aggregates with small particles of micro- polystyrene. It concerns only Chaetoceros neogracile (3 types tested) (Long et al., 2017)
- These interactions can have repercussions on the bioavailability of micro-algae and their future in the water column (Long et al., 2015).

4. Project Interreg Preventing Plastic Pollution PPP

- Project just launched for 3 years. Both scientific (indicator analysis) and operational (solutions to reduce plastic waste) approach.
- Gathers scientists, decision makers, elected representatives, watersheds managers...
- Testing local solutions on 7 sites
- Focus on microplastics toxicity, particularly for the difficult ones to reduce in the environment
- Also actions to reduce daily consumption of single use plastics + collection and sorting of plastic waste.

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ADDRESSING MARINE LITTER IN THE WIDER CARIBBEAN REGION THROUGH REGIONAL AND GLOBAL PARTNERSHIPS

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ABSTRACT

The UNEP Caribbean Environment Programme (CEP), which is also the Secretariat of the Cartagena Convention, promotes best practices and shares experiences about the management of solid waste, marine litter and plastics through various platforms.

Through the Convention, governments receive support to control, reduce and prevent marine pollution from all sources. Marine Litter is one of the priority pollutants being targeted for improved management by the Cartagena Convention Secretariat. The Protocol Concerning Pollution from Land-Based Sources and Activities (LBS) of the Cartagena Convention which was signed in 1999 and adopted in 2010, along with the Regional Action Plan for Marine Litter (RAPMaLi) for the Wider Caribbean Region (see below) form the basis for the support provided to countries in the Wider Caribbean and the development and implementation of several marine litter programmes, projects and activities.

MAIN BODY OF PAPER

I. The Global Partnership on Marine Litter

The Global Partnership on Marine Litter (GPML) brought international agencies, governments, non-governmental organizations, academia, private sector, civil society and individuals together. GPML supports the Global Partnership on Waste Management and seeks to protect human health and the global environment through the reduction and management of marine litter as its main goal. Participants contribute to the implementation of GPML's activities and share knowledge and experiences on how to reduce marine litter. GPML responds to the recommendations made in the Manila Declaration and also supports the implementation of the Honolulu Strategy.

II. The Caribbean Node of the Global Partnership on Marine Litter

Caribbean Node is a partnership involving national, regional organizations, governments, research individuals that work together to reduce the quality and impact of marine litter in coastal zones of the Wider Caribbean Region.

Over the last 4 years, the Caribbean Node has focussed on training, outreach, advocacy, resource mobilization and project development while also enhancing partnerships and collaboration. A few of the projects supported are included in Table 1.

III. Caribbean Regional Action Plan for Marine Litter (RAPMaLi)

RAPMaLi serves as a comprehensive toolkit to assist countries of the WCR to adopt a range of practices for reducing the negative impacts of solid waste, marine litter and plastics. Of the 26 Contracting Parties to the Cartagena Convention, 15 have ratified the LBS Protocol and all have endorsed the Regional Marine Litter Action Plan.

Countries such as Guyana, Barbados and Saint Lucia have received support to improve their national marine litter and solid waste management policies and legislation, expand monitoring and assessment programmes, and enhance their public awareness, education and outreach activities. GPML-Caribe continues to support regional Governments in implementing priority national and regional actions identified in the RAPMaLi.

IV. Global #CleanSeas Campaign

The main goal of #CleanSeas Campaign was to engage governments, the public, civil society, and the private sector in the fight against marine plastic litter. It aimed to address the root-cause of marine litter by targeting the production and consumption of non-recoverable and single-use plastics. More importantly, the #CleanSeas

campaign aims to highlight the scale of the problem and encourage individual and collective action.

V. Regional #CleanSeas Campaign

In 2019, a Regional Clean Seas Campaign was launched for the WCR with support from the Global Partnership for Marine Litter Management (GPML). 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.

The clean-up 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. The Caribbean Breaking Up with Plastics video developed by the Global Environment Facility (GEF) funded Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States (GEF-IWEco Project) was launched as part of the campaign.

VI. The Trash Free Waters International Initiative in the WCR (2016-2019)

The Trash Free Waters International Initiative implemented activities to reduce and prevent land-based trash from entering watersheds, coastal waters, and the marine environment in Jamaica and Panama.

Based on the project's successes, additional resources were mobilized by the GPML-Caribe for additional activities in Jamaica to improve the waste disposal system, enable sustainable meal-packaging in schools and implement upcycling opportunities through Small and Medium Enterprise (SME) Business Training for the residents of the communities involved in the initial project. The conducted activities are given in Table 2 and Table 3.

VII. Cooperation between the OSPAR and the Cartagena Conventions

Through the cooperation between OSPAR and Cartagena Convention, funds were mobilized in 2018 from the Governments of Sweden and the Netherlands to support marine litter activities in the Wider Caribbean Region. During 2019, the GCFI and the Cartagena Convention Secretariat completed a report for harmonized monitoring of marine litter including plastics pollution and initiated the development of a new Regional Marine Litter and Plastics Reduction Strategy. 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.

VIII. Feasibility Study on the Port Reception Facilities in Caribbean SIDS

The Secretariat, through the Regional Marine Pollution Emergency, Information and Training Centre (RAC REMPEITC Caribe), its Regional Activity Centre for the Oil Spills Protocol, collaborated with the International Maritime Organization (IMO) on the completion of a detailed assessment of Port Reception Facilities in Caribbean Small Island Developing States (SIDS). The outcomes of this report complement other strategies for improving management of ship generated wastes, including plastics, and cargo residues within the Wider Caribbean Region, and contributes to efforts towards improving the ability of Caribbean States to effectively fulfil their obligations under MARPOL, or to accede to MARPOL where a State is not already a Party. The regional report of that analysis completed in 2018.

IX. Regional State of the Convention Report

The State of the Convention Area (SOCAR) report (2020) provides a regional quantitative assessment of the state of the marine environment of the Wider Caribbean Region, with respect to land-based sources of pollution. This report incorporates the Driver-Pressure-State-Impact-Response (DPSIR) framework, which describes the interactions between human society and the environment. This report facilitates informed regional or country-level decisions on addressing such sources of pollution and provides quantitative data on solid waste and microplastics levels in the WCR.

X. Status of Plastics and Styrofoams ban in the Wider Caribbean Region

A report on the Status of Plastics and Styrofoam bans in the Wider Caribbean Region was finalized in 2019 by the Secretariat to highlight the ongoing efforts and lessons learned. This will assist in future efforts to regulate the production and use of single-use plastics and other persistent material. This report is complemented by an interactive map of the status of the bans on plastic bags and Styrofoam in the WCR.

Development Goals (SDGS). UN Environment Regional Seas Reports and Studies No. 208

UN Environment Programme (2018). Regional Seas Follow Up and Review of the Sustainable Development Goals (SDGS). Case Studies Supplementary Annex. UN Environment Regional Seas Reports and Studies No. 209

XI. Planned Activities

- Launch of Phase III of the project on Capacity Building Related to Multilateral Environmental Agreements in African, Caribbean and Pacific Countries to strengthen multilateral environmental agreements with specific activities in the area of solid waste and plastics management. Activities include the design and implementation of at least four community based projects with a focus on plastic reduction, reuse and recycling.
- The Caribbean Tourism Organization (CTO) and the United Nations Environment Programme (UNEP), through its Caribbean Sub-Regional Office and the Convention Secretariat, based in Jamaica, launched a partnership in 2020 that will have as one of its first outputs, the development of a Compendium showcasing regional and national initiatives and best practices in solid waste management.

TABLES AND FIGURES

Table 1. Few of the projects supported under the Caribbean Node of the Global Partnership on Marine Litter (GPML-Caribe).

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Table 7. Few of the projects supported under the Caribbean Node of the Global Partnership on Marine Litter (GPML-Caribe)

PROJECTS AND INITIATIVES	AGENCY/PARTNER	BRIEF OVERVIEW
Investigating the incidence of microplastics in commercially important fish in Grenada (completed).	St. George's University in Grenada, GPML-Caribe	Microplastic ingestion by commercially important species of fish in the Caribbean region.
Developing marine litter reduction strategies for major Caribbean cultural events in Trinidad and Tobago (completed).	IAMovement (NGO) in Trinidad and Tobago, GPML-Caribe	Reduction of marine litter associated with activities during Carnival in Trinidad and Tobago, a major Caribbean cultural event.
Investigating the link between marine litter and mosquito-borne diseases (completed).	All Points Geospatial Consulting in Puerto Rico, GCFI	Focus is on marine litter and its relationship to the incidences of mosquito-borne illnesses such as the Chikungunya virus/ Chik V in the Caribbean region.
Enhancing the Solid Waste Reduction Project in the Whitehouse and Bluefields communities in Jamaica (Trash Free Waters Initiative) (2019)	Sandals Foundation, National Environment and Planning Agency of Jamaica, UNEP CEP, GPML-Caribe	This is a continuation of the Solid Waste Reduction Project implemented in the Whitehouse and Bluefields communities in Jamaica and includes improvements to the waste disposal system, enable sustainable meal-packaging in schools and implement upcycling opportunities through Small and Medium Enterprise (SME) Business Training for the residents of the communities involved in the initial project.
Development of a regional Marine Litter Management Strategy (ongoing)	UNEP CEP, GPML-Caribe	A 5-year strategic outline for Marine Litter Management is being finalized to identify useful priorities for fund-raising efforts. The Strategy will complement the Regional Action Plan for Marine Litter (see below).
Developing an approach to harmonizing marine litter monitoring in the Wider Caribbean Region (ongoing)	UNEP CEP, GPML-Caribe	(see below under cooperation with the OSPAR Convention)
Social media campaigns (2019)	UNEP CEP, GPML-Caribe	Social media campaigns were carried out in 2019 during the entire month of July (#PlasticFreeJuly) and December (#PlasticFreeChristmas) to raise awareness on plastic pollution and encourage the use of alternative products and practices.
Caribbean #CleanSeas Campaign (ongoing)	Caribbean Youth Environment Network, Caribbean Network for Integrated Rural Development, UNEP CEP, GPML-Caribe, GEF IWeco	(see below)
Youth Involvement in the Special Session on Marine Litter held during the 72nd Annual Conference of the GCFI, the GPML-Caribe Student Awards and Albatross Film Screening (2019)	GPML-Caribe	Sponsorship was provided for the participation of students at the Marine Litter Session at the 72nd GCFI Conference in the Dominican Republic.

Table 8. Pilot Project in Jamaica (Solid Waste Reduction, Westmoreland, Jamaica)

[Scope- 200 garbage bins distributed across 40 locations in the Whitehouse and Bluefields Communities in Jamaica]

Recycling	4,500 lbs of plastic bottles were collected
Public Awareness Campaigns	3,445 persons were targeted through outreach activities - 2,400 students and 1,045 adults
Compost	2,500 lbs of compost generated
Upcycling workshop	20 residents trained in composting and in jewellery-making using items collected from the sea.

Table 9. Pilot Project in Panama (Partnership for Marine Litter -Juan Diaz Community)

Public Awareness	450 students from 4 schools educated on trash reduction
Volunteer training	10 volunteers trained on the 3 Rs and sensitization of the Juan Diaz River trap being established to help the local community
Public Awareness (Commercial Institutions)	Members of the public benefit from capacity building on proper waste separation
Water Quality Assessment	Students trained in testing water quality

Chapter 6

Best Practices in Solid Waste Management



FOOD WASTE MANAGEMENT IN THE CARIBBEAN: FACILITATING INTERNATIONAL PARTNERSHIPS AND REGIONAL COLLABORATION TO PREVENT FOOD WASTE

AFFILIATION: CREST and WWF

ABSTRACT

In 2018, the Center for Responsible Travel (CREST) and World Wildlife Fund (WWF) embarked on a partnership to better understand the policy and capacity landscape of food waste in the Caribbean, and the role the tourism industry can play in food waste prevention and management. The project stemmed from WWF's work with the American Hotel & Lodging Association (AHLA), supported by The Rockefeller Foundation, to create the Hotel Kitchen platform – a toolkit of guidance and resources to help hotels prevent food waste, donate food, and keep waste out of landfills and incinerators. Through its work to promote responsible tourism policies and practices globally, CREST had the resources and partnerships to facilitate a study on food waste management in the Caribbean.

MAIN BODY

Gaining a Basic Landscape Understanding

In May 2018, CREST released a report providing an overview of current tourism trends, food insecurity, and food waste reduction efforts, challenges, and opportunities within the Caribbean region. The report, *Basic Landscape Overview: Food Waste Reduction & Prevention Opportunities for the Caribbean Hotel Sector*, focused on six countries, including Aruba, The Bahamas, Barbados, Belize, the Dominican Republic, Jamaica, and St. Lucia. Through this research, it became clear that most hotel sector engagement with the issue of food waste management takes place on a property-by-property basis. Although there have been some small-scale initiatives to address food waste, there are few resources to help guide properties on their food waste management, and the policy landscape, particularly around food donation, is either insufficient or not widely understood. There is an opportunity to share and build upon the practices of and

lessons learned from hotels that are managing their food waste at a property level and scale this nationally and regionally.

Hearing Directly from Property Managers

To build upon this work, in April and May of 2018, CREST and WWF distributed a questionnaire on food waste management in Caribbean hotels and resorts, to better understand the strategies properties were currently using and the barriers they faced in implementing more sustainable strategies. They partnered with the Caribbean Hotel and Tourism Association (CHTA) and the Caribbean Alliance for Sustainable Tourism (CAST) to promote and distribute the questionnaire. They received 109 complete and partial responses. The Caribbean and inland Caribbean-adjacent countries represented by respondents included: Aruba, the Bahamas, Barbados, Belize, the Cayman Islands, the Dominican Republic, Grenada, Honduras, Puerto Rico, Jamaica, St. Eustatius, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago.

The top strategies to prevent, reduce, and divert food waste included: buying local foods to extend shelf life (83.9%); using reusable bottles or bulk condiments instead of single-use plastic condiments (77.4%); planning menus purposefully to limit portions and cross-utilize ingredients (75.8%); storing food that can be used later and reviewing stores frequently (75.8%); separating food waste from other waste streams in food service operations (72.7%); separating waste using bins (67.86%); using occupancy rates to forecast food production for the day (66.7%); and using plating techniques that combat overconsumption and wastage (63.6%).

The top barriers to preventing, reducing, and diverting food waste included: local waste haulers do not provide options to manage organic waste (80.0%); respondents were reliant on imports due to lack of local suppliers (59.3%); respondents do not have the time or the resources to monitor food waste production (52.2%); and respondents

do not have adequate space or resources for on-site composting (44.0%).

A majority of properties surveyed do not practice food donation (43.8%). Some maintain a donation program for edible surplus food with a food recovery community partner (12.5%) and some have participated in one-off donations in the past (12.5%).

The barriers cited for implementing food donation practices were: “We do not have a reliable community partner for food recovery” (44.0%); “We do not have adequate storage to hold food for donation” (36.0%); “We are unsure of the policies regarding food donation in our country” (32.0%); and “We cannot avoid contamination of edible food waste” (12.0%).

A majority of properties surveyed hold large meetings, events, banquets, or weddings (70.59%). Of these:

- 51.1% do not track food overproduction/waste from events. Of those that do, 35.3% track food overproduction by monitoring kitchen spoilage, food prep waste, or what comes back from guests’ plates;
- 41.2% do not build a food overproduction percentage into their Banquet Event Order (BEO);
- 61.9% do not have a policy to give customers the option to donate excess food from a large event;
- 25.0% do not have the time or the resources to monitor food waste at their large events.

IMPLEMENTING PROPERTY-LEVEL PILOTS

Following these activities, three pilot projects were undertaken with hotel properties in the Caribbean. The first pilot, undertaken at Bucuti & Tara Beach Resort in Aruba, focused on staff training and behavior change through Lobster Ink food waste training videos. That pilot achieved a reduction of 30% of food wasted before and during service to guests, and this has been maintained since initial project completion in September 2018. In addition, the pilot initiated a culture shift among service staff, who were motivated by the environmental impacts of food waste demonstrated in the Lobster Ink training videos.

Two other pilots focused on the use of food waste tracking technology. Winnow Solutions, a company that provides customized food waste monitoring technologies underpinned by Artificial Intelligence to kitchens globally, enabled a property in Barbados to measure their back and front of house waste in order to identify strategic ways to reduce and manage that waste. These strategies focused on recruiting team members to find solutions to food waste, and tackling key drivers of waste in their buffet service. Winnow’s engagement with this property has formalized and continues beyond the pilot period, which ended in Fall 2019.

Leanpath--a global company providing food waste tracking, analytics and coaching to high-production foodservice kitchens--installed its solution in a pilot program at Grupo Puntacana’s B747 dining facility in the Dominican Republic. The Grupo Puntacana team determined a weekly pre-consumer food waste baseline of 1,812 lb and a post-consumer food waste baseline of 1,341 lb in the B747 staff dining facility.

Using the Leanpath system, they saw reductions in waste that equate to an annualized savings of nearly 20,000 pounds of food waste (which equates to keeping 19,000 meals in the food system and avoiding 60.8 tons of CO2 emissions). The Vice President of the Grupo Puntacana Foundation is seeking to continue this engagement with Leanpath and scale it to other food outlets across their property.

MOVING FORWARD

CREST and WWF remain committed to sharing the best practices gathered during this work and facilitating collaborations to pilot food waste reduction strategies across the Caribbean.

To engage with their teams on this effort, please contact CREST Program Manager Kelsey Frenkiel (kfrenkiel@responsibletravel.org) and WWF Program Officer Samantha Kenny (Samantha.Kenny@wwfus.org).

A CASE STUDY OF BEST PRACTICES AT THE HAAG BOSCH SANITARY LANDFILL FACILITY OF GUYANA

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AFFILIATION: Environmental Health and Sustainability Department (EHSD) of the Caribbean Public Health Agency (CARPHA), Morne Fortune, Castries Saint Lucia. Haag Bosch Sanitary Landfill Facility, Eccles, East Bank Demarara Guyana

ABSTRACT

The increase in solid waste volumes through an expanding tourism industry and changes in consumption patterns in Guyana has prompted steady improvement in the Haag Bosch Sanitary Landfill Facility (HBSLF). The HBSLF is one of the most modern of its kind in the Caribbean. It is fully operational and uses best practices that includes waste segregation, leachate treatment, waste recovery, monitoring of leachate, surface/ground water and air quality. Integrating best practices in landfill management will reduce health risks and pollution. The purpose of the case study was to share best practices at HBSLF that can be adapted for Caribbean countries.

MAIN BODY

The Haags Bosch Sanitary Landfill Facility (HBSLF) is the largest landfill in Guyana. The landfill receives municipal solid waste (MSW), soils, construction/demolition, commercial and some pretreated hazardous waste from more than 25 neighbourhoods. The facility which was originally 300 acres was later reduced to 150 acres, to provide space for housing and industry.

FUTURE PROSPECTS FOR HAAG BOSCH SANITARY LANDFILL

- Preparation for the Fukuoka Technology at HBSLF
- Green Waste Composting
- Landfill Gas Control
- Legislation and Fee System

SUMMARY OF THE BEST PRACTICES/STRATEGIES

BEST PRACTICE/ STRATEGIES	MEASURES EMPLOYED	EFFECT
Controlled entry of waste, vehicles and people	Main gate with security; rigorous procedure for monitoring types of waste	Regulates the flow of vehicles, people and the type of waste entering HBSLF
Control of fires, bad odours and flies	Daily use of tarp/soil cover	Reduces fires, bad odours, flies and other vectors when (the waste is covered)
Formalisation of pickers and picking activities	Waste pickers are part of on-site operations; possess ID badges and have monthly medical checks	Improves daily operation of the site, the waste pickers provide a valuable service of recycling material
Use of the Fukuoka Technology	Construction of drains, and air vents	Increases the life span and the effectiveness of the landfill - better leachate quality, low emission of methane gas, early stabilization of waste, reduced ground water contamination by leachate, cheaper to operate and manage (JICA, 2019)
Efficient waste disposal practices at the site	Full time contractors are employed to conduct the daily operations on the tipping face of the landfill	Improves daily maintenance operation
Leachate management system and treatment	Leachate management system consists of the waste stabilization ponds which includes an anaerobic pond, a facultative pond, a maturation pond and a free flow wet land	Improves and controls leachate quality where safe effluent is released back into the waterways (preventing contamination of waterways)
Environmental monitoring programme	Environmental monitoring programmes include scheduled monitoring of leachate and effluent, gas, on-site wells (ground water) and other waste	Knowledge of leachate quality to inform decision related to leachate management
Data documentation and management	Data collected and documented (scale house and operation services database)	Provides accurate data on waste generation, waste categories, waste composition, etc. which allows calculation/compilation of waste statistics to inform waste management, decision - making and future initiatives
Site maintenance operation	Repair of leachate seeps, repair and maintenance of roads, grading and berming of slopes (control water runoff).	Maintains the efficiency of operations at the landfill

CONSTRUCTION OF PUBLIC POLICY IN THE MANAGEMENT OF WASTE CONTAINERS AND PACKAGING

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ABSTRACT

In 2018, Colombia established the principle of extended producer responsibility for the reverse management of packaging waste by producers, applying a transition period for the implementation of pilot projects that guarantee the design and development of operational, technical and financial resources for the proper management of waste.

Colombia progresses firmly towards the management of waste containers and packaging

Aiming to boost the circular economy and green growth, the Ministry has been implementing an environmental management system for waste containers and packaging made from paper, cardboard, plastic, glass and metal, promoting the use of and encouraging innovation and eco-designing of containers and packages that are placed on the market, and applying a transition period to facilitate the incorporation of producers and regulatory authorities for compliance with their obligations.

The aforementioned management system is based on Resolution 1407 of 2018 which establishes the obligation of producers (national producers and importers) of goods on the market in containers and packaging, to formulate, implement and maintain updated an Environmental Management Plan for Waste Containers and Packaging, in the framework of the extended producer responsibility, which must be monitored by the National Authority for Environmental Licenses - ANLA.

Producers must reincorporate into the production cycle a minimum of 10% by 2021 until gradually reaching 30% in 2030, with respect to the total amount by weight of the containers and packaging placed on the market by the producer. According to the regulatory impact analysis carried out by the Ministry of Environment in 2015, and document CONPES 3874 of 2016, waste containers and packaging represent 15% of the waste generated in Colombia.

Following a review process carried out by the Ministry of the Environment and Sustainable Development, through the Directorate of Urban and Sectoral Environmental Affairs, technical guidelines were defined in consultation with producers for the presentation of pilot projects and the requirements for processing companies as established in the Resolution, after which the producers submitted 21 pilot projects within the framework of the extended producer responsibility principle, which were presented prior to December 31, 2019 to the National Authority for Environmental Licenses - ANLA.

The support process for the development of pilot projects conceived within the framework of Resolution 1407 of 2018 and which are executed by producers, will enable the standardization of criteria for the presentation of waste management plans for containers and packaging, to establish the requirements that must be met by processing companies to verify the tons that were actually used and create other control mechanisms to ensure proper traceability of information on the flow of materials. Additionally, it will facilitate the construction of a baseline for the tons of containers and packaging materials placed on the market for which the consumption goal, the required registration systems and the establishment of organizational models especially for collective plans for the environmental management of containers and packaging are calculated.

The aforementioned technical guidelines will be validated and complemented during the execution of the pilot projects for the management of waste containers and packaging, and with the support of the Ministry of Environment and Sustainable Development these will enable the construction of technical tools to complement and support the producer and the control and monitoring entity to implement on a mandatory basis the reverse management strategy for containers and packaging and guaranteeing their effective implementation as of 2021, when it is expected

that more than 200,000 tons of this waste would be reincorporated into the production cycle, a figure that will continue to increase gradually, based on the goals established in the current regulations.

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EFFECTIVE MONITORING AND ENFORCEMENT OF LEGISLATION, INTER-AGENCY COLLABORATION AND AWARENESS CAMPAIGNS ARE CRUCIAL TO A SUCCESSFUL SOLID WASTE MANAGEMENT PLAN IN GUYANA

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ABSTRACT

In Guyana, solid waste management is one of the most pervasive issues which continue to challenge the nation's socioeconomic and health systems. However, Guyana has begun to implement robust strategies to eliminate littering and poor solid waste management. The adopted approach is an amalgamation of educational and awareness strategies, with collaborations toward the development and enforcement of policies and legislation. This report will succinctly highlight measures taken to address solid waste management, including policies, projects and programmes such as the Guyana's Green State Development Strategy; the National Solid Waste Management Strategy; the Litter Enforcement Regulations; and the impending Single-use Plastics Ban.

MAIN BODY OF PAPER

Introduction

In Guyana, poor waste management practices can have negative impacts on human health, the environment and critical industries such as tourism. With the adoption of a Green State Development Strategy (GSDS), and having ranked #1 "Best Ecotourism Destination in the World" in 2019, Guyana continues to steadily advance towards improved Solid Waste Management. In this regard, the Environmental Protection Agency (EPA), the lead regulatory agency for environmental protection in Guyana, with support from the Department of Environment, Ministry of the Presidency, has collaborated with the Ministry of Communities and other key Stakeholders to tackle the issue of poor solid waste management, through awareness campaigns, enforcement action and collaborative policy-making.

STRATEGIC COMMUNICATION & AWARENESS CAMPAIGNS

"Pick it up" Guyana Campaign

Recognising that a lack of awareness and education on the importance of a clean and healthy environment is a major cause of improper solid waste management in Guyana, the "Pick it up" Guyana campaign was launched in 2012 by the Ministry of Natural Resources. The campaign employed various public awareness tools and educational sessions, including six (6) empowerment workshops, with students, community groups, religious organisations and volunteers across the country. This initiative has since inspired several community cleanups and enhancement projects, domestic composting, and awareness billboards and sessions in communities, both on a small and large scale by various entities in support of promoting a clean environment. As the first massive campaign in Guyana specifically targeting waste management practices, it gained a lot of traction and encouraged community-oriented waste management initiatives.

Green Business Forum

The EPA held Guyana's first Green Business Forum in 2017, on World Environment Day under the theme; "Green Businesses – Connecting with Nature and Driving a green economy." The initiative provided a platform for more than 300 business stakeholders from various sectors, including Tourism, Manufacturing, Mining and Banking, to share the sustainable "green" practices cultivated in their respective sectors, and their associated challenges and opportunities. These included local recycling potential, Green Loans, renewable energy, sustainable tourism, sustainable logging, and green approaches to mining. Since the event targeted the private sector, Government Agencies, non-governmental organisations

and financial institutions, it facilitated critical dialogue on uprooting corrupt mining practices, plastic bottle disposal, and the importance of public-private partnerships and incentivizing “Green Business”.

Trash to Fashion show

Acknowledging that children and youths are integral to shifting the paradigm, the EPA organised several stimulating activities relative to waste management, including ‘Trash to fashion’ shows, held during 2015-2018. Youths from across Guyana were tasked with creating fashionable items from plastics and other waste to raise awareness on waste management issues. This event was very successful and fully engaged over 300 young people.

INTER-AGENCY COLLABORATION

Green State Development Strategy: Vision 2040 (GSDS)

GSDS is Guyana’s twenty-year, national development policy designed around the guiding vision and principles of a ‘Green Sustainable Economy’, through initiatives such as building climate resilient infrastructure, minimisation of solid waste, programmes targeted to promote more environmentally friendly practices, and investments supportive of green initiatives.

The development of the GSDS saw 1800 hours of collaborative work; 32 cluster meetings targeting approximately 1629 persons from 198 communities; 11 engagements with approximately 400 stakeholders; 90 Agencies; and 7 multi-stakeholder expert groups . All government agencies, including the EPA, were required to allocate funds from their 2020

Budget toward the implementation of achievable components of the GSDS, relevant to their respective mandates.

International Coastal cleanup exercises

Since 2015, the EPA has partnered with the Caribbean Youth Environment Network (CYEN) to commemorate the International Coastal

Cleanup in Guyana by mobilising hundreds of volunteers to participate in cleanup exercises annually. These exercises are usually concentrated along a portion of the 280-mile seawall and 63 Beach Berbice, both popular tourist attractions. In 2019 over 36,000 pieces of litter were collected, most of which were single-use plastics.

Sub-Regional Project Within the North Brazil Shelf Large Marine Ecosystem Caribbean Large Marine Ecosystems Project

This ongoing project, which seeks to use the Ecosystem Based Management (EBM) approach to restore a coastal wetland area at Wellington Park Mangrove Reserve in Corentyne, Berbice, is being implemented by the EPA with funding from the United Nations Environmental Programme (UNEP). It involves an analysis of the anthropogenic factors responsible for the depletion of the site; training of ten members of the community to collect water, soil, vegetation, invertebrate and vertebrate samples; and engaging nearby sawmill operators on improper waste management practices which may be contributing to the depletion of the site. Community members and sawmill operators were very receptive and committed to implementing sustainable practices to restore the reserve; to this end, the EPA endeavours to continue collaborations with the community given the importance of mangroves to coastal sea defences.

REGULATORY FUNCTION OF THE EPA

Litter Enforcement Regulations (2013).

Enforcement of legislation targeting improper solid waste management is crucial toward shifting the paradigm. The Litter Enforcement Regulations, developed in 2013 under the Environmental Protection Act, prohibits improper waste disposal. Offences include the deposit of litter in a public place, on private premises, or from a vehicle unto a public place; abetting the commission of littering offences; breach of clean-up orders; and tampering with litter receptacles.

Recognising that penalties are an effective deterrent to curb improper conduct, liability ensues fines between fifty thousand to one hundred thousand dollars (\$50,000 - \$100,000) or imprisonment for six months. In March 2014, the Agency implemented the Litter Enforcement Programme, to reduce littering and illegal dumping in Georgetown and other municipalities by the end of 2016.

Figure 3 illustrates a decline in the number of enforcement actions required during 2014-2018; demonstrating that the ban was successful in reducing the number of litter issues. This was a result of rigorous training of ninety-eight local government representatives as Litter Wardens in 2016, issuance of citations, and the prosecution of offences. The Agency continues to build the capacity of the relevant authorities to strengthen the enforcement of these Regulations, in addition to continuous education and awareness.

Environmental Protection (Expanded Polystyrene Ban) Regulations 2015

Recognising that Styrofoam (expanded polystyrene) products, which are non-biodegradable, were prevalent in solid waste, these Regulations were designed to prohibit the importation of food containers, plates, hot and cold beverage cups, meat and vegetable trays, egg cartons and other products made of Styrofoam, used in the food industry. Extensive stakeholder consultations were conducted to share information on the importance and scope of the proposed ban, which resulted in immense support for its implementation in 2015. Additionally, the EPA engaged the Guyana Revenue Authority (GRA) for monitoring and enforcement to prevent illegal importation through various ports of entry in Guyana, as well as, to provide tax incentives to promote the importation of alternatives. To date, the Agency has overseen the destruction of Styrofoam products confiscated by the GRA in 2016, and has not received formal complaints of continued use of prohibited Styrofoam products in Guyana since.

Impending ban on Single-use Plastics

The EPA, in collaboration with the Department of

Environment, is joining the global effort toward the implementation of a Single-use Plastics Ban to take effect in 2021. The proposed ban seeks to target the most problematic single-use plastics in Guyana: plastic carrier bags, utensils, plates, cups, carryout food containers and straws. Learning from the Styrofoam ban, the Agency is collecting extensive socioeconomic and other baseline data through a comprehensive stakeholder engagement plan, to design a phased approach with appropriate enforcement mechanisms to render a smooth transition into a plastics-free society.

While the proposed ban does not target plastic (PET) bottles at this point, the Agency has established a Taskforce Committee comprising representatives from various government entities, to design a proposal for the effective management of used plastic bottles, in the vein of promoting recycling and reusing.

Environmental Authorisation

The Environmental Protection Act, empowers the EPA to grant Environmental Authorisation (Operation Permit, Construction Permit, or Environmental Permit) for various facilities such as hotels, restaurants, landfills, factories and other industrial/commercial facilities. In 2019, the Agency issued 1381 Environmental Authorisations compared to 926 in 2018. This number is expected to grow exponentially as Guyana becomes an oil producing state.

Integral to environmental audits conducted by the EPA, and Environmental Management Plans (EMP), relative to these facilities, is the maintenance of proper solid waste management practices. Failure to adhere to the terms and conditions of these Authorisations, is an offence punishable by fines and imprisonment.

Complaints, Response and Enforcement

The EPA has a responsibility to respond to complaints of environmental nuisances. In 2019, there were 88 complaints related to improper solid waste management; 83% of which emanated from Region 4. Additionally, the Agency has received 26 waste-related complaints for the first quarter of 2020.

To address this, the EPA has a Central Database for the processing of complaints,

and developed a Standard Operating Procedure for addressing and resolving Environmental Complaints in a more efficient manner. Drone technology and Geographic Information Systems (GIS) are utilised to map complaint hotspots to the specific type of environmental nuisances. (See Figure 4) The Act also prescribes several offences relevant to pollution and environmental harm.

Establishment of Sanitary Landfills

The Ministry of Communities and the EPA are working towards the establishment of sanitary landfill facilities in all ten (10) Administrative Regions of Guyana. Guyana currently has only one sanitary landfill, situated at Haags Bosch in Region 4. However, the establishment of sanitary landfills to replace existing dumpsites will greatly reduce the current risk which open dumping poses to human health and the environment (see Figure 6).

While great strides have been made with the foregoing initiatives, the Agency continues to learn new and innovative measures to tackle improper solid waste management activities in Guyana.

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3rd HIGH LEVEL FORUM (HLF) OF CARIBBEAN MINISTERS RESPONSIBLE FOR WASTE: FROM RESPONSIBILITIES TO ACTION

AUTHORS: Caribbean Water and Wastewater Association

ABSTRACT

Background and context for HLF3 (Addressed by Vincent Sweeney):

- Issues have been identified but the challenge has been implementation.
- History of UNEP's and CWWA's involvement in HLF highlighted stemming from meeting in Curacao in 2016.
- Caribbean Waste Action Plan Draft was developed in 2017 and updated in 2018. Reminder that it is not a static document.
- Raise further awareness on the Caribbean SIDS Waste Action Plan and mobilise support
- Move from awareness to action
- Highlight emerging issues
- Respond to regional/global agendas

MAIN BODY OF PAPER

The 3rd High Level Forum on Waste Management kicked off in St. Kitts & Nevis in October 2019 with representation from ministers, developmental partners, donors and waste practitioners. This forum set out to put into action the outcomes of HLF-3 and the regional agenda on waste management by highlighting the key solid waste issues faced by the islands including emerging issues, the contributions of the tourist sector to waste and identifying opportunities for projects, mobilization of financing and other resources under the theme "From Awareness to Action". Some of the participants expressed that since work has already started, what is needed is continuous effort to build on the present work. The rate of action and the equal distribution of those actions is key to success across the region and one of the focal areas of the high-level forum.

At HLF-2, held in Montego Bay Jamaica in 2018, the Caribbean Waste Management Action Plan (CWMAP) was revised and agreed on. This plan identified 8 areas of priority for action and implementation in the waste sector as follows:

1. To improve strategic planning for waste management and prevention
2. To improve management of waste infrastructure
3. To reduce pollution from waste generation
4. To divert resources from landfill sites
5. To improve recycling and resource recovery
6. To strengthen partnerships and identify sustainable financing mechanisms
7. To upscale outreach and communication efforts
8. To improve capacity of the management of special waste.

Building on this, the main objectives of HLF-3 were:

1. To move forward with the actions coming out of the CWMAP
2. To understand the hindrances to action in the waste sector
3. To highlight training opportunities
4. To understand how the Caribbean fits into the international waste agenda
5. To share knowledge based on work being done in other islands as well as internationally and draw on lessons learnt.
6. To seek out funding and mobilize support toward the setup of waste management projects
7. To help practitioners understand how to be effective in their communication campaigns

There were several rounds of panel discussions held where ministers, donors and other partners expressed their main concerns. The major points coming out of HLF-3 were:

1. The need for collective action at the regional level. This means the standardization of practices such as the creation and adoption of a template for waste separation techniques that results in less waste reaching dumpsites and landfills.
2. Improvements in knowledge transfer and sharing: Data collection, storage and sharing through the establishment of a regional waste management database is encouraged. This waste information becomes crucial for regional and international projects and for quality control of information at the international level to prevent erroneous communication of waste production statistics of Caribbean countries.
3. The integration of the CWMAP into projects that are already on-going in the region as well as tapping into projects, trust funds (ProBlue), grants that have been presented at HLF-3 by the international and regional donors e.g. The European Union (EU), DEFRA UK, Norwegian Embassy, The Caribbean Development Bank (CDB), and the Inter-American Development Bank (IDB).
4. National level waste projects & proposals need to have the ability to be upscaled e.g. BCRC. This allows also for lessons learnt within particular projects to be adapted widely, resulting in time and cost savings.
5. The need to engage with the cruise ship industry. In particular, the quantifiable contribution of transient populations to waste production and the implications of implementing a waste tax to be paid by visitors that would be directly reinvested for waste management in those countries.
6. The extension of the work being done in waste management in the tourism sector to the hospitality industry.
7. The identification of local opportunities for plastic waste and sargassum use and recycling together with projects to motivate participation. This includes the setup of formal systems of business to harness the local involvement.
8. Increase in capacity building and training of solid waste management professionals. E.g. using the progress made by the Belize Solid Waste Management Authority. In addition, the introduction of possible specializations for solid waste professionals such as the UNEP training program. These programs should also be guided by the needs of the industry.
9. Communication and education of waste challenges: the need for more targeted marketing campaigns. E.g. the Clean Seas Project. In most cases the public is aware of the challenges, but the issue surrounds motivating behavioural change. There are cost savings in having standardized regional waste and litter ads and campaigns.
10. Better legislation and policy reforms: introduction of representative litter fines, plastic and styrofoam importation fines and establishment of extended producer responsibility.
11. More research done into the community implications of plastic and styrofoam bans, especially the impact and implications for the poorer class of the society.
12. Adoption of a regional approach to plastic bans: utilization of proven, tested alternatives and initiatives for dealing with PET bottle use at events. E.g. CPL cricket
13. The need for the development of a regional plan of management for sargassum.
14. Greater effort and conceptualization on waste disaster management- i.e. The waste left behind after hurricane events. Lessons learnt from the Hurricane Dorian and the Bahamas can be used to chart a plan.

PLASTIC FREE ST. KITTS: ADVOCATING FOR THE REDUCTION OF SINGLE-USE PLASTICS

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ABSTRACT

Since 2017, the St. Kitts Sustainable Destination Council together with the St. Kitts Ministry of Tourism, has championed 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. By minimizing pollution along St. Kitts’ shorelines and seas, this important initiative plays an important part in preserving the destination’s health, conserving its marine environments, and sustaining its tourism-driven economy.

MAIN BODY OF PAPER

Like many tropical island destinations, St. Kitts and Nevis is highly-reliant on tourism, with 1,297,385 (ECCB, 2020) international tourist arrivals in 2018. As most travelers come to the islands for relaxation and adventure, St. Kitts’ attractive beaches and vibrant marine life are essential elements of its visitor appeal.

Yet one threat to these important tourism assets is the increasing presence of plastic debris along St. Kitts’ coastlines and seas. In addition to degrading the island’s natural beauty, this pollution harms sensitive marine wildlife, such as the critically endangered hawksbill turtles that nest on St. Kitts’ beaches. Reducing plastic pollution is thus necessary to safeguard the island’s marine ecosystems and sustain the tourism industry that drives the local economy.

A MOVEMENT FOR A PLASTIC FREE ST. KITTS

To foster collaboration around sustainable development on the island, the St. Kitts Sustainable Destination Council (SDC) was

established as a multi-stakeholder advisory body to the Ministry of Tourism in 2013. By uniting the public and private sector around joint action, the SDC addresses the most pressing environmental and socio-cultural challenges in St. Kitts.

Recognizing the need to combat plastic pollution within the Federation, the SDC has championed a movement for a “Plastic Free St. Kitts.” Originally launched in 2017 as a monthlong campaign aligned with the global Plastic Free July campaign, the movement has since expanded into an education and advocacy initiative that takes place year-round. Through various community engagement activities, the “Plastic Free St. Kitts” initiative aims to minimize island-wide pollution and preserve environmental health by empowering residents and businesses to reduce their consumption of single-use plastic products.

Public Awareness & Education

Since its inception, the initiative has strived to shift the local mindset and stimulate widespread demand for improved waste management in St. Kitts. This has been accomplished through a series of awareness-raising activities, including television and radio appearances, social media communications, an annual march, screenings of marine plastics documentaries for over 200 stakeholders, and presentations to community organizations and six local schools. These activities shed light on the growing problem of plastic waste, and its consequences for marine ecosystems and tourism activities, such as beach-going and diving.

In addition to establishing the importance of pollution prevention, the initiative educates stakeholders on sustainable waste management practices. Actionable tips and recommendations are disseminated to promote improved waste reduction, re-use, and recycling habits by individuals and businesses. For example, businesses are encouraged

to replace plastic straws with compostable alternatives and only give them out when customers request them.

Encouraging Plastic Alternatives

The initiative has also raised discussion and interest around plastic alternatives, such as compostable and reusable items. Reusable bags are sold for discounted prices at local supermarkets to encourage shoppers to avoid plastic bags. Proceeds from these sales benefitted the Heart of St. Kitts Foundation, a local organization that sponsors community-based sustainability projects on the island. Metal straws and cups are also distributed to replace their plastic counterparts and the SDC offers businesses guidance on how to source plastic alternatives. Since the launch of the initiative, about 2,000 reusable bags and 500 cups have been distributed, and more businesses have started using sustainable products.

The Art of Repurposing Plastics

A particular emphasis has also been placed on repurposing plastics as an innovative means of raising awareness. Each year, repurposing competitions are held for school children and the general public. Participants are challenged to craft their used plastics into useful items, such as jewelry, vases, and other household items.

In 2018, rubbish collected from local beaches was used to create a public art piece that visualizes the impacts of pollution on marine life by depicting fish swimming in an ocean of plastics. Similarly, the SDC has constructed floats out of plastics and styrofoam for St. Kitts' Carnival parade each year as a form of artistic awareness. Last year's design portrayed plastic monsters taking over the pristine island. It remains on display at the Pelican Mall, a business hub for residents and visitors.

Beach Clean-Ups

Over the years, the SDC has partnered with the Heart of St. Kitts Foundation to host a number of beach cleanups across the island. To date, over 300 volunteers have participated in these events. The SDC uses the Clean Swell app to track the amount and types of trash collected

during these cleanups. This valuable data helps the SDC identify the top types of pollutants to target through future activities.

LOOKING TO THE FUTURE

While the Plastic Free St. Kitts initiative has made impressive progress during its first three years, the SDC holds high aspirations for what's to come. The activities to date serve as important building blocks that will pave the way for action-oriented commitments and new policies as residents become more receptive to change. Future objectives include launching a new awareness video, advocating for financial incentives for sustainable products, eliciting waste reduction commitments from businesses, seeking Cabinet support for the banning of single-use plastics, and adhering to the Global Tourism Plastics Initiative.

ROADSIDE LITTER IN BARBADOS: SOURCES AND SOLUTIONS (CERMES TECHNICAL REPORT NO.1)

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ABSTRACT

This study shows that roadside litter in Barbados is a widespread and pervasive problem. The main purpose of this project on roadside litter is to provide information that could be used to determine a realistic solution towards litter management and reduction in Barbados.

The Government of Barbados has been developing a strategic Comprehensive Solid Waste

Management plan inclusive of addressing litter in Barbados. The comprehensive plan to address litter will be part of the overall Comprehensive Solid Waste Management plan, and hence enhance the programme that addresses SWM in Barbados, as "litter relates to how we address waste in general" (City of Greenville, 2000). Indeed, this will be a SWM model for the Caribbean and other Small Island Developing States (SIDS).

MAIN BODY OF PAPER

1. Formal interviews and the history of litter control efforts in Barbados

The variety of the litter stream, including more non-biodegradable litter proves problematic, especially because SSA noted that there are no incentives to return, for instance, small pack containers. Most interviewees noted that littering is a culturally ingrained practice that will require social change, especially through awareness and education. Clearly, the isolated attempts by a few individuals and/or groups to create litter awareness have been insufficient to address the roadside litter problem in Barbados.

Though interested individuals and organizations recognize the need for

litter clean-ups, they have been "proximal rather than fundamental". Clean-ups at the community level in Barbados are recommended in order to involve communities and to educate them and the general public, that the solution to address littering is an individual responsibility, rather than the responsibility of others such as NGOs and SSA as viewed by some members of the public. Some Barbadian residents regard littering as a means of providing jobs to cleaners such as the litter patrol (Ally, 1999). Clearly, this is a social aspect that needs careful attention to disseminate facts about the purpose of clean-ups.

2. Comparison of roadside litter with beach litter and municipal solid waste (MSW) in Barbados

The way in which MSW is recorded does not really allow comparison with roadside litter, but beach litter information does. Plastics are obviously common products, considering that this litter category dominates both on roadsides comprising 59% based on this study, and on beaches, comprising 60%. It is not surprising that glass is the second highest beach litter category comprising 12%.

There is a tendency for more paper to be littered on roads (22%) from students travelling to school, the public reading the newspaper among others, rather than paper litter on the beach (9%). Metal is also relatively lower than that on roadsides (8%). The metal items found on the road, such as sardine cans, vehicle parts and fittings, are not expected on the beach.

Driftwood as well as other wood is more likely to be found on the beach than on roads. Cloth, however, was used as a separate litter category on the beach

by the Marine Conservation Society international coastal clean-up litter categorization and tied at 3% along with rubber and styrofoam. In comparison rubber and styrofoam comprise only 1% and 4% respectively along roadsides.

3. The roadside litter stream

The variety of litter stream found alongside the road include plastics and paper (these two being the dominant categories), metal, glass, Styrofoam, organic and rubber litter sub-categories come from tyres, leather/textiles, clothing pieces, gloves and balloons. Hazardous and special litter are rare, but present in the litter stream. The major litter categories give an overview of the complex nature of the litter stream, indicating that a multi-sectoral, multi-disciplinary and multi-media approach will be required to address the problem of littering in Barbados.

4. Where is litter found?

Bus stops and shops/mini-marts/gas stations emerge as potential sources of litter. This is perhaps because eating and drinking are primary inferential group characteristics associated with littering.

Awareness and education on bin usage must be part of a litter reduction campaign. People attending educational institutions may be more inclined to keep grounds of the institution clean, which would also apply to the adjacent roads. These reasons may explain why there is no association between the total amount of litter and distance to the nearest educational institutions.

Examples reflect upon how people in Barbados respond to the issue of littering in terms of the quantity of litter disposed. Clearly, the degree to which people litter depends in part on the density of litter already present at a site, as well as the site characteristics. Perhaps this indicates that if a site is kept clean, littering is less likely to occur over time.

5. Group characteristics associated with littering

Two group characteristics associated with littering, including eating and drinking, and bag users comprise more than 75% of group characteristics, because many people are accustomed to disposing of unwanted used items irresponsibly after consumption of food and drink.

The "bag users" category is mostly related to the use of bags (mostly plastic) for food and drink, where the bag is disposed of soon after purchase. While it is possible for food and/or drink to be purchased without a bag, either by the vendor not providing a bag or by the buyer refusing the bag, there is evidently a demand for bags.

People who dispose of bags of garbage are clearly aware it is the wrong thing to do. This is because these bags are often hidden. In fact, it appears that littering is related to the NIMBY (Not In My Back Yard) syndrome, whereby someone may dispose of garbage at any location, except at the individuals' immediate surroundings.

Another inferential group characteristic associated with littering is smoking. Littering by "smokers" obviously needs to be addressed, given that smokers generate 13.1% of inferential group characteristics associated with littering. Personal hygiene is only 1.4% and sexual activity is 0.4%. These two groups also attribute consistently to the litter stream group count and is an indication that people will discard almost any item, such as q-tips and condoms on roadsides. It is obvious that littering is itself a behaviour, and is also associated with certain other behaviours. Individuals make a decision to litter by throwing unwanted items from vehicles or while walking. There are specific groups that can be targeted when addressing litter reduction. Whereas the group "eating and drinking" is by far the highest proportion of litterers, this should not exclude other target groups of litterers associated with the following groups, including smoking, bag users, personal hygiene and sexual activity, in any plan to address litter.

6. Implications of liquid accumulation in litter

Given the fact that ten mosquitoes can breed in a thimble that can hold 3 ml of liquid, an estimated 2,081,817 ml (2,082 litres) of liquid per annum has the potential to breed approximately 6,939,390 mosquitoes annually on all road categories. In this regard, the threat of dengue fever outbreak is real in Barbados.

- 7. Total litter discarded annually**
In Barbados, an estimated annual litter count total of over 12 million items, of which more than 10 million are non-biodegradable, clearly creates aesthetic problems for both locals and visitors. Barbados cannot afford the possibility that problems associated with litter will reduce the chance of increasing, or even maintaining, their tourism market share in the world.

The high accumulation of litter certainly provides suitable habitat for vermin. While the general public may not perceive this as a problem, because rodents come out at dawn and dusk, the threat of leptospirosis is a reality.

The estimated total litter along the rural roads in Barbados comprises over 12 million counts, which weighs 260,916 kg (261 mt). With such high quantities of litter to dispose on an annual basis, it will be economically inefficient to sustain annual litter clean-ups along rural roads in Barbados. Hence, awareness and education are crucial before implementation of clearing roads of litter, so that the public will continue to keep the roads clean thereafter.

- 8. Approach to litter management and reduction**

Littering is a complex issue that requires a complex integrated set of solutions. A strategic comprehensive approach is required to manage and reduce litter both directly and indirectly.

Previous studies, Environmental Protection Agency (1989) Decision-Makers Guide to Solid Waste Management, assessment reports on litter locally, regionally and internationally, the Marine Conservation Society all indicate that the success of litter reduction is a process

that requires ongoing:

- a. Political will, which is a crucial factor;
- b. Commitment by all involved;
- c. Secure long-term funding;
- d. Appropriate timing;
- e. Monitoring and evaluation;
- f. Realistic decision making in the local context concerning funding, resources and trained personnel to name a few;
- g. Flexibility;
- h. Creativity;
- i. Efficiency;
- j. Integration and co-operation such as information sharing and jointly sponsored efforts to find solutions;
- k. Defined responsibilities across all sectors;
- l. Research.

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FRENCH INITIATIVES IN THE CARIBBEAN

AUTHORS: REPLAST - Plastic Waste Recycling in the OECS – French Embassy in St Lucia

The REPLAST project aims to create a **sustainable plastic waste management and recycling economy at the Caribbean level**, in particular between the member countries of the OECS (Organisation of Eastern Caribbean States) and the French departments of the Caribbean. The initial objective of the project is to **support the development and implementation of a Caribbean-wide plastic waste collection and recycling chain, through a pilot cooperation approach between St Lucia and Martinique.**

Due to a lack of financial resources and engineering capacity, waste is not currently sorted and recycled in St Lucia or in any other OECS territory, despite a political will to find concrete solutions to meet the ecological and economic challenges. At the same time, in Martinique, a plastics recycling plant, SIDREP, which is largely financed by European funds, is running at under capacity due to the lack of a flow of used plastic bottles from the French Caribbean territories.

In St Lucia, the government, local actors and the private sector have recently become aware of the sustainable impacts on the environment and on the economic and tourist development of the island. After several experiments of very limited scope at the beginning of 2018, the stakeholders are now ready to collectively commit to an ambitious and concrete project to **structure a plastic waste management industry and export to Martinique recycling factory.**

ADEME Study on Extended Producer Responsibility (work in progress) and wreck removal:

- There is an ongoing ADEME (French Agency) study on the EPR (Extended Producer Responsibility) pathway for the destruction/recycling of recreational craft. The ADEME study is based, among other things, on 2 public contracts for the removal of wrecks, led by the Conservatoire du Littoral (Coastal Protection Agency), with main funding from the Ministry

for an Ecological and Inclusive Transition and co-funding from the Conservatoire du Littoral and the Office de l'Eau (ODE). These 2 contracts should make it possible to remove 25 to 30 wrecks of recreational boats. The company selected for these two public contracts, Somara, has recently acquired a new multifunctional barge which, in addition to wreck removal, will be able to carry out various other work at sea (port dredging, waste recovery, project to collect sargasso at sea, etc.). The deconstruction, decontamination and possible recycling of the ships is carried out on an ICPE (Facilities classified for environmental protection)-approved site managed by MetalDOM.

Waste removal / Marine litter in Martinique:

- The newly created natural marine park in Martinique has focused several actions on the collection of waste at sea (labelled Récup'Mer), with a focus on abandoned fishing gear and innovative partnerships between fishermen and divers. For more information, you could contact Aude Brador, director of the Marine Park (aude.brador@afbiodiversite.fr).
- In addition, the Assomer is carrying out several actions to recover waste at sea. For more information, you could contact Amandine Limouzin, director of Assomer (lassomer972@gmail.com) and/or refer to the fiches attached (BIM project).

Waste removal / Marine litter in Guadeloupe:

- Regional clean-up day for the seabed, coastline and rivers of Guadeloupe: A report on the state of the coastline and the seabed leads to the construction of this clean-up project: a lot of waste is accumulating on

our coasts and on the nearby seabed, which contributes to threaten the coral reefs of the Guadeloupe Archipelago, already very damaged by global warming. The objective is therefore to reduce the impact of this threat on these reefs, as pollution by macro-waste destroys these ecosystems and reduces underwater biodiversity.

<https://www.ecoledelamerguadeloupe.com/nettoyage.php>

Youtube 2019 : <https://youtu.be/aXNsb5pfslo>

Sargassum (dams):

- Regarding the fight against sargasso strandings, a number of dam projects in the near-shore area, mainly carried out by municipalities, but also in some cases by the private sector, aim to limit sargasso strandings on the coast. Several dams have already been installed. For more information you can contact Fabien Védie, head of the sargasso mission at the DEAL (french directorate of environment in Martinique) (Fabien.VEDIE@developpement-durable.gouv.fr) or refer to note to the Prefect of Martinique (attached).

POLICY RESPONSES TO SINGLE-USE PLASTIC POLLUTION IN THE CARIBBEAN

AUTHORS: C. Andrea Clayton

The majority of Caribbean nations are islands, and key sectors of their economies (such as tourism and fisheries) depend on the health of the marine ecology. In spite of this high level of dependence on the sea, the English-speaking Caribbean includes ten of the world's top thirty marine polluters per capita (Ewing-Chow, 2019). This is the result of a range of policy failures, including a lack of phytosanitary landfills, poor garbage collection, illegal tipping, minimal recycling, inadequate policies and weak enforcement. The sources include agricultural and sewage run-off, illegal dumping of waste from cruise ships and bilge water by freighters, but about 80% of marine waste in the region consists of single-use plastic (SUP) and polystyrene (Diez, et al., 2019).

Microplastics (including plastic nanoparticles, synthetic microbeads and the secondary microplastics that result from the fragmentation of larger plastic items) are a particular problem, because they can be taken up into the food chain by fishes, bivalves, and crustaceans when they ingest contaminated water. The United Nations Food and Agriculture Organization (2016) reported that of the 25 fish species of commercial significance, 11 now contain detectable quantities of microplastics. Once in the food chain, the toxins then affect humans. The average American now consumes more than 70,000 particles of microplastics per year, and people who drink a lot of bottled drinks could consume an additional 90,000 particles of microplastics per year (American Chemical Society, 2019). Levels of microplastic consumption in the Caribbean have not been quantified, but are likely to be relatively high, as fish and bottled drinks are widely consumed in Caribbean nations (Ferlin & Noriega-Curtis, 1989).

The Caribbean governments now recognize the impact of marine debris on social and economic well-being, and have developed a range of policy responses. However, there has been little comparative analysis of these policy responses to determine their relative efficacy. I therefore reviewed the current and proposed policies in thirteen English-speaking countries of CARICOM. Eleven have introduced

top-down legislative policies to ban SUP and polystyrene use, one is at the local government discussion phase and one has introduced a ban in government buildings. I compared these in terms of their efficacy.

The analysis found that the most successful approaches include primary stakeholder engagement, life-cycle assessment to identify the most effective points to intervene in the supply chain, sufficient lead time between the announcement and implementation of the measures to allow for adjustment, and extensive education to encourage public participation and ownership. For example, the top-down systems of Jamaica and Guyana's initial attempt would be more effective if they were less abrupt and coercive, and included support for substitutes and the use of legislative and other tools to nudge consumers towards these more environmentally friendly options.

Further bans should therefore start in modest stages, such as levies, and move forward in small steps, with education campaigns and support for the production and marketing of alternatives. Countries should work more closely with all stakeholders and the public, ensuring that they are aware of the direction of travel and the timetable. Adequate lead times (i.e. more than a year) would help, especially if supported by research and development, and SUP levies can also be used to contribute to the development of more biodegradable alternatives. This is closer to the model used in Antigua and Barbuda, rather than that in Jamaica and Guyana. Penalties are usually necessary to deal with recalcitrant operators, but in many cases a system of phased substitution, with adequate alternatives available, would make the process far easier. Once the public is persuaded of the case for switching, the battle is largely won.

Andrea Clayton is a Principal Lecturer at the Caribbean Maritime University, and represents the Caribbean region in the EPSRC/GCRF Plastics Pollution Governance Framework Network.

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