Chapter 3. International Discussions on Marine Plastic Litter

3.1 Status of international framework initiatives

The international discussions related to the marine plastic litter issue have been arranged in chronological order and the outcomes are presented in the table below.

Table 3-1 International discussions related to the marine plastic litter issues

Year	Outcomes
2015	"G7 Action Plan to Combat Marine Litter" was formulated at the G7 Summit in Elmau.
2016	Ellen MacArthur Foundation published a report advocating for the transition to the New Plastics Economy in collaboration with the World Economic Forum.
2017	China (the largest importer of plastic waste) began regulations on imports of waste. Import ban in 2018.
2018	The EU formulated the "Plastic Strategy".
2018	G7 leaders, besides Japan and the U.S., signed the "Ocean Plastics Charter" at the G7 Summit in Charlevoix.
2019	The resolution "Marine Plastic Litter and Microplastics" was adopted at the 4th session of the UN Environment Assembly (UNEA4).
2019	The Japanese government formulated the "Resource Circulation Strategy for Plastics".
2019	The EU approved the "Single-Use Plastics Directive".
2019	At the G20 Summit in Osaka, it was agreed to establish the "Implementation Framework for Actions on Marine Plastic Litter". "Osaka Blue Ocean Vision" was shared. The Japanese government launched the "MARINE Initiative" and announced its support for capacity building related to waste management and infrastructure improvement in developing countries.

3.1.1 Impacts of international marine plastic litter issue

The current situation of the marine plastic litter issue is represented in the figure below.

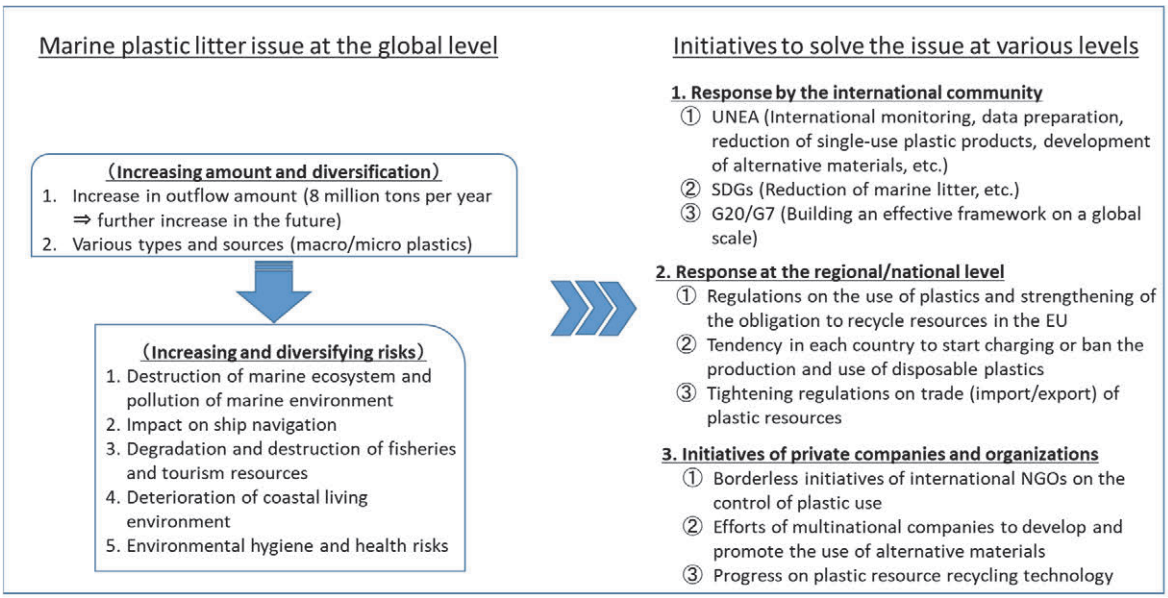


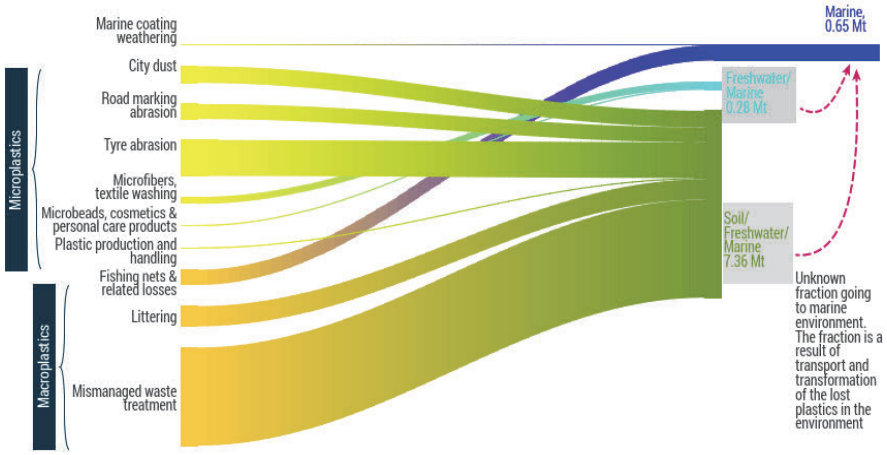
Figure 3-1 Current situation of marine plastic litter issue[96]

3.1.2 Increase and diversification of marine plastic litter generation

Over the last 50 years, global plastic production has increased from 15 million tons in 1964 to 311 million tons in 2014, and is expected to double further in the next 20 years (Ellen MacArthur Foundation. 2017). These are mainly used for containers and packaging (30%), building/construction materials (17%), transport related components such as vehicle bodies, parts and tires (14%), consumer products (10%) and fibers (9%). On the other hand, the amount of plastic released into the ocean in 2015 is estimated to be about 8 million tons per year for macroplastics (more than 5 mm) only, of which 7.36 million tons are estimated to leak from land to ocean via rivers due to improper treatment of municipal solid waste. Other major sources are the loss of fishing nets and fishing activities (about 650,000 tons per year) and microplastics (5 mm or less) (about 280,000 tons per year).

The effects of marine plastics are exacerbated by their quantitative expansion and qualitative diversity: macroplastics, which have a noticeable effect, such as impairing aesthetics and causing floods by obstructing the flow of river water, are regarded as a major problem, while microplastics, which have a small quantitative ratio, are of a level that cannot be ignored for their effects on the ecosystem through ingestion by marine animals.

[96] Source: Created by JICA Survey Team, based on materials from the Ministry of the Environment



Source: UNEP. 2018b

Figure 3-2 Emissions of plastics into the marine environment in 2015

3.1.3 Risks of increasing and diversified marine plastic litter

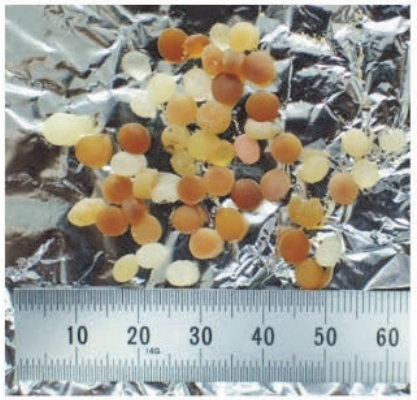
Macroplastics released into the ocean cause the death of marine animals (invertebrates, fish, reptiles, amphibians, birds, mammals), by entangling or by being ingested by these animals. Macroplastics that are problematic in this respect include bags, fishing lines, nets and fishing ropes. In addition, although the amount is small, plastics released directly from maritime activities and plastics discharged from ports and aquaculture facilities also have a large impact, since they have a direct effect.

Microplastics include primary microplastics, fine particles generated as such, produced for example by tire abrasion as mentioned earlier, and secondary microplastics that are generated by deterioration of macroplastics, with the former type being discharged into the environment via rainwater or sewage drainage. Microplastics sometimes contain harmful substances, and due to their characteristics, they are also likely to adsorb harmful substances in the environment, and it is feared that they will be absorbed into the body of marine organisms and cause adverse effects.

It has also been reported that microplastics physically reduce the feeding behavior/capacity of marine organisms[97] (for example, they are eaten by mistake as food and accumulate in the body, resulting in malnutrition). In addition, microplastics have been observed carrying microbes and pathogenic bacteria, and microplastics that accumulate and circulate in the ocean may promote the outbreak of harmful algae and the spread of disease (Group of Experts of the Regular Process. 2016). In that context, it has been pointed out that marine plastic litter has multifaceted adverse effects on marine ecosystems, and also has a negative impact on fisheries, aquaculture, shipping, and tourism, which are industries dependent

[97] Oceans and the law of the sea: Report of the Secretary-General. UN Doc. A/71/74. Published on 22 March 2016. http://undocs.org/A/71/74

on marine resources (UN. 2016).



Resin pellets (Chiba Prefecture, Futtsu City, Nunobiki Beach)

(Primary microplastics)

Plastic fragments (Kōchi Prefecture, Kōchi City)

(Secondary microplastics)

Source: Ministry of the Environment. 2016

Figure 3-3 Microplastics retrieved from the ocean

3.1.4 Responses to the marine plastic litter issue by the international community

The following specific measures have been taken by the international community to address the above-mentioned marine plastic litter issue. Regarding the initiatives of other donors, refer to “3.2.4 Initiatives of other donors”.

a Amendment of the Annex to the Basel Convention: At COP 14 in May 2019, the Annex to the Basel Convention has been revised, and it has been decided that contaminated plastic waste is subject to the Convention’s regulation.

b United Nations Environment Programme (see also 3.2.4 Initiatives of other donors 1) UNEP): Preparation of various reports on marine litter and plastics. Hosting of expert meetings (e.g. working group on plastic pollution monitoring and evaluation).

c World Bank (see also 3.2.4 Initiatives of other donors 2) World Bank): Launch of a trust fund (PROBLUE) that handles marine resource management including marine litter. Issuance of sustainable development bonds to raise awareness of plastic pollution.

d New Plastics Economy Global Commitment: Driven by the United Nations Environmental Programme and the Ellen MacArthur Foundation, it leads companies to commit to their vision and activities.

e Alliance to End Plastic Waste: A cross-industry alliance covering the entire plastic value chain, including chemical and plastic manufacturing, consumer goods manufacturing, retailing, and waste

processing. The goal is to invest a total of US$ 1.5 billion in the five years after its establishment.

f Global Plastics Alliance: Consisting of organizations related to plastics around the world, the Alliance signed The Declaration of the Global Plastics Associations for Solutions on Marine Litter.

g Plastic Solutions Investor Alliance: A coalition of institutional investors who signed the joint declaration “Investor Declaration on Plastic Pollution”.

3.2 Initiatives of other donors such as international organizations (including non-surveyed areas)

3.2.1 Initiatives of the United Nations

1) United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea

The United Nations consultations on maritime issues are held during the UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS), which was established in 1999. A specific topic is discussed each time, and marine debris was designated as consultation theme of the 6th UNICPOLOS in 2005. The agreement reached at this meeting was adopted by the United Nations General Assembly in November of the same year as "UN General Assembly Resolution A/RES/60/30 on Oceans and the Law of the Sea (November 29, 2005)". This resolution calls countries around the world to comply with the Law of the Sea and to cooperate with each other to this end, and as interesting point to mention the International Maritime Organization (IMO) was asked to revise Annex V of the MARPOL Convention. In response, the IMO amended Annex V to ban the discharge of all types of waste from ships (entered into force in 2013). More recently, "Marine Debris, Plastics and Microplastics" was the focus theme of the 17th UNICPOLOS in 2016. Confirming their effects on marine life and human health, and considering that the majority originate from land, the necessity to prevent leakage, with upstream (manufacturers) to downstream (consumers) actions, has been recognized, and each country was urged to take immediate political, legal and social measures.

2) Regional Seas Action Plans

The Regional Seas Programme is an initiative from UNEP in which the world's oceans are divided into several sea areas, and the different countries facing the same sea area formulate Regional Action Plans on Marine Litter (RAPMaLi), mainly addressing the issue of land-based marine pollution through mutual cooperation. It does not have the legal binding force of a convention, but constitutes a flexible framework for coordinating the actions of concerned countries in each region, and the countries surrounding a designated sea area cooperate regionally, for example by concluding agreements to prevent marine pollution and protect the marine environment. Since 1973, such Action Plans have been formulated in 18 regions of the world (Mediterranean, Wider Caribbean, Black Sea, East Asian Seas, South Pacific, etc.). Of the 18 Plans, seven are directly supervised by the UN, and one of them is NOWPAP, of which Japan is a member. Via NOWPAP, Japan encourages environmental collaboration with the other countries bordering the North-West Pacific area (Russia, South Korea and China).

The "Marine Litter Activity (MALITA)" started in 2006 as a NOWPAP activity related to marine litter. MALITA initiatives include the collection and review of data and information on existing marine litter in the Sea of Japan/the Yellow Sea and their coastal areas, holding conferences and workshops to share information and build up a common understanding on marine litter, the development and

implementation of long-term monitoring programs, the creation of guidelines on marine litter management for the fishery, shipping and tourism industries, and awareness-raising activities have been carried out. The “Regional Action Plan on Marine Litter (RAPMaLi)” emerged through the enforcement of MALITA. The main contents of RAPMaLi are (a) Prevention of the inflow of marine litter into the ocean and coastal environment, (b) Monitoring of the amount and distribution of marine litter, and (c) Removal and disposal of marine litter, and various activities, such as information sharing on marine litter among the different governments of the region, have been carried out based on this Plan.

3) Global Partnership on Marine Litter

The “Global Partnership on Marine Litter (GPML)” was launched at a side event of the “UN Conference on Sustainable Development (Rio+20)” held in Rio de Janeiro, Brazil in June 2012. Implemented in accordance with the recommendations adopted at the United Nations Conference held in Manila the same year, it is a partnership on marine litter that brings together international organizations, national governments, businesses, NGOs, academic societies, research institutions, local authorities, and individuals, with UNEP providing the Secretariat. Referring to the Honolulu strategy as a guiding principle, it engages in activities such as the set up of the “Marine Litter Network”, an online portal about marine litter.

4) SDG 14 and United Nations Ocean Conference

The 2030 Agenda for Sustainable Development was signed and the Sustainable Development Goals (SDGs) adopted in September 2015 during the 70th Session of the UN General Assembly. Marine litter is addressed in Goal 14 “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”, and Target 14.1 “By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution” (UN. 2020) urges to prevent pollution caused by marine litter among others.

In response to this Goal 14, the “high-level United Nations Conference to Support the Implementation of Sustainable Development Goal 14 (SDG 14): Conserve and sustainably use the oceans, seas and marine resources for sustainable development” (The United Nations Ocean Conference) was held at the United Nations Headquarters in June 2017 under the theme “Our Oceans, our Future: Partnering for the Implementation of Sustainable Development Goal 14”. The commitment of the participants to the conservation and sustainable use of marine resources was clearly expressed in the outcome document “Call for Action”.

5) The World Ocean Assessment

The first World Ocean Assessment[98] was issued in 2015 as an outcome of the "Regular Process for Global Reporting and Assessment of the State of the Marine Environment" whose implementation was agreed at the 2002 World Summit for Sustainable Development (Johannesburg Summit). The purpose of this evaluation was to investigate the actual state of the marine environment on a global scale, with the survey results intended to be used by policy makers at the regional, national and global levels. The assessment was steered by a Group of Experts of the Regular Process appointed by the United Nations Regional Group, and is divided into seven parts such as ecosystems, crosscutting issues of food security and food safety, the impact of human activities, and marine biological diversity, and among them, Part V "Assessment of Other Human Activities and the Marine Environment", Chapter 25 covers marine debris. This section defines the different types of marine litter, oulines their effects (including entanglement of and ingestion by living organisms, ecosystem destruction, impact on coastal communities/tourism, impact on commercial fisheries), and also compiles the concentrations of floating and deep-sea marine litter by region based on past literature, while the status of the accumulation of marine litter on beaches is drawn from the results of international cleanup activities.

On the other hand, the document pointed out that essential information and data for assessing diverse effects of marine litter were lacking, that the waste management implementation methods in each country constitute obstacles to dealing with the issues, and that the popularization of biodegradable bioplastics as substitute to plastic was necessary.

6) United Nations Environment Assembly (UNEA)

The United Nations Environment Assembly (UNEA) was established with the aim of putting into practice the propositions resulting from the above-mentioned 2012 "UN Sustainable Development Conference (Rio+20)" and the outcome document "Future We Want", and became a decision-making body with the participation of all 193 UN Member States.

At the 4th Assembly (UNEA4) held in Nairobi in March 2019, the theme was "Innovative Solutions for Environmental Challenges and Sustainable Consumption and Production", and marine plastic litter was designated main agenda item in consideration of the increasing global attention. The UNEA4 resulted in the adoption of the Ministerial Declaration, which announced the promotion of innovative solutions to address environmental issues and the acceleration of the shift to sustainable consumption and production patterns. During the Ministerial Declaration negotiations, the United States and several other

[98] World Ocean Assessment I: The First Global Integrated Marine Assessment (https://www.un.org/regularprocess/content/first-world-ocean-assessment)

countries[99] opposed the original plan supported i.a. by India and Europe that "aimed to progressively phase out single-use plastics by 2025", becaming finally "significantly reducing the manufacturing and use of single-use plastic products by 2030".

In addition, a total of 23 resolutions have been adopted, such as "Marine Plastic Litter and Microplastics" based on a joint proposal from Japan, Norway and Sri Lanka, "Addressing Single-Use Plastic Products Pollution", and "Innovative Pathways to Achieve Sustainable Consumption and Production". [100]

The three main points of the resolution on "Marine Plastic Litter and Microplastics" are as follows:

- Reinforcement of the scientific infrastructure, for example through a new scientific and technical advisory mechanism utilizing existing institutions.
- Development of a new multi-stakeholder platform to support the initiatives of diverse entities.
- Implementation of a progress review on international initiatives and analysis of countermeasure options by an Ad Hoc Open-Ended Expert Group, in consideration of UNEA 5 two years later.

Likewise, the three items below are stated as the main contents of the resolution on"Addressing Single-Use Plastic Products Pollution":

- Encourage the planning and implementation of measures at the national and regional levels to tackle the environmental impact of single-use plastics.
- Call for cooperation with the private sector to create affordable and environmentally friendly products in replacement of single-use plastic ones through innovation, and the introduction of business models that consider all the environmental impacts of their products.
- Encourage the promotion of resource efficient design, production, use and proper management throughout the life cycle of plastics.

3.2.2 Initiatives related to marine litter by G7 and G20

1) G7 Action Plan to Combat Marine Litter

Marine litter was mentioned for the first time in a Leaders' Declaration at the G7 Elmau Summit in June 2015. Recognizing that marine litter was a global issue, the Leaders' Declaration emphasized the need

[99] Including the Republic of Cuba

[100] UNEA-4 Resolutions (https://un-spbf.org/unea-4-resolutions/)

for measures to control the source of marine litter from land and water origin, marine litter collection and disposal, as well as education, research and awareness activities, and it was agreed to work on high-priority activities and solutions, attaching the "G7 Action Plan to Combat Marine Litter" as Annex to the Leaders' Declaration.[101] The Action Plan states that"Prevention is key to long-term success in addressing and combating marine litter and that industries and consumers have an important role to play in reducing waste", which demonstrated a commitment to taking the necessary measures to address the marine litter issue (waste minimization, collection of marine litter, engaging the industrial world, etc.). Thereafter, the entire international community reaffirmed its commitment to address marine litter at the 2016 Ise-Shima Summit.

2) G20 Action Plan on Marine Litter

The G20 addressed marine litter for the first time at the Hamburg Summit in July 2017. Based on reports from UNEP and the Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), as well as G7's work, the initiative "G20 Action Plan on Marine Litter" [102] has been launched, providing measures such as generation control, establishment of sustainable waste management, and educational and research activities. The policy items that are given priority in this Action Plan are policy formulation to reduce marine litter, and promotion of waste control and resource efficiency, while the "Global Network of the Committed: GNC" was established to strengthen the international network and to serve as a place for sharing information and knowledge.

3) Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities

At the G7 Charlevoix Summit held in Canada in June 2018, all G7 countries have approved the "Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities", which calls countries around the world to take concrete actions to address the issue of marine plastics.

The Blueprint acknowledged the gravity of the danger that marine plastic litter represents to the ecosystem, stated the commitment to move toward a more resource-efficient and sustainable plastics management, and in addition, showed the way for fostering cooperation with other organizations such as UNEP regarding monitoring methodologies and research on marine litter.

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[101] Annex to the Leader's Declaration G7 Summit 7-9 June 2015 (https://www.env.go.jp/water/marine_litter/07_mat13_2_%EF%BC%93-2ALD.pdf)

[102] G20 Action Plan on Marine Litter (https://www.mofa.go.jp/mofaj/files/000272290.pdf)

4) Ocean Plastics Charter

At the G7 Charlevoix Summit, the “Ocean Plastics Charter”, which promotes the consolidation of plastic regulations in own country, was approved by five countries (the United Kingdom, France, Germany, Italy, and Canada) and the EU. The Ocean Plastics Charter states a deadline for completion and urges to drastically reduce the use of single-use plastics and microbeads and to enhance the collection/management systems and infrastructure of products such as plastic packaging. Japan abstained from signing arguing that it was necessary to carefully consider the effect on national life and national economy and the need to implement measures outside the developed countries, but resolved to reflect the numerical targets set in the Ocean Plastics Charter into the “Resource Circulation Strategy for Plastics” formulated by the Ministry of the Environment.

5) Initiatives of the Scientific and Technical Advisory Panel of the Global Environment Facility (GEF STAP)

At the Fifth International Marine Debris Conference that took place in Honolulu in March 2011, the Scientific and Technical Advisory Panel (STAP) of the Global Environment Facility (GEF) held a workshop called “Seeking Global and Regional Solutions to Marine Debris Problem” together with UNEP and NOAA to discuss the role of GEF in the movement against marine litter. In the same year, STAP issued “Marine Debris: Defining a Global Environmental Challenge” as advisory document to GEF.

In this document, GEF was recommended to 1) Streamline initiatives tackling marine litter into existing GEF projects; 2) Use GEF investments in the prevention, minimization and management of marine debris covered by the Regional Sea Action Plan as a catalyst for the rise of public and private sector resources in order to remodel the market related to the generation, consumption, and use of products that are source of marine waste; 3) Encourage, coordinate, and develop international public-private partnerships to transform the market of single-use plastic packaging into more environmentally friendly alternatives, stimulate private sector innovation and support developing countries, and reduce the use of single-use plastic packaging.

This report was further submitted to the 11th Conference of the Parties to the Convention on Biological Diversity (2012), and in response, Resolution 18 of the Conference demanded the Convention Secretariat to spur parties to report on the impacts of marine litter on the marine ecosystem.

3.2.3 International conventions, pledges and strategies related to marine litter

1) London Convention and London Protocol

The “Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972”,

commonly known as the “London Convention”, was set up by the IMO with the purpose of preventing marine pollution caused by discharge of land-based waste into the ocean and incineration at sea. Although it does not directly deal with marine debris, it regulates activities that can produce marine debris. Initially, the treaty adopted a “list method” in which highly harmful substances were listed in the Annex, and the ocean dumping of these substances was prohibited or strictly restricted. Later, as awareness of the urgency to protect the marine environment was rising throughout the world, the “1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972” (commonly known as “London Protocol”) was adopted in November 1996 and entered into force in March 2006 (Japan joined this Protocol in October 2007). In the Protocol, the “reverse list method” was adopted in which the dumping of wastes and other matter into the ocean and the incineration at sea are prohibited in principle, and the items that can exceptionally be considered for dumping are listed in the Annex. The “World Ocean Assessment” addresses waste dumping in Chapter 24, reviewing the status of the London Convention and the London Protocol. According to the Assessment, the London Treaty had 87 parties and the London Protocol had 45 parties, with 34 having signed both, as of October 2014. However, the document also points out that many countries have engaged in similar regional agreements related to waste dumping into the ocean. It further mentions that it is difficult to fully grasp the situation of ocean dumping based on the London Convention and the London Protocol due to inconsistent reports from member states, but it is considered that a large part of ocean dumping consists of dredged material to maintain navigational channels.

2) MARPOL 73/78 Convention

While the dumping of land-based waste into the ocean and incineration at sea are regulated in the London Convention and Protocol, the discharge of oil, toxic substances, and waste by ships is treated in the “International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978”, commonly known as the MARPOL 73/78 Convention. This Convention comprises the main body and six Annexes, and as mentioned above, Annex V stipulates the prohibition of dumping waste from ships (waste generated by a ship) such as cargo residues.

Waste regulated in this Annex V are those that are Harmful to the Marine Environment (HME), and the dumping of waste generated by ships into the ocean is prohibited in principle, with the exception of some items that are considered as not harmful.

3) Basel Convention

The Basel Convention was established in 1989 and entered into force in 1992 to regulate the transboundary movement of hazardous waste. Norway, Japan and other countries jointly presented an amendment to add mixed, unrecyclable and contaminated plastic waste to the hazardous waste subject

to the Basel Convention, which was adopted in May 2019. After its enforcement in January 2021, it will be necessary to obtain the consent of the partner country when exporting contaminated plastic waste. In that context, the Conference of the Parties has decided to establish a Partnership on plastic waste, and it was agreed to provide technical and financial support, gather information on the current condition of initiatives to minimize plastic waste in each country and region, and raise public awareness.

4) Convention on Biological Diversity

The Convention on Biological Diversity was signed at the United Nations Conference on Environment and Development (UNCED) held in June 1992 in Rio de Janeiro, Brazil at the request of environmental protection groups such as IUCN (International Union for Conservation of Nature), and came into effect on December 29, 1993. At the 13th Ordinary Meeting of the Conference of the Parties to the Convention (2016), resolution No. 10 "Addressing impacts of marine debris and anthropogenic underwater noise on marine and coastal biodiversity"[103] on the impact of marine litter on biodiversity was adopted. In addition, at the 14th Ordinary Meeting of the Conference of the Parties to the Convention (2018), resolution No. 10 "Other matters related to marine and coastal biodiversity"[104], which called for mitigating and minimizing the impact of marine plastics on biodiversity, was adopted.

Ratification status of these treaties by the countries surveyed is summarized in the table below.

Table 3-2 Ratification status of these treaties by the surveyed countries

Country	MARPOL Convention	London Convention	London Protocol	Basel Convention	Convention on Biological Diversity
Antigua and Barbuda	○	○	○	○	○
Republic of Guyana	○		○	○	○
Republic of Cuba	○	○		○	○
Grenada					○
Jamaica	○	○		○	○
Republic of Suriname	○	○	○	○	○
Saint Vincent and the Grenadines	○	○		○	○
Saint Christopher and Nevis	○		○	○	○
Saint Lucia	○	○		○	○
Dominica	○			○	○
Dominican Republic	○	○		○	○
Republic of Trinidad and Tobago	○		○	○	○

[103] Addressing impacts of marine debris and anthropogenic underwater noise on marine and coastal biodiversity (https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-10-en.pdf

[104] Other matters related to marine and coastal biodiversity (https://www.cbd.int/doc/decisions/cop-14/cop-14-dec-10-en.pdf)

Country	MARPOL Convention	London Convention	London Protocol	Basel Convention	Convention on Biological Diversity
Republic of Haiti		○			○
Commonwealth of The Bahamas	○			○	○
Barbados	○	○	○	○	○
Belize	○			○	○
United Mexican States	○	○	○	○	○

3.2.4 Initiatives of other donors

The initiatives of major donors and international organizations are presented below.

1) UNEP[105]

UNEP assumes the role of taking initiative againt marine plastic litter and at the same time supports individual projects as donor.

(1) The Global Partnership on Marine Litter (GPML)

The Global Partnership on Marine Litter (GPML) was established in 2012 as a multi-stakeholder partnership that connects international organizations, governments, non-governmental organizations, academia, the private sector, civil society and individuals. GPML supports a global partnership on waste management with the objective of protecting human health and the global environment through the reduction and management of marine litter. Participants share knowledge and experience that contribute to the reduction of marine litter. GPML has five nodes that support the work of partnerships at the regional level, one of which is the WCR.

(2) The Caribbean Node of the Global Partnership on Marine Litter (GPML-Caribe)

GPML-Caribe was launched in 2016 and is hosted by the regional NPO Gulf and Caribbean Fisheries Institute (GCFI) and the Cartagena Convention Secretariat. Over the last four years, it has focused on training, support activities, advocacy and project development, and, as presented below, has promoted a number of projects to improve regional marine solid waste management. In addition, the formulation of a 5-year strategy on marine litter management and the development of a marine litter monitoring

[105] Source: CEP. 2020a

approach in the WCR are underway.

Table 3-3 Examples of completed GPML-Caribe projects

Country	Executing agency	Outline
Grenada	St. George's University	A survey on microplastic ingestion by commercially important fish species in the Caribbean.
Republic of Trinidad and Tobago	IAMovement (NGO)	Development of marine litter reduction strategies for major Caribbean cultural events.
Jamaica	Sandals Foundation, National Environment and Planning Agency	Continuation of solid waste reduction projects implemented in the Whitehouse and Bluefields communities. Improvement of waste management systems, implementation of sustainable meal packaging in schools, and provision of upcycling opportunities through business training for small and medium enterprises.

(3) RAPMaLi[106] For The Wider Caribbean Region 2014

This document provides an update to the 2008 "Marine Litter in the Wider Caribbean: A Regional Overview & Action Plan" (RAPMaLi), which was part of an initiative conducted by UNEP on marine litter, and develops a strong and effective regional program to help protect the Caribbean's valuable marine resources and the precious ecosystems and wildlife that inhabits the region.

(4) Global #CleanSeas Campaign

The #CleanSeas campaign was launched in February 2017 with the objective of engaging governments, civil society and the private sector in marine plastic litter issues. It also aimed to address the root cause of marine litter, targeting the production and consumption of single-use plastics that cannot be collected. In addition, this campaign aims to highlight the scale of the problem and to encourage individual and collective actions.

(5) Regional #CleanSeas Campaign

This campaign was launched in the WCR in 2019, building upon the annual International Coastal Cleanup (ICC) activities with the support of the Caribbean Youth Environment Network (CYEN). It was first initiated in Barbados, the Republic of Trinidad and Tobago and Saint Christopher and Nevis in October, and started in Grenada and Saint Vincent and the Grenadines in November of the same year. Cleaning activities carried out as part of the campaign were used to field test a marine litter monitoring

[106] Regional Action Plan on Marine Litter Management

methodology developed at the end of 2018. The GEF-funded “Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States” (GEF-IWEco Project) was also launched as part of the campaign.

(6) The Trash Free Water International Initiative in the WCR (2016-2019)

Activities on land-based waste reduction were implemented in Jamaica and Panama. The project was a success and provided an improved waste management system, the implementation of sustainable meal packaging in schools, as well as upcycling opportunities through business training for SMEs.

(7) Cooperation between the OSPAR & Cartagena Conventions

The Secretariats of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) and the Cartagena Convention agreed in June 2017 to support the implementation of Sustainable Development Goal 14. Through this cooperation, funding was provided by the Swedish and Dutch governments in 2018 to support marine litter activities in the WCR. In 2019, the GCFI and Secretariat to the Cartagena Convention completed a report on monitoring marine litter, including plastic pollution, and began developing a new regional strategy on marine litter and plastics reduction.

(8) Activities planned in 2020 and 2021

- In the field of solid waste and plastics, phase III of the project “Capacity Building Related to Multilateral Environmental Agreements in Africa, the Caribbean and the Pacific countries”: plan to implement at least four community-based projects with a focus on plastic reduction, reuse and recycling.
- The Caribbean Tourism Organization (CTO) and UNEP, through its Caribbean Regional Office and the Convention Secretariat, launched a partnership in 2020, and as one of its first outcome, it is planned to develop an introduction to regional and national initiatives and best practices in solid waste management.

2) World Bank

(1) Sustainable Development Bond

At the World Water Week 2018 held in August 2018, the World Bank Group announced a new initiative on water and marine resources, and in line with this, activities focusing on Goal 6 and Goal 14 of the

SDGs started. So far, Sustainable Development Bonds had been issued for projects aiming at achieving the SDGs related to women and children, and this was the first issue of bonds mainly targeting water and marine resources. The International Bank for Reconstruction and Development (IBRD) issued a 7-year bond of SEK 1 billion (about 12.2 billion yen) and sold it to institutional and individual investors to raise funds.

(2) PROBLUE

Implemented by the World Bank as part of the Blue Economy Program, PROBLUE is a new Multi-Donor Trust Fund (MDTF) for marine pollution control, fisheries management and sustainable coastal economic growth. It invests in four pillars: “Fishery and aquaculture management”, “Response to the threat of marine pollution including plastics”, “Sustainable development of tourism, maritime transport and offshore renewable energy”, and “Capacity building of governments”. About US$ 75 million has been committed to the fund. Broken down, the Norwegian government has invested US$ 15 million, the Canadian government has announced a participation of US$ 50 million, while Germany, Sweden, Iceland and the European Commission are also planning to contribute.

3) Inter-American Development Bank

The Inter-American Development Bank launched the “Open Innovation Challenge” to develop solutions to reduce plastic usage.

4) Asian Development Bank

The Asian Development Bank launched the “Action Plan for Healthy Oceans and Sustainable Blue Economies” for US$ 5 billion. In addition, Technical Assistance on “Promoting Action on Plastic Pollution from Source to Sea in Asia and the Pacific” started.

5) GEF/Addressing Marine Plastics: A Systemic Approach

Project funded by GEF, with UNEP as executing agency, and supported by the Ellen MacArthur Foundation, Ocean Conservancy, and GRID Arendal. The project lasted two years from 2017 to 2019 for a total of US$ 13 million, and resulted in the implementation of the following four components:

1. Building an international alliance platform to redesign plastics from inception : Implemented by New Plastics Economy
2. Development of waste management measures and provision of advanced knowledge base in the Asia- : Implemented by Ocean Conservancy

Pacific region

3. Identification of priority intervention points and provision of integrated strategic guidance : Implemented by UNEP
4. Facilitation of the effective compilation and sharing of each component outcomes : Implemented by GRID Arendal

The project used the Global Programme of Action (GPA) and the UNEP Regional Seas Programme. The project mapped out and summarized in a report the global outflow of plastics into the environment thoughout the value chain, with 2015 as the reference year. The mapping covers the plastic production and processing, the consumption of plastics or plastic containers, as well as the disposal of the products.

6) European Investment Bank (EIB) / Clean Ocean Initiative[107]

The EIB launched the initiative in October 2018 in collaboration with the German Reconstruction Credit Institute (KfW) and the French Development Agency (AFD). The goal of this initiative is to provide EUR 2 billion support to sustainable, feasible and low-carbon projects related to the reduction of marine litter, especially marine plastic litter, in the public and private sector, by 2023. The projects to be funded include:

- Collection, recycling, processing and disposal of plastics and other waste from rivers and coastal areas.
- Reduction of plastics and other waste in ports by improving waste management.
- Measures to prevent plastics from entering the oceans, and development of reusable or biodegradable plastics.
- Expansion and improvement of wastewater collection and treatment to prevent plastic from flowing into rivers and oceans.
- Urban rainwater management systems that prevent waste and plastic from entering the waterways during rain or flood.

In particular, KfW provided EUR 80 million to the rehabilitation of wastewater treatment facilities in Cape Town, South Africa, and AFD approved loans of 76 million euros and 75 million euros for the

[107] Source: European Investment Bank. 2019

sewerage systems in Sri Lanka to improve the sanitation sector, and much more.

7) GIZ/Reducing the input of plastic litter into the ocean around Cozumel [108] and Grenada[109]

This study, conducted by GIZ as part of its sector project on "Concepts for Sustainable Waste Management", aimed at reducing plastic use or plastic waste through legal systems or economic measures in Cozumel, United Mexican States, and Grenada.

Designed in conjunction with GIZ's Integrated Climate Change Adaptation Strategies (ICCAS), this study aims to provide policymakers in Grenada with appropriate measures to reduce the volume of waste, especially PET bottles. Stakeholders included the Ministry of Agriculture, Lands, Forestry, Fisheries and the Environment, the Ministry of Health, Grenada Solid Waste Management Authority (GSWMA), the Hotels and Tourism Association, importers and distributors of PET bottles, NGOs conducting clean-up activities, waste collection contractors, among others. The study collected information through a baseline study conducted by a local consultant, a desk research performed by an international consultant, a field survey as well as consultations with relevant stakeholders, and finally proposed (1) a deposit-refund scheme within EPR, and (2) incentivising separation by charging for waste collection, as appropriate instruments to reduce PET bottle waste. The study period was scheduled for June-September 2015 (Grenadapts. 2015) and the study report was published in December 2015.

Similarly on Cozumel Island, (1) a deposit-refund scheme coupled with a fee imposed on importers, and (2) a scheme for the separate collection of PET bottles at source together with incentives for local people, have been preselected based on a baseline study as policy measures to reduce plastic bottle litter in the surrounding sea. Finally, it was proposed to promote an expanded collection system with the elements of a deposit-refund scheme, which required the initiation of a dialogue with national and state governments for implementation. The survey was also carried out during the summer of 2015, and the survey report was published in December of the same year.

8) IUCN

(1) Plastic Waste Free Islands

IUCN implemented this initative as part of its "Close the Plastic Tap Programme", with the the Norwegian Agency for Development Cooperation (NORAD) as donor. The "Close the Plastic Tap

[108] Source: GIZ. 2015a

[109] Source: GIZ. 2015b

Programme" projects provide assistance to Small Island Developing States (SIDS) in three regions that are vulnerable to the impact of marine plastic litter, namely: Oceania (Vanuatu, Fiji, and Samoa), the Mediterranean (Menorca in Spain, and Cyprus), and the Caribbean (Antigua and Barbuda, Saint Lucia, and Grenada). The amount of support provided by NORAD is 61,000,000 NOK (approx. 700 million yen, as of July 9, 2020) for the 6SIDS[110] in the Pacific and Caribbean, with an implementation period planned to be three years from December 2018 to December 2021 (Norwegian Government. 2020).Through the reduction of plastic waste and improvement of waste management in general (Norwegian Government. 2020), this project also aims to reprocess waste into economically viable products and create employment opportunities in the area. Major organizations in the surveyed regions will prepare and approve detailed plans for the entire value chain, from plastic production to disposal, in various fields such as tourism and fisheries.

(2) Marine Plastics and Coastal Communities Project- MARPLASTICCs

This project was launched by IUCN in 2017 and funded by the Swedish International Development Cooperation Agency (Sida). The target countries are South Africa, Mozambique, Kenya, Thailand and Vietnam, and the project period is 3 years. Through an integrated life cycle approach, it supports the transition of plastics from the traditional "take, make, dispose" model to a circular economy model. In particular ① support governments and regional organizations in Africa and Asia to reinforce, develop and enforce laws and other measures to mitigate plastic pollution, ② support the government, industry and civil society in the target areas to turn off the "Plastic Tap" by developing instruments, knowledge and capacity, and ③ consider the entire plastic life cycle, and not only marine litter downstream.

(3) PlastiMed

Funded by the Swiss-based MAVA Foundation, this initiative started in 2017. It targets the Mediterranean region with the objective to understand the flow of plastics from the source to the sea and provides support for devising solutions that can be implemented locally.

(4) PlastiMed BeMed

Funded by Prince Albert II Foundation, this initiative is scheduled to be carried out during the period 2019-2021. This IUCN project aims to upgrade existing methodologies, models and data through the combination of modeling and field approaches to evaluate plastic waste runoff, routes and settlement in

[110] The 2 countries in the Mediterranean region receive support from the PRIMAT Foundation.

the Mediterranean Sea, focusing primarily on North African countries.

(5) Baltic Solutions to Plastic Pollution

With the support of the Swedish Postcode Foundation, the IUCN's Global Marine and Polar Programme (GMPP), this project intends to prove the impacts of plastic waste pollution on climate change, biodiversity and food safety in the Baltic region. GMPP set up a network of researchers to obtain, through desk research and experiments, scientific proofs of the adverse environmental and social impacts of plastic pollution in the Baltic region, and will explore on this basis policy promotion mechanisms in collaboration with local experts and grassroots organizations (IUCN. n.d.).

9) World Economic Forum (WEF) / The Global Plastic Action Partnership (GPAP)

This partnership aimed at addressing the plastic pollution issue through the cooperation of companies, civil society, national and local governments, community groups, and world-class experts (The Global Plastic Action Partnership. n.d.). It receives funding and support from the Canadian and British governments, companies (Dow Chemical, Coca-Cola, PepsiCo, Nestlé, etc.), the World Resources Institute, and the World Bank, among others. The first GPAP cooperation was with the Indonesian government, and Indonesia became the first country to introduce a national version of the GPAP, the National Plastic Action Partnership (NPAP). NPAP stakeholders included the Coordinating Ministry of Maritime Affairs, the Ministry of Environment and Forestry, and the Ministry of Industry at the national level, Chandra Asri Petrochemical, Coca-Cola, Dow Chemical, Ellen MacArthur Foundation, Evoware, Giti Group, the Indonesian Business Council for Sustainable Development, the Indorama Group, Indofood, PepsiCo, Nestlé, the World Bank, WWF Indonesia and others on the private sector level, as well as the governors/mayors of four municipal governments.

10) WWF / ReSource: Plastic[111]

ReSource: Plastic is an initiative for plastic waste reduction targeting private businesses, and WWF provides the following support to the member companies:

- Suggestions and guidance from experts on the most suitable ways to reduce plastic waste.
- Dispatch of experts and provision of tools, including step-by-step guidance on best practices and

[111] ReSource Plastic (https://resource-plastic.com/)

measurement frameworks to help reduce plastic waste.

- Promotion of collaboration between companies and governmen engaged in the plastic waste issue.

The principal members are currently Keurig Dr. Pepper, McDonald's, Procter & Gamble, Starbucks, and The Coca-Cola Company.

11) Ocean Conservancy

American NGO. For more than 30 years since 1986, it is supervising the International Coastal Cleanup (ICC) campaign, cleaning the marine environment around the world and collecting data on marine debris. The data collected in each region also serves to formulate international laws and treaties on marine pollution. In addition, workshops are held every year to disseminate information on marine debris.

12) The Ocean Cleanup

Dutch NGO founded in 2013. The organization is developing an original system for collecting and removing floating waste and gathering various data in the Great Pacific Garbage Patch. The ultimate goal is to remove 90% of the world's marine plastics by 2040.

13) Ellen MacArthur Foundation

UK registered charity, and global leader in promoting circular economy. The foundation leads the initiative "New Plastics Economy Global Commitment"[112] to address the marine plastic issue, endeavors to eradicate unnecessary plastic packaging and containers, to promote the transition to reusable, recyclable, and compostable products, and to implement a circular economy for plastic.

14) Breaking Free From Plastic

Established in September 2016 by international environmental NGOs such as Green Peace and Basel Action Network to prevent plastic pollution, this international movement brings together approximately 1,500 environmental NGOs to conduct research on plastic waste and formulate policy recommendations. A "Brand Audit" classifies the waste collected on the coasts by brand and is made public to spur businesses to cut down the manufacturing and sale of single-use plastic containers.

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[112] Ellen Macarthur Foundation. Global Commitment (https://www.newplasticseconomy.org/projects/global-commitment)

15) Basel Action Network (BAN)

International environmental NGO headquartered in Seattle, Washington, USA, the Basel Action Network (BAN) is one of the founding members of the Breaking Free From Plastic movement. The organization conducts research to control plastic pollution, tracks the movement of e-waste, recycles abandoned ships, and formulates policy recommendations on transboundary waste movement. In the back of the conference hall at the Basel Convention COP 14, BAN actively encouraged the publication of Annex II related to plastic waste.

16) Global Ghost Gear Initiative (GGGI)

World's largest cross-sectoral international alliance established to deal with Ghost Gear (abandoned, lost or discarded fishing gear) left in the sea. As of June 2019, 92 NGOs and companies, 14 national governments and 2 international organizations are participating. Information on abandonned and discarded fishing gear, including those made of plastic, is collected from around the globe using a dedicated smartphone application, converted into a database, and research, collection, and recycling projects are being conducted by affiliated organizations in each country.

17) Japan Environmental Action Network (JEAN)

The Japan Environmental Action Network (JEAN) is an NGO that coordinates the "International Coastal Cleanup" (ICC) in Japan. In order to share information among the stakeholders engaged in the marine litter issue, JEAN set up the "Marine Litter Issue Platform Japan" in 2005 and organizes various events. In addition, through study sessions for the members of the National Diet, the NGO also encouraged the government to bring up the marine litter issue and contributed to the enactment of the 2009"Act on Promoting the Treatment of Marine Debris Affecting the Conservation of Good Coastal Landscapes and Environments to Protect Natural Beauty and Variety".

18) Plastic Waste Management Institute (PWMI)

PWMI is an institute that conducts research and studies on the recycling of plastic waste with the aim to minimize the environmental burden of plastic throughout its life cycle and contribute to the sound development of plastic-related industries to build a sustainable society. In addition, information on plastic waste processing and recycling is compiled and disseminated in a publication called "An Introduction to Plastic Recycling".

3.3 Organized information on the impact of Covid-19 on marine plastic litter

Waste has increased rapidly due to the spread of Covid-19 infection throughout the world (UNEP. 2020), with a notable surge in the use of single-use plastics such as disposable masks and gloves that affect the marine environment, and the intensification of marine plastic pollution is a matter of concern (CGTN. 2020). Disposable masks (nonwovens) usually contain polypropylene, and more complex and expensive face masks also contain polyurethane and polyacrylonitrile (Earth Org. 2020). In the Caribbean, where tourism is a major source of income, plastic consumption is expected to decrease as the number of tourists declines in consequence of measures against Covid-19, but it has been reported that several countries and municipalities accross the world have lifted or postponed the prohibition of plastic bags, and that people tended to use more disposable items rather than reusable ones for hygienical resons (World Economic Forum. 2020, Earth Org. 2020). The table below summarizes information about the increase in plastic consumption due to Covid-19.

Table 3-1 Information related to plastic increase due to Covid-19

Information classification	Outline
Policy and legal	・ The ban on single-use plastic bags has been lifted in California. New York, New Jersey and the United Kingdom postponed the ban on plastic bags that should have come into force this year (World Economic Forum. 2020).
Consumption behavior of the population	・ Greeners Action, an environmental group in Hong Kong, surveyed more than 2,000 participants in early April 2020 and found that people were ordering food more than twice as much as last year (Earth Org. 2020). ・ British charities Keep Britain Tidy and Thames 21 point out changes in social interactions before and after the lockdown. As the number of people visiting beaches, parks, and other outdoor places increase, a significant growth in fast food packages, confectionery wrappers, and drink bottles has been observed (Earth Org. 2020).
Actual situation (increasing Covid-19-related waste in marine litter, based on NGO/NPO survey)	・ Opération Mer Propre (NPO in France) reported on Covid-19 waste (masks, gloves, bottles of disinfectant) found by divers in the Mediterranean Sea (CGTN. 2020). ・ OceansAsia, an environmental NGO conducting surveys on marine litter in Hong Kong, reported an increase in Covid-19-related waste on an uninhabited island in Hong Kong. Before the pandemic, most of the waste consisted of bottles, polystyrene containers, lighters, single-use cutlery, and straws, but after Covid-19, 70 masks were collected across an area of just 100 meters long on a beach. One week later, 30 masks were collected again (Earth Org. 2020, The Economic Times. 2020, The Guardian. 2020).

With the spread of Covid-19 infections, plastic for hygienic use have proven to be essential for protecting people, especially healthcare workers in the frontline, but the increase in medical waste raises issues regarding the improvement of waste management (CEP. 2020b). Waste management requires soft and hard improvements at each step of the process (waste discharge, collection/transport, treatment/disposal), based on the recognition of the following issues:

- Discharge: In response to the marine plastic litter issue, many countries have been taking measures such as prohibiting the use of plastic bags, however, public awareness of residents who have been

using plastic bags for discarding their waste until now may not be sufficient, for example guidance on how to discharge waste without using plastic bags. Especially in developing countries, residents often throw their waste directly into large containers without using plastic bags, but it has been reported that the virus can live up to 24 hours on paper, cardboard, and fabrics, and up to 72 hours on plastics (World Economic Forum. 2020), so it is necessary to ensure proper discharge, in a way that waste doesn't come into contact with other people.

- Collection and transport: Implementation of training for collection workers on the usage of safety equipment and proper collection, and infection prevention measures for the informal sector (traders and waste pickers) that are particularly vulnerable to the Covid-19 pandemic (World Economic Forum. 2020).
- Treatment and disposal: Appropriate treatment and disposal of collected waste, including medical waste, are required. Especially for medical waste, consider incineration.

Chapter 4. Japanese Technology and Experience

4.1 Japanese technology for waste management that contributes to the reduction of marine plastic litter

In Japan, the recycling of plastic waste, which comprises municipal waste and industrial waste, consists of material recycling, chemical recycling, and thermal recycling (thermal recovery in Europe and the United States)[113]. In addition, some plastic waste is also unused, without being recycled. The material flow of plastic waste in Japan is represented below:

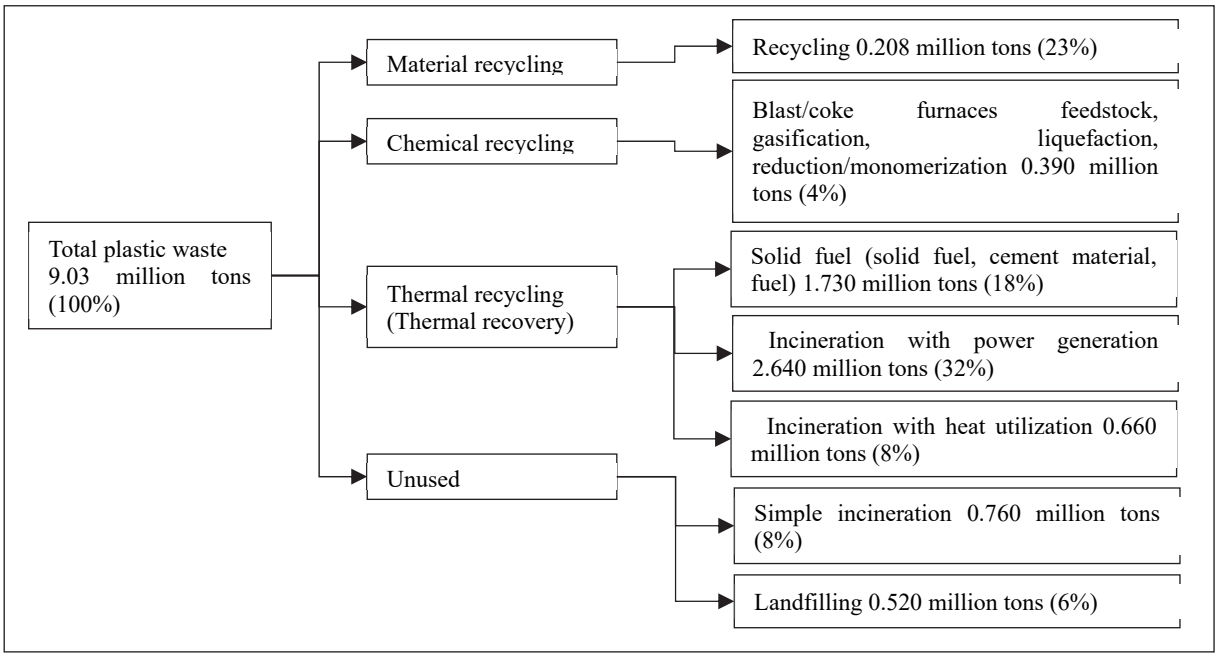


Figure 4-1 Material flow of plastic waste in Japan[114]

Referring to the above figure, we will consider Japanese technologies for the three types of recycling (material recycling, chemical recycling, and thermal recycling), as well as technologies for collecting waste floating on the water surface and beach litter.

4.1.1 GDP, population density, and other data in the surveyed countries

Since GDP[115] and population density are important key factors for the selection of Japanese technology

[113] Although there is a trend in Europe and the United States that thermal recycling cannot be categorized as "recycling", it is included in the category "recycling" according to the definition of the Japanese Plastic Waste Management Institute.

[114] Created by JICA Survey Team based on "An Introduction to Plastic Recycling in Japan 2019" of the Plastic Waste Management Institute.

[115] As a general rule, the minimum economic power required for proper treatment is considered to be a GDP per capita of

that can be introduced, these items have been compiled prior to the Survey.

Among the waste treatment and disposal technologies, the cheapest and most stable technology is sanitary landfill, but since relatively large land is required to set up a sanitary landfill disposal site, in countries with a certain economic level, where the available land area is small and the population density is high, such as Japan, drastic reduction in landfill amount by incineration is required for waste disposal. On the other hand, in countries where sufficient land can be secured for a disposal site, sanitary landfill is often the optimal solution in terms of cost. The table below shows the GDP, population, population density and coastline length of each country in the survey area.

Table 4-1 GDP, population density, and other data in the surveyed countries

Country	GDP per capita (US$) (2018)	Population (2017)	Population density (people/km^2)	Coastline length (km)
Antigua and Barbuda	16,727.0	95,426	218.80	153
Republic of Guyana	4,979.0	775,221	4.00	459
Republic of Cuba	8,821.8	11,339,259	109.00	3,735
Grenada	10,640.5	110,874	327.80	121
Jamaica	5,354.2	2,920,853	271.00	1,022
Republic of Suriname	6,234.0	570,496	3.70	386
Saint Vincent and the Grenadines	7,361.4	109,827	282.60	84
Saint Christopher and Nevis	19,275.4	52,045	201.70	135
Saint Lucia	10,566.0	180,955	298.20	158
Dominica	7,691.3	71,458	95.50	148
Dominican Republic	8,050.6	10,513,131	220.00	1,288
Republic of Trinidad and Tobago	17,129.9	1,384,072	270.90	362
Republic of Haiti	868.3	10,982,366	403.60	1,771
Commonwealth of The Bahamas	32,217.9	381,761	38.50	3,542
Barbados	17,949.3	286,233	666.60	94
Belize	4,884.7	375,769	16.80	386
United Mexican States[116]	8,230.7	18,492,618	58.00	3,294

Sources: World Bank Group. World Development Indicators, CIA. n.d.

As shown in footnote 115, “As a general rule, the minimum economic power required for proper treatment is considered to be a GDP per capita of about US$ 8,000 to 9,000 for waste incineration power generation and US$ 3,000 for sanitary landfill.” By focusing on the GDP per capita in the table above, it is possible to introduce sanitary landfill from the viewpoint of economic power, except in Haiti. In terms of population density, it seems easy to secure land for sanitary landfill sites in Guyana and Suriname, and it is considered that sanitary landfill disposal alone is sufficient. However, since the values are the population density of the entire country, for urban areas, it is necessary to consider the

about US$ 8,000 to 9,000 for waste incineration power generation and US$ 3,000 for sanitary landfill.

[116] The source of the GRDP values for the 6 Mexican states on the Caribbean coast is the National Bureau of Statistics of Mexico (https://www.inegi.org.mx/).

actual situation of the cities.

4.1.2 Material recycling

Regarding material recycling technologies, there are three treatment levels as shown in the figure below, taking into consideration the economic level, technical level, and needs for plastic materials in the surveyed countries.

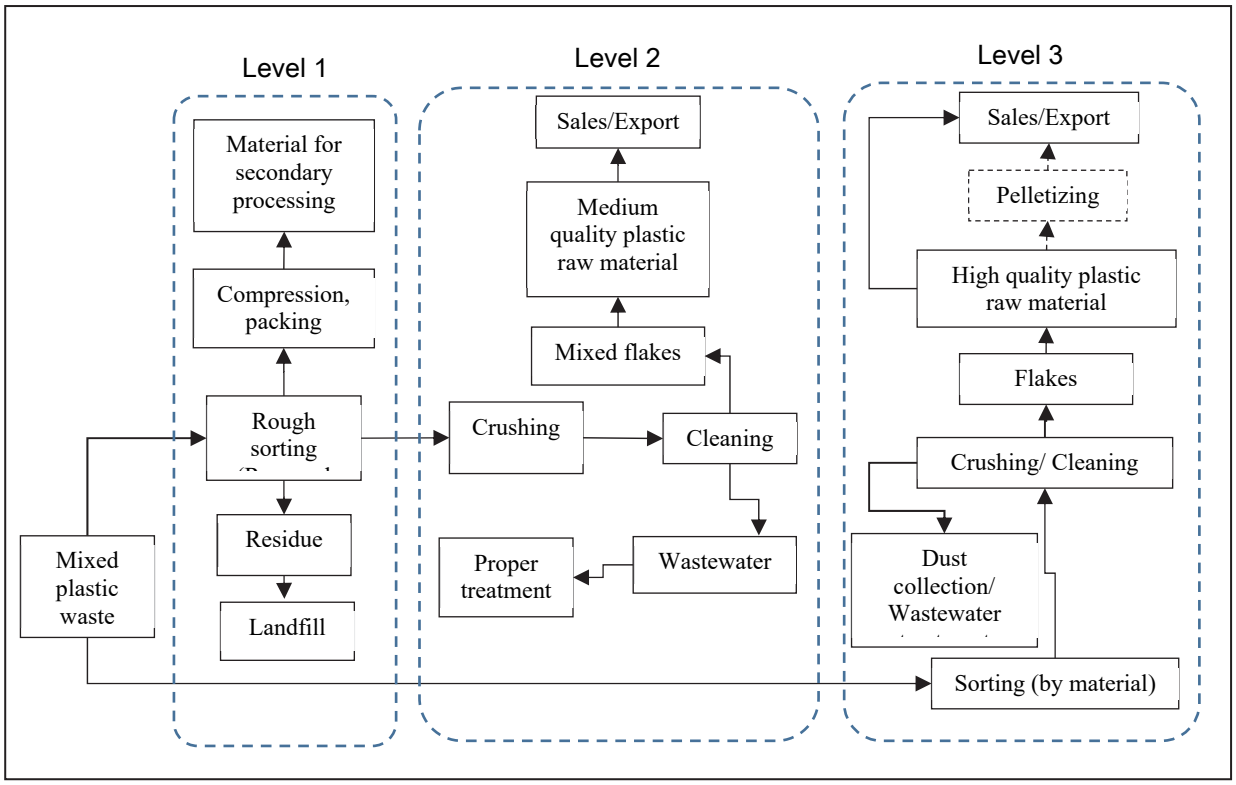


Figure 4-2 Plastic material recycling process[117]

[117] Source: Created by JICA Survey Team based on "An Introduction to Plastic Recycling in Japan 2019" of the Plastic Waste Management Institute.

1) Examples of technologies at each level

Level 1	This rough sorting process is performed in low-income countries by waste pickers at the landfill site - the sorted plastics are roughly divided by type, packed or compressed in some form, sold to brokers, who collect and recycle them as material for secondary processing.	 Plastic bottles collected by waste pickers[118]
Level 2	In Japan, AI-controlled robot arms have recently been used in place of manual work, but at present, hand sorting by humans is the most common. At Level 2, the sorted plastic is pulverized and then washed, and the resulting mixed flakes are recycled as medium-quality plastics that will serve as raw materials for making industrial products. At Level 2, plastic waste is crushed and washed, so that dust prevention measures in the crushing stage and proper treatment of wastewater are necessary.	  Examples of manual sorting in developing countries[119]
Level 3	At Level 3, waste and plastics are separated on a hand sorting conveyor or by a robot arm, and then plastics are divided into different types using a machine, crushed and cleaned into high quality flakes, pelletized or recycled directly as industrial raw materials. This is the method used in developed countries, including Japan. The so-called “non-burnable waste” or “non-combustible waste” of municipal solid waste in Japan is recycled through this process, with public waste treatment facilities usually processing up to the sorting, while flakes and pellets are mostly produced by the recycling businesses.	 Example of manual sorting in Japan https://www.fjtex.co.jp/kankyo/products/sorter/236

[118] Source: Photographs of the JICA Project for Capacity Development for Solid Waste Management in Tiznit Municipality and Neighboring Communes.

[119] Created by JICA Survey Team based on the technical explanation materials for the JICA Waste Management Capacity Improvement Support Work in Morocco.

2) Applicability to the surveyed countries

The next table shows the classification by economic level (GDP per capita) that indicates the possibility of introducing the 3 levels of technology from the above figure in the surveyed countries. The recycling of plastic waste starts being economically feasible only if there is a market where it can be traded at a reasonable price, however, in developed countries including Japan, plastic products are recycled even if it is not economically viable, taking the point of view of resource conservation.

Table 4-2 Level of applicability to the surveyed countries

Country	GDP per capita (US$) (2018)	Applicable level
Antigua and Barbuda	16,727	Level 3
Republic of Guyana	4,979.0	Level 2
Republic of Cuba	8,821.8	Level 2 or 3 in terms of GDP, but need to consider the double currency system.
Grenada	10,640.5	Level 3
Jamaica	5,354.2	Level 2
Republic of Suriname	6,234.0	Level 2 or 3
Saint Vincent and the Grenadines	7,361.4	Level 2 or 3
Saint Christopher and Nevis	19,275.4	Level 3
Saint Lucia	10,566.0	Level 3
Dominica	7,691.3	Level 2 or 3
Dominican Republic	8,050.6	Level 2 or 3
Republic of Trinidad and Tobago	17,129.9	Level 3
Republic of Haiti	868.3	Level 1
Commonwealth of The Bahamas	32,217.9	Level 3
Barbados	17,949.3	Level 3
Belize	4,884.7	Level 2
United Mexican States[120]	8,230.7	Level 2 or 3

Source: “GDP per capita (US$) (2018)” comes from World Bank Group. World Development Indicators, and “Applicable level” has been evaluated and categorized by JICA Survey Team.

Level 1 and 2 technologies are basic, and if GDP per capita is around US$ 5,000, they can be produced domestically or procured from neighboring countries. Therefore, from the perspective of Japanese technology deployment, the targets are countries of Level 3.

[120] The source of the GRDP values for the 6 Mexican states on the Caribbean coast is the National Bureau of Statistics of Mexico (https://www.inegi.org.mx/).

From the perspective of a waste treatment company, in countries of Level 1 and 2, it is theoretically possible for Japanese companies to procure simple and inexpensive equipment from local or neighboring countries and enter the market as a recycling operator. Japanese companies don't always have the edge on Level 3 technologies, but it can be said that any waste treatment plant manufacturer in Japan can handle it.

4.1.3 Chemical recycling

The chemical recycling methods for recycling plastic waste are roughly divided into five technologies. These technologies are outlined in the table below:

Table 4-3 Chemical recycling methods

Method	Outline
1. Blast furnace feedstock technology	Used as a reducing agent in the blast furnace instead of coke. Unlike coke, the main components of plastic are carbon and hydrogen, so carbon dioxide emissions are low during pig iron production.
2. Coke oven chemical feedstock technology	Plastic waste is cracked thermally under pressure at high temperature (600 to 1,300 degrees) to obtain coke as blast-furnace reducing agent, hydrocarbon oil as chemical feedstock, and coke oven gas used for power generation.
3. Gasification technology	By limiting the amount of oxygen and heating, most of the plastic becomes hydrocarbon, carbon monoxide, and hydrogen, which are used as raw material for the chemical industry such as methanol, ammonia, and acetic acid.
4. Liquefaction technology	Using a reforming catalyst at about 400° C, plastic is completely pyrolyzed to obtain hydrocarbon oil. For the treatment of municipal plastic waste, how to remove chlorine is important.
5. Feedstock/Monomerization technology	Waste plastic products are chemically decomposed, returned to raw material and monomers, and used again for plastic products.

In Japan, with the full enforcement of the "Containers and Packaging Recycling Law" (2000), the methods for treating plastic waste generated from containers and packaging was examined from all sides, and chemical recycling was scrutinized from various perspectives until around 2005, but as shown in Figure 4-1 Material flow of plastic waste in Japan, the ratio of chemical recycling to the total amount of waste plastics treated is no more than 4%. Of the total plastic waste, data[121] on the breakdown of containers and packaging recycled through chemical recycling of plastics shows that in 2018, about 70% of these 4% was recycled as chemical feedstock for coke ovens, about 19% through gasification and about 11% as blast-furnace feedstock.

Regarding the liquefaction of plastic waste in developing countries, there is "The City of Cape Town,

[121] Homepage of the The Japan Containers And Packaging Recycling Association (https://www.jcpra.or.jp/recycle/related_data/tabid/510/index.php)

Republic of South Africa: Pilot survey for disseminating small and medium enterprise technologies for recycling waste plastic to fuel towards sustainable waste management", which was carried out as a JICA's SME dissemination and demonstration project in 2016, however, in this project, plastics sent to the liquefaction facilities were thoroughly washed and sorted, and only clean and liquefiable plastic materials (PP: polypropylene, PE: polyethylene, PS: polystyrene) were processed, and the purpose of the project was achieved.

In this context, it is important to note that in the case of plastic waste liquefaction, the types of plastics that can be converted to oil are limited, and that the plastics that are inserted into the liquefaction equipment must be thoroughly cleaned.

Coke oven chemical feedstock system is a recycling method of plastic as a substitute of coal, generating coke, oil (hydrocarbon oil), and gas (coke oven gas). Just like steaming coal, plastic waste is steamed so that coke, oil (hydrocarbon oil) and gas (coke oven gas) are recovered and used. In Japan, this method is used exclusively in steel mills. Therefore, if there is such demand in the surveyed countries, there is room for consideration.

In addition to these technologies for recycling plastic waste in developing countries, the 2017 Pilot Survey for Disseminating SMEs' Technologies "Verification Survey with the Private Sector for Disseminating Japanese Technologies for Plastic Recycling System to Convert Waste to Eco-Product" (Cambodia) demonstrated that recycled plastic products can be manufactured using unsorted plastic waste as raw material without pretreatment (sorting and cleaning). They require a low initial investment, are easy to process and of high quality compared to general recycled plastic products, and have sufficient strength to be used as building material for construction. This technology claims that plastic waste can be recycled without pretreatment (sorting and cleaning) using unsorted waste plastic as raw material, but when considering this technology, it is necessary to evaluate whether or not it can be introduced after conducting a test to confirm that it can be applied using local plastic waste.

4.1.4 Thermal recycling (Thermal recovery)

Thermal recycling uses plastic waste as fuel to recover heat, and use the heat directly or for power generation; this also includes power generation from waste incineration. As a general rule, the minimum economic power required for proper treatment by waste incineration power generation is a GDP per capita of around US$ 8,000 - 9,000 or more. In addition, a suitable facility scale for power generation is at least 100 tons/day[122]. Possible countries under these conditions include the Republic of Cuba, Saint

[122] According to the "JICA Guideline for Promoting Waste to Energy Facility Projects" published in September 2020, introduction can be considered when the population of the target area is 100,000 or more and the facility scale is 70 tons/day or more.

Lucia, the Dominican Republic, the Republic of Trinidad and Tobago, the Commonwealth of The Bahamas, Barbados and the United Mexican States.

Table 4-4 Countries where thermal recycling is feasible among the surveyed countries

Country	GDP per capita (US$) (2018)	Waste generation (ton/day)	Feasibility of power generation from waste incineration
Antigua and Barbuda	16,727	83	
Republic of Guyana	4,979.0	510	
Republic of Cuba	8,821.8	7,400	Although it is X (possible) in terms of GDP, need to consider double currency system, etc.
Grenada	10,640.5	85	
Jamaica	5,354.2	2,921	
Republic of Suriname	6,234.0	234	
Saint Vincent and the Grenadines	7,361.4	87	
Saint Christopher and Nevis	19,275.4	86	
Saint Lucia	10,566.0	217	X
Dominica	7,691.3	36	
Dominican Republic	8,050.6	11,118	X
Republic of Trinidad and Tobago	17,129.9	2,078	X
Republic of Haiti	868.3	6,407	
Commonwealth of The Bahamas	32,217.9	714	X
Barbados	17,949.3	489	X
Belize	4,884.7	290	
United Mexican States[123]	8,230.7	15,888	X

X: Countries where power generation from waste incineration is feasible
Source: World Bank Group. World Development Indicators

In the United Mexican States, there is the case of a contract signed with a private company[124] in 2017 to install and operate the world's largest waste incineration power generation facility (13,000 tons/day) in the capital city of Mexico, gathering the momentum of introducing power generation from waste incineration. However, in the 2018 Mexico City Governor's election, Ms. Claudia Scheinbaum, an opponent of waste incinerators, was elected and the contract was canceled (Environmental Justis Atlas. 2019). It is therefore essential to take into account circumstances such as this case when introducing

[123] The source of the GRDP values for the six Mexican states on the Caribbean coast is the National Bureau of Statistics of Mexico (https://www.inegi.org.mx/).

[124] A 30-year concession contract with Veolia Mexico.

power generation from waste incineration.

When introducing power generation from waste incineration, the calorific value of the waste to be incinerated is one issue. In Panama City, which is not a surveyed country but has similar weather conditions, the weighted average of the calorific value of households, offices, markets and street cleaning waste measured previously by a JICA survey was approximately 1,250 kcal/kg (5,250 kJ/kg) (JICA. 2003). Waste of this calorific value can be appropriately incinerated without using auxiliary fuel with the Japanese technology for waste incineration power generation, but European technology for waste incineration power generation requires the use of auxiliary fuel unless the calorific value is of at least about 1,400 kcal/kg. From the viewpoint of the calorific value of waste, Japanese technology for power generation from waste incineration is superior.

In addition, according to a report from UNEP, coastal waste includes waste that poses health issues such as medical waste, sanitary products, and disposable diapers (UNEP. 2014), and it is possible to introduce small incinerators using Japanese technology that can co-combust medical waste and plastic waste in order to solve this problem even in countries other than those listed in Table 4-4.

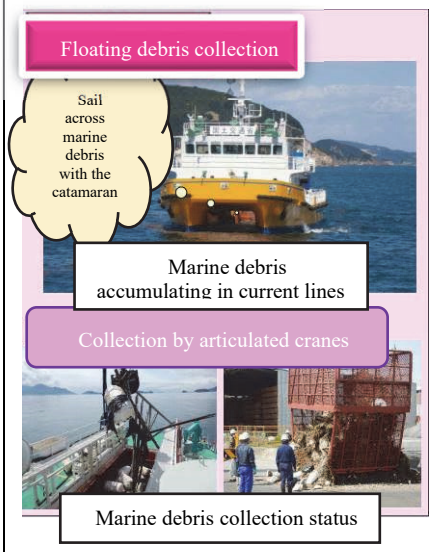
4.1.5 Collection technology for floating debris and beach litter

1) Floating debris

Japanese collection technology for floating debris ranges from large marine debris collection vessels (official name: Ocean Environment Maintenance Ships) to small river debris collection boats deployed by the Ministry of Land, Infrastructure, Transport and Tourism in Tokyo Bay, Ise Bay, the Seto Inland Sea, and the Yatsushiro Sea.

Large vessels are designed and constructed by relatively large shipbuilding companies, while small boats are designed and manufactured by small and medium-sized enterprises. In addition, there exists various small-sized types such as ships with outboard motor or where collection is operated by radio control.

Table 4-5　Examples of floating debris collection technologies

Example of large marine vessel	Example of small river boat	Examples of unmanned ships operated by radio control
		
Explanatory material from the Ministry of Land, Infrastructure, Transport and Tourism, Document 3-7 February 2019 Ministry of Land, Infrastructure, Transport and Tourism	Tokyo Port Terminal Corporation http://www.tptc.co.jp/business/harbor	Mirai Kouro Co., Ltd. Future Line Service Co., Ltd. https://www.miraikouro.co.jp/ecoboat/

All of these ships are tailor-made, and it is possible to provide solutions that meet local needs by combining technologies from large to small in accordance with local circumstances.

In any case, it is essential to understand the sea area where floating waste is likely to accumulate in order to formulate countermeasures. Regarding this, in Japan, the Port and Harbours Bureau of the Ministry of Land, Infrastructure, Transport and Tourism and the Coastal Development Institute of Technology play a central role in the realization of"predicting the sea currents where floating waste accumulates from observed values (flow direction/flow velocity) of the ocean shortwave radar (HF radar), carried out by the Port and Harbours Bureau, and collecting floating waste"[125]. By using this technology, it is possible to operate the collection ship efficiently and to monitor the position of floating waste.

2)　Beach litter

Waste of various types and sizes are washed up and dumped on beaches (sandy beach). According to the 2018 Ocean Conservancy International Cleanups results, Number 1 of coastal litter in terms of

[125] Proceedings of the Coastal Development Institute of Technology No. 9 (2009) on the efficiency of collecting floating debris on the sea using ocean shortwave radar

number of units are cigarette filters, Number 2 candy wrappers, and Number 3 straws, and it requires a lot of time and efforts to remove these small debris manually. As a means for solving this, there is a machine called a “beach cleaner”, a technology to pick up even fine debris by mechanically stirring the surface layer of the beach. By introducing this equipment, it is possible to collect waste on sandy beaches efficiently. Overseas companies also work on/supply this machine, but there is one company in Japan that develops/distributes it commercially[126].

Example of beach cleaner

Before use

After use

Fuso Co., Ltd. (https://www.kk-fuso.com/beach-cleaner)

Figure 4-3 Example of beach cleaner (Photographs)

[126] Honda Motor Co., Ltd. (https://www.honda.co.jp/philanthropy/beach/mind/cleaner/) also owns the technology but has no plans to put it on the market, the company is developing beach cleaners and carrying out beach cleaning activities as part of its CSR.

4.2 Japan's approach to the marine plastic litter issue

The amount of plastic released to the ocean in 2015[127] is estimated to be about 8 million tons per year for only macroplastics (more than 5 mm), of which 7.36 million tons are due to improper treatment of municipal solid waste, and it is presumed that plastic waste is flowing from the land to the ocean via rivers. Other major sources are loss from fishing nets and fishing activities (about 650,000 tons per year) and those classified as microplastics (5 mm or less) (about 280,000 tons per year).

At present, the amount of marine plastic litter discharged from Japan is estimated to be 20,000 to 60,000 tons per year, but assuming effective use of plastics, the Japanese government intends to thoroughly implement the following initiatives with the aim of realizing a world that does not create new pollution[128].

- Collect and properly dispose of plastic waste through the waste management system more thoroughly than ever before, while promoting the prevention of littering, illegal dumping, and unintentional ocean leakage.
- For waste that is still discharged into the environment, first focus on collection on land. Then, work on the collection of plastic waste that has leaked into the ocean.
- Promote innovation such as the development of materials that have little impact even if they flow into the ocean (marine biodegradable plastics, paper, etc.) and transition to such materials.
- Contribute to the effective prevention of leakage of marine plastic litter in developing countries by leveraging knowledge, experience, and technology related to proper disposal of waste in Japan.
- As basis for promoting measures against marine plastics globally, strive to understand the actual conditions of marine plastic litter and enhance scientific knowledge.

4.2.1 Plastic resource circulation

1) Policy

The legal measures related to the recycling of resources including plastics in Japan originate from the "Act on the Promotion of Effective Utilization of Resources" enforced in 1991, which encourages companies to consider recycling from the design stage, and use recycled resources in product manufacturing and manufacturing processes.

In 2000, the "Basic Act on Establishing a Sound Material-Cycle Society" was enacted, and the "Act on the Promotion of Effective Utilization of Resources (enforced in 2001)" was revised. In addition, in order to promote concrete resource recycling, the "Container and Packaging Recycling Law (enforced

[127] UNEP. 2018b

[128] Action Plan for Countermeasures to Plastic Waste in the Oceans. Ministerial Council on Marine Plastic Litter, May 31, 2019

in 2000)", the "Home Appliance Recycling Law (enforced in 2001)", the "Automobile Recycling Law (enforced in 2005)", and other laws related to the particular recycling of specific products, as well as the "Green Purchasing Law (enforced in 2001)" that promotes the use of recycled resources by procuring recycled products, have been introduced, stimulating the creation of a sound material-cycle society.

However, since it is not enough to qualitatively and quantitatively recycle all the materials and reduce greenhouse gases by simply promoting the recycling of individual products based on laws and regulations, comprehensive measures aimed at realizing a sound material-cycle society and a low-carbon society have been considered, and in June 2018, the "4th Fundamental Plan for Establishing a Sound Material-Cycle Society" was approved by the Cabinet.

Specifically, it aims to ① reduce dependence on non-renewable resources, ② replace with renewable resources, and ③ thoroughly collect used resources and recycle them many times. Based on the contents of this plan, the "Resource Circulation Strategy for Plastics (Strategy for the Comprehensive Promotion of Plastic Resource Circulation)" was formulated in May 2019 and corresponding measures were taken.

In this strategy,

- Reduction of plastic use that contributes to the mitigation of environmental load, such as curtailment of single-use containers and packaging
- Thorough, effective and efficient recovery and recycling of used plastic resources, including unused plastics
- Improvement of practicality of bioplastics and promotion of substitution of plastics derived from fossil fuels

and more, are comprehensively promoted. In addition, in international arenas such as the G20, the objective is to share Japan's measures with other countries and to lead discussions in order to promote global and effective initiatives involving emerging countries.

2) Industry-government-academia collaboration

In order to solve the problem of marine plastics, it is crucial that a wide range of actors such as ministries, local governments, companies, NGOs and research institutes collaborate and cooperate to push measures forward. In Japan, "Plastics Smart" by the Ministry of the Environment and "Japan Clean Ocean Material Alliance" by the Ministry of Economy, Trade and Industry, were set up to gather various information, disseminate information, and hold events in order to stimulate dialogues and exchanges among various entities.

Table 4-6 Industry-government-academia collaboration platform

Main entity	Name	Outline
Ministry of the Environment	Plastics Smart	Established in January 2019 with 48 companies and organizations, 506 organizations were participating as of February 20, 2020. The purpose is to push forward measures by collecting and sharing information on plastic waste reduction. Many examples of initiatives are currently being aggregated to be sent out into the world at opportunities such as the G20.[Examples of participating companies and organizations] AEON, Coca-Cola Japan, McDonald's Japan, Kanagawa Prefecture, Japan Agency for Marine-Earth Science and Technology, National Institute for Environmental Studies, etc.
Ministry of Economy, Trade and Industry	Japan Clean Ocean Material Alliance	Founded in January 2019 with the participation of 159 companies and organizations. It was established with the purpose of strengthening cooperation between stakeholders in order to accelerate the development and diffusion of alternative materials such as biodegradable plastics, and a more sustainable use of plastic products in order to reduce marine plastic litter. In the future, the promotion of collaboration and technology exchange will be carried out at places such as the Dissemination & Promotion WG and the International WG. [Examples of participating companies and organizations] Kao, Kaneka, Asahi Kasei, Japan Packaging Institute, Japan Plastics Industry Federation, etc.

4.2.2 Measures against marine debris

1) Policy

Japan's legislation concerning countermeasures against marine debris is the "Act on Promoting the Treatment of Marine Debris Affecting the Conservation of Good Coastal Landscapes and Environments to Protect Natural Beauty and Variety (Act on Promoting the Treatment of Articles that Drift Ashore) (enforced in 2009)". This law was enforced in 2009 with the purpose of implementing measures against beach wreckage, as the damage on the coast of Japan worsened, such as the deterioration of the coastal environment including the ecosystem and the impact on the fishing industry, caused by a large amount of debris from Japan and neighboring countries. The three main measures were ① smooth treatment of marine debris and control of its generation, ② ensure the appropriate division of roles and coordination among the different relevant parties, and ③ promotion of international cooperation, and the responsibilities of coast managers, the duty of municipalities to cooperate, and the promotion of measures to collect marine debris in sea areas were explicitely stated.

After that, the "Act on Promoting the Treatment of Articles that Drift Ashore (enforced in 2009)" was amended in 2018 to foster the treatment of marine debris and to address the marine plastic litter issue. The points of the revision were as follows:

- Addition of the perspective of marine environment conservation.
- Addition of "marine debris, etc." and promotion of smooth treatment of marine debris.

- Suppression of coastal wreckage by promoting the 3Rs.
- Measures against microplastics (it is stipulated that businesses must make efforts to reduce their use and control their emissions, and that the government should promptly examine the measures to control microplastics and take measures based on the results).
- Securing international collaboration and promotion of international cooperation.

In addition, in the "Regional Measures Promotion Project for Coastal Debris", which is one of the assistance programs of the Ministry of the Environment, subsidies have been provided to projects related to the formulation of regional plans for marine litter, collection and treatment of marine litter, and measures to control the generation of marine litter carried out by prefectures and municipalities, based on Article 29 of the "Act on Promoting the Treatment of Articles that Drift Ashore (enforced in 2009)". This program has been implemented since 2009, and contributes to the conservation of the marine environment in various regions by supporting activities for collecting and treating marine litter with heavy equipment and volunteers. Besides, various surveys on policies for reducing marine debris in the coastal area of Japan are conducted every year for understanding the actual situation and for examining international strategies, and knowledge on marine debris in general is being accumulated.

As for those specializing in marine plastic litter, the "Environment Research and Technology Development Fund" (FY 2018-2020) provides assistance for research on the actual situation of marine plastic pollution and on future predictions on a global scale, and it is expected that the movements and environmental impacts of marine plastic litter will be clarified in a systematic manner in the future.

2) Industry-government-academia collaboration

In order to promote the collection and dissemination of information in cooperation with a variety of actors regarding the measures against marine debris, the Ministry of the Environment and the Nippon Foundation have launched a platform to carry out All-Japan Initiatives such as "UMIGOMI (marine trash) Zero Week".

Table 4-7 Industry-government-academia collaboration platform

Main entity	Name	Outline
Ministry of the Environment, Nippon Foundation	CHANGE FOR THE BLUE	Project launched in November 2018 in collaboration with 12 organizations from industry, government, academia, and citizens to create a model for reducing marine debris, and disseminate it domestically and overseas. In cooperation with Plastics Smart of the Ministry of the Environment, it carries out "UMIGOMI (marine trash) Zero Week", "UMIGOMI Zero Award" and "UMIGOMI Zero International Symposium".

4.3 Questionnaire survey for Japanese companies

1) Contents of the Questionnaire survey

A Questionnaire survey using Google Forms was carried out for companies with Japanese technology described in "4.1 Japanese technology for waste management that contributes to the reduction of marine plastic litter". The Questionnaire survey was implemented based on information obtained from the Internet, after selecting about 30 companies that were judged to possess technologies and products useful to address the marine plastic litter issue. The contents of the Questionnaire Survey are described in the table below:

Table 4-8 Contents of the Questionnaire survey

Survey Items	Survey Contents
1. Respondent Information	Company name, Department, Position, Name, Email address, Phone number
2. Technology/ Product Name	・ Name of the technology/product that can be used for the collection, treatment, and disposal of marine plastic litter. ・ Method to obtain information, such as catalogues, to understand the specific features of the technology/product.
3. Track Record of Overseas Development	・ Track record of overseas supply of technology/product mentioned in survey item 2. ・ Supply destination (country, city and organization name), supply period, supply method (purely commercial, JICA's private partnership program, volunteer, donation, etc.)
4. Future Overseas Development	・ Desired technology/product supply method. ・ Information needed to expand into Central America and the Caribbean. ・ Expectations regarding JICA projects. ・ Intention to participate in the survey results information session after the end of this survey (only at the time of holding). ・ Possibility to cooperate on a more specific survey.

Source: JICA Survey Team

2) Results of the Questionnaire survey

The results obtained from the Questionnaire survey are as follows. Of the 30 companies that were asked to complete the Questionnaire Survey, responses were obtained from 9 companies. There were 4 companies with track records of supplying to island countries or small island states.

Table 4-9 Results of the Questionnaire survey to Japanese companies

Survey Items	Survey Results	Based on track records in island countries or small island states
1. Respondent Information	− Answers obtained from 9 companies.	− 4 companies / 9 companies
2. Technology/Product Overview	− Primary sorting by a crushing and sorting machine − Small incinerator − Plastic processing and thermal recovery by incineration − Conversion of waste plastic to fuel	− — − ○ − ○ − ○

Survey Items	Survey Results	Based on track records in island countries or small island states
	− Liquefaction machine − Manufacture of recycled plastic products (faux wood and building materials) − Radio-controlled waste collection ship	− ○ − — − —
3. Track Record of Overseas Development	− No track record: 1 company − Track record in several countries: 7 companies − Track record of delivery of hundreds of equipments in more than 30 countries: 1 company	− — − ○ − ○
4. Local information and local circumstances required for overseas expansion	− Current status of waste treatment − Waste plastic composition, quantity, processing unit price, fuel users − Mechanism for collecting waste plastic − Involvement of the government − Legal regulations and permits regarding the installation of incinerators − Existence of partner companies (search) − Existence of operation manager (search) − Existence of reliable agents (search/creation) − Existence of companies capable of providing maintenance (search/creation) − Stability of voltage and electricity supply − Stability of water pressure and water supply − Fuel (kerosene) quality (whether it contains impurities) − Radio waves condition	− — − ○ − — − — − ○ − — − — − ○ − ○ − ○ − ○ − ○ − —

The desired technology/product supply method is as shown in the figure below. There are no companies that only want to sell, and half of the companies aspire for a form that include sales and operation guidance.

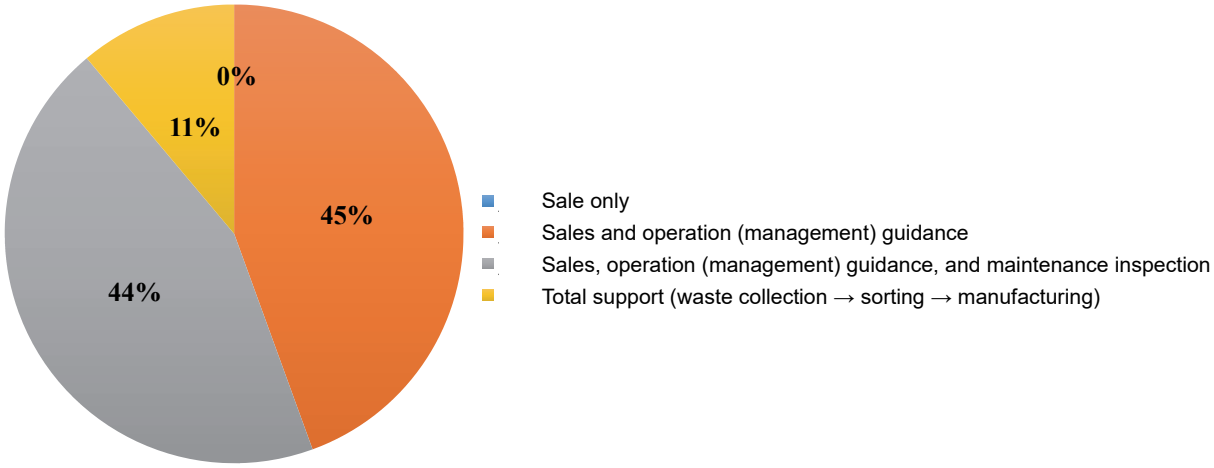


Figure 4-4　Desired method of Japanese companies to supply technologies/products overseas (survey results)

In addition, the following answers were given in response to the question "Would you participate if an information session about the results of this survey was held (online) after this survey is completed?"

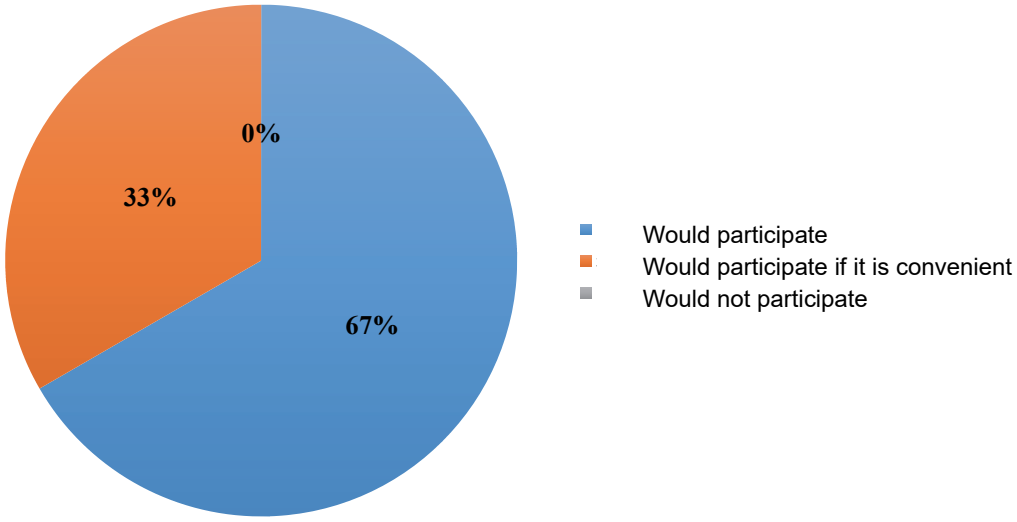


Figure 4-5　Intention of Japanese companies to participate in the online information session on the results of this survey (survey results)

Chapter 5. Organized Information for Considering Cooperation Proposals to Countries Regarded as Particularly High Priority

5.1 In-depth survey

5.1.1 Selection of the target countries for the in-depth survey

Based on the desk research conducted in the first stage, and with the formulation of projects for solutions for marine plastic litter in mind, the 17 countries were sorted into the three categories shown in the following table. As a result of discussions with JICA, and as indicated by the underlined parts of the table, a total of six countries were selected as targets for in-depth survey: Grenada, Saint Christopher and Nevis, and Saint Lucia were selected in Category A (Small island nations), the Republic of Guyana and Jamaica were selected in Category B (Nations other than small island nations), as well as the United Mexican States, which forms Category C. In light of the fact that the survey is conducted remotely rather than on-site as a result of the novel coronavirus pandemic, priority was placed on countries from which cooperation of ex-participants of JICA training and others was obtainable in addition to the potential for future project formulation.

Table 5-1 Selection of target countries for the in-depth survey

Category	Category overview	Countries in the category	Approaches
A. Small island nations	This category comprises mainly countries in the Lesser Antilles. Large-scale projects are difficult to formulate in any one of these countries by itself for many reasons: with small populations and amounts of waste, human resources are limited, and with few manufacturing industries, it is difficult to operate waste processing industries to recycle products after they are imported and consumed. However, it is possible to deploy a "small island nation model" wherein a regional project targets multiple countries. Additionally, ex-participants are cooperative.	Antigua and Barbuda, Grenada, Saint Vincent and the Grenadines, Saint Christopher and Nevis, Saint Lucia, Commonwealth of Dominica, Republic of Trinidad and Tobago,Commonwealth of The Bahamas, Barbados	・Regional technical cooperation ・Regional expert dispatch ・Collaboration with the private sector
B. Nations other than small island nations	This category comprises countries in the Greater Antilles and non-island countries. In these countries, experience can be applied; for example, in Jamaica, UNEP and WB are conducting studies on marine plastic litter, and in the Dominican Republic, JICA is implementing technical cooperation on waste management, and ex-participants are introducing the Fukuoka Method. Additionally, in light of factors such as the waste management capacity, scale, and	Republic of Guyana, Republic of Cuba, Jamaica, Republic of Suriname, Dominican Republic, Republic of Haiti, Belize	・Technical cooperation for improving waste management capacity ・Assistance for creating and implementing programs for applying Japanese technology ・Application of project experience

Category	Category overview	Countries in the category	Approaches
	economic level of individual countries, projects (technical cooperation, waste processing industry formulation and expansion, etc.) can be implemented in any one of these countries.		
C. United Mexican States	The United Mexican States is a large country; according to 2018 figures, it accounts for roughly 75% of the population of the surveyed countries. The country is facing issues with marine plastic litter that extend beyond the Caribbean Sea; these issues stem mainly from numerous issues with waste management on land. Therefore, the country's needs and solutions are different from those in Category A and B, and must be considered separately.	United Mexican States	・Assistance for creating and implementing programs for applying Japanese technology ・Assistance for the Caribbean that maximizes the technology and good examples of the United Mexican States

Target countries for in-depth survey are underlined.
Source: JICA Survey Team

5.1.2 Implementation of in-depth survey through questionnaire surveys and web conferencing systems

1) In-depth survey implementation process

The Covid-19 pandemic has made it difficult to conduct field studies, therefore, questionnaire surveys and web conferencing systems were used to conduct surveys of the affiliated organizations, aid agencies, and others of the countries selected as targets for the in-depth survey. However, because the information was gathered only through a virtual Q&A format without on-site investigation, the subjective views and values of the interview subjects are reflected in no small measure in the survey results. Additionally, the scope of interview subjects was limited to members of organizations in charge of municipal solid waste management rather than organizations responsible for marine plastic litter, thus, it should be noted that the information gathered about marine plastic is limited. The table below shows the organizations that received the questionnaires, and the survey implementation process. Since no answer was obtained to the questionnaire sent to the Solid Waste Management Corporation of Saint Christopher and Nevis and no online hearing could be conducted, Saint Christopher and Nevis is not mentioned in the subsequent sections.

Table 5-2 In-depth survey process

Country	Questionnaire survey recipients	Dates		
		Questionnaire survey send date	Response reception date	Online interview date
Grenada	Grenada Solid Waste Management Authority	6/25 (Thu)	7/4 (Sat)	7/10 (Fri)

Country	Questionnaire survey recipients	Dates		
		Questionnaire survey send date	Response reception date	Online interview date
	Ministry of Climate Resilience, the Environment, Forestry, Fisheries, Disaster Management and Information	7/14 (Tue)	—	—
Saint Christopher and Nevis	Solid Waste Management Corporation	6/25 (Thu)	—	—
	Department of Environment	7/14 (Tue)	7/22 (Wed)	—
	Ministry of Health, Nevis	7/14 (Tue)	—	—
Saint Lucia	St. Lucia Solid Waste Management Authority	6/25 (Thu)	7/25 (Sat)	7/30 (Thu)
	Department of Sustainable Development, Ministry of Education, Innovation, Gender Relations and Sustainable Development	7/14 (Tue)	—	—
Republic of Guyana	Ministry of Communities	6/25 (Thu)	7/10 (Fri)	7/15 (Wed)
Jamaica	National Solid Waste Management Authority (NSWMA)	7/8 (Wed)	7/30 (Thu)	8/5 (Wed)
	National Environment and Planning Agency	7/14 (Tue)	7/23 (Thu)	—
	Maritime Authority of Jamaica	7/14 (Tue)	—	—
United Mexican States	SEMARNAT	6/30 (Tue)	7/11 (Sat)	7/17 (Fri)
	Tamaulipas Secretaría de Desarrollo Urbano y Medio Ambiente	7/17 (Fri)	8/1 (Sat)	—
	Veracruz Secretaría de Medio Ambiente	7/17 (Fri)	—	—
	Tabasco Secretaría de Bienestar, Sustentabilidad y Cambio Climatico	7/17 (Fri)	—	—
	Campeche Secretaría de Medio Ambiente y Recursos Naturales	7/17 (Fri)	—	—
	Yucatán Secretaría de Sarrollo Sustentable	7/17 (Fri)	—	—
	Quintana Roo Secretaría de Ecologia y Medio Ambiente	7/17 (Fri)	—	—
Aid agencies (all target countries of in-depth survey)	UNEP Jamaica	—	—	6/27 (Sat) 8/20 (Thu)
	Caribbean Development Bank	7/14 (Tue)	—	—
	Inter-American Development Bank	7/14 (Tue)	7/15 (Wed)	—
	Organisation of Eastern Caribbean States	7/14 (Tue)	—	—

Source: JICA Survey Team

2) Description of in-depth survey implementation

In the additional survey, information was gathered, and issues were sorted with the formulation of projects for solutions for marine plastic litter in mind and based on the survey conducted in the first

stage. The table below shows the main survey items.

Table 5-3 Description of the in-depth survey

Survey item	Description
A. Social and economic conditions	
Demographics and climate	Population, population growth rate, urban population, population density, precipitation, hurricane frequency
B. Waste management data	
Waste management indicators	Amount of waste generated, amount generated per person, amount of plastic waste generated, waste composition, amount collected, collection rate, final disposal amount
Recycling	Recycling rate, plastic recycling rate
C. State of waste management and marine plastic litter	
1. Laws	Presence/absence of laws contributing to plastic consumption reduction, laws regulating waste management, laws regarding recycling, etc.
2. Policies and programs	Policies, programs, strategies, etc. related to marine plastic litter and waste management.
3. Implementation systems	Institutions and systems related to marine plastic litter and waste management.
4. Waste management technology	- Collection and transport: Frequency and format of municipal and commercial waste collection, presence/absence of sorted collection, number, and operation rate of collection vehicles. - Intermediate treatment: Number and processing capacity of facilities (MRF, composting, incineration, transfer stations). - Final disposal: Disposal methods, ownership, details of equipment, state of operation and management, property location and area, disposal amount, etc.
5. Finances	Percentage of national budget devoted to waste management, itemized list of financial resources for waste management costs, collection and transport cost per ton, intermediate treatment cost, final disposal cost.
6. Donor aid	State of aid from donors in the marine plastic litter and waste management sectors.
7. Social considerations	Presence/absence of laws and policies regarding assistance for the informal sector, information about public promotion and education, etc.
8. Marine plastic litter	Problems related to marine plastic litter, and solutions (if good practices exist).
9. Issues to improve upon	Awareness and underlying reasoning of issues in the marine plastic litter and waste management sectors. Additionally, new issues in these fields with regard to Covid-19, etc.
10. Other potential interview subjects	Organizations and contact people deeply involved in the marine plastic litter issue.

Source: JICA Survey Team

5.2 Organized information for considering cooperation proposals to the selected countries

5.2.1 Grenada

1) Areas where special assistance is needed, with supporting reasons

The table below shows fields in Grenada where assistance is deemed necessary, and the reasoning behind the judgments. Issues related to marine plastic litter in Grenada were confirmed in questionnaire surveys and online interviews. Each issue is sorted into a subcategory and assigned one of three levels of need for assistance (High, Medium, or Low)[129] based on the reasoning given in the table below.

Evaluations were carried out as shown in the table below in light of the fact that the CDB is implementing the Integrated Solid Waste Management Project in Grenada, and the counterpart is providing assistance in response to each item regarded as an issue.

Table 5-4 Introduction and explanation of issues and need for assistance in Grenada

Field			
Subcategory	Issue	Need for assistance	Reasoning
Reducing plastic usage			
—	・ Not applicable	Low	・ Measures to reduce consumption of single-use plastic and styrene foam are already being undertaken, with high priority placed on reducing discharge after consumption.
Reducing the leakage of plastic into the marine environment			
Legislation, policies, and programs	・ Stricter enforcement of laws related to waste management, such as the Waste Management Act and the Abatement of Litter Act	High	・ Laws are not sufficiently enforced due to a lack of human resources mainly in executive bodies (the police force and the Environmental Health Department of the Ministry of Health). Stricter enforcement of laws will help improve terrestrial waste management, thereby solving the issue of marine plastic litter. ・ JICA has experience implementing technical cooperation for the purpose of improving waste management capacity, including establishing legal regulations for waste management and strengthening enforcement.
	・ Strengthening regulations to control plastic beverage bottles and single-use plastic at	Low	・ A system is in place whereby the operators of roadside stands are responsible for processing waste and cannot operate their stands unless they participate in drills before events and obtain a certificate (that must be renewed each year). The system is already being implemented fairly thoroughly.

[129] High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

Field				
Subcategory		Issue	Need for assistance	Reasoning
		sporting events and festivals		・ However, regulations must be strengthened to prevent city residents from littering during events.
Institutions and implementation systems		・ Improving cleanup operations	Low	・ Specifically, the GSWMA's jurisdiction over cleanup is limited to city limits; it does not have jurisdiction over coastal areas. ・ This has been raised as an issue, but it was not considered a high priority in terms of the need for assistance.
Finances		・ Maintaining dependable financial resources for waste management	Medium	・ The country relies on environmental levies to fund waste management; however, financial resources are insufficient due to the sharp decrease in the number of tourists because of Covid-19. As a result, waste collection companies are unpaid, and the country is unable to pay maintenance expenses for collection vehicles and the like. ・ Environmental levies are not entirely dependent on the number of tourists; however, given the impact of the spread and protraction of Covid-19, there is a need to consider further strengthening finances.
Waste management technology	Discharge	・ Improving education and public awareness about proper management of waste	Medium	・ Active efforts toward education and public awareness are already underway on social media and in schools, but there is a need to develop materials and secure human resources for creating tools to educate and inform the public on a broader scale. ・ Education and public awareness on topics such as composting and litter prohibition are underway; however, because an island nation is a closed system, it is important to focus education efforts on reducing and reusing in addition to recycling.
		・ Installing trash cans on streets and in recreation areas to prevent littering	Low	・ The need for assistance is low because trash cans have already been installed in several beach areas, and plans exist to install more.

Field				
Subcategory		Issue	Need for assistance	Reasoning
	Collection/ Transport	・ Updating the GSWMA's collection machinery and improving maintenance capacity	Medium	・ Assistance is needed because, although the operation rate of the collection vehicles is nearly 100%, they are quite old (made in 1999, etc.). The situation requires careful examination because there are many issues, including issues with procurement and technology as with heavy machinery at disposal sites, and issues with paying extraordinary expenses.
	Treatment	・ Considering the possibility of introducing WTE (providing grounds for judging whether WTE is suitable technology)	Medium	・ Several organizations promoting WTE have approached the Grenada National Science and Technology Council to discuss introducing WTE, but the government has not been able to judge whether it is suitable technology. ・ Grenada's GDP per citizen is greater than US$ 10,000; financially, it is possible to introduce WTE. ・ As for feasibility, due to insufficient data on matters such as the calorific value of waste, detailed studies are required to move forward with plans. ・ To promote the introduction of WTE, assistance must be provided from an independent standpoint at the earliest stages; there is a need to aim to introduce Japanese technology.
		・ Promoting proper recycling ・ Establishing policy and legislation to support private-sector recycling business	Medium	・ Recycling is done on a limited basis, but proper recycling is not being done. ・ Policy and legislation to support private-sector recycling business is underdeveloped, presenting possibilities for assistance. ・ A plastic pelletization project is scheduled to begin in July 2020 on the island of Carriacou; however, the feasibility of the project requires confirmation.
	Disposal	・ Improving maintenance and repairs of heavy machinery at disposal sites	Low	・ The operation rate of the GSWMA's heavy machinery at disposal sites is nearly 100%, but the machines are quite old (made in 1999). ・ Careful examination is necessary as there are several level of issues such as issues with procurement or technology, or temporary difficulty in raising funds.
		・ Proper operation and management of final disposal sites, and	Medium	・ The Perseverance Final Disposal Site is located on a steep slope on the island of Grenada. Slope collapse, fires, and smoke occur frequently; residents in the vicinity lodge many complaints. ・ At the final disposal site on the island of

Field				
Subcategory		Issue	Need for assistance	Reasoning
		preventing plastic from scattering from disposal sites		Carriacou, strong winds toppled the fence installed to prevent plastic waste from scattering. An increased amount of plastic waste is flowing into the ocean through the drainage channel adjacent to the disposal site. At present, solutions have not progressed beyond workers collecting the waste by hand. ・ JICA has experience implementing technical cooperation to improve disposal site operations and construct, rehabilitate, and close disposal sites. Improving the operations of disposal sites, namely preventing waste from scattering from them, will contribute to solving the issue of marine plastic litter. ・ As for the Perseverance Final Disposal Site, the CDB is already providing assistance. ・ Although there is a need for assistance for final disposal site operations, the balance between the beneficiary population and input must be considered for assistance for this country from JICA on this particular issue apart from others.
Collecting plastic waste that has reached the ocean				
―		Not applicable	Low	・ This is of lower priority than improving the management of solid waste (including plastic) at all stages from proper discharge and collection to final disposal.

High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

2) Scheme and approach methods considered as particularly effective in Grenada

The following schemes and approaches were considered for the issues listed in the table above with the need for assistance evaluated as High or Medium. The small island nations of the Caribbean Sea likely face common issues, among them (1) limited human resources, (2) highly tourism-dependent economic structures negatively impacting waste management, (3) lack of integrated plans for WTE among responsible government agencies, and (4) a direct connection between the scattering and outflow of waste to the marine waste issue; therefore, it should be effective to dispatch regional experts to respond to these issues on a transnational scale.

Table 5-5 Proposed scheme/approaches for Grenada (1)

Item	Description
Scheme	Regional expert dispatch
Target region/area	Small island nations of the Eastern Caribbean (Grenada)
Potential	Grenada Solid Waste Management Authority (GSWMA)

Item	Description
implementing agencies	Ministry of Agriculture, Lands, Forestry, Fisheries and the Environment Environmental Health Department of Ministry of Health *Rather than having regional agencies respond to issues under their jurisdiction for all small island nations of the Eastern Caribbean, the envisioned scheme will have experts rotating between countries to provide tailor-made responses to the organizations in charge of issues in their respective countries.
Issues	a Stricter enforcement of laws related to waste management b Securing dependable financial resources for waste management from a tourism-dependent economic (profit) structure c Improving education and public awareness about proper management of waste d Promoting intermediate treatment and recycling, and establishing policy and legislation to support private entities involved in those businesses e Providing materials for starting discussions (grounds for judging whether WTE is suitable technology) due to the limited availability of land for final disposal sites f Improving methods of discharging, collecting, and transporting waste and final disposal site operations in order to thoroughly prevent the scattering and outflow of waste into the ocean surrounding the national land
State of efforts to resolve the issues	a Unclear. b Financial resources for waste management have been obtained through the collection of environmental levies since the enactment of the Environment Levy Act in 1997. A portion of the financial resources is secured through the collection of electricity surcharges. c Education and public awareness on topics such as composting promotion and litter prohibition are underway on social media and in schools; however, activities are limited on the topic of the 3Rs, namely prioritizing reducing and reusing. d Composting has become widespread. The GSWMA has metal presses and wood chippers at their disposal sites, and is reducing the amount of waste carried to final disposal sites. Plans exist for the island of Carriacou to receive a plastic crusher under UNDP assistance in August 2020. e Multiple external organizations promoting WTE have approached the government to discuss the technology; piecemeal considerations have been made. f Efforts toward improvement include the installation of fences to prevent scattering and the assignment of personnel.
Approaches	Approach 1: Approach to waste management supervisory bodies ・ Provide recommendations on the implementation of laws related to the plastic waste problem and waste management ・ Develop, share, and provide recommendations on a financial structure for waste management ・ Provide recommendations on promoting intermediate treatment and recycling, and establishing policy and legislation to support private entities involved in those businesses ・ Provide assistance with studies including flow consolidation and sharing, calorific value, etc. for considering the feasibility of WTE Approach 2: Approach to the GSWMA ・ Provide recommendations on improving final disposal site operations Approach 3 ・ Sharing between the small island nations where Approaches 1 and 2 are implemented
Outlook after project completion	・ Initiatives on issues in the areas of marine plastic litter and waste management in small island nations are shared and expanded.

Item	Description
	・ Considerations begin for implementing regional technical cooperation projects in small island nations of the Caribbean Sea, referencing examples from small island nations in Oceania. ・ Japanese technology that is particularly useful in small island nations begins to expand.

Table 5-6 Proposed scheme/approaches for Grenada (2)

Item	Description
Scheme	Collaboration with the private sector (SME overseas expansion assistance project)
Target region/area	Carriacou, Grenada
Potential implementing agencies	GSWMA
Issues	a Reducing the landfill disposal rate and extending the service lives of existing disposal sites on the remote island of Carriacou
State of efforts to resolve the issues	a Unclear
Approaches	Approach 1: Introduce Japanese technology ・ Introduce compact incinerators with the aim of reducing the landfill disposal rate.
Outlook after project completion	・ The project expands after confirming needs and feasibility. ・ After results are verified, considerations begin for expanding the project to other small island nations of the Eastern Caribbean.

3) Points to bear in mind when formulating projects in Grenada

As shown in the table below, the CDB is implementing the Integrated Solid Waste Management Project, a five-year project launched in 2016. Additionally, the UNDP is scheduled to install a plastic pelletizing machine in August 2020. Grenada is also in the scope of the IUCN's ongoing project for reducing plastic waste and improving waste management in SIDS. During project formulation, sufficient care should be taken to avoid overlapping with this assistance from other donors.

Table 5-7 CDB assistance in Grenada

Item	Description
Project name	Integrated Solid Waste Management Project
Donors	CDB
Total amount	US$ 1,517,200
Duration	2016-2021 (five years)
Implementing agencies	Grenada Solid Waste Management Authority (GSWMA)
Description	Providing consulting services on the following seven matters: 1. Revising national strategies for waste 2. Improving and developing the capacity of the GSWMA 3. Feasibility study on establishing a commercial-scale composting system 4. Public education and awareness, and school education 5. (1) Improving the Perseverance Final Disposal Site - Design/bidding for the construction of an access road (400 m) and platform (200 m^2) - Rehabilitating Landfill Cell 1.2 (0.7 ha)

Item	Description
	- Developing a new landfill cell (2 ha) - Closing an old dumpsite inside the final disposal site - Closing landfill cells inside the final disposal site - Constructing facilities for collecting and treating leachate (6,000 m^3) - Developing workshop equipment (2) Procuring trucks and collection vehicles 6. Monitoring and evaluation 7. Project coordination

Source: Online interviews, documents provided by stakeholders, CDB, n.d.

Table 5-8 Plastic recycling project in Grenada

Item	Description
Project name	The Plastic Problem… Carriacou Solution The Global Environmental Facility Small Grants Programme
Donors	UNDP
Funding donors	UNDP and GIZ
Total amount	Unclear
Duration	July 28, 2020 (Launch)
Implementing agencies	Unclear
Description	・ Collecting plastic products—including bottles, bags, cups, and toys—and transporting them to the Dumfries Final Disposal Site. ・ Planned installation of a granulator (crusher) at the final disposal site in August 2020. ・ Transportation of crushed plastic to local brick manufacturers, where it is processed into bricks for construction. ・ Analysis of bricks containing waste plastic by the Grenada Bureau of Standards to ensure that they comply with standards for strength. Planned initial analysis of the construction of public waste receptacles.

Source: Online interviews, documents provided by stakeholders

Table 5-9 IUCN project in Grenada

Item	Description
Project name	Plastic Waste Free Islands (implemented as part of the IUCN's Close the Plastic Tap Programme)
Donors	Norway Agency for Development Cooperation (NORAD)
Funding donors	Norway Agency for Development Cooperation (NORAD) and Didier and Martine Primat Foundation
Total amount	Total amount of assistance to SIDS in Oceania, the Mediterranean Sea, and the Caribbean Sea: Roughly 700 million JPY
Duration	December 2018-December 2021 (three years)
Implementing agencies	IUCN and OECS Ministry of Climate Resilience, Environment, Forestry, Fisheries and Disaster Management
Description	・ Reducing plastic waste ・ Improving general waste management ・ Reusing waste in commercial products and creating job opportunities in local communities ・ Leading organizations creating and approving detailed plans for value chains from plastic production to disposal in various sectors, including the tourism and fishing industries

Source: Online interviews, documents provided by stakeholders, Norwegian government, 2020.

4) Technologies and products of Japanese companies that are expected to be particularly useful in Grenada

Present circumstances

The current status of waste disposal using equipment and machinery in Grenada is as follows:

- A waste plastic pelletization project was launched at the end of July 2020 on the island of Carriacou. Under the project, a granulator will be installed and pelletization will begin in August 2020. The pellets will be transported to local block manufacturers, who will use them to manufacture blocks to be used as construction materials. The Grenada Bureau of Standards will conduct strength tests on the blocks.
- The GSWMA has metal presses, and uses them to shape iron, aluminum, copper, zinc roofing, automobiles, electronic products, and other materials collected by people in the informal sector into bales (at a rate of US$ 7 per bale), and then exports the bales to Trinidad.
- In addition to metal presses, the GSWMA also has wood chippers, and uses them to process logs, tree trimmings, and other materials brought to final disposal sites in order to extend the service lives of the sites.
- As for organic waste, small-scale composting has become widespread. Additionally, with cooperation from the Ministry of Agriculture and Lands and GIZ, agricultural associations are attempting to establish closed commercial-scale composting systems that include storage and bagging facilities for organic waste, sanitary facilities such as restrooms, and more.
- Regarding medical waste, at present, incinerators are offline due to malfunctions; however, through the Pan American Health Organization (PAHO), an incinerator manufactured in Japan is scheduled to be installed at the Perseverance Final Disposal Site before the end of the year.

Regarding WTE, several organizations promoting WTE have approached the Grenada National Science and Technology Council to discuss the technology. However, in terms of feasibility, due to insufficient data on matters such as the calorific value of waste, detailed studies of such data are required to make real progress with these plans. The Survey Team conducted a questionnaire survey, and used the resulting waste composition to estimate heat generation use of waste of roughly 4,200-5,000 kJ/kg (1,000-1,200 kcal/kg); Japanese technology can be used to incinerate the waste to generate power. The amount of waste itself is not large; it is roughly 126 t/day (excluding the island of Carriacou). Therefore, although the anticipated power generation amount is not very large, it is highly likely that Japanese technology can be introduced in this country where the GDP per capita is greater than US$ 10,000.

Potentially useful Japanese technology and products

In light of present circumstances, the following is a summary of specific technology and products from Japanese companies that can be put to use in Grenada.

Table 5-10 Technologies and products of Japanese companies that are expected to be particularly useful in Grenada

Japanese technology/products	Reasoning	Remarks
Converting waste plastic into construction materials	・ Regarding material recycling, it is possible to apply technology as high as Level 3 as explained in Chapter 4. Regarding Level 3 pelletization, a project has already been launched on the island of Carriacou; the final product of the project is blocks to be used as construction materials. ・ The effectiveness of Japanese technology for manufacturing recycled construction materials from waste plastic was confirmed in a JICA diffusion and demonstration project in Cambodia (2017 Pilot Survey for Disseminating SMEs' Technologies).	・ The technology makes it possible to manufacture recycled plastic products from unsorted waste plastic without preprocessing (sorting and cleaning) the raw materials (the simplicity of processing makes initial investments affordable). ・ The products are of a higher quality than common recycled plastic products and are strong enough to be used as construction materials.
Power generation from waste incineration	As explained previously, the Grenada side has indicated interest in power generation from waste incineration; thus, careful explanation and understanding by the counterpart can start the process toward introducing Japanese technology.	Compared to European waste incineration technology, Japanese technology makes it possible to incinerate even waste with low calorific value (4,200 kJ/kg, 1,000 kcal/kg) to generate power without supplementary fuels.
Compact incinerators	Roughly 6,000 people live on the island of Carriacou, and it is estimated that they generate roughly six tons of waste per day. Although it is not possible to generate power from waste on this scale, it is possible to introduce compact incinerators for the purpose of recovering hot water and reducing landfill disposal rates.	One Japanese company has made more than 400 deliveries of compact incinerators outside Japan; making Japanese companies highly competitive in this industry.
Converting waste plastic into oil (liquefaction)	The technology required to convert waste plastic into oil is extremely attractive, but only works on a limited range of plastic types. The technology can be introduced if it can be assumed that sorting and cleaning is strict and precise.	Technology exists to convert waste plastic into oil if waste plastic is limited to polyethylene, polypropylene, and polystyrene.
Sand cleaning machines	The GSWMA is in charge of beach cleanup, and there is a need for assistance.	Although there is a need for sand cleaning machines, the Japanese government already has plans to

Japanese technology/products	Reasoning	Remarks
		provide them.

5.2.2 Saint Lucia

1) Areas where special assistance is needed, with supporting reasons

The table below shows fields in Saint Lucia where assistance is deemed necessary, and the reasoning behind the judgments. Issues related to marine plastic litter in Saint Lucia were confirmed in questionnaire surveys and online interviews. Each issue is sorted into a subcategory and assigned one of three levels of need for assistance (High, Medium, or Low)[130] based on the reasoning given in the table below.

Table 5-11 Introduction and explanation of issues and need for assistance in Saint Lucia

Field			
Subcategory	Issue	Need for assistance	Reasoning
Reducing plastic usage			
—	・ Not applicable	Low	・ Measures to reduce consumption of single-use plastic and polystyrene foam are already being undertaken, with high priority placed on reducing discharge after consumption.
Reducing the leakage of plastic into the marine environment			
Legislation, policies, and programs	・ Not applicable	Low	・ No issues were confirmed.
Institutions and implementation systems	・ Not applicable	Low	・ No issues were confirmed.
Finances	・ Maintaining financial resources for waste management	Medium	・ Although this was not raised as a need, waste collection fees are not collected from the general public, nor are tipping fees collected from operators. ・ At disposal sites, special processing fees are collected for disposing of construction waste above a certain amount as well as confidential documents, asbestos, waste from boats, and more. Other than the special processing fees, disposal sites depend on subsidies from the government and a head tax paid by visitors to the island (however, at present revenue is essentially

[130] High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

Field				
Subcategory		Issue	Need for assistance	Reasoning
				zero due to Covid-19). ・ Financial resources are not entirely dependent on the tourism industry, however, given the impact of the spread and protraction of Covid-19, there is a need to consider further strengthening finances.
Waste management technology	Discharge	・ Improving public awareness and promoting education about littering	Low	・ Collection and disposal rates are high, recognition of education and further improvement of public awareness as an issue is not regarded as a matter for which assistance is needed.
		・ Improving discharge methods, especially in densely populated, unplanned communities	Low	・ Collection points equipped with trash cans for discharge exist, but waste is constantly scattering from the trash cans because it is deposited on non-collection days. ・ Analysis has been conducted on the reasons for waste scattering in specific communities. This has been raised as an issue, but it was not considered a high priority in terms of the need for assistance.
	Collection/ Transport	・ Improving collection systems, especially in densely populated, unplanned communities	Low	・ The collection rate is essentially 100%. The issue of improving collection systems in specific communities was not considered a high priority in terms of the need for assistance.
		・ Establishing collection systems for green waste (trimmings)	Medium	・ The challenge is to establish collection systems for the purpose of intermediate treatment, recycling, and reusing green waste rather than simply collecting it. Additionally, the Japanese government has already provided wood chippers. ・ Trimmings are not collected, and residents discard them along the sides of roads. The situation requires confirmation as to whether assistance is needed if collection vehicles can be arranged.
	Treatment	・ Establishing sustainable recycling systems by promoting sorting through a reward (incentive)	High	・ Incentives have not been specified in detail, but fee collection could be expanded beyond the present level of collecting only for the disposal of a portion of waste (charging higher fees for unsorted waste, etc.). ・ This could also be related to the Returnable Containers Bill. JICA has experience with regional technical cooperation for container deposit systems in Oceania, so

Field				
Subcategory		Issue	Need for assistance	Reasoning
		system		assistance is possible.
	Disposal	・ Implementing regular maintenance of heavy machinery at final disposal sites	Medium	・ Careful examination is needed as to whether the causes of malfunctions are technical or financial. ・ Insufficient compaction and soil covering due to heavy machinery malfunctions results in increased waste scattering and outflow.
Collecting plastic waste that has reached the ocean				
―		・ Taking measures against floating waste in Castries Harbour.[131]	Medium	・ An existing example of Japanese technology is a cleanup boat that effectively removes floating waste from rivers, ports, and harbors. ・ Since JICA public-private partnerships are proposal-style schemes, a company must make a proposal.

High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

2) Scheme and approach methods considered as particularly effective in Saint Lucia

The following was considered for Saint Lucia for the issues listed in the table above with the need for assistance evaluated as High or Medium. It was confirmed that Saint Lucia is on course to promote issues related to recycling as well as sorting and recycling. The range of possibilities includes considering the implementation of a regional technical cooperation project aiming to establish sustainable recycling systems in small island nations of the Caribbean Sea, including examples from small island nations and Oceania as references.

Table 5-12 Proposed scheme/approaches for Saint Lucia (1)

Item	Description
Scheme	Regional expert dispatch
Target region/area	Small island nations of the Eastern Caribbean (Saint Lucia)
Potential implementing agencies	Dept. of Sustainable Development SLSWMA
Issues	a Maintaining financial resources for waste management. b Establishing collection systems for green waste (trimmings). c Establishing sustainable recycling systems by promoting sorting through a reward (incentive) system. d Implementing regular maintenance of heavy machinery at final disposal sites.
State of efforts to	a At disposal sites, special processing fees are collected for disposing of

[131] The description of this issue is cited from documents gathered by the Survey Team (The Voice, 2017. The Voice, 2016. Garbage problem. 2009).

Item	Description
resolve the issues	construction waste above a certain amount as well as confidential documents, asbestos, waste from boats, and more. b Plans indicating interest in composting exist, and wood chippers have already been obtained from Japan. c At present, waste is not sorted. The Returnable Containers Bill should encourage the recycling of beverage containers in exchange for payments of cash rebates. d Heavy machinery can be provided as rentals to prevent malfunctions from causing problems.
Approaches	Approach 1: Approach to the SLSWMA ・ Develop, share, and provide recommendations on a financial structure for waste management ・ Provide recommendations on sorted collection systems ・ Provide recommendations on promoting sorting through incentives ・ Provide recommendations on establishing sustainable recycling systems in small island nations ・ Provide recommendations on analyzing and taking action on issues with heavy machinery malfunctions at final disposal sites
Outlook after project completion	・ Initiatives on issues in the areas of marine plastic litter and waste management in small island nations are shared and expanded. ・ Considerations begin for implementing regional technical cooperation projects in small island nations of the Caribbean Sea, referencing examples from small island nations in Oceania. ・ Japanese technology that is particularly useful in small island nations begins to spread.

Table 5-13 Proposed scheme/approaches for Saint Lucia (2)

Item	Description
Scheme	Collaboration with the private sector (SME overseas expansion assistance project, SDGs)
Target region/area	Castries Harbour, Saint Lucia
Potential implementing agencies	Unclear
Issues	a Leakage of plastic waste and other floating waste from waterways and rivers into Castries Harbour and the ocean
State of efforts to resolve the issues	a Unclear
Approaches	Approach 1: Introduce Japanese technology ・ Use special boats to implement a floating waste collection project in ports and harbors including Castries Harbour.
Outlook after project completion	・ After results are verified, considerations begin for expanding the project to other nations in the Caribbean.

3) Points to bear in mind when formulating projects in Saint Lucia

The projects shown in the table below are ongoing. During project formulation, sufficient care should be taken to avoid overlapping with this assistance from other donors.

Initially, RePLAST (implemented by UNITE Caribbean) called for the export of plastic waste collected

from Saint Lucia to SIDREP, a facility in the French territory of Martinique (UNITE Caribbean, n.d.). However, SIDREP suspended operations in November 2019 (L'Usine Nouvelle, 2019), so the export destination was changed to Honduras. SIDREP, which was established in 2014, was intended to recycle 4,500 tons of plastic bottles per year, but it has never received more than 1,250 tons, which is far below the plant's recycling capacity. Major losses ensued, and plant operations were eventually suspended (L'Usine Nouvelle, 2019).

Additionally, Saint Lucia has applied to join the Commonwealth Clean Ocean Alliance (CCOA) and the Ramlit Project of OECS for marine waste management. Ramlit is a project involving waste management on land. After joining the CCOA, involvement in at least one of the following measures for reducing the use of plastic is recommended (The Commonwealth Blue Charter, n.d.).

- Eliminating all avoidable disposal plastic waste
- Substantially reducing the amount of single-use plastic bags by 2021
- Prohibiting the sale and manufacture of microbeads used in rinse-off cosmetics and personal care products by 2021

Table 5-14 French Ministry of Foreign Affairs' assistance in Saint Lucia

Item	Description
Project name	RePLAST OECS Project
Donors	French Ministry of Europe and Foreign Affairs
Total amount	Unclear
Duration	2019-2021 (two years)
Implementing agencies	UNITE Caribbean
Description	The aim of this project is to evaluate the approach and system involving the collection and recycling of plastic waste in the OECS through a pilot project involving the export of plastic waste from Saint Lucia to the French territory of Martinique. Detailed objectives are as follows: ・ Establishing a plastic waste collection management system involving the public and private sectors as well as local stakeholders. ・ Assisting recyclers in Saint Lucia (and ultimately throughout the Caribbean) with exporting used plastic bottles to the SIDREP recycling facility[132] in Martinique. ・ Enhancing awareness about sorting and waste management that enables recycling. ・ Applying the lessons learned from the Saint Lucia pilot project elsewhere in the OECS region.

Source: Online interviews, UNITE Caribbean, n.d.

[132] A facility that manufactures recycled plastic bottles. Private-sector financing with 11 million EUR from the European Fund (France-Antilles, 2019.).

Table 5-15 World Bank assistance in Saint Lucia

Item	Description
Project name	Saint Lucia Health System Strengthening Project
Donors	World Bank
Total amount	US$ 20 million
Duration	2018-2023
Implementing agencies	Solid waste: SLSWMA
Description	An ongoing project aiming to improve access to, and the efficiency and responsiveness of medical services. Regarding the field of waste, formulating the SWM Strategy. (As of August 2020, sector assessment is complete, and a report has been submitted. Plans call for the details to be reflected in the SWM Strategy.)

Source: Online interviews, World Bank Group. 2020

4) Technologies and products of Japanese companies that are expected to be particularly useful in Saint Lucia

Present circumstances

The current status of waste management in Saint Lucia is as follows:

- Waste collection services cover nearly 100% of residential areas, but according to available video information,[133] discharge and collection are not being managed properly due to problems such as residents discharging waste after collection, trash is piled up on the streets and flows out into water areas when it rains.
- Regarding single-use plastic bags, a total ban on imports was instituted in 2019, and the depletion of the domestic supply was awaited before instituting a total ban on the use of plastic bags in phases starting August 1, 2020. At present, paper trays and plates are circulating in the market as alternatives. There are no restrictions against plastic bags yet, but the imposition of a 0.25-ECD fee for each plastic bag at supermarkets has resulted in many customers bringing their own reusable bags.
- The SLSWMA is in charge of municipal waste as well as medical waste thanks to the installation of medical autoclaves at the Deglos Disposal Site. However, the collection and transport of waste is outsourced to specified private operators. None of the medical facilities incinerates or otherwise processes their own medical waste, and all medical waste on the island is processed in the autoclaves at Deglos.
- Sorted collection is not done on an official basis, but female waste pickers collect glass bottles, aluminum cans, plastic bottles, and the like at final disposal sites, and the SLSWMA provides support for them in the form of onsite storage areas for their valuables, technical support, and the

[133] https://www.youtube.com/watch?v=jgkZtefIpxk, https://www.youtube.com/watch?v=IeazDJZEIVc

like. Several informal-sector recyclers also exist, but because market prices fluctuate and the business is not always profitable, they end up retaining stockpiles of valuables collected for long periods of time. Among them, operators who recycle items such as high-grade metals and car batteries are only profitable because market prices are high.

- Regarding intermediate treatment, the government has been approached by operators about WTE, but none of them have offered any sort of demonstration, and nothing has come to fruition due to issues such as an insufficient total amount of waste for the island.
- Pyrolysis (compact, manufactured in Malaysia) was discussed last year, but progress has stalled due to Covid-19.
- Regarding final disposal, the Deglos Sanitary Landfill (roughly 9 ha) has a weighbridge, autoclaves for medical waste, maintenance building, wood chippers, tire shredders, and MRF (only used for storing collected valuables at present). The wood chippers were introduced with assistance from Japan (the exact supplier is unclear), and the SLSWMA has plans to use them when it begins composting operations in the future.

Potentially useful Japanese technology and products

In light of present circumstances, the following is a summary of specific technology and products from Japanese companies that can be put to use in Saint Lucia.

Table 5-16 Technologies and products of Japanese companies that are expected to be particularly useful in Saint Lucia

Japanese technology/products	Reasoning	Remarks
Garbage boats for collecting floating debris	Waste is piled up on the streets, and flows out into water areas when it rains, compromising the marine scenery—a valuable tourism resource—and otherwise degrading the environment. Floating waste collection is needed to improve on this issue.	・ Japanese technology ranging from compact radio-controlled boats to piloted cleanup boats (environmental cleanup boats) can be provided. These boats are custom-made and can meet local needs with as much or as little technology as needed. ・ That said, for radio-controlled boats, local radio wave restrictions must be checked.
Converting waste plastic into construction materials	・ The ability to process plastic affordably and recycle it into construction materials or the like would reduce the massive amount of plastic disposed of at final disposal sites at present, and help extend the service lives of the sites.	・ The technology makes it possible to manufacture recycled plastic products from unsorted waste plastic without preprocessing (sorting and cleaning) the raw materials (the simplicity of processing makes initial investments

Japanese technology/products	Reasoning	Remarks
	・ The effectiveness of Japanese technology for manufacturing recycled construction materials from waste plastic was confirmed in a JICA diffusion and demonstration project (2017 project to spread and demonstrate the technology with SMEs).	affordable). ・ The products are of a higher quality than common recycled plastic products and are strong enough to be used as construction materials.
Power generation from waste incineration	・ The GDP per capita is greater than US$ 10,000. In terms of finances, it is highly likely that Japanese technology for power generation from waste incineration can be introduced. ・ However, although power generation from waste incineration has been raised as a topic of discussion, no specific studies have been conducted to date.	Given the state of waste shown in the videos, there appears to be a lot of plastic and wood waste, and it should be possible to ensure roughly the same calorific value as Grenada (4,200-5,000 kJ/kg (1,000-1,200 kcal/kg)).
Converting waste plastic into oil (liquefaction)	The technology of converting waste plastic into oil is extremely attractive because it returns waste plastic to petroleum, one of its raw materials. However, practically speaking, the only types of plastic that can be converted into oil are polyethylene (PE), polypropylene (PP), and polystyrene (PS). Additionally, the waste materials must be cleaned. Therefore, the technology can be introduced if it can be assumed that sorting is strict and precise, and waste materials are cleaned.	In many cases, styrene foam and plastic bags are made of PE, PP, or PS. The use of single-use plastic, styrene foam containers, and the like is prohibited in Saint Lucia, therefore, there is a need to gain an understanding of the amount of waste plastic that can be converted into oil.

5.2.3 Republic of Guyana

1) Areas where special assistance is needed, with supporting reasons

The table below shows fields in the Republic of Guyana where assistance is deemed necessary, and the reasoning behind the judgments. Issues related to marine plastic litter in Guyana were confirmed in questionnaire surveys and online interviews. Each issue is sorted into a subcategory and assigned one of three levels of need for assistance (High, Medium, or Low)[134] based on the reasoning given in the table below.

[134] High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

Table 5-17 Table Introduction and explanation of issues and need for assistance in the Republic of Guyana

Field				
Subcategory		Issue	Need for assistance	Reasoning
Reducing plastic usage				
—		・ Not applicable	Low	・ Measures to reduce consumption of single-use plastic and polystyrene foam are already being undertaken, with high priority placed on reducing discharge after consumption.
Reducing the leakage of plastic into the marine environment				
Legislation, policies, and programs		・ Establishing a legal framework for proper solid waste management. Establishing regulations for the 3Rs and dealing with marine plastic litter.	High	・ 3R promotion could be confirmed in the National Integrated Solid Waste Management Strategy 2017-2030, while details about the Solid Waste Management Bill (presently awaiting National Assembly approval) need to be confirmed. There is awareness of the need for capacity improvement, but there is no market for recycled plastics, which are not sorted at present, so the situation calls for a roadmap or other instrument to illustrate how the 3Rs will be promoted. ・ Tax rates have not been revised since the 1970s. At present, it is not possible to pay maintenance expenses for collection vehicles and the like. Fee collection systems must take final disposal into account in addition to other factors.
Institutions and implementation systems		・ Improving capacity for promoting the implementation of proper solid waste management		
Finances		・ Establishing fee collection systems to cover the expenses of waste collection and disposal		
Waste management technology	Overall	・ Compiling basic, comprehensive data on waste collection, including amounts of waste generated, collection rates, etc.	High	・ Critical basic data on waste management is presently unavailable. This data is important for formulating waste management plans, among other things.
	Discharge	・ Promoting public awareness and education to prohibit littering and otherwise modify residents' behavior	Medium	・ Rivers are used for transport among other things, and the dumping of waste in rivers is recognized as a problem. The need for assistance is unclear, but it is possible to incorporate this issue into a project in combination with other issues.

Field				
Subcategory		Issue	Need for assistance	Reasoning
	Collection/ Transport	・ Preventing the scattering and outflow of uncollected waste	High	・ Collection rates are low, leading to illegal dumping of plastic and other waste into rivers, waterways, and the like.
	Treatment	・ Ensuring plastic recycling facilities and a market for them	High	・ Plastic has accounted for 20%-30% of waste in recent years, and at present, all of it is disposed of at disposal sites. The scattering and outflow of plastic waste from disposal sites has been raised as an issue.
		・ Establishing facilities for processing commercial waste and hazardous waste	Medium	・ This has been raised as an issue. Consideration is required as to the priority of this issue in terms of assistance for dealing with marine plastic litter.
	Disposal	・ Preventing the scattering and outflow of waste from disposal sites during the rainy season	High	・ Many disposal sites are located relatively close to the coast, and compaction and soil covering are insufficient (due to difficulty sourcing a sufficient amount of cover soil). This issue is directly connected to the marine plastic litter issue.
Collecting plastic waste that has reached the ocean				
―		・ Not applicable	Low	・ Proper management of plastic and other solid waste is already a high-priority issue.

High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

2) Scheme and approach methods considered as particularly effective in the Republic of Guyana

The following schemes and approaches were considered for the issues listed in the table above with the need for assistance evaluated as High or Medium. The Republic of Guyana has confirmed issues related to waste management in nearly all fields, from legal and institutional to financial and technical. Additionally, online interviews confirmed the country's prioritization of improving terrestrial waste management as a means of resolving the marine plastic litter issue. At present, no other donors are providing assistance in the waste management sector. A technical cooperation project to provide assistance by tackling these issues comprehensively should be effective.

Table 5-18 Proposed scheme/approaches for the Republic of Guyana

Item	Description
Scheme	Technical cooperation project
Target region/area	Georgetown, the capital of the Republic of Guyana
Potential	Ministry of Communities (MoC), Sanitation Management Unit

Item	Description
implementing agencies	Municipal Councils Environmental Protection Agency (EPA)
Issues	a Establishing a legal framework for proper solid waste management. b Improving capacity for promoting the implementation of proper solid waste management. c Establishing fee collection systems to cover the expenses of waste collection and disposal. d Compiling basic, comprehensive data on waste collection, including amounts of waste generated, collection rates, etc. e Promoting public awareness and education to prohibit littering and otherwise promote behavior modification. f Preventing the scattering and outflow of uncollected waste, a problem connected to collection rate. g Ensuring plastic recycling facilities and a market for them. h Establishing facilities for processing commercial waste and hazardous waste. i Preventing the scattering and outflow of waste from final disposal sites during the rainy season.
State of efforts to resolve the issues	a The Draft SWM Bill 2014 required revisions due to a change in government in 2015 and the progression of decentralization. It has already been submitted to the National Assembly and is presently awaiting approval. Regarding the reduction of plastic consumption, the EPA has formulated Styrofoam regulations, and is presently working to prohibit single-use plastics. b through i: The government places a low priority on waste management. The MoC Sanitation Management Unit established in 2016 has a limited budget and capacity, and the initiatives it is involved in are insufficient.
Approaches	Approach 1: Approach supervisory bodies in charge of waste management policy (Environmental Protection Agency (EPA) and Ministry of Communities (MoC)) - Provide assistance for formulating laws and institutional frameworks that include clarification of responsibility for processing various types of waste (including industrial waste from the petroleum industry, etc.) based on the Polluter Pays Principle (PPP) - Provide assistance for formulating action plans and the like for the 3Rs and dealing with marine plastic litter - Management and supervision of Approach 2 Approach 2: Approach the waste management implementing agency - Implement the following with the objective to improve waste management capacity in the government of the capital city of Georgetown: - Provide assistance for formulating waste management plans - Investigate waste amount and composition - Provide assistance for obtaining and managing waste-related data - Conduct investigations related to considering intermediate treatment options for waste plastic and other waste - Provide assistance for establishing waste management fee collection systems - Provide assistance for public awareness and education - Implement a training related to the planning, design, and operation of final disposal sites using the Fukuoka method. - Implement an experimental landfill pilot project using the Fukuoka method after the above training - Prepare a final disposal site plan and operation guidelines that reflect the actual situation in the Republic of Guyana based on the knowledge obtained through the landfill experiment - Provide assistance for operation and maintenance of existing final disposal sites

Item	Description
Outlook after project completion	・ The responsibilities of entities responsible for processing various types of waste are effectively supervised. ・ The initiatives and outcomes of the technical cooperation project begin to spread to the other nine local governments. ・ Japanese companies begin to consider expansion in response to the improvement of industrial waste treatment and disposal facilities.

3) Points to bear in mind when formulating projects in the Republic of Guyana

So far, the Republic of Guyana has been continuously participating in the thematic training "Sustainable Solid Waste Management in Islands Areas", and the Fukuoka method is being experimented at the national level. A request for training focused on the Fukuoka method has been submitted to Japan.

The country has not received assistance from other donors.

4) Technologies and products of Japanese companies that are expected to be particularly useful in the Republic of Guyana

Present circumstances

The current status of waste management in Guyana is as follows:

- In terms of population, four of the five largest cities in Guyana are located in coastal areas—the capital city of Georgetown (Region 4) is the largest, the cities of New Amsterdam (Region 6), Anna Regina (Region 2), and Corriverton (Region 6) are the third-largest, fourth-largest, and fifth-largest, respectively (the city of Linden, the second-largest, is located inland). The HBSL Disposal Site in Georgetown is located relatively near the coast, near the right bank of the mouth of the Demerara River. Regions 1-6 line the coast from northwest to southeast, and disposal sites in each are located relatively near the coast. When it rains, plastic waste that is not properly compacted and covered with soil scatters and flows into the ocean without obstruction. Additionally, in inland mining cities, waste is often dumped into rivers illegally.
- As for waste amounts, Region 4, which includes the capital, generates 546 t/day, and although regional cities generate much less—2.3 t/day (825 t/year) in Mahdia in Region 8, 11.4 t/day (4,150 t/year) in Bartica in Region 7, and 11.0 t/day (4,024 t/day) in Linden in Region 10—waste from regional cities includes a lot of plastic.
- Regarding plastic regulations, the EPA has enacted Styrofoam regulations. The agency is also moving forward with initiatives to prohibit single-use plastic, but at present, the country lacks a system for recycling plastic and all collected plastic waste is transported to disposal sites.
- Although medical waste is the purview of the Ministry of Public Health (not the MoC), medical

waste is received at regional disposal sites.

- The highest-priority issues on the Guyana side are improving waste collection and disposal followed by improving waste management capacity and creating systems to utilize waste through composting and the like. They consider the marine plastic issue to be lower-priority than the above.
- Also important is public awareness and education to promote behavior modification. Guyanese people are accustomed to littering, and the coastlines and beaches are overflowing with waste. Long-term efforts toward public awareness and education are needed to improve on this habit of littering.
- First and foremost, collection and disposal—the fundamentals of SWM—are not implemented sufficiently in Guyana. Thus, these problems should be prioritized, and it is too early to focus efforts on marine plastic litter. However, improving collection and proper landfilling ultimately leads to less marine pollution and scattering of plastic waste.
- Regarding the type of final disposal sites, Fukuoka Method initiatives are underway on a national level, and the Republic of Guyana has asked Japan for training focused on the Fukuoka Method.

In light of the above, there is a need to improve waste collection rates and to properly handle plastics in waste. These measures are also necessary because final disposal site input includes medical waste.

Potentially useful Japanese technology and products

In light of present circumstances, the following is a summary of specific technology and products from Japanese companies that can be put to use in the Republic of Guyana.

Table 5-19 Technologies and products of Japanese companies that are expected to be particularly useful in the Republic of Guyana

Japanese technology/products	Reasoning	Remarks
Final disposal facilities based on the Fukuoka Method	The highest-priority issues on the Guyana side are improving waste collection and disposal. They are quite intent on introducing the Fukuoka Method to improve disposal sites.	The Fukuoka Method works outstandingly well, however, technology transfer is required because the method requires slightly more complex landfill operations than anaerobic landfills as well as proper treatment of leachates.
Converting waste plastic into construction materials	At present, the country lacks a system for recycling plastic. However, the effectiveness of one form of Japanese technology for manufacturing recycled construction materials from waste plastic that does not require complex sorting or cleaning was	The technology makes it possible to manufacture recycled plastic products from unsorted waste plastic without preprocessing (sorting and cleaning) the raw materials (the simplicity of processing makes initial investments affordable). The products are of a higher quality

Japanese technology/products	Reasoning	Remarks
	confirmed in a JICA diffusion and demonstration project (2017 project to spread and demonstrate the technology with SMEs). It is possible to introduce this technology.	than common recycled plastic products and are strong enough to be used as construction materials.
Medical waste incinerators	Because medical waste is received at regional disposal sites, there is a possibility of introducing medical waste incinerators for the purpose of safely treating medical waste.	One Japanese company has made more than 400 deliveries of compact incinerators outside Japan, making Japanese companies highly competitive in this industry.
Compact incinerators	There is a possibility of inputting Japanese technology for consistently incinerating extremely small amounts of waste from regional cities.	Micro-scale Japanese incineration technology used in the remote islands of Okinawa and elsewhere is already being deployed outside Japan.
Converting waste plastic into oil (liquefaction)	The technology of converting waste plastic into oil is extremely attractive because it returns waste plastic to petroleum, one of its raw materials. However, practically speaking, the only types of plastic that can be converted into oil are polyethylene (PE), polypropylene (PP), and polystyrene (PS). Additionally, the waste materials must be cleaned. Therefore, the technology can be introduced if it can be assumed that sorting is strict and precise, and waste materials are cleaned.	In many cases, styrene foam and plastic bags are made of PE, PP, or PS. The use of single-use plastic, styrene foam containers, and the like is prohibited in Guyana, therefore, there is a need to gain an understanding of the amount of waste plastic that can be converted into oil.

5.2.4 Jamaica

1) Areas where special assistance is needed, with supporting reasons

The table below shows fields in Jamaica where assistance is deemed necessary, and the reasoning behind the judgments. Issues related to marine plastic litter in Jamaica were confirmed in questionnaire surveys and online interviews. Each issue is sorted into a subcategory and assigned one of three levels of need for assistance (High, Medium, or Low)[135] based on the reasoning given in the table below.

Table 5-20 Table Introduction and explanation of issues and need for assistance in Jamaica

Field			
Subcategory	Issue	Need for assistance	Reasoning
Reducing plastic usage			
—	・ Studies and	Low	・ Careful examination is needed as to

[135] High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

Field				
Subcategory		Issue	Need for assistance	Reasoning
		research on the effects of microplastic.		whether JICA should make efforts on this issue.
		・ Enforcing laws related to the prohibition of plastic packaging materials.	Low	・ Detailed confirmation of the implementation status of the GEF Plastic Waste Minimization Project is required.
Reducing the leakage of plastic into the marine environment				
Legislation, policies, and programs		・ Not applicable.	Low	・ No issues were confirmed.
Institutions and implementation systems		・ Not applicable.	Low	・ Plans exist for IDB assistance for institutions and implementation systems (described later).
Finances		・ Not applicable.	Low	・ No issues were confirmed.
Waste management technology	Overall	・ Confirming waste reduction targets to meet by the end of 2021.	High	・ Investigations of waste amount and composition are carried out infrequently. ・ The status of monitoring is unclear. It is important to continue to maintain an understanding of collection amounts, disposal amounts, and the like.
	Discharge	・ Public awareness and education efforts to improve residents' awareness of solid waste management (including illegal dumping).	Medium	・ Active efforts toward education and public awareness are already underway in Jamaica, and the Jamaica side understands the need to continue implementing long-term public awareness and education activities targeting multiple generations. ・ There is little possibility for JICA assistance on this issue alone, but it can be incorporated into a project with other components.
		・ Together with the introduction of fees for plastic bags, ensure proper waste discharge among poor people with low purchasing	High	・ Various countries have established regulations for different stages of plastic consumption. However, sufficient consideration has not been paid to segments of society that are not covered by these countermeasures. This is an important component of preventing the scattering and outflow of waste

Field				
Subcategory		Issue	Need for assistance	Reasoning
		power. (Plastic bags for discharge cannot be purchased and waste may be scattered.)		during discharge and collection.
	Collection /Transport	・ Taking measures to address the lack of vehicles to collect and transport waste, which is expected to increase in the future.	Low	・ The central government has promised to add 100 collection trucks over the next two years. The plan calls for the addition of 20 vehicles in July 2020, 15 vehicles before that, and 30 vehicles by the end of 2020 or the beginning of 2021, with an additional 50 vehicles before the end of fiscal 2021. It is highly likely that JICA's assistance is not needed on this issue.
		・ Improving low collection rates in villages where poor people live.	High	・ Collection is difficult in areas such as villages and illegal settlements along waterways. Collection rates remain low throughout the country, institutional improvement and technical assistance will probably be needed even after collection vehicles are updated and added.
	Treatment	・ Developing WTE.	Medium	・ The Solid Waste Management Enterprise Team is already implementing a feasibility study, and demarcation is needed to consider JICA assistance.
		・ Resuming operation of non-operating MRFs and establishing composting facilities. ・ Ascertaining the state of recycling.	Low	・ The general state of each recyclable material is known, but much of this information is gained through informal activities, and details are not fully grasped. ・ According to the Jamaica side, plans exist to study PET plastic recovery rates. ・ The problem is not underdevelopment of infrastructure, it is the operation system. The IDB plans to implement a public-private partnership (PPP), so there is no need for JICA's assistance.
	Disposal	・ Managing final disposal sites.	Medium	・ After fires occurred at disposal sites, various prevention efforts were made, including covering with a thick layer of soil and installing fire extinguishing systems. No issues were confirmed. ・ The facilities lack weighbridges and security fences, and discharged amounts and waste pickers are not

Field			
Subcategory	Issue	Need for assistance	Reasoning
			properly managed.
Collecting plastic waste that has reached the ocean			
—	・ Waste in waterways due to insufficient waste management.	High	・ The Jamaican National Labor Bureau designed waste traps for drainage gutters as part of the GEF "Plastic Waste Minimization Project". The introduction of the traps by the NSWMA is expected to reduce the amount of waste flowing into the ocean. ・ Another option is to focus on large waterways and rivers rather than gutters with Japanese technology—namely cleanup boats that effectively remove floating waste. Since JICA public-private partnerships are proposal-style schemes, a company must make a proposal.
	・ Floating waste in Kingston Harbour.	Medium	・ Kingston Harbour is the largest source of plastic waste in the Caribbean Sea. Assistance is possible. ・ A local NGO has planned a project for the collection of plastic waste. Confirmation of matters such as the continuity of activities is required.

High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

2) Scheme and approach methods considered as particularly effective in Jamaica

The following was considered for the issues listed in the table above with the need for assistance evaluated as High or Medium. In an online hearing with the organization, there was a response that it was working appropriately with financial support from the government. On the other hand, in Jamaica where the gap between rich and poor is large, there are open issues related to improper management of waste on land, such as low collection rate in poor residential areas and fires at disposal sites, and a technical cooperation project that comprehensively solves these problems is considered to be effective.

Table 5-21 Proposed scheme/approaches for Jamaica (1)

Item	Description
Scheme	Technical cooperation project
Target	One of four parishes[136] of Jamaica. Candidates are under the jurisdiction of SPM

[136] NSWMA has four Regional Offices (MPM Waste Management Ltd., SPM Waste Management Ltd., WPM Waste Management Ltd., NEPM Waste Management Ltd.), each of which is responsible for waste management in the Parishes under its jurisdiction. The division of all 14 Parishes is as follows. The Riverton landfill is in Kingston and the Retirement landfill is in St. James.

Item	Description
region/area	Waste Management Ltd. or NEPM Waste Management Ltd.
Potential implementing agencies	NSWMA Ministry of Local Government and Community Development (MLGCD)
Issues	a Compiling basic, comprehensive data on waste collection, including amounts of waste generated, collection rates, etc. b Public awareness and education efforts related to solid waste management (including illegal dumping). c Improving collection rates in villages where poor people live. d Managing final disposal operations and waste pickers.
State of efforts to resolve the issues	a Waste amount and composition are investigated. b Public awareness and education efforts are implemented. c Collection vehicles are procured to improve collection rates. d Measures are taken in response to fires at final disposal sites.
Approaches	Approach 1: Implement the following under a waste management capacity improvement project in impoverished areas with highly problematic collection rates, and an area with a small-scale disposal site (one of four parishes of Jamaica) - Provide assistance for formulating waste management plans - Provide assistance for creating waste business schemes properly suited for financial sustainability of waste management - Provide assistance for establishing waste management fee collection systems - Provide assistance for obtaining and managing waste-related data - Provide assistance for public awareness and education for promoting the reduction of illegal dumping - Provide assistance for reducing areas with no collection, such as impoverished communities - Provide assistance for improving collection rates - Provide assistance for operation and maintenance of final disposal sites, including managing waste pickers
Outlook after project completion	・ The initiatives and outcomes of the technical cooperation project for the target parishes of Jamaica expand into the other three parishes. ・ The initiatives and outcomes of the technical cooperation project begin to spread to other English-speaking countries of the Caribbean. ・ A Japan-Jamaica Partnership Program focused on South-South cooperation assistance to other English-speaking island nations of the Caribbean Sea is considered.

Table 5-22 Proposed scheme/approaches for Jamaica (2)

Item	Description
Scheme	Collaboration with the private sector (SME overseas expansion assistance project, SDGs)
Target	Prominent waterways of Jamaica

MPM: Kingston, St. Andrew, St. Catherine, St. Thomas

SPM: Clarendon, Manchester, St. Elizabeth

WPM: Trelawny, Hanover, St. James, Westmoreland

NEPM: St. Ann, St. Mary, Portland

Item	Description
region/area	
Potential implementing agencies	Undetermined
Issues	a Preventing the leakage of plastic waste and other floating waste from waterways and rivers into ports, harbors, and the ocean
State of efforts to resolve the issues	a The Jamaican national labor bureau designed waste traps for drainage gutters as part of the GEF Plastic Waste Minimization Project. The NSWMA plans to introduce the traps. b A local NGO plans to collect floating waste from Kingston Harbour.
Approaches	Approach 1: Introduce Japanese technology ・ Create projects and implement diffusion and demonstration projects for collecting floating waste from waterways. ・ Use special compact boats to collect floating waste from waterways.
Outlook after project completion	・ After results are verified, considerations begin for expanding the project to other nations in the Caribbean

3) Points to bear in mind when formulating projects in Jamaica

As described in the following table, UNEP is presently implementing the GEF Plastic Waste Minimization Project.

Additionally, Recycling Partner of Jamaica (NGO) is planning to implement a project to collect waste from Kingston Harbour using waste collection boats developed by The Ocean Cleanup (a Dutch environmental group).

(As of April 2020,) IDB plans to implement technical cooperation aiming to improve on the solid waste problem through the creation of plans needed for public-private partnerships (PPP) in Jamaica for a three-year period starting in June 2020. The following tables are overviews of these projects. During project formulation, sufficient care should be taken to avoid overlapping with existing projects.

Table 5-23 UNEP assistance in Jamaica through GEF

Item	Description
Project name	Plastic Waste Minimization Project
Donors	Global Environment Facility (GEF)
Total amount	US$ 33 million
Duration	2018-2021
Implementing agencies	UNEP Caribbean Sub-Regional Office
Description	・ Strengthening waste management capacity, and policy and legal framework for reducing marine waste and plastic, including polystyrene. Includes the following initiatives: - Regulatory impact evaluation (led by NEPA) - Formulating national strategies and action plans - Implementing communication campaigns - Improving awareness through PET plastic pilot projects in communities

Source: Online interviews

Table 5-24 Jamaican NGO Action plan for large waste collecting ships

Item	Description
Project name	Unclear
Donors	Benioff Ocean Initiative and the Coca-Cola Foundation
Total amount	US$ 1 million
Duration	Starting in 2021
Implementing agencies	Recycling Partner of Jamaica and The Ocean Cleanup (a Dutch environmental organization)
Description	・ Collecting waste from Kingston Harbour using a large ship developed by The Ocean Cleanup (picture below). ・ The large ship is equipped with onboard solar power generation. ・ The collection capacity is 50 t/day.  Source: *Buzz*, 2020.

Source: Online interviews

Table 5-25 IDB Technical cooperation project in Jamaica

Item	Overview
Objectives	a Prepare for plans to close the Riverton Disposal Site and conduct a location investigation for the new disposal site (the Development Bank of Jamaica (DBJ) has already drafted detailed TOR) b Prepare for investigations to provide assistance for executable business cases to help improve waste management c Reconstruct the NSWMA to provide assistance for the second objective
Background	● Issues - The NSWMA is named in laws related to the establishment of disposal sites as the entity responsible for waste management. In reality, the NSWMA focuses on providing waste management services throughout the country, and it is not fulfilling its strategic, regulatory, educational, and other roles. - The NSMWA collects waste through four wholly owned local operators. Due to the limited availability of collection vehicles, roughly 30% of generated waste is not collected. - None of the eight certified final disposal sites on the island is fully equipped with bottom liners and degassing pipes. Even at the two main final disposal sites (Riverton and Retirement), fires caused by improper management and operations are causing severe health and environmental effects. - As for waste composition, roughly 20% is inorganic. Recycling is informal, with waste pickers collecting and selling scrap metal, cardboard, and plastic. Compost production was done on a small scale in the past, but it is economically impractical. ● Positioning of issues and efforts in Jamaica - Based on the Vision 2030 National Development Plan, sustainable management and use of environmental and natural resources is positioned as a national outcome. One national strategy for achieving this outcome is to manage all forms of waste effectively. Several efforts are required to

<table>
<tr><th>Item</th><th>Overview</th></tr>
<tr><td></td><td>achieve this objective, including creating proper institutional frameworks, modernizing waste management infrastructure, creating incentives to develop a market for waste (WTE, recycling, etc.), and promoting public awareness and education.
- In light of the above, the government aims to establish and implement a competitive bidding process for selecting private operators to design, construct, raise funds for, and maintain waste collection, transport, treatment, and disposal services. In order to promote the above, and to provide a comprehensive overview of the solid waste management sector and present options for establishing proper PPP transactions to the Jamaican government, the Solid Waste Management Enterprise Team (SWMET) has begun preparations for pre-FS, waste composition investigations, and option analysis. During the investigations, the improvement of collection and transport systems was recommended, and the closure and relocation of disposal sites was approved. The options included the construction of sanitary landfill disposal sites and WTE.
- The DBJ asked the IDB for assistance through the Jamaican government, and assistance will be provided for these efforts.</td></tr>
<tr><td>Activities</td><td>● Activity 1: Business Case and Transaction Advisory
- Consulting services for transaction advisory.
- Two activities in Jamaica: (1) Preliminary evaluation to review research and projects related to waste management services and plan strategies of the NSWMA, and (2) Proper verification of projects (based on PPP standards, namely Business Case and Transaction Advisory to develop a foundation for evaluating the feasibility of proposed PPP projects, and a Bidding Process including technical, legal, and financial recommendations for private operator procurement).
● Activity 2: Studies for new final disposal site selection
- Consulting services for conducting studies during the selection of a location for the new final disposal site in the Kingston metropolitan area.
- (1) Review of past reports identifying recommended sites, and (2) Discussions with the MLGCD, the NEPA, the National Land Agency (NLA), and the NSWMA, as well as any other organizations as needed.
● Activity 3: Closure of Riverton Disposal Site
- Consulting services for preparing to close the disposal site according to standards for approval, land rehabilitation, and care requirements after closure.
- The Riverton Disposal Site should be closed in such a way that fully accounts for the existence of waste pickers and people living there illegally, and specific social issues that require proper action.
● Activity 4: Institutional strengthening of the NSWMA
- Consulting services related to the NSWMA's planned transition from service provider into administrator of waste regulations, and to provide assistance to the NSWMA for the transition.
- Preparations for plans for institutional strengthening to enable the SWMET, DBJ, and NSWMA to promote private-sector investment, and preparations for efficiently executing regulatory roles, particularly after the privatization of the NSWMA.</td></tr>
<tr><td>Budget</td><td>- The total budget is US$ 800,000. Details of each activity are as follows.
<table>
<tr><th>Activity</th><th>IDB/Fund Funding</th><th>Counterpart Funding</th><th>Total</th></tr>
<tr><td>Activity 1</td><td></td><td>1,500,000</td><td>1,500,000</td></tr>
<tr><td>Activity 2</td><td></td><td>300,000</td><td>300,000</td></tr>
<tr><td>Activity 3</td><td>250,000</td><td></td><td>250,000</td></tr>
<tr><td>Activity 4</td><td>500,000</td><td></td><td>500,000</td></tr>
</table></td></tr>
</table>

Item	Overview					
		Project management	50,000	50,000	100,000	
		Transaction expenses and contingency		155,000	155,000	
		Total	**800,000**	**2,005,000**	**2,805,000**	

4) Technologies and products of Japanese companies that are expected to be particularly useful in Jamaica

Present circumstances

The current status of waste management in Jamaica is as follows:

- The IDB has already launched the project shown in Table 5-25, and is making progress on the aspect of institutional improvement for waste management. Additionally, regarding floating waste in the ocean, a Dutch environmental organization has plans to collect floating waste from Kingston Harbour using a large ship ().
- The Dutch environmental organization will likely take the lead in implementing the floating waste cleanup in the ocean, however, further countermeasures are needed because the large ship cannot navigate small and medium-sized rivers and other waterways.
- Regarding terrestrial waste management, the IDB's project is expected to result in institutional improvement. Additionally, methods must be developed to handle the plastic collected by the Dutch environmental organization as well as sorted plastic collected as a result of improved waste management.
- Regarding WTE, details remain unclear, but the Enterprise Team is conducting a feasibility study, and will present the results to the president, who is the decision-maker.

In light of the above, floating waste must also be collected from small and medium-sized rivers.

Potentially useful Japanese technology and products

In light of present circumstances, the following is a summary of specific technology and products from Japanese companies that can be put to use in Jamaica.

Table 5-26 Technologies and products of Japanese companies that are expected to be particularly useful in Jamaica

Japanese technology/products	Reasoning	Remarks
Garbage boats for collecting floating	Waste is piled up on the streets, and flows out into water areas when it	・ Japanese technology—specifically, compact radio-

Japanese technology/products	Reasoning	Remarks
debris	rains, compromising the marine scenery—a valuable tourism resource—and otherwise degrading the environment. Floating waste collection is needed to improve on this issue.	controlled boats—can be used to collect floating waste from small and medium-sized rivers and other waterways that the large ship cannot navigate. ・ That said, for radio-controlled boats, local radio wave restrictions must be checked. ・ Rivers in Jamaica do not always have sufficient flow for small boats to enter, and it is necessary to take measures such as using them when there is enough flow after rainfall. ・ If the flow velocity exceeds 1.0 m/sec, navigation facing the flow becomes impossible.
Converting waste plastic into construction materials	The ability to process plastic affordably and recycle it into construction materials or the like would reduce the massive amount of plastic at final disposal sites at present, and help extend the service lives of the sites. The effectiveness of Japanese technology for manufacturing recycled construction materials from waste plastic was confirmed in a JICA diffusion and demonstration project (2017 project to spread and demonstrate the technology with SMEs).	・ The technology makes it possible to manufacture recycled plastic products from unsorted waste plastic without preprocessing (sorting and cleaning) the raw materials (the simplicity of processing makes initial investments affordable). ・ The products are of a higher quality than common recycled plastic products and are strong enough to be used as construction materials.
Converting waste plastic into oil (liquefaction)	The technology of converting waste plastic into oil is extremely attractive because it returns waste plastic to petroleum, one of its raw materials. However, practically speaking, the only types of plastic that can be converted into oil are polyethylene (PE), polypropylene (PP), and polystyrene (PS). Additionally, the waste materials must be cleaned. Therefore, the technology can be introduced if it can be assumed that sorting is strict and precise, and waste materials are cleaned.	In many cases, styrene foam and plastic bags are made of PE, PP, or PS. The use of single-use plastic, styrene foam containers, and the like is prohibited in Jamaica, therefore, there is a need to gain an understanding of the amount of waste plastic that can be converted into oil.

5.2.5 United Mexican States

1) Areas where special assistance is needed, with supporting reasons

The table below shows fields in the United Mexican States where assistance is deemed necessary, and

the reasoning behind the judgments. Issues related to marine plastic litter in the United Mexican States were confirmed in questionnaire surveys and online interviews. Each issue is sorted into a subcategory and assigned one of three levels of need for assistance (High, Medium, or Low)[137] based on the reasoning given in the table below.

Table 5-27 Introduction and explanation of issues and need for assistance in the United Mexican States

Field			
Subcategory	Issue	Need for assistance	Reasoning
Reducing plastic usage			
—	・ Establishing federal laws related to plastic usage	Medium	・ State laws prohibiting the use of single-use plastic exist in five of the six target states (except in Campeche), that said, the scope of the waste is different in each state (for example, in Yucatán, the scope includes plastic bags, straws, and polystyrene foam containers, while in Tamaulipas, it includes only plastic bags). However, no federal laws have been established. ・ Throughout the world, efforts are underway to establish usage targets for single-use plastic and the like, regulate microplastic, and normalize and standardize alternative products. ・ Although the United Mexican States side sees this as an issue, future confirmation is needed as to specific details and whether this is considered a high priority in terms of the need for assistance.
Reducing the leakage of plastic into the marine environment			
Legislation, policies, and programs	・ Not applicable.	Low	・ No issues or needs were confirmed.
Institutions and implementation systems	・ Strengthening administrative and technical capacity for proper waste management in local governments in charge of municipal	High	・ Questionnaire surveys revealed the high priority of the administrative capacity of local governments in both marine plastic litter and issues related to waste management. ・ JICA has experience implementing technical cooperation aiming to improve waste management capacity. Therefore, assistance from JICA should be effective as a measure to reduce the leakage of plastic into the ocean. ・ The mean collection rate of the six states

[137] High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

Field				
Subcategory		Issue	Need for assistance	Reasoning
		solid waste management		on the Caribbean coast of Mexico is only around 81% (excluding the state of Quintana Roo, where the collection rate is near 100%). Technical cooperation projects will be implemented for states with particularly low collection rates (Yucatán and others), and seminars and the like will be used in the lateral spread of measures to reduce waste leakage into the ocean.
Finances		・ Enhancing financial sustainability for waste management through the creation of waste collection schemes that ensure local governments' ability to pay.	High	・ Very few local governments (Mérida, Yucatán, for example) collect fees for waste collection from residents. Meters are used to charge tipping fees for commercial waste brought to disposal sites, but most local governments rely on payouts from the federal government for their financial resources. Thus, the situation calls for consideration of matters such as the establishment of systems for collecting fees for waste collection.
Waste management technology	Discharge	・ Promoting education and public awareness for promoting waste sorting	High	・ This refers to public awareness and education for waste sorting, but the establishment of processing infrastructure has also been raised as an issue. A project that includes the processing and disposal of sorted waste as part of the package would be effective.
	Collection/ Transport	・ Improving collection services by improving access for communities far removed from urban areas	Medium	・ It is difficult to provide waste collection services to communities far removed from urban areas because roads to connect the two are underdeveloped, and people in these communities resort to means of disposal such as dumping waste into rivers or open burning. ・ It is highly likely that collection rate improvement is directly connected to resolving the marine plastic litter issue. ・ However, in the field of waste management, it is difficult to envision JICA assistance predicated on developed roads. Thus, the situation calls for the consideration of the possibility of resolving issues through such efforts as providing assistance for operational issues such as efficient collection, public awareness and education about improper disposal, and introducing appropriate technology (including consideration of the use of trench disposal to dispose of waste near its sources).

Field				
Subcategory		Issue	Need for assistance	Reasoning
	Treatment	・ Securing infrastructure and machinery for collecting, storing, processing, recycling, and disposing of waste ・ Invigorating the recycling market	High	・ Assistance from JICA can be envisioned in the form of introducing waste collection vehicles, establishing intermediate treatment facilities and sanitary landfill disposal sites, and the like.
		・ Improving the state of infrastructure development, and improving on low recycling rates compared to sorted collection of PET bottles and the like ・ Fully understanding the state of recycling	High	・ No private companies in the six states on the Caribbean coast of Mexico process or recycle plastic. Such companies exist in other states, but they only pelletize the plastic. Japanese technology can be deployed in areas such as recycled plastic products and conversion to RDF. ・ These circumstances must be fully understood when introducing Japanese technology in the recycling sector.
		・ Establishing waste management infrastructure for single-use products resulting from the spread of Covid-19	Medium	・ Food deliveries and the use of single-use products such as masks have increased sharply due to the spread of Covid-19. ・ Assistance from JICA can be envisioned in the form of establishing intermediate treatment facilities, but it is unclear whether it should address urgent matters such as these. ・ Proper collection to address the problem of the scattering of used masks in the state of Tamaulipas. Disposal must be established.
	Disposal	・ Preventing waste from flowing into the ocean from urban areas and disposal sites	High	・ The leakage of waste into the ocean from urban areas and disposal sites due to hurricanes has become a noticeable problem on the Pacific coast of the country. ・ Measures to prevent leakage from urban areas include persistent public awareness and education about litter prevention and improving collection rates, and measures to prevent scattering and outflow from

Field				
Subcategory		Issue	Need for assistance	Reasoning
				disposal sites include improving disposal site operations and selecting appropriate locations for newly planned sites. ・ JICA has a wealth of experience providing assistance in this field.
Collecting plastic waste that has reached the ocean				
—		・ Preventing residual materials from river bottoms from flowing into dams and oceans during the rainy season	High	・ Residual materials from river bottoms flow into dams and the ocean during the rainy season. ・ An existing example of Japanese technology is a cleanup boat that effectively removes floating waste from dams and the ocean. ・ Since JICA public-private partnerships are proposal-style schemes, a company must make a proposal.
		・ Removing marine plastic litter and drifting Sargassum seaweed.[138]	Medium	・ In addition to marine plastic litter, drifting Sargassum seaweed is a crucial cross-sectoral issue on the federal, state, and local government levels. ・ Plastic comprises 73% of the waste on Mexican beaches. The negative effects of marine litter kill 100,000 sea animals each year, and plastic waste comprises 80% of this marine litter. ・ The volume of drifting Sargassum seaweed is massive and a series of countermeasures taken to date have failed to produce major improvement. ・ Assistance from Japanese technology can be envisioned in the form of introducing cleanup boats for effective removal of floating waste.

High: Need for support is high, Medium: Need for support exists, Low: Need for support is low

2) Scheme and approach methods considered as particularly effective in the United Mexican States

The following three schemes and approaches were considered for the issues listed in the table above with the need for assistance evaluated as High or Medium.

Table 5-28 Proposed scheme/approaches for the United Mexican States (1)

Item	Description
Scheme	Expert dispatch
Target	Mexico City, the capital of the United Mexican States

[138] The JICA Survey Team cited details about this issue from Diagnóstico Básico para la Gestión Integral de los Residuos, 2020, a basic assessment of the situation introduced by the counterpart that was created with assistance from the IDB in May 2020.

Item	Description
region/area	
Potential implementing agencies	SEMARNAT of the federal government
Issues	a Establishing federal laws related to plastic usage. b Improving recycling technology and low recycling rates (compared to sorted collection) in a country where not much recycling takes place. Gaining a full understanding of nationwide data on the amounts of material recycling, chemical recycling, and thermal recovery from plastic waste.
State of efforts to resolve the issues	a State laws on the use of plastic are enforced. b Unclear
Approaches	Approach 1: System for supporting the execution of state laws on the use of plastic ・ Establish systems such as laws for recycling containers and packaging, basic plans for forming recycling societies, etc. ・ Provide recommendations on developing methods of evaluating alternative materials such as biodegradable plastic (evaluation methods, standardization and normalization, safety, durability, convenience) ・ Provide recommendations on establishing legal regulations on microplastic Approach 2: Promoting the use of plastic in industry ・ Provide assistance for formulating policy and the like to promote the use of plastic in industry ・ Provide assistance for fact-finding studies on the use of plastic waste
Outlook after project completion	・ Japanese manufacturers of alternative products and recyclers begin considerations for expanding the project to other countries. ・ The systems extend to neighboring countries. ・ Japanese companies in Mexico and other operators begin to expand activities.

Table 5-29 Proposed scheme/approaches for the United Mexican States (2)

Item	Description
Scheme	Technical cooperation project
Target region/area	Each of the six states on the Caribbean coast of the United Mexican States. In terms of collection rates, Yucatán is the most promising. Tamaulipas, the only one of the six states from which a response was received, also warrants consideration.
Potential implementing agencies	State governments. In terms of the following, it is difficult to envision specific local governments. - With over 2,000 local governments throughout the country, selection would be difficult. - Mayors change every three years, so that continuity is a challenge. - JICA has no experience providing this kind of assistance in the past (only selection as part of a pilot project).
Issues	a Strengthening administrative and technical capacity for proper waste management in local governments. b Enhancing financial sustainability for waste management in local governments. c Promoting education and public awareness for promoting waste sorting. d Improving waste collection rates in rural communities. e Fully understanding the state of recycling. f Improving intermediate treatment facilities and final disposal site operations (preventing the scattering and outflow of waste from these facilities).
State of efforts to resolve the issues	To date, JICA has provided assistance in several forms with regard to these issues, including assistance for formulating waste management policy and master

Item	Description
	plans based on the 3Rs, and assistance for extending the lives of final disposal sites and constructing new sites. Additionally, recent waste collection rates are higher than in the past, which speaks to the efforts to improve waste management.
Approaches	Approach 1: Approach state governments - Establish systems for promoting sorting and recycling within states (including fact-finding studies about recycling) Approach 2: Approach local governments for pilot testing - Provide assistance for creating collection schemes suited for financial sustainability of waste management - Provide assistance to promote education and public awareness for promoting waste sorting - Provide assistance for improving collection rates - Provide assistance for improving intermediate treatment facilities and final disposal site operations Approach 3: Promotion seminars - Share and promote Approaches 1 and 2 to local governments in the state
Outlook after project completion	・ Japanese companies and other operators in the plastic processing industry begin expanding by establishing systems to promote recycling. ・ Good practices for recycling promotion spread to other states in the country. ・ Waste management improves in each local government of the state.

Table 5-30 Proposed scheme/approaches for the United Mexican States (3)

Item	Description
Scheme	Collaboration with the private sector (SME overseas expansion assistance project, SDGs)
Target region/area	Caribbean Sea area of the United Mexican States
Potential implementing agencies	Federal government State governments Local governments
Issues	a Preventing plastic waste and other floating waste in rivers from accumulating in dam reservoirs and flowing into the ocean b Taking measures against massive amounts of drifting Sargassum seaweed in addition to marine plastic litter (Massive amounts of Sargassum seaweed including waste and detritus accumulate on coastlines, producing foul odors, obstructing the laying and incubation of sea turtle eggs, reducing coastal vegetation, and resulting in coastal eutrophication due to the decomposition of organic matter, clouding the ocean water. Ultimately, all of these negatively impact the tourism industry—namely beach resorts. Sargassum seaweed functions as a habitat for a diverse array of fish and other marine life, but sets off a chain of negative effects when it drifts ashore).
State of efforts to resolve the issues	a Unclear b In 2005, as an urgent first-stage measure, and while considering the negative impact on the laying and incubation of sea turtle eggs, SEMARNAT invested 15 million MXN into personnel costs and 12 million MXN into heavy machinery rentals to remove drifting Sargassum seaweed. For the second stage, after soliciting the opinions of experts, SEMARNAT decided to remove drifting Sargassum by blocking it offshore, and invested 45 million MXN. As for measures taken in 2015, SEMARNAT considered establishing a nature reserve or coastal habitat for sea turtle egg laying and incubation, and installed floating blocks of a total length of roughly 2,200 m offshore to collect drifting Sargassum waste.
Approaches	Approach 1: Introduce Japanese technology

Item	Description
	・ Create projects and implement diffusion and demonstration projects in the highly tourism-dependent states of the six states on the Caribbean coast (Quintana Roo, etc.). ・ Use marine radar (and possibly real-time satellite imaging or drones) or the like to efficiently collect floating waste from the surface from the proper places. ・ Use special boats to collect floating waste from the ocean surface.
Outlook after project completion	・ After results are verified, considerations begin for expanding the project to other nations in the Caribbean

Source: Diagnóstico Básico para la Gestión Integral de los Residuos, 2020, a basic assessment of the situation created with assistance from the IDB in May 2020.

3) Points to bear in mind when formulating projects in the United Mexican States

The JICA Mexico Office partnered with the Instituto Nacional de Ecología y Cambio Climático (INECC) to provide third-country training on solid waste and the 3Rs over a period of more than 11 years through 2016 based on the Japan-Mexico Partnership Program.

As for activities of other donors, GIZ is implementing or planning the following projects. More effective and efficient Japanese assistance must be considered to avoid overlapping with these projects.

Table 5-31 GIZ assistance in the United Mexican States (Implementation Stage)

Item	Description
Project name	OLAS: Océano Limpio
Donors	GIZ
Total amount	Unclear
Duration	2018-2020
Implementing agencies	Geocycle México and GIZ
Description	Location: Quintana Roo Objective: To undertake measures against plastic waste on land to prevent it from reaching the ocean Description: ・ Improving awareness of plastic waste as a problem through public awareness and education efforts and the like. ・ Prioritizing the reduction of plastic, followed by reuse, and then recycling. Promoting the functioning of plastic waste as a raw material in the recycling economy.

Source: Online interviews, Coprocesamiento.org, 2019.

Table 5-32 GIZ assistance in the United Mexican States (Planning Stage)

Item	Description
Project name	Prevención de residuos plásticos en América Central y Caribe Preventing Plastic Waste in Central America and the Caribbean Sea
Donors	GIZ
Total amount	Up to 7 million EUR as technical cooperation
Duration	August 2020-July 2023
Implementing agencies	Central American Integration System (SICA: Sistema de la Integracion Centroamericana)/United Mexican States

Item	Description
Description	・ The aim is to reduce, collect, and recycle plastic waste from the rivers and Caribbean coastlines of SICA countries and the United Mexican States to contribute to the minimization of pollution and preservation of oceans in the region. ・ The exchange of the results of pilot projects and good practices from all SICA countries will be promoted.

Source: Online interviews, SICA, 2019.

4) Technologies and products of Japanese companies that are expected to be particularly useful in the United Mexican States

Present circumstances

The current status of waste management and the United Mexican States is as follows:

- Waste is divided into three categories in the United Mexican States: municipal solid waste (waste discharged from households, including waste from cleaning the streets), which is the purview of local governments, special waste (including waste that is hazardous or cannot be categorized as municipal solid waste, waste discharged by entities that generate large amounts of municipal solid waste, construction waste, and e-waste), which is the purview of state governments, and hazardous waste (waste that includes explosive, toxic, or infectious substances), which is the purview of the federal government.
- As for responsibility for marine plastic litter, local governments (gobierno municipal) are responsible for treating plastic waste that has not yet reached the ocean (including waste that has reached the coast); and for processing Sargassum seaweed and other waste that settles temporarily on coastlines within their boundaries. The federal government is responsible for waste that drifts into the ocean.
- Regarding sorted collection of waste, sorting is performed in four of the six states on the Caribbean coast (5 municipalities in Veracruz, 1 municipality in Tabasco, 2 municipalities in Yucatan, 1 municipality in Quintana Roo). However, each of them only separates waste into two categories: organic and inorganic waste.
- The number of intermediate treatment facilities listed in the basic assessment[139] is limited to those managed by the central and local governments. No private companies in the six states recycle plastic materials. A major PET plastic recycler called PETSTAR operates in other states.

[139] Diagnóstico Básico para la Gestión Integral de los Residuos, 2020

- In Tamaulipas, Covid-19 has resulted in the littering of large amounts of single-use masks.[140]

Additionally, the introduction of WTE is financially possible in the four of the six states with GRDP per capita greater than US$ 8,000 (Veracruz (US$ 5,500) and Yucatán (US$ 7,000) do not meet the threshold, while Campeche (US$ 27,000) leads the group), however, given the lack of clarity as to the circumstances of individual local governments and the fact that WTE introduction was suspended in Mexico City, detailed studies are needed as to whether to introduce WTE.

Potentially useful Japanese technology and products

In light of present circumstances, the following is a summary of specific technology and products from Japanese companies that can be put to use in the United Mexican States.

Table 5-33 Technologies and products of Japanese companies that are expected to be particularly useful in the United Mexican States

Japanese technology/products	Reasoning	Remarks
Introducing marine floating waste detection systems and garbage boats for collecting floating debris	Local governments are responsible for processing marine floating waste, Sargassum, and other waste that settles temporarily on coastlines within their boundaries, but the federal government is responsible for waste that drifts into the ocean. Therefore, measures are needed at the federal level.	There is a possibility of introducing an effective floating waste collection system that combines two types of Japanese technology: cleanup boats (environmental cleanup boats) and marine floating waste detection systems that use high-frequency radar (shortwave radar). In Japan, the marine floating waste detection system using HF radar is a remote sensing technology researched and developed mainly by the Ports and Harbours Bureau of the Ministry of Land, Infrastructure, Transport and Tourism, the Regional Development Bureau, and the Coastal Development Institute of Technology. It is not limited to floating waste, and similar research is being conducted in developed countries as a mean to monitor the sea conditions on a daily basis. As for cleanup boats, they can be built in countries that possess shipbuilding technology.
Converting waste plastic into construction materials	The ability to process plastic affordably and recycle it into construction materials or the like	The technology makes it possible to manufacture recycled plastic products from unsorted waste plastic

[140] Results of questionnaire survey conducted in Tamaulipas. Respondents: Ing. Gilberto Estrella Hernández, Secretario de Desarrollo Urbano y Medio Ambiente

Japanese technology/products	Reasoning	Remarks
	would reduce the massive amount of plastic at final disposal sites at present, and help extend the service lives of the sites. The effectiveness of Japanese technology for manufacturing recycled construction materials from waste plastic was confirmed in a JICA diffusion and demonstration project targeting Cambodia (Verification Survey with the Private Sector for Disseminating Japanese Technologies for Plastic Recycling System to Convert Waste to Eco-Product [141], May 2018-August 2020, Koa Shoji Co., Ltd.) (2017 Pilot Survey for Disseminating SMEs' Technologies).	without preprocessing (sorting and cleaning) the raw materials (the simplicity of processing makes initial investments affordable). The products are of a higher quality than common recycled plastic products and are strong enough to be used as construction materials. Since we have not investigated the situation in all the countries of the world in detail, the situation in other countries is uncertain, but this technology is probably unique to Japan.
Power generation from waste incineration	Four states have a GRDP per capita greater than US$ 8,000. In terms of finances, it is highly likely that Japanese technology for power generation from waste incineration can be introduced.	Given the financial circumstances on the state level, WTE introduction is possible, but the circumstances of individual local governments are unclear. The most common technologies for power generation from waste incineration are Japanese and European, but as described in 4.1.4, the particularity of the Japanese technology, compared to European, is that it can generate electricity even if the calorific value of waste is as low as 1,000 kcal/kg (4,200 kJ/kg). Major European waste incinerator manufacturers include AE & E Inova, Steinmüller Babcock Environment, and Standardkessel Baumgarte, all of which are subsidiaries of Japanese companies[142].
Converting waste plastic into oil (liquefaction)	The technology of converting waste plastic into oil is extremely attractive because it returns waste plastic to petroleum, one of its raw materials. However, practically speaking, the only types of plastic that can be converted into oil are polyethylene (PE), polypropylene	The conversion of waste plastic into oil (liquefaction) has been demonstrated in a JICA SME project "The City of Cape Town, Republic of South Africa: Pilot survey for disseminating small and medium enterprise technologies for recycling waste plastic to fuel towards

[141] https://www2.jica.go.jpja/priv_smepartner/document/821/F171035_summary.pdf

[142] AE & E Inova is a subsidiary of Hitachi Zosen, Steinmüller Babcock Environment is a subsidiary of Nippon Steel Engineering, and Standardkessel Baumgarte is a subsidiary of JFE Engineering.

Japanese technology/products	Reasoning	Remarks
	(PP), and polystyrene (PS). Additionally, the waste materials must be cleaned. Therefore, the technology can be introduced if it can be assumed that sorting is strict and precise, and waste materials are cleaned.	sustainable waste management" (2016). In addition, the "Survey on the dissemination of liquefaction equipment for the conversion of waste plastic into oil in the Pacific region" under the Ministry of Foreign Affairs' project to promote support for developing countries through the utilization of Japanese technology, examined ODA or private business expansion in the target countries of Palau, Fiji and Samoa (2016). According to the websit [143] of a Japanese company that handles this plastic oil liquefaction equipment, actual machines are supplied in Oceania, Asia, the Middle East, Europe, Africa, North America, and Latin America. In many cases, styrene foam and plastic bags are made of PE, PP, or PS. Some states already prohibit the use of single-use plastic, styrene foam containers, and the like, therefore, there is a need to gain an understanding of the amount of waste plastic that can be converted into oil.

5.2.6 Island nations

The five target countries of the in-depth survey other than the United Mexican States face common issues with marine plastic litter that differ from those of inland cities in non-island countries. Additional information from desk research and online interviews with stakeholders (including aid agencies) in the first stage revealed issues faced by island nations that were not directly mentioned in the questionnaire surveys conducted in each of the countries. This section examines those issues as well as schemes and approaches to address them.

The table below shows the major cities located along the coast or in coastal areas in the five countries other than the United Mexican States. All the capitals are located near the coast and face the same circumstances as many major cities. In island nations, urbanization starts in coastal areas, major roads are developed along coastlines, and there is not much physical distance between the ocean and most residential areas and commercial facilities. Thus, residential areas, where waste is discharged, and final

[143] Blest Co., Ltd. (https://www.blest.co.jp/index.html), JICA (https://www.jica.go.jp/yokohama/topics/2013/ku57pq00000coqh7.html)

disposal sites, where final disposal occurs, are also located relatively near the coast, scattered plastic likely flows into the ocean without obstruction during the steps in between and including waste discharge and disposal.

Table 5-34 Major cities located along the coast or in coastal areas in island nations

Country	Major cities located along the coast or in coastal areas
Grenada	Saint George's (capital), Grenville, Gouyave, Sauteurs, Victoria, Hillsborough (the largest city on the island of Carriacou)
Saint Christopher and Nevis	Saint Christopher Island: Basseterre (capital), Saint Paul's, Saddlers, Middle Island, Tabernacle, Mansion, Cayon, Sandy Point Nevis: Charleston, Newcastle
Saint Lucia	Castries (capital), Dennery, Laborie, Vieux Fort, Micoud, Anse La Raye (most of the major cities)
Republic of Guyana	In order from most to least populated: Georgetown (capital), New Amsterdam (third-largest), Anna Regina (fourth-largest), Corriverton (fifth-largest) (the second-largest city is located inland)
Jamaica	Kingston (capital), Portmore, Montego Bay, Savanna-la-Mar, Ocho Rios, Port Antonio, Saint Ann's Bay, Morant Bay

Additionally, Caribbean island nations obviously face the same issues as the island nations of Oceania, which should serve as references for the ideal state of cooperation from Japan. The following are issues that both regions have in common according to Sakurai (2016), and in response to these issues, Oceania has been promoting cooperation between the countries of the region in various ways.

(1) Changes in waste amount and composition caused by lifestyle changes

(2) Difficulty securing final disposal sites due to limited space on islands

(3) Limitation on the costs for transporting resources to remote recycling markets

(4) Improper waste processing leading to damage to the environment, the bedrock of the tourism industry

(5) Vulnerability to climate-related disasters due to climate change

Note that the regional technical cooperation project proposed as an approach to these common issues of island nations should not be limited to the target countries of the in-depth survey, but should be applied broadly to the island nations in the Caribbean region.

1) Areas where special assistance is needed, with supporting reasons, in island nations

The table below shows a summary of fields in island nations where assistance is deemed necessary, and the reasoning behind the judgments. In inland cities, plastic waste and other waste that scatters from discharge locations or final disposal sites as a result of wind or sudden rain showers settles on nearby ground surfaces and is collected through efforts such as street cleanup, and thus does not reach rivers or

the ocean. In contrast, in island nations, in light of the urbanization described previously, some amount of plastic waste scatters and flows into the ocean, even with 100% coverage by waste collection services.

Table 5-35 Areas where special assistance is needed in island nations, with supporting reasons

Issues and fields where assistance is deemed necessary	Reasoning
Preventing the scattering and outflow of plastic waste and other waste into the ocean during discharge, collection, and transport	・ Waste—particularly lightweight plastic and styrene foam—discharged by residents onto roadsides or streets can easily flow into the ocean as a result of wind or sudden rain showers. ・ When waste is discharged directly onto the ground, it increases the amount of lightweight plastic that flows to the coast as a result of sudden rain showers and the like.
Preventing the scattering and outflow of waste into the ocean from final disposal sites	・ Rain and wind can carry lightweight plastic and styrene foam waste into the ocean from final disposal sites quickly and without obstruction. ・ When operations (including final disposal site design and landfilling) are inadequate, it is likely that rain carries away large amounts of waste.

2) Scheme and approach methods considered as particularly effective in island nations

The table below shows schemes and approaches in response to the issues outlined above. Island countries lack legislation and infrastructure for recycling and intermediate treatment, so the first priority is to contribute to the reduction of marine plastic litter and other marine waste by implementing measures to prevent the scattering and outflow of waste through the thorough improvement of existing discharge, collection, transport, and disposal methods.

In addition to bilateral cooperation with Japan, the existence of a place (opportunity) for sharing good practices in the region should greatly contribute to solving the problems of other countries facing similar issues in the region. Caribbean island nations lack a platform organization like the Secretariat of the Pacific Regional Environment Programme (SPREP) in Oceania, thus, under consideration is an approach that starts with sharing information at workshops and other events amid regional technical cooperation projects as shown in the table below.

Table 5-36 Proposed scheme/approaches for island nations

Item	Description
Scheme	Regional technical cooperation project
Target region/area	Caribbean island nations
Potential implementing agencies	Waste management organizations
Issues	a Preventing the scattering and outflow of plastic waste and other waste into the ocean during discharge, collection, and transport b Preventing the scattering and outflow of waste into the ocean from final disposal sites

Item	Description
State of efforts to resolve the issues	a Many small island nations have high collection rates, and efforts have been made to improve the collection rates. Efforts have also been made to reduce discharge by prohibiting plastic bags, single-use plastic, and styrene foam in addition to other measures to reduce usage. b Many small island nations have high final disposal rates, and efforts have been made to improve the final disposal rates. Several countries have developed sanitary landfill disposal sites.
Approaches	Approach 1: Technical assistance ・ Provide assistance for public awareness and education about discharge methods, dates, and times ・ Provide assistance for improving collection and transport plans ・ Provide assistance for final disposal sites (plans for new sites, rehabilitation, operation improvement) Approach 2: Interregional cooperation ・ Hold workshops and other events, including introductions to the technical assistance provided under Approach 1 ・ Provide training in leading areas of the region under waste management operators serving wide areas ・ Provide assistance for implementing trainer dispatch programs involving the dispatch of regional trainers with good practices to other countries in the region ・ Provide assistance to establish and operate a human resources database
Outlook after project completion	・ Management of waste discharge, collection, transport, and disposal improves, reducing marine litter. ・ Considerations begin for regional technical cooperation projects for recycling and intermediate treatment. ・ Sharing of good practices within the region is promoted.

3) Points to bear in mind when formulating projects in island nations

See the items set out for the individual island nations.

4) Technologies and products of Japanese companies that are expected to be particularly useful in island nations

See the items set out for the individual island nations.

5.2.7 Summary of proposed cooperation in target countries for in-depth survey

The table below is a summary of the schemes, descriptions, and outlooks after project completion in island nations and each of the six countries selected as target countries for in-depth survey in this study (Category A through C).

Japan's policy for assistance is to provide assistance in four areas named in the Marine Initiative of the Osaka Blue Ocean Vision—(1) waste management, (2) marine litter collection, (3) innovation promotion, and (4) capacity improvement in developing countries toward the above ends. With these in mind, and in light of the issues raised in each target country, trends in assistance from other donors, and the results of questionnaire surveys and interviews with Japanese companies, priority should be placed on considering the implementation of the following assistance.

Regional expert dispatch to small island nations is intended to address the main issues in island nations that are too small to easily establish viable material recycling systems, and for spillover effects to spread to other small island nations. In contrast, the issues addressed in expert dispatch to the United Mexican States are for situations where manufacturers and recyclers who work with plastic already exist, and the envisioned spillover effects from these efforts will spread to the relatively large neighboring countries in Central and South America, not small island nations.

Table 5-37 Summary of proposed cooperation in the target countries of the in-depth survey

Category	Target region/area	Scheme	Description	Outlook after project completion
A.Small island nations	Small island nations of the Eastern Caribbean, including Grenada and Saint Lucia	Regional expert dispatch	・ Experts provide tailor-made responses to the waste management issues of individual countries as measures against the leakage of plastic into the ocean. ・ Experts provide recommendations on various issues in legislation, finances, and waste collection, transport, treatment, and disposal, focusing mainly on areas related to recycling and intermediate treatment.	・ Initiatives on issues in the areas of marine plastic litter and waste management in small island nations are shared and expanded. ・ Considerations begin for implementing regional technical cooperation projects in small island nations of the Caribbean Sea. ・ Japanese technology that is useful in small island nations begins to spread.
	Grenada	Collaboration with the private sector (SME overseas expansion assistance	・ Introduce compact incinerators with the aim of reducing the landfill disposal rate.	・ The project expands after confirming needs and feasibility. ・ After results are verified, considerations begin

Category	Target region/area	Scheme	Description	Outlook after project completion
		project, SDGs)		for expanding the project to other small island nations of the Eastern Caribbean.
	Saint Lucia	Collaboration with the private sector (SME overseas expansion assistance project, SDGs)	・ Use special boats to implement a floating waste collection project in ports and harbors including Castries Harbour.	・ After results are verified, considerations begin for expanding the project to other nations in the Caribbean.
B. Nations other than small island nations	Georgetown, the capital of the Republic of Guyana	Technical cooperation project	・ Provide assistance for an institutional framework for supervisory bodies in charge of waste management. Include clarification of responsibility for industrial waste treatment. ・ Implement a project to improve waste management capacity in the government of the capital city of Georgetown.	・ The responsibilities of entities responsible for processing various types of waste are effectively supervised. ・ The initiatives and outcomes of the technical cooperation project begin to spread to the other nine local governments. ・ Japanese companies begin to consider expansion in response to the improvement of industrial waste processing and disposal facilities.
	Jamaica	Technical cooperation project	・ Implement a waste management capacity improvement project in impoverished areas with highly problematic collection rates, and a parish with a small-scale disposal site. ・ Provide assistance for public awareness and education, improving discharge in impoverished areas as well as collection through the establishment of a primary collection	・ The initiatives and outcomes of the technical cooperation project for the target parish of Jamaica expand into the other three parishes. ・ The initiatives and outcomes of the technical cooperation project begin to spread to other English-speaking countries of the Caribbean. ・ A Japan-Jamaica Partnership Program

Category	Target region/area	Scheme	Description	Outlook after project completion
			system, and final disposal site operation and maintenance including the management of waste pickers.	focused on South-South cooperation assistance to other English-speaking island nations of the Caribbean Sea is considered.
		Collaboration with the private sector (SME overseas expansion assistance project, SDGs)	・ Use special compact boats to collect plastic and other floating waste from waterways.	・ After results are verified, considerations begin for expanding the project to other nations in the Caribbean.
C. United Mexican States	Mexico City, the capital of the United Mexican States	Expert dispatch	・ Provide recommendations for establishing federal laws related to the use and availability of plastic. ・ Provide recommendations for promoting the use of plastic in industry.	・ Japanese manufacturers of alternative products and recyclers begin considerations for expanding the project to other countries. ・ The systems extend to neighboring countries. ・ Japanese companies in Mexico and other operators begin to expand activities.
	Each of the six states on the Caribbean coast of the United Mexican States	Technical cooperation project	・ Provide technical cooperation for improving local governments' capacity for waste management, which has been identified as a nationwide issue. ・ Provide assistance for state governments to make various improvements required to promote recycling and intermediate treatment. ・ To the selected local governments, provide assistance related to administrative and technical capacity and financial sustainability.	・ Japanese companies and other operators in the plastic processing industry begin expanding by establishing systems to promote recycling. ・ Good practices for recycling promotion spread to other states in the country. ・ Waste management improves in each local government of the state.

Category	Target region/area	Scheme	Description	Outlook after project completion
	Caribbean Sea area of the United Mexican States	Collaboration with the private sector (SME overseas expansion assistance project, SDGs)	・ Collect marine litter including plastic from waterways, rivers, dams, and the ocean. ・ Also, deal with Sargassum seaweed drifting in the ocean, which has been identified as an issue in the region.	・ After results are verified, considerations begin for expanding the project to other nations in the Caribbean.
Island nations	Island nations	Regional technical cooperation project	・ Provide assistance for preventing the leakage of waste into the ocean resulting from the proximity of waste discharge locations (residential areas) and final disposal sites to the coast. ・ Provide assistance for waste discharge, collection, transport, and final disposal. ・ Use training, workshops, and technical cooperation in the region to introduce and share good practices.	・ Management of waste discharge, collection, transport, and disposal improves, reducing marine litter. ・ Considerations begin for regional technical cooperation projects for recycling and intermediate treatment. ・ Sharing of good practices within the region is promoted.

5.3 Seminar for target countries of the in-depth survey

A seminar using a web conferencing system was held for the 5 English-speaking countries (Grenada, Saint Christopher and Nevis, Saint Lucia, Republic of Guyana, Jamaica) out of the 6 countries subject to the in-depth survey. In the seminar, the survey results were shared and examples of Japanese technology and JICA cooperation were introduced. The table below shows an overview of the seminars.

Table 5-38 Overview of the online seminar for target countries of the in-depth survey

Item	Content		
Target countries	Grenada, Saint Christopher and Nevis, Saint Lucia, Republic of Guyana, Jamaica		
Seminar date/time	October 3, 2020 0:00 am – 01:30 am (Japan time) October 2, 2020 11:00 am – 12:30 pm (Grenada, Saint Christopher and Nevis, Saint Lucia, Republic of Guyana) October 2, 2020 10:00 am – 11:30 am (Jamaica)		
Language	English		
Agenda	・ Greeting ・ Opening Remarks (JICA St. Lucia) ・ Presentation 1. Background of the Survey 2. Methodology 3. Results of the Survey 4. Cooperation Needs 5. Possible idea of Approach 6. Efforts for marine plastic litter in Japan 7. Japanese Technology 8. Case Study Approach ・ Question and Answer ・ Closing		
Participants	Country	Organization	Number
	Grenada	GSWM	2
		Ministry of Climate Resilient and Environment	1
	Saint Lucia	SLSWMA	3
	Republic of Guyana	Ministry of Local Government and Regional Development	1
	Jamaica	NEPA	5
	Aid agency	UNEP Jamaica	4
		Global Partnership on Marine Litter-Caribbean Node	1
	JICA	Latin America and Caribbean Department, Saint Lucia Office, Dominican Republic Office, Jamaica Office	8

The following are the questions and answers from the seminar.

Table 5-39 Questions and Answers from the online seminar for the five English-speaking countries

Agenda item	Questioner affiliation	Question/Comment	Answer
6. Efforts for marine plastic litter in Japan Material flow of plastic waste in Japan	Grenada, GSWMA	What are the ways to determine the amount of plastic waste generated? We usually carry out waste quality	Conducting a waste quality survey by an appropriate method is the base. Regarding plastics, it is also

Agenda item	Questioner affiliation	Question/Comment	Answer
		surveys, but this cannot determine the exact amount. I think it is important to understand the waste flow in order to know how resources (plastic) can be used.	deemed important to know the import volume.
7. Japanese Technology (1) Semi aerobic Landfill Technology (Fukuoka Method)	Republic of Guyana, Ministry of Local Government and Regional Development	The second cell of the final disposal site is under construction using the Fukuoka method. However, we have some push back from EPA (Environmental Protection Agency) believing landfill should be installed HDPE liners. It would be helpful if JICA could support the promotion of the Fukuoka method domestically.	Consultation with all stakeholders including EPA is useful. It is important for them to understand the actual method to address various environmental issues caused by open dump system. You can also present similar technologies that have worked in other countries. (The above is from the representant of GSWMA, Grenada.) The Fukuoka method is also being implemented in the Caribbean and Africa. In Africa, joined training is being conducted locally with participants from neighboring countries.
5. Possible idea of Approach	Aid agency, UNEP Jamaica	UNEP Caribbean Regional Office also has several projects related to plastic and solid waste management underway at different stages (drafting, planning, etc.), and we would like to have discussions with JICA from the perspective of cooperation and collaboration before the final report is completed.	― Comment only ―

References

Abinco Plastics, n.d. Helping to Keep Antigua Beautiful. Retrieved from https://www.abincoplastics.com/ (Available on 26 May 2020)

Aichi resort & spa. 2018. Recycling Dominica's Plastic Waste into Marketable Products. Retrieved from https://www.anichidevelopment.com/recycling-dominicas-plastic-waste/

AMICA. 2015. 2º Congreso Nacional, Sitios De Disposición Final De Residuos Solidos Urbanos En El Estado De Tamaulipas. Retrieved from http://www.amica.com.mx/issn/archivos/110.pdf (Accessed on 13 May 2020)

Antigua nice. com. 2014. Recycling in Antigua. Retrieved from https://www.antiguanice.com/v2/client.php?id=943&news=7480

Antigua & Barbuda. 2015. Intended Nationally Determined Contribution (INDC). Retrieved from https://www.ctc-n.org/sites/www.ctc-n.org/files/UNFCCC_docs/indc_antigua_barbuda.pdf (Available on 26 April 2020)

Arias Martinez. 2016. Gestion Integral de Residuos Solidos urbanos: Caso Tabasco. Retrieved from http://revistas.ujat.mx/index.php/ecosoc/article/view/1454/1283 (Accessed on 14 May 2020)

Ayuntamiento de Mérida. N/Ae. Relleno sanitario. Retrieved from http://www.merida.gob.mx/sustentable/contacto/relleno-sanitario.phpx (Accessed on 15 May 2020)

Barbados Solid Waste Management Programme. 2018 Barbados Solid Waste Management Programme Retrieved from https://solid.gov.bb/recycling/

Belize Tourism Board. 2020. 2019 Belize Travel & Tourism Mid-Year Performance Report. Retrieved from https://www.belizetourismboard.org/belize-tourism/statistics/

Bepensa. 2019. Canje ReQpet 2019 Campeche. Retrieved from http://www.fundacionbepensa.org/canje-reqpet-2019-campeche/

Bepensa. n.d.a Centros de Acopio PET Costeros. Retrieved from http://www.fundacionbepensa.org/linea-de-accion-medio-ambiente/centros-de-acopio-pet-costeros/

Bepensa. n.d.b. ReQpet. Retrieved from http://www.fundacionbepensa.org/linea-de-accion-medio-ambiente/reqpet/

Bepensa. n.d.c. Limpieza de Costas. Retrieved from http://www.fundacionbepensa.org/linea-de-accion-proyectos-especiales/limpieza-de-costas/

Be social. n.d. Limpieza de Playas en Playa del Carmen y Cancún. Retrieved from https://www.besocialplayadelcarmen.mx/2019/01/limpieza-playas-playa-del-carmen/

Burke, L., K. Reytar, M. Spalding, and A. Perry. 2011. "Reefs at Risk Revisited." World Resources Institute. Washington, DC. http://www.wri.org/publication/reefs-risk-revisited

Business News Caribbean. 2016. The Saint Lucia Solid Waste Management Authority Retrieved from Efficient waste management - https://businessviewcaribbean.com/saint-lucia-solid-waste-management-authority/

BUZZ. 2020. The Ocean Cleanup gets US$1 million to clean Kingston Harbour, Jamaica's most polluted water body Retrieved from https://buzz-caribbean.com/news/the-ocean-cleanup-gets-us1-million-to-clean-kingston-harbour-jamaicas-most-polluted-water-body/ (Available on 05 August 2020)

Canal del Congreso. 2018. Realizan diputados IV Coloquio sobre Megalópolis y medio ambiente. Retrieved from https://www.canaldelcongreso.gob.mx/noticias/11317/Realizan_diputados_IV_Coloquio_sobre_Megalopolis_y_medio_ambiente (Available on 27 May)

Canal de Panama. 2020. Panama Canal Traffic2017 to 2019. Retrieved from https://www.pancanal.com/eng/op/transit-stats/index.html (Available on 27 May 2020)

Caribbean Environment Programme (CEP). 2019. Status of Styrofoam and Plastic Bag Bans in the wider Caribbean Region.

Caribbean Environment Programme (CEP). 2020a. Addressing Marine Litter in the Wider Caribbean Region through Regional and Global Partnerships

Caribbean Environment Programme (CEP). 2020b. The Intricate Balance of Life and Nature: Lessons from COVID 19. Retrieved from https://www.unenvironment.org/cep/news/blogpost/intricate-balance-life-and-nature-lessons-covid-19 (Available on 06 July 2020)

Caribbean Environment Programme (CEP). n.d. Addressing Marine Litter in the Wider Caribbean Region through Regional and Global Partnerships

Caribbean Development Bank (CDB). n.d. Procurement Notice. Retrieved from https://www.caribank.org/work-with-us/procurement/procurement-notices/integrated-solid-waste-management-project (Available on 31 July 2020)

Caribbean Regional Fisheries Mechanism (CRFM). 2016. CRFM Statistics and Information Report for 2016. Retrieved from http://www.crfm.int/~uwohxjxf/images/CRFM_Statistics__Information_Report__2016_Final.pdf (Available on 28 April 2020)

Caribbean Regional Fisheries Mechanism (CRFM). 2018. CRFM Statistics and Information Report - 2016.

Caribbean & American News. 2020. Grenada Tourism Sets Sight on Steady Visitor Increase Retrieved from https://www.cndenglish.com/tourism/grenada-tourism-sets-sight-steady-visitor-increase

CDN. 2020. Presidente Medina emite decreto 21-20 para reestructuración del vertedero Duquesa. Retrieved from https://cdn.com.do/2020/01/17/presidente-medina-emite-decreto-21-20-para-reestructuracion-del-vertedero-duquesa/#

CEAC Outsourcing. 2019. Project Brief for Relocation of Hazardous Waste Incinerator to Ferry, St. Andrew. – Retrieved from https://www.nepa.gov.jm/new/services_products/applications/eias/docs/StAndrew/ferry/ferry_project_brief_20190418v2.pdf (Available on 24 April 2020)

Central Water and Sewerage Authority (CWSA). 2015. 2015 Annual Report. Retrieved from http://www.cwsasvg.com/financials/2015%20CWSA%20Annual%20Report.pdf (Available on 27 April 2020)

CGTN. 2020. Masks and gloves 'floating' like jellyfish: The effects of COVID-19 waste in the ocean Retrieved from https://newseu.cgtn.com/news/2020-06-13/Gloves-floating-like-jellyfish-COVID-19-waste-littering-the-ocean-RdG9aG2cTK/index.html (Available on 06 July 2020)

CIA. n.d.a. The World Fact Book. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/fields/282.html

CIA. n.d.b. The World Fact Book. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/fields/350.html

CITMA. n.d. Organigrama del Citma. Retrieved from http://www.citma.gob.cu/organigrama/

Commonwealth Blue Charter. n.d. Commonwealth Clean Ocean Alliance. Retrieved from https://bluecharter.thecommonwealth.org/action-groups/marine-plastic-pollution/ (Available on 05August 2020)

Commonwealth of Dominica. 2017. Management of post-hurricane disaster waste. Retrieved from https://www.eecentre.org/wp-content/uploads/2019/05/Disaster-waste-management-Dominica-Oct-2017-final-draft-formatted-6.pdf (Available on 27 April 2020)

Constitución Política del Estado Libre y Soberano de Quintana Roo. 2020. Retrieved from http://documentos.congresoqroo.gob.mx/leyes/L176-XVI-20200306-CN1620200306D02.pdf (Accessed on 15 May 2020)

Coprocesamiento.org. 2019. Reducir la entrada de residuos de plástico al océano Retrieved from https://coprocesamiento.org/reducir-la-entrada-de-residuos-de-plastico-al-oceano/ (Available on 31 July 2020)

Cubahora. 2019. Atres: una cooperativa cubana con una alternativa diferente (+Fotos). Retrieved from https://www.cubahora.cu/economia/atres-una-cooperativa-cubana-con-una-alternativa-diferente (Available at 27 June 2020)

De Bood Schap. 2019. Ministerie OWT&C tekent MOU voor verwerking huishoudelijk afval. Retrieved from https://www.deboodschap.today/ministerie-owtc-tekent-mou-voor-verwerking-huishoudelijk-afval/

Decreto Número 337 por el que se expide la Ley Para la Prevención, Gestión Integral y Economía Circular de los Residuos del Estado de Quintana Roo. 2019. Retrieved from http://documentos.congresoqroo.gob.mx/decretos/EXV-2019-05-29-337.pdf (Accessed on 15 May 2020)

Decreto 80/2019 por el que se modifica la Ley para la Gestión Integral de los Residuos en el Estado de Yucatán. 2019. Retrieved from http://www.yucatan.gob.mx/docs/diario_oficial/diarios/2019/2019-06-18_2.pdf (p.18~) (Accessed on 15 May 2020)

Department of Public Information. 2018. Sanitation operators using the tarp deployer to cover waste at the Haags Bosch Landfill site. Retrieved from https://dpi.gov.gy/contractors-collaborate-to-monitor-waste-disposal-at-haags-bosch/

Diario Libre. 2019. La República Dominicana produce 264 mil toneladas de residuos de plástico. Retrieved from https://www.diariolibre.com/actualidad/medioambiente/la-republica-dominicana-produce-264-mil-toneladas-de-residuos-de-plastico-FF13612986

Dominica news online. 2018. Tonge announces increase in cruise ship passengers for 2017-2018 Retrieved from https://dominicanewsonline.com/news/homepage/news/tourism-publicity/tonge-announces-increase-in-cruise-ship-passengers-for-2017-2018/

Dominica Solid Waste Management Corporation (DSWMC). n.d. Community Programmes. Retrieved from http://www.dswmc.dm/index.php/about-us/8-community-programmes

Dominican today. 2018. Ports set records: 2017 cruise ship arrivals by the numbers. Retrieved from https://dominicantoday.com/dr/tourism/2018/01/08/ports-set-records-2017-cruise-ship-arrivals-by-the-numbers/

Dominican Today. 2020. Duquesa landfill dump divers fear for its closure. Retrieved from https://dominicantoday.com/dr/local/2020/01/19/duquesa-landfill-dump-divers-fear-for-closure/

Dra. Nancy Merary Jiménez Martínez. n.d. La gestión de los residuos sólidos urbanos en México, Centro Regional de Investigaciones Multidisciplinarias de la UNAM.

El Día. 2020. El problema no es Duquesa, es el entramado de todo un Sistema. Retrieved from https://eldia.com.do/el-problema-no-es-duquesa-es-el-entramado-de-todo-un-sistema/

El Heraldo de Tabasco. 2019. Hay en Tabasco mil 600 tiraderos a cielo abierto. Retrieved from https://www.elheraldodetabasco.com.mx/local/hay-en-tabasco-mil-600-tiraderos-a-cielo-abierto-4477427.html (Accessed on 14 May 2020)

El Manana. 2019. Ponen en marcha programa ´Reynosa sin plástico´. Retrieved from https://www.elmanana.com/ponen-en-marcha-programa-reynosa-sin-plastico-dia-mundial-del-medio-ambiente-empaques-bolsas-de-plastico-reciclaje-material-reciclado/4838767 (Accessed on 13 May 2020)

El Sol de Tampico. 2019. Con gran entusiasmo, Ama tu Playa, AC limpia Miramar. Retrieved from https://www.elsoldetampico.com.mx/circulos/con-gran-entusiasmo-ama-tu-playa-ac-limpia-miramar-3904266.html (Accessed on 13 May 2020)

EL Universal, 2019. Mexico: Poor waste management and recycling culture. Retrieved from https://www.eluniversal.com.mx/english/mexico-poor-waste-management-and-recycling-culture-0

Ellen Macarthur Foiundation. 2017. The New Plastics Economy: Rethinking the Future of Plastics & Catalysing Action. Retrieved from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/NPEC-Hybrid_English_22-11-17_Digital.pdf (Available on 27 May 2020)

Énfasis Packaging. 2019. Buscan optimizar la gestión de residuos sólidos urbanos en Tabasco. Retrieved from http://www.packaging.enfasis.com/notas/84933-buscan-optimizar-la-gestion-residuos-solidos-urbanos-tabasco (Accessed on 14 May 2020)

Environmental Management Authority. 2019. The Administrative Record For Draft Waste Management (Registration and permitting) Rules, 2018. Retrieved from https://www.ema.co.tt/images/Files/Waste/Admin%20Record-Waste%20Rules%202018-27Dec18.pdf

Environmental Justice Atlas. 2019. Waste-to-energy incineration plant by Veolia in Mexico City, Mexico. Retrieved from https://ejatlas.org/conflict/plans-for-a-waste-to-energy-incineration-plant-by-veolia-in-mexico-city-resisted-by-wastepickers (Available on 03 July 2020)

Food and Agriculture Organization of the United Nations (FAO). 2010. FAOLEX Database. Retrieved from http://www.fao.org/faolex/results/details/en/c/LEX-FAOC176000/

Food and Agriculture Organization of the United Nations (FAO). 2007. National Strategic Plan of Barbados 2006-2025. Retrieved from http://www.fao.org/faolex/results/details/en/c/LEX-FAOC174639/

France Antilles. 2019. Recyclage plastique : Sidrep liquidée. Retrieved from https://www.martinique.franceantilles.fr/actualite/economie/recyclage-plastique-sidrep-liquidee-545702.php (Available on 06 August 2020)

Estados Unidos Mexicanos. n.d. Programa para la Prevención y Gestión Integral de Residuos 2009-2012. Retrieved from https://www.gob.mx/cms/uploads/attachment/file/187438/pnpgir_2009-2012.pdf (Available on 27 April 2020)

Fundation de Parques y Museos de Cozumel. n.d. Fundación de Parques y Museos de Cozumel. Retrieved from http://www.fpmc.qroo.gob.mx/eng/

European Investment Bank. 2019. The Clean Oceans Initiative. Retrieved from https://www.eib.org/en/publications/the-clean-ocean-initiative (Available on 03 July 2020)

Garbage problem. 2009. Retrieved from https://www.youtube.com/watch?v=IeazDJZEIVc (Available on 27 July 2020)

Gard Insight. 2017. MARPOL Annex V – the international convention banning the discharge of plastic and garbage from ships. Retrieved from http://www.gard.no/web/updates/content/23504095/marpol-

annex-v-the-international-convention-banning-the-discharge-of-plastic-and-garbage-from-ships

GEF. 2018. Waste management in Antigua & Barbuda. Retrieved from https://www.youtube.com/watch?v=bhsVDOU8vx0

GIZ. 2018a. Converting solid urban waste into energy. Retrieved from https://www.giz.de/en/worldwide/29020.html

GIZ. 2018. Situación Actual de Gestión de Residuos en República Dominicana. Retrieved from https://cambioclimatico.gob.do/phocadownload/Documentos/giz/Wolf,%20Judith%20-%20Informe%20Final,%20Estado%20GIRS%20Rep.Dom.%20Nov.%202018.pdf (Available on 27 April 2020)

GIZ. 2015a. Reducing the input of plastic litter into the ocean around Cozumel Retrieved from https://www.giz.de/de/downloads/giz2015_en_marine-litter-instruments_cozumel.pdf (Available on 27 May 2020)

GIZ. 2015b. Reducing the input of plastic litter into the ocean around Grenada. Retrieved from https://www.giz.de/de/downloads/giz2015_marine-litter-instruments_grenada.pdf (Available on 27 May 2020)

Global Recycling. 2016. Cuba's Recycling Industry: Slowly Requested by Foreign Inestors. Retrieved from https://global-recycling.info/archives/1032 (Available on 3rd July 2020)

Gobierno del Estado Tabasco. 2014. Programa Estatal De Remediacion De Sitios Contaminados Con Residuos Solidos Urbanos Y De Manejo Especial. Retrieved from https://transparencia.tabasco.gob.mx/media/RN/77/250842_3.pdf (Available on 27 May 2020)

Gobierno del Estado de Tabasco. 2020.Reformas normativas en materia de bolsas de plástico, popotes y unicel. Retrieved from https://tabasco.gob.mx/reforma-residuos-sbscc (Accessed on 14 May 2020)

Gobierno del Estado de Yucatán. 2019. Hacia un Yucatán con cero residuos para transformar al estado. Retrieved from http://www.yucatan.gob.mx/saladeprensa/ver_nota.php?id=336 (Accessed on 15 May 2020)

Gobierno del Estado de Veracruz. 2019g. Coordinó SEDEMA limpieza de cuatro playas veracruzanas. Retrieved from http://www.veracruz.gob.mx/2019/04/09/coordino-sedema-limpieza-de-cuatro-playas-veracruzanas/ (Accessed on 14 May 2020)

Gobierno del Estado de Veracruz. 2019h. Convoca SS al Primer Limpiatón Playero 2019. Retrieved from http://www.veracruz.gob.mx/2019/03/21/convoca-ss-al-primer-limpiaton-playero-2019/ (Accessed on 14 May 2020)

Gobierno del Estado de Veracruz. 2019i. Retiradas más de 40 toneladas de basura del río Blanco: SEDEMA. Retrieved from http://www.veracruz.gob.mx/2019/09/28/retiradas-mas-de-40-toneladas-de-basura-del-rio-blanco-sedema/ (Accessed on 14 May 2020)

Gobierno del Estado de Veracruz. 2019j. Gobierno de Veracruz y empresas firman alianza para erradicar plásticos de un solo uso. Retrieved from http://www.veracruz.gob.mx/2019/09/17/gobierno-de-veracruz-y-empresas-firman-alianza-para-erradicar-plasticos-de-un-solo-uso/ (Accessed on 14 May 2020)

Gobierno del Estado de Veracruz de Ignacio de la Llave. 2018. Ley de Prevención y Gestión Integral de Residuos Sólidos Urbanos y de Manejo Especial para el Estado de Veracruz de Ignacio de la Llave (Ley Numero 847). Retrieved from https://www.legisver.gob.mx/leyes/LeyesPDF/LPGIRS2911182.pdf (Accessed on 14 May 2020)

Gobierno del Estado de Veracruz-Llave. n.d. Ley Estatal de Protección Ambiental. Retrieved from https://docs.google.com/file/d/0B87bmmJLaLIgY0J1WmxXZkE4VTQ/edit (Accessed on 14 May 2020)

Gobierno del Estado de Tabasco. 2020.Reformas normativas en materia de bolsas de plástico, popotes y unicel. Retrieved from https://tabasco.gob.mx/reforma-residuos-sbscc (Accessed on 14 May 2020)

Government of Belize Ministry of Economic Development. 2016. Growth and Sustainable Development Strategy 2016-2019. Retrieved from http://extwprlegs1.fao.org/docs/pdf/blz167431.pdf

Government of Saint Lucia. 2014. Government to convert waste to energy. Retrieved from http://www.govt.lc/news/government-to-convert-waste-to-energy

Government of the Republic of Trinidad and Tobago. 2015. National Waste Recycle Policy. Retrieved from https://www.planning.gov.tt/sites/default/files/WASTE%20RECYCLING%20POLICY%202015%20Final.pdf (Available on 27 April 2020)

Government of the Republic of Trinidad and Tobago. 2018. Government working to shut down landfills. Retrieved from http://www.news.gov.tt/content/government-working-shut-down-landfills#.XqY54OR7mSN

Gov.tt. n.d. Cruise visitor arrivals increase in Trinidad -http://www.news.gov.tt/content/cruise-visitor-arrivals-increase-trinidad#.XqJn2OR7mSN

Grenadapts. 2015. Grenada Adapts to Climate Change. Now! Retrieved from https://www.facebook.com/permalink.php?story_fbid=368429353355952&id=235877526611136 (Available on 09 July 2020)

Grenada Solid Waste Management Authority (GSWMA). n.d.a. National Experience on Waste Statistics. Retrieved from https://unstats.un.org/unsd/envstats/meetings/2019-Grenada/documents/Session%204.5.1%20GSWMA%20National%20experience%20in%20waste%20statistics.pdf

Grenada Solid Waste Management Authority (GSWMA). n.d.b. Retrieved from http://www.gswma.com/

Group of Experts of the Regular Process. 2016. The First Global Integrated Marine Assessment: World Ocean Assessment I.

Grupo Empresarial de Reciclaje. 2020. Intereses de Trabajo del Grupo Empresarial de Reciclaja.

Haiti Liberte. 2018. Who Benefits from the Poor Management of the Truitier Landfill? Retrieved from https://haitiliberte.com/who-benefits-from-the-poor-management-of-the-truitier-landfill/

Hermawan, R., Damar, A and Hariyadi, S. 2017. Economic Impact from Plastic Debris on Selayar Island, South Sulawesi. *Jurnal Ilmu dan Teknologi Kelautan Tropis* Vol. 9, No. 1, Hlm. 327-336.

Instituto Nacional de Estadística y Geografía (INEGI). n.d. INEGI. Retrieved from https://www.inegi.org.mx/

INEGI. 2017. Anuario estadístico y geográfico de Campeche.2017. Retrieved from https://www.datatur.sectur.gob.mx/ITxEF_Docs/CAM_ANUARIO_PDF.pdf (Available on 27 May 2020)

INEGI. 2019. Censo Nacional de Gobiernos Municipales y Demarcaciones Territoriales de la Ciudad de México 2019. Retrieved from https://www.inegi.org.mx/programas/cngmd/2019/default.html#Tabulados

INEGI. n.d. Mexico en Cifras. Retrieved from https://www.inegi.org.mx/app/areasgeograficas/?ag=04 (Available on 27 May 2020)

Inter-American Development Bank (IDB). 2015 Joint Consulting with IOs. Retrieved from https://www.barbadosparliament.com/uploads/bill_resolution/897c5af66e0a60b9904b37d062499dba.p

df

Inter-American Development Bank (IDB). 2016. Solid Waste Management in Caribbean -Proceedings from the Caribbean Solid Waste Conference. Retrieved from https://publications.iadb.org/publications/english/document/Solid-Waste-Management-in-the-Caribbean-Proceedings-from-the-Caribbean-Solid-Waste-Conference.pdf (Available on 27 April 2020)

Inter-American Development Bank (IDB). 2017. Mexican Government and IDB to invest $13.7 million to improve climate change mitigation and adaptation abilities in three cities. Retrieved from https://www.iadb.org/en/news/news-releases/2017-12-07/solid-waste-energy-sanitation-cities-in-mexico%2C11999.html (Accessed on 14 May 2020)

Inter-American Development Bank (IDB). 2018. Short Sea Shipping Network and Finance Model for the Caribbean. Retrieved from https://publications.iadb.org/en/short-sea-shipping-network-and-finance-model-caribbean (Available on 27 April 2020)

Inter-American Development Bank (IDB). n.d. Retrieved from https://www.iadb.org/en/news/news-releases/2017-12-07/solid-waste-energy-sanitation-cities-in-mexico%2C11999.htm

International Union for Conservation of Nature (IUCN). n.d. Marine and Plar: Projects. Retrieved from https://www.iucn.org/theme/marine-and-polar/our-work/close-plastic-tap-programme/projects (Available on 27 May 2020)

Jamaica Environment Trust. 2016. Regulating plastic waste in Jamaica time to act. Retrieved from http://www.jamentrust.org/wp-content/uploads/2016/05/Regulating-Plastic-Waste-in-Jamaica-Time-To-Act-May-2016.pdf (Available on 28 April 2020)

Jamaica Information Service. 2020. Over 1.5 Million Cruise Passenger Arrivals In 2019. Retrieved from https://jis.gov.jm/over-1-5-million-cruise-passenger-arrivals-in-2019/

Jamaica Observer. 2015. Jamaica has dumps and not landfills. Retrieved from http://www.jamaicaobserver.com/news/jamaica-has-dumps-and-not-landfills_18633824

Jamaica Observer. 2020. NSWMA conducts surveillances, issues removal notices. Retrieved from http://www.jamaicaobserver.com/latestnews/NSWMA_conducts_surveillances,_issues_removal_notices_?profile=1228

Jamaica Social Investment Fund. 2015. Residents of St. James Encouraged to Protect Themselves from Landfill Smoke – Retrieved from https://jis.gov.jm/residents-of-st-james-encouraged-to-protect-themselves-from-landfill-smoke/ (Available on 27 April 2020)

Jamaica Social Investment Fund, 2020. NSWMA Collects Over 3,500 Pounds Of Plastic Under Pilot Project. Retrieved from https://jis.gov.jm/nswma-collects-over-3500-pounds-of-plastic-under-pilot-project/ (Available on 27 April 2020)

JICA. 2003. The Study on Solid Waste Management Plan for Municipality of Panama in the Republic of Panama.

JICA. 2014.キューバ国ハバナ市廃棄物管理向上プロジェクト　プロジェクト事業完了報告書

JICA. 2015. プロジェクト研究「小規模島嶼国における地域振興のあり方」報告書

JICA. 2017. Topics & Events. Report for the "Waste Reduction through Waste Separation, Waste Diversion and Recycling Pilot Project" FY2016 Follow-Up Cooperation Program. Retrieved from https://www.jica.go.jp/jamaica/english/office/topics/170621.html

JICA. 2018. キューバ国ハバナ市廃棄物収集車両整備能力向上支援業務　支援業務完了報告書

Juntos transformemos Yucatan. 2019. Aprueban la iniciativa del Gobernador Mauricio Vila Dosal para

eliminar bolsas y popotes de plástico y contenedores de unicel en Yucatán http://sds.yucatan.gob.mx/noticias/noticia-detalles.php?IdNoticia=593

Juntos transformemos Yucatan. 2020. Limpieza de Playas. Retrieved from http://sds.yucatan.gob.mx/noticias/noticia-detalles.php?IdNoticia=614

Juntos transformemos Yucatan. n.d. Registro Único de Control de Plásticos (RUCP). Retrieved from http://sds.yucatan.gob.mx/rucp/index.php

La Jornada Maya. 2019. Impulsa Aguakan limpieza de playas en Quintana Roo. Retrieved from https://www.lajornadamaya.mx/2019-09-18/Impulsa-Aguakan-limpieza-de-playas-en-Quintana-Roo

La Jornada Maya. 2020. Entra en vigor ley de residuos sólidos en las islas de QRoo. Retrieved from https://www.lajornadamaya.mx/2020-01-02/Entra-en-vigor-ley-de-residuos-solidos-en-las-islas-de-QRoo

Le Floridien. 2019. Gestion des déchets en Haïti : une négligence qui nous coûtera cher. Retrieved from https://www.lefloridien.com/gestion-des-dechets-en-haiti-une-negligence-qui-nous-coutera-cher/

Le Nouvelliste. 2019. Truitier, l'unique site de décharge de la région métropolitaine, est plein à craquer Retrieved from https://lenouvelliste.com/article/204912/truitier-lunique-site-de-decharge-de-la-region-metropolitaine-est-plein-a-craquer

Learning English. 2019. Bahamian Officials: Islands Still Open for Tourism. Retrieved from https://learningenglish.voanews.com/a/bahamian-officials-islands-still-open-for-tourism/5078007.html

Lee, Jeo. 2015. Economic valuation of marine litter and microplastic pollution in the marine environment: An initial assessment of the case of the United Kingdom. SOAS, University of London. Retrieved from https://www.researchgate.net/profile/Jeo_Lee3/publication/283680054_Economic_valuation_of_marine_litter_and_microplastic_pollution_in_the_marine_environment_An_initial_assessment_of_the_case_of_the_United_Kingdom/links/564328df08ae451880a31e52/Economic-valuation-of-marine-litter-and-microplastic-pollution-in-the-marine-environment-An-initial-assessment-of-the-case-of-the-United-Kingdom.pdf (Available on 30 Jun 2020)

Ley de Protección Ambiental del Estado de Tabasco. 2019. Retrieved from https://tabasco.gob.mx/leyes/descargar/0/431 (Accessed on 14 May 2020)

Ley de Protección al Medio Ambiente del Estado de Yucatán. 2019. Retrieved from http://sds.yucatan.gob.mx/archivos/marco-juridico-publicaciones-oficiales/archivos/201912132374.pdf (Accessed on 15 May 2020)

Ley para la gestión Integral de los Residuos en el Estado de Yucatán. 2019. Retrieved from http://sds.yucatan.gob.mx/archivos/marco-juridico-publicaciones-oficiales/archivos/201912132101.pdf (Accessed on 15 May 2020)

Ley para la Prevención, Gestión Integral y Economía Circular de los Residuos del Estado de Quintana Roo. 2019. Retrieved from http://documentos.congresoqroo.gob.mx/leyes/L199-XV-20190618-L1520190618337.pdf (Accessed on 15 May 2020)

Ley para la Prevención y Gestión Integral de los Residuos del Estado de Tabasco. 2019. Retrieved from https://tabasco.gob.mx/leyes/descargar/0/433 (Accessed on 14 May 2020)

L'usineNouvelle. 2019. La seule usine de recyclage des bouteilles en plastique aux Antilles liquidée. Retrieved from https://www.usinenouvelle.com/article/la-seule-usine-de-recyclage-des-bouteilles-en-plastique-aux-antilles-liquidee.N908984 (Available on 05 August 2020)

Michael, A. Maike, B. Yeniley, A.L. and Heike, T. 2018. Wasted! Resource recovery and waste management in Cuba (Hohenheim Discussion Papers in Business, Economics and Social Sciences, 2018

Ministry of Communities.n.d.a. Solid Waste Management. Retrieved from https://moc.gov.gy/solid-waste-management/

Ministry of Communities. n.d.b. Putting Waste in its place: A National Integrated Solid Waste Management Strategy for the Cooperative Republic of Guyana 2017-2030. Retrieved from https://www.chpa.gov.gy/images/PDF/GuyanaNSWMS.pdf

MEGJC. 2019. Reduction of plastic waste. Retrieved from https://megjc.gov.jm/reduction-of-plastic-waste/

Menos Plástico es Fantástico en Mahahual. n.d. Concenos Learn about us. Retrieved from https://www.menosplasticoesfantastico.com/

Meteorological service Suriname. n.d. Flash Flood Guidance Suriname. Meterological service Suriname. Retrieved from http://www.wmo.int/pages/prog/hwrp/flood/ffgs/saffg/documents/presentations/Countries/Suriname.pdf (Available on 27 April 2020)

Mexico News Daily. 2019. At 7.84 million, cruise ship passenger numbers highest in a decade. Retrieved from https://mexiconewsdaily.com/news/cruise-ship-numbers-highest-in-a-decade/

Mexico News Daily. 2019b. Recycling continues to take off but there's room for growth. Retrieved from https://mexiconewsdaily.com/news/recycling-continues-to-take-off/

Ministerio de Industrias. 2019. Política para el incremento del Reciclaje de Materias Primas. Retrieved from https://www.mindus.gob.cu/es/node/236 (Available on 03 July 2020)

Ministry of Environment and Housing. n.d. Garbage collection. Retrieved from https://eh.gov.bs/gov_initiatives/garbage-collection/

Ministry of Planning and Development. 2018. Minister Robinson-Regis' speech at the launch of Phase 2 of the iCARE Programme Retrieved from https://www.planning.gov.tt/content/minister-robinson-regis-speech-launch-phase-2-icare-programme

Ministry of the Environment of Japan. 2016. 平成27 年度 漂着ごみ対策総合検討業務　報告書. Retrieved from http://www.env.go.jp/press/files/jp/105275.pdf (Available on 27 May 2020)

MOFA. 2019a.アンティグア・バーブーダ. Retrieved from https://www.mofa.go.jp/mofaj/area/antigua/data.html#section1

MOFA. 2019b. ガイアナ共和国. Retrieved from https://www.mofa.go.jp/mofaj/area/guyana/data.html

MOFA. 2019c. グレナダ. Retrieved from https://www.mofa.go.jp/mofaj/area/grenada/data.html

MOFA. 2019d. ジャマイカ. Retrieved from https://www.mofa.go.jp/mofaj/area/jamaica/data.html

MOFA. 2019e. スリナム共和国. Retrieved from https://www.mofa.go.jp/mofaj/area/suriname/data.html

MOFA. 2019f. セントビンセント及びグレナディーン諸島. Retrieved from https://www.mofa.go.jp/mofaj/area/svg/data.html

MOFA. 2019g. セントクリストファー・ネービス. Retrieved from https://www.mofa.go.jp/mofaj/area/scn/data.html

MOFA. 2019h. セントルシア. Retrieved from https://www.mofa.go.jp/mofaj/area/s_lucia/data.html

MOFA. 2019i. ドミニカ国. Retrieved from https://www.mofa.go.jp/mofaj/area/c_dominica/data.html

MOFA. 2019j. ドミニカ共和国. Retrieved from https://www.mofa.go.jp/mofaj/area/dominican_r/data.html

MOFA. 2019k.トリニダード・トバゴ共和国. Retrieved from https://www.mofa.go.jp/mofaj/area/trinidad/data.html

MOFA. 2019l.ハイチ. Retrieved from https://www.mofa.go.jp/mofaj/area/haiti/data.html

MOFA. 2019m.バハマ. Retrieved from https://www.mofa.go.jp/mofaj/area/bahama/data.html

MOFA. 2019n.バルバドス. Retrieved from https://www.mofa.go.jp/mofaj/area/barbados/data.html

MOFA. 2019o.ベリーズ. Retrieved from https://www.mofa.go.jp/mofaj/area/belize/data.html

MOFA. 2019p. カリブ共同体（CARICOM：カリコム）概要. Retrieved from https://www.mofa.go.jp/mofaj/area/latinamerica/kikan/caricom/gaiyo.html

MOFA. 2019q. カリブ諸国連合（ACS）. Retrieved from https://www.mofa.go.jp/mofaj/la_c/crb/page23_002337.html

MOFA. 2020a. キューバ共和国. Retrieved from https://www.mofa.go.jp/mofaj/area/cuba/index.html

MOFA. 2020b. メキシコ合衆国. Retrieved from https://www.mofa.go.jp/mofaj/area/mexico/data.html.

Mouat, John, Rebeca Lopez Lozano, and Hannah Bateson. 2010. Economic Impacts of Marine Litter. KIMO

(Kommunenes Internasjonale Miljøorganisasjon).

Nadar Contra El Plastico. n.d. Las Limpiezas. Retrieved from https://mexico.swimagainstplastic.com/es/las-limpiezas/

National Disaster Management Advisory Council (NaDMAC) & National Disaster Management Agency of Grenada (NaDMA). 2015. National Disaster Plan. Retrieved from https://www.mgovernance.net/sites/default/files/docs/Documents/nadma/national_disaster_plan.pdf (Available on 27 April 2020)

Natacha C. M., Fernando C. C., Johanna K., Detlef L. 2015. A Unique Approach for Sustainable Energy in

Trinidad and Tobago. Inter-American Development Bank.

National Environment and Planning Agency (NEPA).n.d. Role of the Parish Councils & The KSAC in Local Sustainable Development and Environmental Management. Retrieved from https://www.nepa.gov.jm/symposia_03/Policies/RoleofLAinEnvironmentalManagement.pdf (Available on 27 April 2020)

National Oceanic and Atmospheric Administration (NOAA). n.d. Retrieved from https://coast.noaa.gov/hurricanes/#map

National Solid Waste Management Authority (NSWMA). n.d. Map of disposal site. Retrieved from http://www.nswma.gov.jm/collection-schedule/ (Available on 27 April 2020)

Nava Fuentes, Juan Carlos & Granados, P. & Martins, Filomena. 2018. Integrated coastal management in Campeche, Mexico; a review after the Mexican marine and coastal national policy. Ocean and Coastal Management. 154. 34-45. 10.1016/j.ocecoaman.2017.12.029. Retrieved from https://www.researchgate.net/publication/322556854_Integrated_coastal_management_in_Campeche_Mexico_a_review_after_the_Mexican_marine_and_coastal_national_policy

NEPA. 2020 Jamaica Beach Guide. Retrieved from https://www.nepa.gov.jm/new/services_products/subsites/beach_guide/adopt.php

NEPA. n.d. Plastic Waste Minimization Project. Retrieved from https://www.nepa.gov.jm/new/projects/docs/Project_Information_Plastic_Project.pdf (Available on 28 April 2020)

Nevis Island Administration. 2014. American-based Omni Alpha promises Waste to Energy Plant on Nevis by late 2015 Retrieved from https://nia.gov.kn/american-based-omni-alpha-promises-waste-to-energy-plant-on-nevis-by-late-2015/

Norwegian Government. 2020. https://www.regjeringen.no/globalassets/departementene/ud/vedlegg/hav/marin_litter_table.pdf (Available on 09 July 2020)

Ocean conservancy. 2019. The beach and beyond.

OWT & C. 2019. Aanpak Vuilstortplaats Ornamibo in volle gang. Retrieved from http://publicworks.gov.sr/actueel/2019/aanpak-vuilstortplaats-ornamibo-in-volle-gang/

PEPGIR-Ver. n.d. Programa Estatal para la Prevención y Gestión Integral de los Residuos Sólidos Urbanos y de Manejo Especial del Estado de Veracruz. Retrieved from https://www.gob.mx/cms/uploads/attachment/file/187445/Veracruz.pdf (Accessed on 14 May 2020)

Plan Estatal de Desarrollo (PED) Quintana Roo 2016-2022. Retrieved from https://qroo.gob.mx/ped (Accessed on 15 May 2020)

Plastic Oceans International. 2018. World Oceans Day Beach Cleanup: Veracruz, Mexico. Retrieved from https://plasticoceans.org/event/world-oceans-day-beach-cleanup-veracruz-mexico/ (Accessed on 14 May 2020)

Programa Estatal para la Prevención y Gestión Integral de los Residuos en el Estado de Quintana Roo, 2009-2011. Retrieved from https://www.gob.mx/cms/uploads/attachment/file/187443/Quintana_Roo.pdf (Accessed on 15 May 2020)

Qoo.gob.mx. 2018. Pacto de Quintana Roo por un océano limpio. Retrieved from https://qroo.gob.mx/sema/pacto-de-quintana-roo-por-un-oceano-limpio

RAC-REMPEITC Carib. 2018. Regional Activity Centre/Regional Marine Pollution Emergency Information and Training Centre – Wider Caribbean Region.

Radio Jamaica News. 2020. Jamaica to get update to divestment of Riverton City dump soon – McKenzie Retrieved from http://radiojamaicanewsonline.com/local/jamaica-to-get-update-on-divestment-of-riverton-city-dump-soon-mckenzie (Available on 08 July 2020)

Reglamento de la Ley del Equilibrio Ecológico y Protección al Ambiente del Estado de Campeche. 2000. Retrieved from http://legismex.mty.itesm.mx/estados/ley-camp/CAMP-R-LeyEquiEcoProtAmb2000_08.pdf (Accessed on 13 May 2020)

Reglamento de la Ley de Protección al Medio Ambiente del Estado de Yucatán. 2018. Retrieved from http://sds.yucatan.gob.mx/archivos/marco-juridico-publicaciones-oficiales/archivos/201912130204.pdf (Accessed on 15 May 2020)

Reglamento de la ley Para la Gestión Integral de los Residuos en el Estado de Yucatán. 2020. Retrieved from http://sds.yucatan.gob.mx/archivos/marco-juridico-publicaciones-oficiales/archivos/202003052861.pdf (Accessed on 15 May 2020)

Reglamento de la Ley para la Prevención y Gestión Integral de los Residuos, del Estado de Tabasco. 2019. Retrieved from https://tabasco.gob.mx/leyes/descargar/1/1010 (Accessed on 14 May 2020)

Resources & Waste Advisory Group. 2020. Cooks Landfill Site Antigua. Retrieved from https://www.youtube.com/watch?v=a_GPd4LHixc

Reuters. 2009. Mega-ship, mountain fort could boost Haiti tourism. Retrieved from https://www.reuters.com/article/us-haiti-tourism/mega-ship-mountain-fort-could-boost-haiti-tourism-idUSTRE5950F220091006

Saint Lucia Solid Waste Management Authority (SLSWMA). 2015. Annual Report 2014-2015. Retrieved from https://www.sluswma.org/wp-content/uploads/2020/03/operations-report-2014-2015.pdf (Available on 27 April 2020)

Saint Lucia Solid Waste Management Authority (SLSWMA). n.d. SLSWMA. Retrieved from https://www.sluswma.org/#Deglos1

Sakurai. 2016. 大洋州島嶼国廃棄物管理分野での日本の協力J-PRISM (特集 太平洋島嶼国の持続的開発と国際関係). 日本貿易振興機構（ジェトロ）アジア経済研究所. アジ研ワールド・トレンド. 244. 32-35.

Searchlight, 2019. SVG to put an end to single use plastic shopping bags. Retrieved from https://searchlight.vc/searchlight/front-page/2019/11/29/svg-to-put-an-end-to-single-use-plastic-shopping-bags/

Secretaría de Desarrollo Sustentable del Gobierno del Estado de Yucatán. N/Aa. Yucatán Cero Residuos. http://sds.yucatan.gob.mx/yucatan-cero-residuos/ (Accessed on 15 May 2020)

Secretaría de Desarrollo Urbano y Medio Ambiente. n.d.a. Programa Estatal para la Prevención y Gestión Integral de Residuos en Tamaulipas. Retrieved from https://www.gob.mx/cms/uploads/attachment/file/187446/Tamaulipas.pdf (Accessed on 13 May 2020)

Secretaría de Desarrollo Urbano y Medio Ambiente. n.d.b. Programa Estatal para la Prevención y Gestión Integral de Residuos 2009-2012. Retrieved from https://www.gob.mx/cms/uploads/attachment/file/187447/Yucatan.pdf (Accessed on 15 May 2020)

Secretaria del Medio Ambiente. n.d. Programa de Gestion Integral de Residuos Solidos. Retrieved from https://www.sedema.cdmx.gob.mx/storage/app/media/programas/residuos-solidos/pgirs.pdf (Available on 27 April 2020)

SEMA. 2017. Concluyen El Saneamiento Del Relleno Sanitario De Othón P. Blanco. Retrieved from https://www.qroo.gob.mx/sema/concluyen-el-saneamiento-del-relleno-sanitario-de-othon-p-blanco (Accessed on 15 May 2020)

SEMARNAT. 2017. Residuos Sólidos Urbanos (RSU) Retrieved from https://www.gob.mx/semarnat/acciones-y-programas/residuos-solidos-urbanos-rsu (Available on 07 July 2020)

SICA. 2019. Acta Final de las Negociaciones sobre la Cooperación para el Desarrollo entre el Sistema de la Integración Centroamericana (SICA), el Banco Centroamericano de la Integración Económica (BCIE) y el Gobierno de la República Federal de Alemania. Retrieved from https://www.sica.int/documentos/acta-final-de-las-negociaciones-sobre-la-cooperacion-para-el-desarrollo-entre-el-sistema-de-la-integracion-centroamericana-sica-el-banco-centroamericano-de-la-integracion-economica-bcie-y-el-gobierno-de-la-republica-federal-de-alemania_1_118665.html (Available on 31 July 2020)

SKN News. 2019. Brantley supports petition to ban single-use plastics in St. Kitts-Nevis. Retrieved from https://sknnews.com/saint-kitts-nevis/brantley-supports-petition-ban-single-use-plastics-st-kitts-nevis-22241803/

SLHTA. n.d. Replacing “single use” plastics In Caribbean Hospitality. Retrieved from http://gefmarineplastics.org/resolveuid/aa69bdad-818d-4f64-92d4-d8da5780015e

St. Kitts Solid Waste Management Corporation. n.d. Waste Matter. Retrieved from https://www.stkittsswmc.com/

St Kitts & Nevis Obeserver. 2019 Government Considers Ban of Single Use Plastics. Retrieved from https://www.thestkittsnevisobserver.com/government-considers-ban-of-single-use-plastics/

St. Lucia News Online. 2019a. Plastic recycling project launches in Saint Lucia. Retrieved from https://www.stlucianewsonline.com/plastic-recycling-project-launches-in-saint-lucia/

St. Lucia News Online. 2019b. Vieux Fort landfill closes. Retrieved from https://www.stlucianewsonline.com/vieux-fort-landfill-closes/

St. Vincent and the Grenadines. 2019. Sixth National Report to the convention on biological diversity. Retrieved from https://www.cbd.int/doc/nr/nr-06/vc-nr-06-en.pdf (Available on 27 April 2020)

Statista. n.d. Number of cruise passenger visitors to Cuba from 2012 to 2017 (in 1,000s) Retrieved from https://www.statista.com/statistics/915643/number-cruise-passenger-visitors-cuba/

Stichting SuReSur, 2019. World Clean Up Day 2019. Retrieved from http://suresur.green/world-clean-up-day-2019/

Suriname Herald, 2019. Voedselindustrie moet binnen zes maanden overstap doen naar biobased material. Retrieved from https://www.srherald.com/suriname/2019/05/31/voedselindustrie-moet-binnen-zes-maanden-overstap-doen-naar-biobased-materiaal/

SusGren, n.d. Sustainable Grenadines. Retrieved from http://www.susgren.org/

The daily Observer. 2017. Record breaking cruise arrivals by year end. Retrieved from https://antiguaobserver.com/record-breaking-cruise-arrivals-by-year-end/

The department of Emergency Management. n.d. Flood Safety. Retrieved from http://dem.gov.bb/public/downloads/floodSafety.pdf (Available on 27 April 2020)

The Economic Times. 2020. Hong Kong’s got a face mask problem. Retrieved from https://economictimes.indiatimes.com/news/international/world-news/hong-kongs-got-a-face-mask-problem/washed-up/slideshow/76297141.cms (Available on 06 July 2020)

The Gleaner, 2020. Recycling company Now offering $ 10 For Plastic Bottles. Retrieved from http://jamaica-gleaner.com/article/news/20200116/recycling-company-now-offering-10-plastic-bottles

The Global Plastic Action Partnership. n.d. A world without plastic waste and pollution is possible. Retrieved from https://globalplasticaction.org/ (Available on 27 May 2020)

The Government of the Bahamas. 2017. Minister Ferreira visits New Providence Landfill. https://www.bahamas.gov.bs/wps/portal/public/gov/government/news/minister%20ferreira%20visits%20new%20providence%20landfill

The Government of Saint Lucia (GoSL). 2019. Environmental & Social Management framework (ESMF) for the Saint Lucia Health System Strengthening Project (P166783) Revised Final Version. Retrieved from http://www.govt.lc/media.govt.lc/www/pressroom/news/attachments/slu-hssp-esmf-july-1st-2019-1.pdf (Available on 27 April 2020)

The Guardian. 2020. 'More masks than jellyfish': coronavirus waste ends up in ocean. Retrieved from https://www.theguardian.com/environment/2020/jun/08/more-masks-than-jellyfish-coronavirus-waste-ends-up-in-ocean (Available on 06 July 2020)

The Planetary Press. 2019. Antigua and Barbuda, Trinidad and Tobago, and Paraguay Join Battle

Against Marine Plastic Pollution. Retrieved from https://www.theplanetarypress.com/2019/03/antigua-and-barbuda-trinidad-and-tobago-and-paraguay-join-battle-against-marine-plastic-pollution/

The Saint Christopher and Nevis Solid Waste Management Corporation. 2020. Retrieved from https://www.stkittsswmc.com/news-events/

The Yucatan Times. 2017. Recycling is a big business in Yucatan. Retrieved from https://www.theyucatantimes.com/2017/11/recycling-is-a-big-business-in-yucatan/ (Accessed on 15 May 2020)

The Voice. 2017. Garbage is Everyone's Problem. Retrieved from https://www.thevoiceslu.com/2017/11/garbage-everyones-problem/ (Available on 12 August 2020)

The Voice. 2016. SLHTA calls for Action on Plastic Waste. Retrieved from https://www.thevoiceslu.com/2016/04/slhta-calls-action-plastic-waste/ (Available on 12 August 2020)

Travel Agent Central. 2018. Stats: St. Kitts Passes 1 Million Cruise Passengers. Retrieved from https://www.travelagentcentral.com/destinations/stats-st-kitts-passes-1-million-cruise-passengers

Travel Agent Central. 2019. Stats: St. Lucia Records Over 1.2 Million Visitors in 2018. Retrieved from https://www.travelagentcentral.com/destinations/stats-st-lucia-records-over-1-2-million-visitors-2018

Trinidad & Tobago Solid Waste Management Company Limited. n.d. Waste Management Topic Waste Management and Recycling. Retrieved from https://www.swmcol.co.tt/index.php/education/7-waste-management-topics

UN. 2016. Oceans and the law of the sea: Report of the Secretary-General. Retrieved from https://undocs.org/A/71/74 (Available on 27 May 2020)

UN. 2020. Goal 14: Conserve and sustainably use the oceans, seas and marine resources. Retrieved from https://www.un.org/sustainabledevelopment/oceans/ (Available on 03 July 2020)

UN. n.d. Trash Free Waters – International. Retrieved from https://oceanconference.un.org/commitments/?id=16222

UNEP, Stockholm Convention, UNIDO and gef. 2019. National Implementation Plan (NIP) Update for the Stockholm Convention on Persistent Organic Pollutants (POPs) for Suriname.

UNEP. n.d.a. National Programmes for Ation for Pollution Prevention. Retrieved from https://www.unenvironment.org/cep/national-programmes-action-pollution-prevention

UNEP. n.d.b. What is our Pollution or LBS Protocol? Retrieved from http://cep.unep.org/cartagena-convention/lbs-protocol/protocol-concerning-pollution-from-land-based-sources-and-activities

UNEP. 2014. Regional Action Plan on Marine Litter Management (RAPMaLi) for the wider Caribbean Region.

UNEP. 2016. GEO-6: Regional assessment for Latin America and the Caribbean. Retrieved from https://www.unenvironment.org/resources/assessment/geo-6-regional-assessment-latin-america-and-caribbean (Available on 30 June 2020)

UNEP. 2018a. Legal limits on single-use plastics and microplastics. Retrieved from https://www.unenvironment.org/resources/report/legal-limits-single-use-plastics-and-microplastics

UNEP. 2018b. Mapping of global plastics value chain and plastics losses to the environment – with a particular focus on marine environment. Retrieved from https://gefmarineplastics.org/files/2018%20Mapping%20of%20global%20plastics%20value%20chain%20and%20hotspots%20-%20final%20version%20r181023.pdf

UNEP. 2018c. Single-Use Plastics: A Roadmap for Sustainability. Retrieved from

https://www.unenvironment.org/ietc/ja/node/53?%2Fresources%2Fpublication%2Fsingle-use-plastics-roadmap-sustainability=

UNEP. 2020a. Mexico city, a megapolis' war on plastic bags. Retrieved from https://www.unenvironment.org/news-and-stories/story/mexico-city-megalopolis-war-plastic-bags (Available on 27 May 2020)

UNEP. 2020b. Report: Consumers and business concerned about plastic waste but expect governments to do more. Retrieved from https://www.unenvironment.org/news-and-stories/press-release/report-consumers-and-business-concerned-about-plastic-waste-expect (Available on 06 July 2020)

Unicef. 2019. Children Uprooted in the Caribbean.

UNITE Caribbean. n.d. RePlast (Pilot Recycling plastic project – OECS) Retrieved from https://unite-caribbean.com/en/project/replast-pilot-recycling-plastic-project-oecs-18

UN-OHRLLS. 2015. Small Island Developing States in Numbers - Climate Change Edition 2015

Usfnews. 2019. Volunteers Clean Up Cockleshell Beach on Southeast Peninsula. Retrieved from https://usf.news/the-americas/the-caribbean/st-kitts-and-nevis/volunteers-clean-up-cockleshell-beach-on-southeast-peninsula/

Verdict Media Limited. 2018. Charting a fresh course for Barbados' cruise sector. Retrieved from https://www.ship-technology.com/features/barbados-cruise-trends-crisis/

World Bank Group. 2019. Marine Pollution in the Caribbean: Not a minute to waste

World Bank Group. 2020. Saint Lucia Health System Strengthening Project. Retrieved from https://projects.worldbank.org/en/projects-operations/project-detail/P166783

World Bank Group. N.A. What a Waste2.0. Retrieved from http://datatopics.worldbank.org/what-a-waste/

World Economic Forum. 2020. Protector or polluter? The impact of COVID-19 on the movement to end plastic waste. Retrieved from https://www.weforum.org/agenda/2020/05/plastic-pollution-waste-pandemic-covid19-coronavirus-recycling-sustainability/ (Available on 06 July 2020)

World Travel & Tourism Council (WTTC). 2018. 2019 Annual Research: Key Highlights.

WTXL, 2018. 520 tons of rubbish collected from beach in Dominican Republic. Retrieved from https://www.wtxl.com/news/tons-of-rubbish-collected-from-beach-in-dominican-republic/article_8fa45f08-8e00-11e8-b00e-271662745368.html

Xpicob. n.d. Limpieza de playas. Retrieved from https://www.xpicobcampeche.com/inicio/programas-y-proyectos/limpieza-de-playas/ (Accessed on 13 May 2020)

Appendix

Contents

Appendix 1 Length of the coastline of the six Mexican states facing the Caribbean Sea

State	Coastline (km)
04 Quintana Roo	1,176
12 Yucatán	340
10 Campeche	425
16 Tabasco	200
05 Veracruz	720
09 Tamaulipas	433
subtotal	3,294

Source: https://www.paratodomexico.com/geografia-de-mexico/litorales-de-mexico.html

Appendix 2 Answers to the questionnaire in the in-depth survey

1） Grenada

Current Situation of Solid Waste Management (SWM) and Marine Plastic Litter (MPL) in Grenada

Respondent: Ms. Myrna Julien
Position: Senior Public Relations Officer
Organization: Grenada Solid Waste Management Authority

A. Basic Information:

Item	Contents
Population	110,000 (Ministry of Finance Statistical Dept., 2010)
Population growth (annual %)	2.3% (Ministry of Finance Statistical Dept., 2010)
Urban population	3,100 (National Census report. Ministry of Finance Statistical Dept., 2010)
Population density (people/km2)	306.80 (National Census report. Ministry of Finance Statistical Dept., 2010)
Average national rainfall (millimetres/year)	979.3 (Point Salines Meteorological services)
Annual frequency of hurricanes (times/year)	Grenada not considered in the Hurricane Belt. Last Hurricane 2005

B. SWM Data:

Item	Contents
Waste generation amount (tons/day)	126.319 obtained by weighbridge data at Perseverance Landfill (Annual Report GSWMA, 2018)
Waste generation rate (kg/person/day)	1.9 (National Waste Management Strategy Review for Grenada, 2019. WACS was done by WSP, the Canadian consulting company with the financial support of Caribbean Development Bank)
Plastic waste generation amount (tons/day)	19 tons/day 7,134 tons/year (National Waste Management Strategy Review for Grenada, 2019)
Waste collection amount (tons/day)	126.31 (Annual Report GSWMA, 2018)
Waste collection coverage (%)	98% as a percentage of population (Annual Report GSWMA, 2018)
Recycling rate (%)	N/A
Recycling rate of plastic materials (%)	N/A
Final disposal amount (tons/day)	N/A
Waste composition (%)	Organic waste - 25.3% Hazardous Waste - 2.5% Paper board/Cardboard - 13.9% Special Waste* - 5% Glass 7.7% Refundable Glass 1.9% Construction and demolition waste 3.8% Non-ferrous metals 2.0% Hard Plastics 10.7% Soft Plastics 3.7% Textiles 6.2% E-waste 3.7% White goods 0.2% Non-recyclable non hazardous waste 7.2% (National Waste Management Strategy Review for Grenada, 2019)

*Special waste: waste from cruise ship.

C. Current Situation of SWM and MPL:

Item	Contents
1. Legal system	● Grenada Solid Waste Management Authority Act #11 1995 ● The Waste Management Act 2001: stipulates the definition of each type of waste. ● The Abatement of Litter Act #24 2015 ● The Environmental Levy Act 1997 ● The Physical Planning and Development Control Act#25 of 2002 ● The Non-Biodegradable Waste Control Act 2018
2. Policy/plan	● National Waste Management Strategy 2002- Under review
3. Implementation system	● Grenada Solid Waste Management Authority (GSWMA): responsible for facilities for SWM, waste collection, and street and beach cleaning. ● Ministry of Communication and Works: responsible for maintenance of drains. ● Ministry of Agriculture, Lands, Forestry, Fisheries and the Environment: Fishery Department is responsible for designation of marine protected area. In the Waste Management Act 2001, people can be charged if they dump waste into these areas. Marine cadets under this department are responsible for patrolling these illegal activities. Department of Environment is responsible for legislation dealing with marine plastics such as the Non-Biodegradable Waste Control Act. ● Environmental Health Department of Ministry of Health: Environmental health officers are in charge of enforcement of relevant legislation under the department. Royal Grenada Police Force: Enforcement in general.
4. Technical system	
Collection and transportation	● Waste from household: The GSWMA has contracted the services of eight private companies to provide garbage collection service in 8 Collection Zones throughout Grenada, Carriacou and Petit Martinique. - Every household gets twice per week curbside collection service in the sparsely populated communities, whereas in the densely populated areas of the south, garbage is collected every day for residents along the main roads and three times per week in minor roads. Some communal bins are stationed at areas that cannot be accessed by collection teams. - Every household is entitled to the collection of 3 bulky items (furniture, appliances, e-waste etc.) for free per month through special collection service. ● Waste from commercial area: All Towns are provided with a daily collection service for small businesses, stores, fresh markets and food stands. The two major towns of St. George and Grenville are provided with twice daily collection service. ● Separated collection system: There is no separation of residential waste currently in Grenada, as there are no recycling initiatives. Only the metal waste, tires and cardboard boxes from businesses arrive at the landfill separated through private collection company. Glass bottles which are refundable do not enter the waste stream but are retrieved by the respective beverage manufacturers/importers. Construction companies are required to transport construction and demolition waste by themselves to the disposal site. Shipping companies are required to make their own arrangement with private waste hauler to dispose waste generated on their vessels into the disposal site. ● Number of collection vehicles: There are 14 collection and street cleaning companies working in 6 cities (St. George, Grenville, Gouyave, Sauteurs, Victoria, and Hillsborough in Carriacou). Collectively, our contractors own 32 compactor trucks serving the three islands (30 for main island,

Item	Contents
	2 for Carriacou), 9 tipper trucks for heavy items and 1 boat for transportation of waste from Petit Martinique to Carriacou. They are all functional. ● The Main GSWMA has one Compactor Truck and 2 tipper trucks and 1 skip truck. They are all functional. ● There are 4 independent private waste haulage companies who operate 3 Compactor trucks, 4 Skip Trucks and an undisclosed number of tipper trucks.  Grenada Solid Waste Management Authority Compactor Truck at Perseverance Landfill.  Garbage collection by Rainbow Janitorial Services. South St. George  Skip Truck operated by GSWMA  Compactor Fleet of one Company contracted by GSWMA for the provision of residential collection service. Fleet in the process of being upgraded to new trucks. (Southern Waste Management Services Ltd)
Intermediate treatment	● Plastic pelletizing machine: the project will be launched on July 28th, 2020 in Carriacou island. ● One metal baler is owned by GSWMA. Informal sector brings metals (iron, aluminum, copper, zinc roofing, vehicles, appliances etc.) to landfill site and GSWMA make a bale at the cost of 7 USD/bale to ship to Trinidad. ● Composting facilities: GSWMA has given intensive composting trainings to school (under the Environmentally Friendly School Initiative), various institutions, hotel ground staff, prisoners, Homes for the Elderly, and Farmers Organization. The Farmers Organization is currently trying to expand their unit (windrow type) to a larger commercial scale with the assistance of Ministry of Agriculture and GIZ (GIZ donated

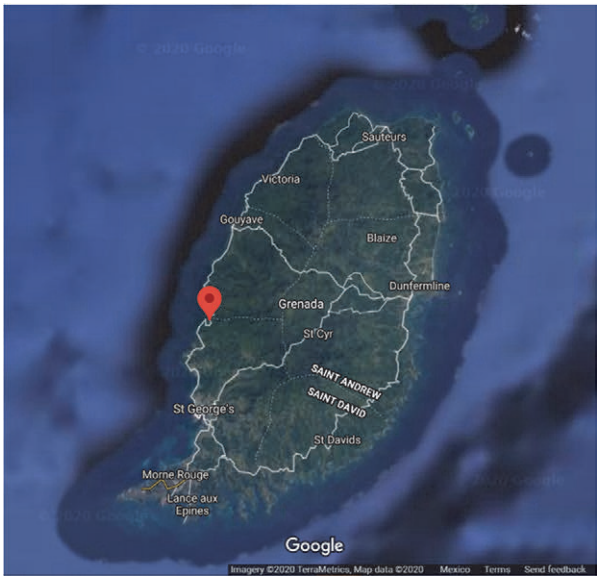
Item	Contents
	3 wood chippers), and seeking for the financial assistance of 200,000USD for composting unit (closed type), waste storage, packaging facility, and washrooms etc. ● Large industrial wood chipper is owned by GSWMA to chip the logs brought into the landfill site. GSWMA also provides the service for chipping woods from land clearance for construction.
Final disposal	● There is one Landfill called Perseverance in Grenada. However, the two active cells are being operated as an open dump with no daily covering. The GSWMA currently is constructing a new semi-aerobic landfill which will use the Fukuoka method of landfilling. This construction is currently underway and is due for completion in May 2021. The current cell being developed will have a life expectancy of 5 years. 1) Owner: GSWMA, 2) Location: N12.10885 W61.74576, 3) Area: 17 Acres, 4) Waste disposal amount: avg. 126.3197 tons per day, 5) Data source: obtained by weighbridge, 6) Installed facility: weighbridge, fence, tire shredder, wood shredder, metal baler, and hazardous waste storage, 7) Operation in practice: compaction of waste but no covering with soil ● The Authority has an open dump at Perseverance which has been used for 50 years but currently on fire for the past 5 months from January 2020 and not being used. Coordinates: N12.0623.3 W61.44506 Area: 11 acres ● There is one landfill in Carriacou. Anaerobic landfilling method is used. 1) Owner: GSWMA, 2) Location: N12.463229 W61.457882 3) Area: 10.87 Acres, 4) Waste disposal amount: Approximately 5 tons per day, 5) Data source: no weighbridge, estimated by multiplying collection truck's capacity and number of trips. 6) Installed facility: used to have litter fence but blown off by strong wind, therefore currently lots of plastic waste in landfill entering to drainage system and washed out into the sea. That is why the Carriacou was chosen as the pilot site for plastic pelletizing project. 7) Operation in practice: compaction of waste but no covering with soil  Tractor compacting waste at Perseverance Landfill, Grenada

Item	Contents
	 Extinguishing Fire at 11 acre Perseverance Open disposal site.  Private waste hauler tipping waste at Perseverance landfill, Grenada.  Carriacou Landfill cell. Currently covered and new cells have been developed.
5. Financial system	● Ratio of SWM budget allocated within national budget: There is no budgetary allocations for waste management in Grenada. ● Main source of SWM costs: Waste Management is financed by the Environmental Levy which is collected by the following means: a. Householders - Through electricity consumption - agent of collection is the Grenada Electricity Company. b. Cruise Passengers - Passenger head tax payable through cruise companies. c. Stay-over visitors head tax- Paid by Airlines - Agent is Grenada Airports Authority. d. Import levy - on goods, vehicles, appliances etc. - Agent is Customs and Excise department. All of these levies and paid directly to the GSWMA by the agents. ● Cost required for collection/transportation: N/A ● Cost required for intermediate treatment: N/A ● Cost required for final disposal: N/A
6. Donor support	● Caribbean Development Bank - Integrated Solid Waste Management Project for Grenada 2016 – 2021, budget for landfill project is 10.08 million USD.
7. Social consideration	● As part of the Integrated Solid Waste Management Project for Grenada, the GSWMA will give consideration to formalizing the practice of waste picking on the landfill. A waste pickers facility including shower room and appropriate equipment for waste pickers will be constructed as part of the project so as to regulate the operations of pickers to avoid unhealthy scavenging. ● The Authority is currently financing salaries for beach cleaners on the eastern shoreline

Item	Contents
	who are community groups engaged in the removal of Sargassom seaweed from coastal areas. ● Policy or law for supporting the informal sector: N/A ● Public awareness raising activities: The GSWMA has a sustained public awareness and education programme. This involves the extensive use of electronic and social media, school initiatives including in-house and public education, promotion of organic waste composting, identification of challenges and interventions, Beach adoptions & adoption of public places, community activities, collaborations and regular staged activities and promotions.
8. MPL issues	● Issues associated with Marine Plastic litter include the following: a. Discarding of waste on land in rivers and streams and waste is washed out to sea when it rains. b. Littering in drains in towns. When it rains, the low-lying towns become flooded and the waste is washed out to sea. E.g. Grenville, St. George and Grenville. c. Beach festivals and Marine recreation activities also contribute extensively to beach littering and contribute significantly to MPL. d. There is no implementation of the waste management act or the abatement of litter act, which can help to curb the problems of littering, improper waste disposal and pollution.  Plastic litter at the mouth of the Charlott River, in Gouyave St. John's.  Plastic Bottles in drain in Victoria, St. Marks about to enter the sea.  A beach Cleaner carts away beach waste including ropes and plastic bottles

Item	Contents
	Hundreds of plastic bottles among waste brought ashore after heavy tides 
9. Areas for improvement	● Public awareness: although GSWMA has been putting so much effort in public education, it is lacking tools for editing, equipment for printing, manpower (there are only 2 staff in Public Relation Department), and dissemination of message is quite costly. ● Implementation of legislation: legislations are in place but getting assistance from enforcement agencies (Police Force and Environmental Health Department of Ministry of Health) is difficult due to lack of manpower. ● Clean-up operations: GSWMA is only responsible for the town area but other coastal areas are left out for cleaning. ● Installation of litter bins in towns and recreational beach areas to help prevent people from littering. Some litter bins were already installed in main beaches and will be installed in more areas soon. ● Regulations governing marine sports/entertainment activities/festivals. These activities tend to produce a lot of plastic waste, especially beverage bottles, and venders are required to be responsible for collecting their waste, but the spectator is a challenge.
10. Other candidates for interview	● Aria St. Louis, Ministry of Environment - aristlouis1@gmail.com ● Andre Worme, Chief Environmental Health Officer in the Ministry of Health - amworme@hotmail.com. ● Dr. Spencer Thomas,Architect of Grenada's NDC (Nationally determined contributions) sthomas@ectel.int

Map of Grenada



Perseverance Landfill in Grenada

The following photos were provided by Myrna Julien after interview.

Official opening of Carriacou Plastic Recycling

Carriacou Plastic Project

Petit Martinique

Petit Martinique

Shipping waste from Petit Martinique **to Carriacou**

Shipping waste from Petit Martinique to Carriacou

	
Biogas in prison	Biogas in prison
	
Biogas in prison	Biogas in prison

２）Saint Christopher and Nevis

Current Situation of Marine Plastic Litter (MPL) in Saint Christopher and Nevis

Respondent: Mr. Eavin L. Parry
Position: Environmental Scientist
Organization: Department of Environment, Ministry of Environment and Cooperatives

Item	Contents
1. Legal system	• The Solid Waste Management Act, 2009 is the principle Act for the management of solid waste in St. Kitts and Nevis. The Litter Abatement Act provides for the prohibition on disposal of litter as well as for transportation and unreasonable accumulation of litter on premise or in public areas. • Section VII (30) of the National Conservation and Environmental Protection Act of 1987 (NCEPA) prohibits persons from polluting the coastal zone by depositing sewage, solid waste, garage oil, or other waste in any place in the coastal zone'. • Fisheries, Aquaculture and Marine Resources Act, 2016 (Act No. 1 of 2016) • The Public Health Act • Under the Cartagena Convention for the Protection and Development of the Marine Environment of the Wider Caribbean, contracting parties are obligated to take appropriate measures to prevent, reduce or control pollution form activities such as dumping, land-based sources, ocean activities, ships, and airborne pollutants. Although not yet a signatory to the Land Based Sources of Marine Pollution Protocol, St. Kitts and Nevis are guided by the provisions outlined with regard to protection of the marine zones form land-based pollution sources. It is envisaged that St. Kitts and Nevis will proceed to signing on to the LBS protocol within the near future. • The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. Annex V of MARPOL prohibits ocean dumping of ship generated plastics and regulates dumping of other garbage.
2. Policy/plan	• The National Biodiversity Strategy and Action Plan • The 6th National Report to the CBD • The St. Georges Declaration of Principles for Environmental Sustainability in the OECS makes provisions under Goal 3 (Principle 10 – Prevent and control pollution and management of waste.
3. Implementation system	Key Institutions with Responsibility: • Department of Environment • The Solid Waste Management Corporation (SWMC) • Department of Marine Resources • The Environmental Health Department
4. Donor support	NONE
5. MPL issues	Issues: • Marine plastic litter plastic represents a crucial component of solid waste found in the coastal environment of St. Kitts and Nevis. Plastic is resistant to degradation relative to other forms of solid waste, remaining in the environment for years. Data from beach and coastal clean-ups conducted in St. Kitts and Nevis over the last ten (10) years indicate that plastic beverage bottles alone amount to almost 30 percent of the items recorded. When other common plastic items are counted, 40 percent of all items are single-use plastic. Good Practices: • As part of the efforts to reduce marine litter, St. Kitts and Nevis has joined the global

Item	Contents
	movement to adopt education campaigns, public awareness, and is in the early stages considering new legislation to reduce persistent marine litter items. St. Kitts and Nevis is moving with the regional trend in the fight against plastic pollution; the country is formulating a banned on the use of litter such as single-use plastic bags and Styrofoam. St. Kitts and Nevis remains cognizant that managing and planning for the prevention and abatement of plastic waste will accrue benefits from a cleaner environment which can in turn improve international investment, tourism, and economic growth. • St. Kitts and Nevis like most other countries has been participating in the Annual International Coastal Cleanup Campaign against marine litter. Additionally, a number of coastal cleanup activities takes place throughout the year, including with the assistance of the 'Clean Seas Campaign'.
6. Areas for improvement	

3）Saint Lucia

Current Situation of Solid Waste Management (SWM) and Marine Plastic Litter (MPL) in Saint Lucia

Respondent: Mrs. Emlyn Jean, Information & Communication Manager
Mrs. Cristal K Smith-Peter, Weighbridge Attendant
Organization: Saint Lucia Solid Waste Management Authority

A. Basic Information:

Item	Contents
Population	179,995 (2019 midyear estimate provisional) - **Department of Statistics**
Population growth (annual %)	0.73% (2018-2019 growth rate) - **Department of Statistics**
Urban population	34,990 - **Department of Statistics** (Includes urban center and peripheral only available for 2010)
Population density (people/km2)	292.2 - **Department of Statistics**
Average national rainfall (millimeters/year)	Average Rainfall I based on the 30 year climatological mean from 1981 to 2010. In Saint Lucia average rainfall is sectioned into two parts because there are two monitoring stations: Hewanorra International Airport - 1491.9 millimeters George FL Charles Airport - 1900.2 - **Saint Lucia Meteorological Service**
Annual frequency of hurricanes (times/year)	Less than 1% per year (not any adverse impact) - **Saint Lucia Meteorological Service**

B. SWM Data:

Item	Contents
Waste generation amount (tons/day)	216 tons (average data from weighbridge in Deglos Sanitary Landfill and in Vieux-Fort Solid Waste Management Facility, which includes all types of waste such as construction & demolition, green, hotel as well as municipal solid waste, 2019)
Waste generation rate (kg/person/day)	1.2 kg per/person/day (above total waste generation amount divided by population)
Plastic waste generation amount (tons/day)	N/A (not measured)
Waste collection amount (tons/day)	Household waste accounts for 90.95 tons/day out of total waste generation amount (Weighbridge data, 2019)
Waste collection coverage (%)	100% for residential waste
Recycling rate (%)	N/A
Recycling rate of plastic materials (%)	N/A
Final disposal amount (tons/day)	215 tons (average, 2019). This is a reflection of both sites Vieux-Fort Solid Waste Management Facility and Deglos Sanitary Landfill.
Waste composition (%)	WACS has been done by SLSWMA in Gros Islet (urban collection zone) and Anse La Raya/Canaries (rural collection zone) in 2018[1].

[1] https://www.sluswma.org/

Item	Contents
	<table><tr><th>Component</th><th>Percent</th><th>Waste Quantity (tons)</th></tr><tr><td>Paper & Paperboard</td><td>12</td><td>53</td></tr><tr><td>Glass</td><td>4</td><td>18</td></tr><tr><td>Metal</td><td>3</td><td>13</td></tr><tr><td>Plastics</td><td>20</td><td>97</td></tr><tr><td>Textile</td><td>5</td><td>22</td></tr><tr><td>Organics</td><td>53</td><td>233</td></tr><tr><td>C & D Wastes</td><td>1</td><td>4</td></tr></table>

C. Current Situation of SWM and MPL:

Item	Contents
1. Legal system	● Waste Management Act #8 of 2004 ● Styrofoam and Plastic Food Services Containers (Prohibition) Act No. 22 of 2019: partially banned for importation in 2019 and totally banned for use by August 1st, 2020. ● Returnable Containers Bill: drafted by Dept. of Sustainable Development but waiting for approval. ● Public Health Act No. 8 of 1975: enforced by the Ministry of Health. It also includes SWM in health aspect. ● St Lucia is Party to the MARPOL Convention and accepts Ship Waste for Management on Island.
2. Policy/plan	● SWM Strategy : currently SLSWMA is developing strategy with the assistance of World Bank.
3. Implementation system	● Saint Lucia Solid Waste Management Authority (SLSWMA) has the responsibility for the collection of solid waste from households, government institutions, offices as well as biomedical waste collection and treatment. ● The Ministry of Health has oversight responsibility for all solid waste management issues in health perspective. ● Dept. of Sustainable Development: is a statutory body and oversees the activities of SLSWMA. They have the Coastal Zonae Management Unit which oversees the marine litter management. ● The National Conservation Authority has the responsibility for removing solid waste from parks and beaches. They engage in most of cleaning activities. ● The Ministry of Infrastructure has the responsibility for desilting rivers and drains and maintenance of verges. ● The town and village councils are responsible for drain cleaning and street sweeping in the respective communities while the Castries City Council is responsible for Castries. ● Private sector has the responsibility for transporting their own waste to the disposal facilities.
4. Technical system	
Collection and transportation	● Waste from households and Government institutions: twice weekly collection with parts of the inner city receiving a thrice weekly- collection. The Authority overseas a privatized curbside and communal collection service. ● Waste from commercial entities: The Authority is not mandated to collect commercial waste. The onus is on the generator as per Waste Management Act No. 8 of 2004. ● Separated collection system: no separate collection exists. Only monthly bulky waste collection service offered to households and government institutions (white and brown goods). ● Number of collection vehicles: N/A as collection is all outsourced to the private sectors.

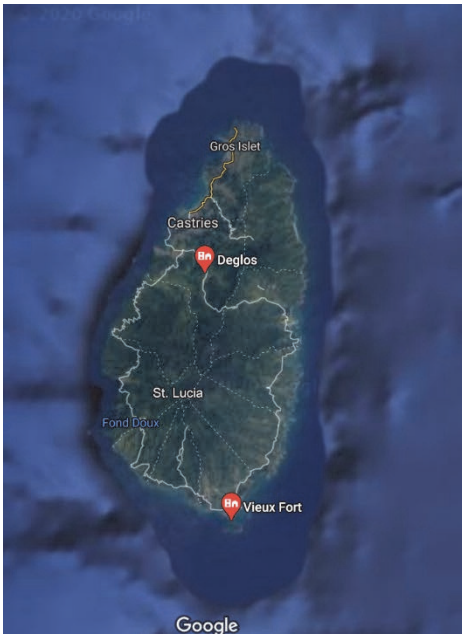
Item	Contents
Intermediate treatment	● Biomedical waste is treated in the autoclave housed at the Deglos Sanitary Landfill. ● Transfer Station: Vieux-Fort Solid Waste Management Facility has no sorting system. ● Tyre shredder: shredded materials are utilized as an intermediate cover at Deglos Landfill site. ● Woodchipper: donated through the Japanese International Cooperation System under Japan's Non-project grant aid for provision of Japanese SME's Products. ● MRF (more like a stockyard of recyclables): cardboard, glass, paper, plastic materials etc. are separated at Deglos Landfill site.
Final disposal	● Deglos Sanitary Landfill is the only landfill in St. Lucia. 1) Owner: SLWMA, 2) Location: located in the north of the island, 5 miles away from SLWMA, 3) Area: 9 hectors, 4) Waste disposal amount: 215 tons/day, 5) Data source: obtained by weighbridge, 6) Installed facility: weighbridge, autoclave for medical waste, maintenance facility, wood chipper (SLWMA has a plan to implement compost facility), tyre shredder, MRF, and partially fenced. 7) Operation in practice: compaction of waste with minimal covering with soil.
5. Financial system	● Ratio of SWM budget allocated within national budget: .0005/1 (7.7M/1.4B ECD) ● Main source of SWM costs: collection fee is not charged from residents. The tipping fee is not charged from hotels, restaurants etc. but fee for special materials such as confidential documents, asbestos, ship waste etc. are charged for disposal. Some demolition waste is charged after certain amount. SLSWMA also receives subsidy from the Government and a percentage of head tax of visitors to the islands but currently no visitors due to Covid-19. ● Cost required for collection/transportation: $7.8 Million ECD annually ● Cost required for intermediate treatment: N/A ● Cost required for final disposal: $3.5 Million ECD annually
6. Donor support	● Commonwealth Clean Ocean Alliance (CCOA): In Progress, (proposal is submitted, awaiting response)[2] ● Reduction of Marine Litter (REMLit) Project: Financing from Norwegian Ministry of Foreign Affairs toward the cost of the building resilience in the Eastern Caribbean. It deals with management of marine litters. The components cover SWM as the land sourced waste goes into the ocean environment. (proposal is submitted, awaiting response). ● RePLAST OECS Project (2019 – 2021): focus on testing approaches and systems for setting up a plastic waste collection and recycling scheme through export from Saint Lucia to Martinique (the original destination was set to Martinique island but failed, instead they exported 2 containers (12 tons) of PET to Honduras). The project also includes public awareness raising activities for recycling and WACS (conducted in 2018) etc.[3] ● World Bank (ongoing): sector assessment has been done already to develop the SWM strategy. WACS will be completed island-widely in this project.
7. Social consideration	● Policy or law for supporting the informal sector: approximately there are 30 waste pickers in Deglos landfill. SLAWMA is currently looking at the formalization of informal sectors. ● Public awareness raising activities: Saint Lucia joined the Commonwealth Clean

[2] https://bluecharter.thecommonwealth.org/action-groups/marine-plastic-pollution/

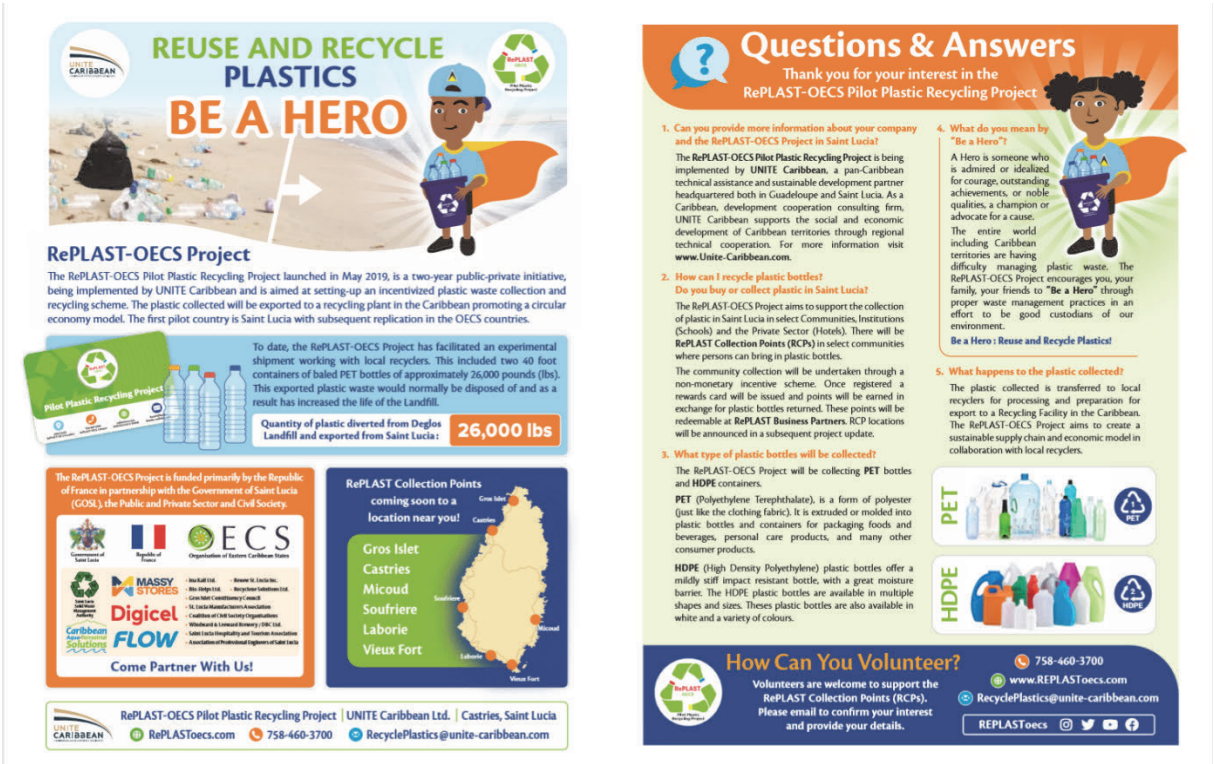
[3] https://pressroom.oecs.org/plastic-recycling-project-replast-oecs-launches-in-saint-lucia

Item	Contents
	Ocean Alliance (CCOA). SLSWMA collaborates with the Caribbean Youth Environment Network (CYEN) and other agencies in annual coastal cleanup throughout the island in recognition of the observance of International Coastal Cleanup (ICC). ● (Good practice) Fulcrum, a mobile data collection platform was implemented in July, 2017. It is a hosted mobile forms platform which allows the Authority to build/design forms/custom apps for data collection from the field. Field Officers capture information with respect to public complaints; collection points; illegal dumps; and school, health care, garage audits etc. from their mobile devices.
8. MPL issues	● Poor management of whatever happens on land will inevitably enter the ocean through the drains and waterways.
9. Areas for improvement	● Public Awareness/Effective Public Education is necessary as people have bad behavior of littering. ● Improvement of resident's waste discharging manner and collection system: especially the unplanned community where is densely populated area has collection points or bins for residents to discharge waste but there are always waste scattering around the bins as people discharge waste whenever they want. However, currently in one of the unplanned communities (Odlum City), microhaulers programme is proposed, which requires technology to facilitate the collection of waste along footpaths (the proposal provided by SLSWMA). ● There is no collection system for green waste. SLSWMA is now looking for some collection system for this type of waste. ● Landfill equipment have constant break down so currently renting them. ● Sustainable recycling system should be established by incentivizing people to separate waste through rewarding system.
10. Other candidates for interview	●

Administrative divisions in St. Lucia



Deglos Sanitary Landfill and Vieux Fort SWM facility



Brochure for RePLAST OECS Project (2019 – 2021)

4) Republic of Guyana

Current Situation of Solid Waste Management (SWM) and Marine Plastic Litter (MPL) in Co-operative Republic of Guyana

Respondent: Mr. Satrohan Nauth
Position: Senior Engineer
Organization: Ministry of Communities

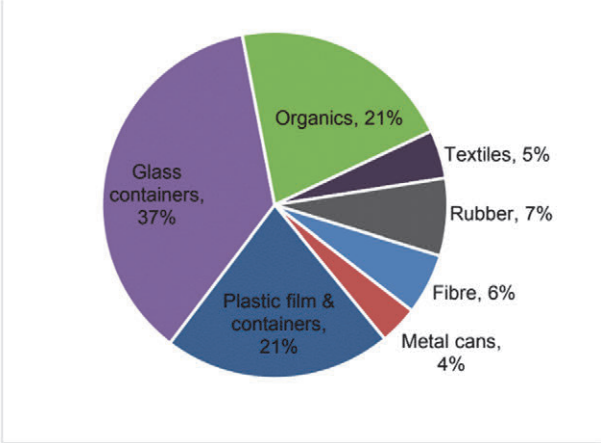
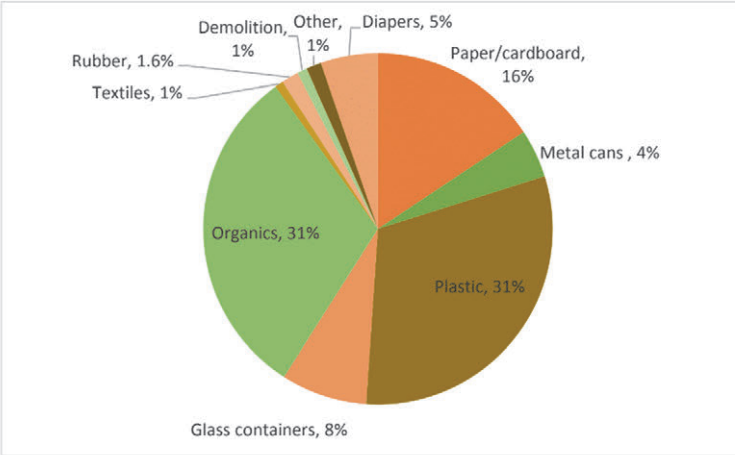
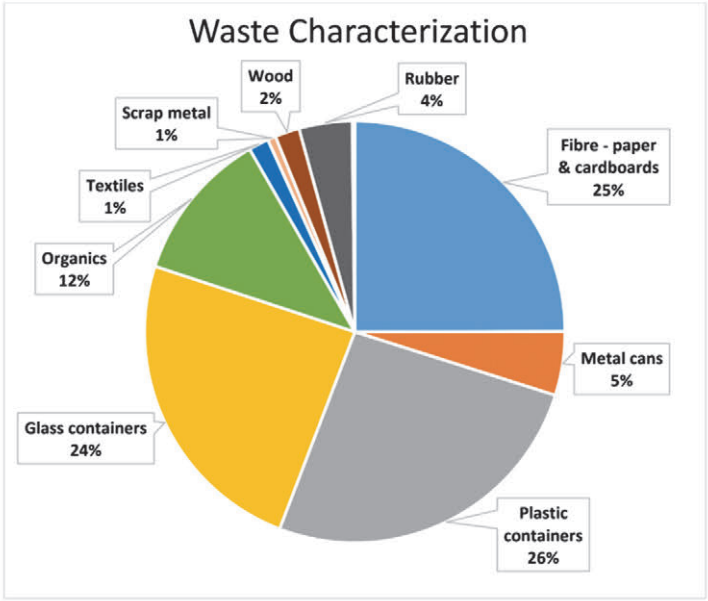
A. Basic Information:

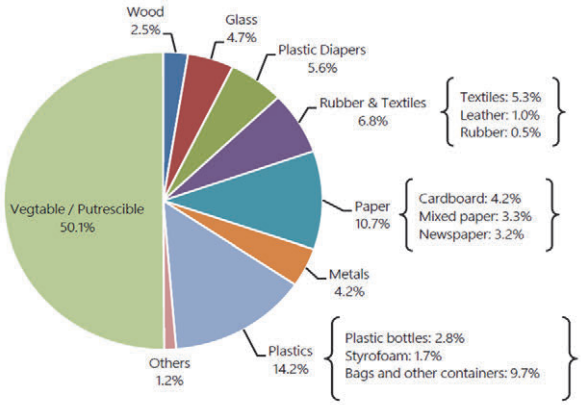
Item	Contents
Population	746,955 (Population Census, 2012)*
Population growth (annual %)	-0.04 (Population Census, 2012)
Urban population	191,810 (Population Census, 2012) - Georgetown
Population density (people/km2)	3.5 persons/km2 (Population Census, 2012)
Average national rainfall (millimetres/year)	2,200 mm/year (Hydromet)
Annual frequency of hurricanes (times/year)	N/A

*based on the latest available census in 2012. Next census will be in 2022.

B. SWM Data:

Item	Contents
Waste generation amount (tons/day)	No data available on whole country. Region 4 – 546 t/day (Hydroplan, 2010) Mahdia in Region 8 – 825 t/year (WACS conducted in 2018) Bartica in Region 7 – 4,150 t/year (WACS conducted in 2018) Linden in Region 10 – 4,024 t/year (WACS conducted in 2017)
Waste generation rate (kg/person/day)	Region 4 – 1.35 kg/person/day (Hydroplan, 2010) Mahdia – 0.91 kg/person/day (WACS conducted in 2018) Bartica – 0.6 kg/person/day (WACS conducted in 2018)
Plastic waste generation amount (tons/day)	N/A
Waste collection amount (tons/day)	N/A
Waste collection coverage (%)	N/A
Recycling rate (%)	0
Recycling rate of plastic materials (%)	0
Final disposal amount (tons/day)	400 to 450 tons/day at Haags Bosch Sanitary Landfill Facility, Region 4

Item	Contents
Waste composition (%)	NB: I have provided data from the WCS studies I got accessed to. • WCS Mahdia, 2018  • WCS Linden, 2017 Figure 2: Composition of Solid Waste (by Category)  • WCS Bartica, 2018 **Figure 1:** Composition of Solid Waste (by Category) 

Item	Contents
	• WCS Region 4, 2010  Figure 1: Household Waste Composition for Region 4 (Hydroplan, CEMCO Inc, 2010)

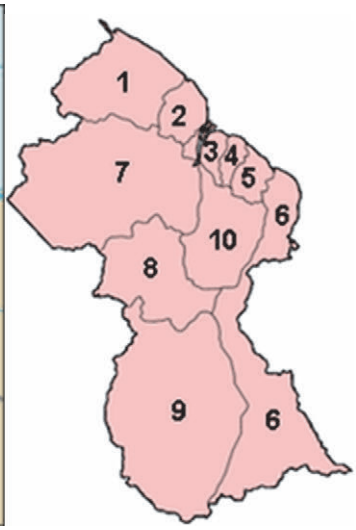
C. Current Situation of SWM and MPL:

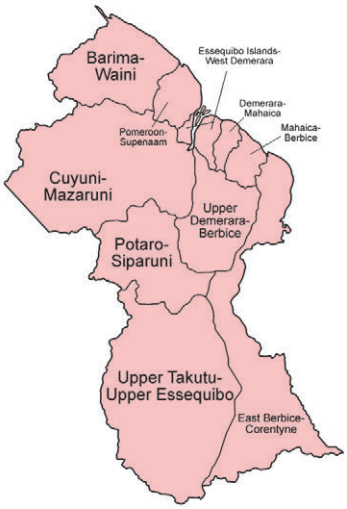
Item	Contents
1. Legal system	● Municipal and District Councils Act, Chapter 28:01, Laws of Guyana ● Environmental Protection Act, Chapter 20:05, Laws of Guyana ● Environmental Protection litter enforcement regulations, 2013 ● Public Health Ordinance, Chapter 145, Laws of Guyana ● Draft Solid Waste Management Bill, 2014 ● Regulations No. 8 of 2015 - The Environmental Protection (Expanded Polystyrene Ban) Regulations, 2015
2. Policy/plan	● National Integrated Solid Waste Management Strategy, 2017-2030
3. Implementation system	● Ministry of Communities (MoC): covers housing, water, and local governance sectors. Sanitation Management Unit is under the local governance and provides technical and financial supports in SWM and wastewater to Local Government. This unit was established by the IDB project in 2016. ● Regional Democratic Councils (RDCs): there are 10 RDCs. They are the supreme Local Government Organ in each region with the responsibility for the overall management and administration of the Region and the coordination of the activities of all 80 Local Democratic Organs (LDO) within its boundaries. They provide all services required within its boundaries (services such as health, education, public works etc.). ● Municipal Councils: there are 10 Municipal Councils. Each Council has the responsibility for solid waste collection and disposal, maintenance of infrastructure services (roads, bridges, etc.). ● Neighborhood Democratic Councils (NDCs): there are 70 NDCs. They cover a small geographic area within each region with responsibility for the management and administration of these areas. ● Environmental Protection Agency (EPA): Industry/Waste Management Department is in charge of all types of waste. ● Ministry of Public Health, Allied Health Council: responsible for medical waste.
4. Technical system (in case of Georgetown)	
Collection and transportation	● Waste from household: Once per week curbside collection system ● Waste from commercial area: Daily collection ● Separated collection system: None ● Number of collection vehicles: N/A as collection service is contracted to private

Item	Contents
	service providers and minimal LDO collectors.
Intermediate treatment	● None
Final disposal	● Haags Bosch Sanitary Landfill Facility is located just outside of the city (Eccles, East Bank Demerara). Operation started in 2011 and has life expectancy of 25 years. There are 64 scavengers interfering operation of landfill. 1) Owner: Government 2) Location: 6.764706, -58.147649 3) Area: 26 Hectares only for disposal area 4) Waste disposal amount: 400-450 tons/day 5) Data source: Both weighbridge and estimation technique 6) Installed facility: No liner in cell No.1, however cell No.2 is being constructed with liner presently, weighbridge, lined leachate treatment system, storm water ponds, gate, fence, administrative building, white goods and metal area, recyclers/scavenger area, security and spotter huts. 7) Operation in practice: compaction of waste and covering with soil and clay (but not daily due to lack of covering materials). ● Lusignan Landfill in Region 4: Controlled dump site ● Espranar Landfill in New Amsterdam in Region 6: Open dump site ● Rosehall Region 6: Open dump site ● Linden Region 10: Open dump site ● Latam Region 9: Open dump site ● Bartica Region 7: Open dump site
5. Financial system	● Ratio of SWM budget allocated within national budget: N/A ● Main source of SWM costs: SWM cost is supposed to be covered by Rates & Taxes received by LDOs but the amount is so small. Therefore, Central Government gives Local Government subsidies. Waste collection fee is not charged for citizens but in some areas, residents pay for private collection (3USD per 40gal bin/week). No tipping fee is charged. Landfill operations are financed by the Government. ● Cost required for collection/transportation: N/A ● Cost required for intermediate treatment: None ● Cost required for final disposal: N/A.
6. Donor support	● JICA: 2018 capacity building program in SWM. ● Inter-American Development Bank (IDB): Georgetown SWM Project (2006-2014) the project includes; construction of Haags Bosch Sanitary Landfill, closure of Mandela dump site, formalization of informal sector(scavengers), establishing a Municipal Solid Waste Management Department in the Municipality of Georgetown, conducting a public awareness campaign in Georgetown and the NDCs, and reviewing and improving the contracts for solid waste collection in the Georgetown[4].
7. Social consideration	● Policy or law for supporting the informal sector: None However, the EPA is working along with all stakeholders to ban single use plastics e.g. straws, bags, eating utensils, cups, etc. ● Public awareness raising activities: Green Generation Guyana Program focus on promoting SWM & WASH in primary schools and at social events, SWM sensitization program by municipality, private groups also focus on beach and park cleaning activities, etc.
8. MPL issues	● No plastic recycling facility nor a market for such materials in our country.

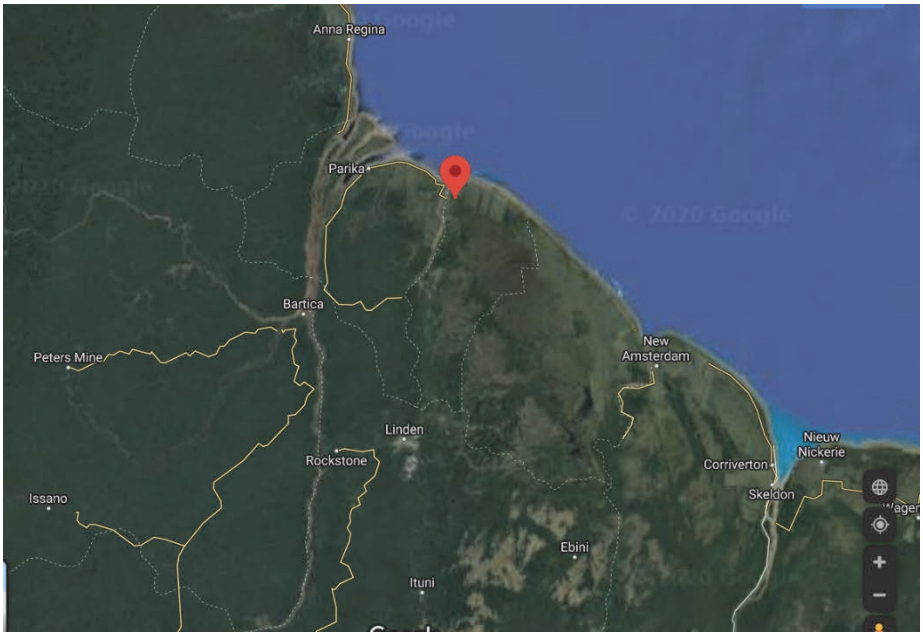
[4] https://www.iadb.org/en/news/news-releases/2006-05-09/idb-approves-18-million-for-solid-waste-management-in-guyana%2C3051.html

Item	Contents
	● The rivers, Atlantic Ocean and drainage network are being treated as a dumping ground for solid waste. ● Citizens utilizing the river transportation services would litter the waterways with their garbage. ● In other instances, the residents, businesses and miners residing along the embankments would dispose of their solid waste in the rivers. ● During the rainy season, surface water runoff transports plastic materials as well as other waste materials into waterway, and onward into creeks, rivers and the Atlantic Ocean.
9. Areas for improvement	● Our country is not addressing the situation at its source. To begin with, Guyana needs laws and legislative framework as the key drivers for proper SWM. More so, specific regulations to drive the 3Rs programme (composting, waste separation etc.), MPL among others. ● Secondly, we need a cost recovery mechanism for dealing with waste especially collection and disposal. We should start charging the disposal fee from business entities and then the collection fee from residents. ● Continuous public awareness campaign targeting behavior change. ● Guyana is not prepared to deal with waste generated from the oil and gas industry. There is no commercial nor hazardous waste disposal facility. ● We need to build capacity within our institutions to deliver their mandate and promote good solid waste management practices.
10. Other candidates for interview	● Environmental Protection Agency – Odessa Duncan – Senior Environmental Officer, oduncan@epaguyana.org





Map of Guyana Region of Guyana by number and name



Location of Haags Bosch Sanitary Landfill

5）Jamaica

Current Situation of Solid Waste Management (SWM) and Marine Plastic Litter (MPL) in Jamaica

Respondent: Mr. Edson Z. Carr
Position: Projects and Planning Manager
Organization: National Solid Waste Management Authority

A. Basic Information:

Item	Contents
Population	2,726,667 (Source: STATIN, Year: 2018)
Population growth (annual %)	-0.1 (Source: STATIN , Year: 2017-2018)
Urban population	477,201 (# of households) (Source: STATIN, Year: 2011)
Population density (people/km2)	248 (Source: STATIN, Year: 2018)
Average national rainfall (millimetres/year)	1,773 (Source: Met Office, Year: 1971-2000)
Annual frequency of hurricanes (times/year)	N/A, no adverse impact.

B. SWM Data:

Item	Contents
Waste generation amount (tons/day)	2,781 (Source: NSWMA, Year: 2018)
Waste generation rate (kg/person/day)	1.02 (Source: NSWMA, Year: 2017)
Plastic waste generation amount (tons/day)	0.16
Waste collection amount (tons/day)	2,641 (Source: NSWMA, Year: 2019)
Waste collection coverage (%)	70% per geographical area (Source: NSWMA, Year: 2020)
Recycling rate (%)	N/A
Recycling rate of plastic materials (%)	N/A
Final disposal amount (tons/day)	2,641 (Source: NSWMA, Year: 2019)
Waste composition (%)	yard: 22%, food: 26%, plastics: 16%, papers: 15%, Styrofoam: 1%, textile: 3%, metals/tin: 2%, glass: 4%, e-waste: 4%, wood/board: 2%, other: 5% (NSWMA: Year: 2017)
Main types of recycled materials	Glass bottles, aluminum cans, steel cans, PET bottles

C. Current Situation of SWM and MPL:

Item	Contents
1. Legal system	• National Solid Waste Management Act, 2001 • NSWM (Disposal of Hazardous Waste) Electronic & Electrical, 2020 • NSWM (Public Cleansing) Regulations, 2020 • The Trade (Plastic Packaging Materials Prohibition) Order, 2018 • The Natural Resources Conservation Authority (NRCA) Plastic Packaging Materials Prohibition Order, 2018: to ban the importation, distribution, manufacture and commercial use of certain types of single use plastics beginning January 1st, 2019.
2. Policy/plan	• National SWM Policy, 2000 • Solid Waste Management Enterprise Team, 2017 • National Policy Environmentally Sound Management of Hazardous Waste (Green Paper): drafted and waiting for approval. • The (Draft) Regulatory Impact Assessment, 2020: proposed general and ultimate objectives is to prevent and reduce plastic waste entering the environment (land, air and water).

Item	Contents
3. Implementation system	• National Solid Waste Management Authority (NSWMA): responsible for the collection, transportation & disposal of SW. The NSWMA falls under the Ministry of Local Government and Community Development (MLGCD) and has four regional offices, namely : MPM Waste Management Ltd., SPM Waste Management ltd., WPM Waste Management ltd., NEPM Waste Management ltd.[5]. • National Environment & Planning Agency (NEPA): responsible for policy direction on SWM, especially for monitoring and enforcing compliance with the NRCA (Plastic Packaging Materials Prohibition) Order, 2018. • Medical Waste Management Unit, Ministry of Health: responsible for medical waste.
4. Technical system	
Collection and transportation	• Waste from household: collected once a week under the curbside collection system. • Waste from commercial area: collected 1-3 times a week. • Separated collection system: not yet in practice but NSWMA is working on separate collection of PET in some pilot communities. Also, separation of tetra pack material is under consideration. • Number of collection vehicles: 68 compactor trucks (27 compactor trucks of 20 cubic, 17 compactor truck of 19 cubic, 19 compactor truck of 14 cubic, 3 compactor truck of 30 cubic, 2 compactor truck of 7 cubic), 2 crane trucks, 9 tipper trucks, of which 12.6% is non-functional due to lack of maintenance and spare parts. New 20 compactor trucks have been handed over to NSWMA in July, 2020 and this number is excluded from above information.[6]  Collection Vehicles
Intermediate treatment	• There is 1 Material Recovery Facilities (MRF)/Recycling Plant for PET (hand sorting) in the parish of St. Andrew, at the Riverton disposal site. The facility is currently not in use because the former company can no longer do their business. They need to find a new contractor to restart this business. • There is 1 composting facility (windrow method) owned by NSWMA. The facility is currently not in use but internal discussion for the promotion is ongoing under strong initiative from the Executive Director of NSWMA. • There is a proposed transfer station facility to be built in the parish of Trelawny. The construction site has been designated but the construction will be delayed due to Covid-19. Waste loaded at the facility will be transferred to the Retirement Disposal Site which covers four perishes: Westmoreland, Hanover, St. James, Trelawny in WPM Region. • The waste tires are currently utilized as the energy source at the cement company.
Final disposal	• There is one controlled dump site in St. James parish called Retirement Disposal Site 1) Owner: NSWMA 2) Location: Retirement St. James 3) Area: 26.9 hectors 4) Waste disposal amount: 638 tons/day 5) Data source: estimated by volumetric carrying capacity of truck 6) Installed facility: gate bar

[5] http://www.nswma.gov.jm/areas-served-and-services-offered/

6 http://www.nswma.gov.jm/20-shacman-compactor-garbage-trucks-for-nswma/

Item	Contents
	7) Operation in practice: spreading, compaction of waste with soil covering. • There is one controlled dump site in St. Andrew parish called Riverton Disposal Site 1) Owner: NSWMA 2) Location: Riverton Meadows, St. Andrew 3) Area: 68.3 hectors, 4) Waste disposal amount: 1,400 tons/day, 5) Data source: estimated by volumetric carrying capacity of truck 6) Installed facility: office space, fire suppression system, and manned gate for entrance control. 7) Operation in practice: spreading and compaction of waste with soil covering. There was a big fire accident happened in 2015 but since then, NSWMA has been covering waste with extra soils and installed the fire suppression system at site. • There are two controlled dump sites in St. Ann parish called Haddon and Tobolski. 1) Owner: NSWMA 2) Location: Haddon and Tobolski St. Ann 3) Area: 6.9 and 3.5 hectors respectively, 4) Waste disposal amount: 219.5 & 86 tons/day respectively, 5) Data source: estimated by volumetric carrying capacity of truck 6) Installed facility: gate bar (Haddon) 7) Operation in practice: spreading and compaction of waste with soil covering. • There is one controlled dump site in Portland parish called Doctor's Wood Disposal Site 1) Owner: NSWMA 2) Location: Buff Bay, Portland 3) Area: 14 hectors, 4) Waste disposal amount: 84.6 tons/day, 5) Data source: estimated by volumetric carrying capacity of truck 6) Installed facility: 7) Operation in practice: spreading and compaction of waste with soil covering. • There is one controlled dump site in Manchester parish called Martins Hill Disposal Site 1) Owner: NSWMA 2) Location: Martins Hill, Manchester 3) Area: 17.7 hectors, 4) Waste disposal amount: 134.5 tons/day, 5) Data source: estimated by volumetric carrying capacity of truck 6) Installed facility: gate bar 7) Operation in practice: spreading and compaction of waste with soil covering. • There is one controlled dump site in St. Elizabeth parish called Myresville Disposal Site 1) Owner: NSWMA 2) Location: Myresville, St. Ann 3) Area: 7.2 hectors, 4) Waste disposal amount: 39.9 tons/day, 5) Data source: estimated by volumetric carrying capacity of truck 6) Installed facility: 7) Operation in practice: spreading and compaction of waste with soil covering. • There is one controlled dump site in St. Thomas parish called Church Corner Disposal Site 1) Owner: NSWMA 2) Location: Church Corner, St. Thomas 3) Area: 1.5 hectors, 4) Waste disposal amount: 38.5 tons/day,

Item	Contents
	5) Data source: estimated by volumetric carrying capacity of truck 6) Installed facility: 7) Operation in practice: spreading and compaction of waste with soil covering.
5. Financial system	• Ratio of SWM budget allocated within national budget: N/A • Main source of SWM costs: property tax, percentage depends on total revenue of the Central Gov. NSWMA do not charge collection fee from residents, but charge from commercial entities by trip. Private collection companies pay tipping fee at disposal site. • Cost required for collection/transportation: N/A • Cost required for intermediate treatment: N/A • Cost required for final disposal: N/A
6. Donor support	• Plastic Waste Minimization Project (2018 - 2021): funded by the Global Environment Facility (GEF), UNEP (Caribbean Sub-Regional Office, IETC, Global Program of Action for the Protection of the Marine Environment from Land-based Activities-Marine Litter). The main objective of the Project is to enhance the capacity of the country to carry out waste management activities and strengthen the policy and legislative framework for reduction of plastic, inclusive of polystyrene, and marine litter in Jamaica. These engagements will involve a regulatory impact assessment (led by NEPA) and development of a national strategy and action plan, development of a communication campaign, and increased awareness through community intervention.[7] • Benioff Ocean Initiative and The Coca-Cola Foundation (2021~): The Ocean Cleanup (Dutch non-profitable organization) will collaborate with the Recycling Partners of Jamaica (RPJ) to deploy an Interceptor, its scalable and solar-powered solution that is capable of capturing 50,000 kg of trash per day. RPJ will operate the Interceptor and ensure the environmentally sound disposal of all collected plastics and materials. [8] • Inter-American Development Bank (IDB) Support for Improvement of Solid Waste Management: still under preparation. This technical cooperation aims to assist the Gov. of Jamaica with the preparation of closure plans and designs for Riverton Disposal Site, preparation of studies to support the business case, and the re-orientation of NSWMA to support the preparation of a viable business case for improvement of SWM in Jamaica[9].
7. Social consideration	• Policy or law for supporting the informal sector: No such legal support for informal sector. • Public awareness raising activities: Public Relation and Communication Dept. of the NSWMA is actively engaged in sensitization on Plastic Waste Minimization Project, waste separation of PET, and composting. These activities are being promoted through Public Relation Officers visiting community and schools, and social medias. The NSWMA also has introduced the mobile app for a faster response time regarding illegal dumping, burning and non-collection of garbage.[10] NSWMA also organizes a lot of campaign for cleaning the beach with community participation.
8. MPL issues	• There is a lot of garbage in several gullies that feed into Kingston harbor. The NSWMA is working with the communities along these main gullies to promote anti-littering and cleaning activities. As part of Plastic Waste Minimization Project, the National Work Agency has designed the waste trap to be set up at these gullies. Once they are procured, NSWMA will be implementing the waste trap system so that they can prevent waste from being washed into the ocean.
9. Areas for	• More public awareness is necessary as to facilitate behavioral change in solid waste management best practices. Younger generation should be focused to have effective

[7] https://jis.gov.jm/plastic-waste-management-project-gets-33-million/

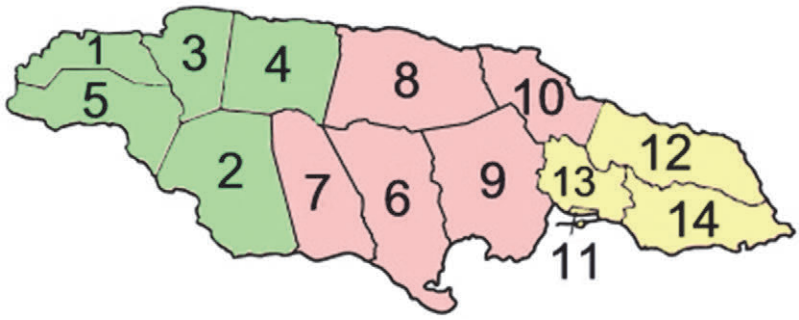
[8] https://buzz-caribbean.com/news/the-ocean-cleanup-gets-us1-million-to-clean-kingston-harbour-jamaicas-most-polluted-water-body/

[9] Information provided by the JICA Jamaica Office, https://www.iadb.org/en/project/JA-T1182

[10] https://www.facebook.com/NSWMA876/

Item	Contents
improvement	behavioral change in society. • The per capita generation of solid waste is expected to increase over the next few years; it is prudent to acquire additional transportation and collection equipment for the increased waste. The Central Government has committed to add another 100 collection trucks over the next 2 years. Before the new 20 additional trucks handed over in July, 15 trucks were given, and additional 30 will be given by the end of the year or the early 2021, and additional 50 will be given within the 2021 financial year.
10. Other candidates for interview	•

Cornwall County		Capital	km²	Middlesex County		Capital	km²	Surrey County		Capital	km²
1	Hanover	Lucea	450	6	Clarendon	May Pen	1,196	11	Kingston	Kingston	25
2	Saint Elizabeth	Black River	1,212	7	Manchester	Mandeville	830	12	Portland	Port Antonio	814
3	Saint James	Montego Bay	595	8	Saint Ann	St. Ann's Bay	1,213	13	Saint Andrew	Half Way Tree	453
4	Trelawny	Falmouth	875	9	Saint Catherine	Spanish Town	1,192	14	Saint Thomas	Morant Bay	743
5	Westmoreland	Savanna-la-Mar	807	10	Saint Mary	Port Maria	611				



Administrative divisions of Jamaica[11]

11 Jamaica is divided into 14 parishes, which are grouped into three historic counties that have no administrative relevance. In the context of local government the parishes are designated "Local Authorities". These local authorities are further styled as "Municipal Corporations", which are either city municipalities or town municipalities. Any new city municipality must have a population of at least 50,000, and a town municipality a number set by the Minister of Local Government. There are currently no town municipalities.

Map of disposal site[12]

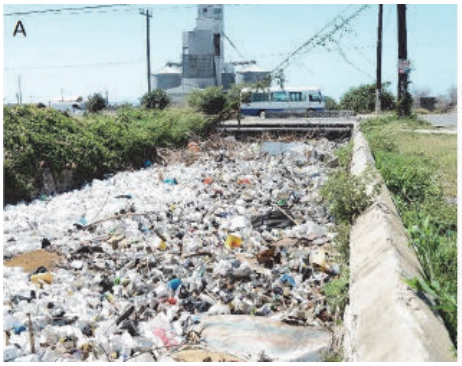
[12] http://www.nswma.gov.jm/collection-schedule/

Current Situation of Marine Plastic Litter (MPL) in Jamaica

Respondent: Mr. Anthony McKenzie
Position: Director, Environmental Management and Conservation Division
Organization: National Environment and Planning Agency

Item	Contents
1. Legal system	Solid Waste Management Authority Act, 2002 Natural Resources Conservation Authority Act ,1997 Jamaica introduced legislation to ban the importation, distribution, manufacture and commercial use of certain types of single use plastics beginning January 1st, 2019: • The Trade (Plastic Packaging Materials Prohibition) Order, 2018. • The Natural Resources Conservation Authority (Plastic Packaging Materials Prohibition) Order, 2018 *There are several international environmental agreements relevant to plastic pollution. However, there is no legally binding global international agreement that governs the wholesale regulation and reduction of marine plastic pollution in a comprehensive manner. The following presents a summary of multilateral environmental agreements which are binding and their relevance to Jamaica:* ***United Nations Convention on the Law of the Sea 1982 (UNCLOS)*** • *Jamaica became a party to UNCLOS on 21 March 1983. Any legislation that Jamaica adopts to control land-based sources of marine pollution due to plastics, contributes to the fulfilment of the requirements of UNCLOS objectives.* ***The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (herein after referred to as the Basel Convention)*** • *Jamaica became a party to the agreement in 2003. Any actions that the Jamaican government does to minimize or prevent the generation of plastic waste will work towards meeting the requirements of the Convention. If Jamaica seeks to export any unrecyclable or contaminated plastic waste it would have to meet the requirements of the BASEL Convention.* ***Cartagena Convention*** • *Jamaica ratified the Convention in 1987 and the Protocol in 2015. As a party to this agreement must seek to implement the action plan and conduct such activities to support regional goals and indicators.* ***International Maritime Organization Convention on Prevention of Marine Pollution by Dumping of Wastes and other Matter, 1972 (London Convention)*** • *Jamaica is not yet a party to the 1996 Protocol.* ***The International Convention for the Prevention of Pollution from Ships (MARPOL)*** • *Jamaica became a party to MARPOL in 1991 and must regulate the dumping of materials from ships through its national legislation. A Draft Shipping (Pollution Prevention and Control) Bill is to be enacted which will address the prevention of pollution, response to pollution incidents and compensation for pollution damage.* ***General Agreement on Tariffs and Trade (GATT)*** • *Jamaica's prohibition on the production and importation of single-use plastic products could be perceived as discriminatory.* *Non-binding international resolutions to further regulate plastics:* • ***United Nations Environment Assembly (UNEA-4)*** • ***The UN Sustainable Development Goals***

Item	Contents
	• ***Polluter Pays***
2. Policy/plan	The (Draft) Regulatory Impact Assessment, 2020 - proposed general and ultimate objectives is to prevent and reduce plastic waste entering the environment (land, air and water). The immediate strategies include: 1. To reduce the amount of single use plastic imported and manufactured in Jamaica. 2. To improve the waste collection and disposal system in Jamaica. 3. To minimise the amount of plastic entering the waste stream through adequate recovery and reuse. 4. To change public attitudes and behaviour through sensitization, education and appropriate incentives
3. Implementation system	The National Environment and Planning Agency is responsible for monitoring and enforcing compliance with the Natural Resources Conservation Authority (Plastic Packaging Materials Prohibition) Order, 2018. NEPA led the preparation for the Regulatory Impact Assessment as an output of the Plastic Waste Minimization Project. The main objective of the Project is to enhance the capacity of the country to carry out waste management activities and strengthen the policy and legislative framework for reduction of plastic, inclusive of polystyrene, and marine litter in Jamaica. Additional Agencies responsible for implementation/ enforcement of the policy objectives include: • National Solid Waste Management Authority is the primary Agency responsible for the managing solid waste collection and disposal. • The Jamaica Customs Agency, inclusive of the Commissioner of Customs and customs officers are responsible for the enforcing the Customs Act, in particular, ensuring the payment of the relevant duties on goods imported into Jamaica at all ports of entry. • The Bureau of Standards and the National Compliance and Regulatory Authority would provide oversight and compliance by ensuring standards for verifying the composition and characteristics of alternatives are met. • The Trade Board Limited in the Ministry of Industry, Commerce, Agriculture and Fisheries is a regulatory agency of Government, operating under the legal authority of the Trade Act. They are Jamaica's certifying authority for goods exported under various trade agreements. They are responsible for monitoring enforcement and compliance of the Trade (Plastic Packaging Materials Prohibition) Order, 2018. This Order focuses on the importation of the plastic material. • The National Compliance and Regulatory Authority (NCRA) conducts check at the different ports of entry to flag plastic items.
4. Donor support	• The Plastic Waste Minimization Project is being funded by the Global Environment Facility (GEF), and other executing partners, namely, the UN Environment (Caribbean Sub-Regional Office, IETC, Global Program of Action for the Protection of the Marine Environment from Land-based Activities-Marine Litter).
5. MPL issues	**Issues**: The overarching issue is inadequate solid waste management resulting in blocked drains which contributes to flooding and damage to coastal and marine ecosystems. Disposal of single use plastics particularly plastic bottles in addition to plastic bags accounts for the largest amount of plastic items. Plastic bag imports almost doubled from 2011 to 2015, going from 4 million kilograms (or 720 million bags) to 7 million kilograms, or approximately 1.3 billion bags.

Item	Contents
	  A- blocked drains, D – garnage on beach/shoreline **Good practice recommendations:** Ban on manufacture, importation and production of single use plastic, Deposit Refund Scheme, use of alternative materials.
6. Areas for improvement	• Enforcement of the objectives of the plastic ban • Further studies may be useful to sample sections along the major gullies in the Kingston corporate area to determine what percentage is plastic to have a better understanding of the amount and nature of the waste that is entering the marine environment. • Waste characterization study to confirm if there have been actual reductions in the waste stream by the end of the 2021. This would provide enough time for all phases of the ban to be fully implemented and in effect. • Study to determine impact of micro plastics • Development of waste to energy technology

6）United Mexican States

Current Situation of Solid Waste Management (SWM) and Marine Plastic Litter (MPL) in the United Mexican States

Respondent: Mr. Sergio Mendoza Aguirre
Position: Director General de Fomento Ambiental, Urbano y Turístico
Organization: SEMARNAT

A. Basic Information:

<table>
<tr><th>Item</th><th>Contents</th></tr>
<tr><td>Population</td><td>
<table>
<tr><th>Estado</th><th>Población (hab)/1</th></tr>
<tr><td>Tamaulipas</td><td>3,650,602</td></tr>
<tr><td>Veracruz</td><td>8,539,862</td></tr>
<tr><td>Tabasco</td><td>2,572,287</td></tr>
<tr><td>Campeche</td><td>1,000,617</td></tr>
<tr><td>Yucatán</td><td>2,259,098</td></tr>
<tr><td>Quintana Roo</td><td>1,723,259</td></tr>
<tr><td>Nacional</td><td>127,792,286</td></tr>
</table>
Fuente de información:
1/ Consejo Nacional de Población CONAPO, Proyección a 2020 (mitad de año)
http://www.conapo.gob.mx/work/models/CONAPO/Mapa_Ind_Dem18/index_2.html
</td></tr>
<tr><td>Population growth (annual %)</td><td>
<table>
<tr><th>Estado</th><th>Tasa de crecimiento natural</th><th>Tasa de crecimiento social</th><th>Tasa de crecimiento Total</th></tr>
<tr><td>Tamaulipas</td><td>1.11</td><td>-0.3</td><td>0.81</td></tr>
<tr><td>Veracruz</td><td>0.92</td><td>-0.33</td><td>0.59</td></tr>
<tr><td>Tabasco</td><td>1.24</td><td>-0.16</td><td>1.08</td></tr>
<tr><td>Campeche</td><td>1.21</td><td>0.44</td><td>1.65</td></tr>
<tr><td>Yucatán</td><td>0.91</td><td>0.2</td><td>1.11</td></tr>
<tr><td>Quintana Roo</td><td>1.3</td><td>0.92</td><td>2.22</td></tr>
<tr><td>Nacional</td><td>1.08</td><td>-0.14</td><td>0.94</td></tr>
</table>
Fuente de información:
Consejo Nacional de Población CONAPO, Proyección a 2020
http://www.conapo.gob.mx/work/models/CONAPO/Mapa_Ind_Dem18/index_2.html

Nota:
Tasa de crecimiento natural: diferencia entre el número de nacimientos y número de defunciones de una población en un determinado tiempo
Tasa de crecimiento social: está relacionado con los datos de inmigración y emigración de una población en un determinado tiempo
</td></tr>
<tr><td>Urban population</td><td>
<table>
<tr><th>Estado</th><th>Población (hab)</th></tr>
<tr><td>Tamaulipas</td><td>3,062,061</td></tr>
<tr><td>Veracruz</td><td>4,961,740</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>Tabasco</td><td>1,042,996</td></tr>
<tr><td>Campeche</td><td>677,582</td></tr>
<tr><td>Yucatán</td><td>1,773,061</td></tr>
<tr><td>Quintana Roo</td><td>1,334,762</td></tr>
<tr><td>Nacional</td><td>91,670,131</td></tr>
</table>
Fuente de información:
https://apps1.semarnat.gob.mx:8443/dgeia/indicadores_verdes16/indicadores/01_contexto/1.1.2.html (año de referencia 2015)</td></tr>
<tr><td>Population density (people/km2)</td><td>
<table>
<tr><th>Estado</th><th>Densidad poblacional (hab/km^2)</th></tr>
<tr><td>Tamaulipas</td><td>47</td></tr>
<tr><td>Veracruz</td><td>122</td></tr>
<tr><td>Tabasco</td><td>106</td></tr>
<tr><td>Campeche</td><td>18</td></tr>
<tr><td>Yucatán</td><td>58</td></tr>
<tr><td>Quintana Roo</td><td>40</td></tr>
<tr><td>Nacional</td><td>65</td></tr>
</table>
Fuente de información:
Estimado con los datos de población Consejo Nacional de Población CONAPO, Proyección a 2020 (mitad de año)</td></tr>
<tr><td>Average national rainfall (millimetres/year)</td><td>
<table>
<tr><th>Estado</th><th>Precipitación promedio (mm/año)</th></tr>
<tr><td>Tamaulipas</td><td>773</td></tr>
<tr><td>Veracruz</td><td>1,502</td></tr>
<tr><td>Tabasco</td><td>2,404</td></tr>
<tr><td>Campeche</td><td>1,187</td></tr>
<tr><td>Yucatán</td><td>1,080</td></tr>
<tr><td>Quintana Roo</td><td>1,266</td></tr>
<tr><td>Nacional</td><td>778</td></tr>
</table>
Fuente de información:
http://dgeiawf.semarnat.gob.mx:8080/ibi_apps/WFServlet?IBIF_ex=D3_AGUA01_01&IBIC_user=dgeia_mce&IBIC_pass=dgeia_mce&NOMBREENTIDAD=*&NOMBREANIO=*(Promedio 2005-2019)</td></tr>
<tr><td>Annual frequency of hurricanes (times/year)</td><td>En el océano Atlántico: 12 huracanes/2019
Fuente de información:
https://smn.conagua.gob.mx/es/ciclones-tropicales/informacion-historica
Para mayor detalle consultar el vínculo anterior.</td></tr>
</table>

B. SWM Data:

<table>
<tr><th>Item</th><th>Contents</th></tr>
<tr><td>Waste generation amount (tons/day)</td><td>
<table>
<tr><th>Estado</th><th>Generación de residuos (t/d)</th></tr>
<tr><td>Tamaulipas</td><td>3,591</td></tr>
<tr><td>Veracruz</td><td>7,813</td></tr>
<tr><td>Tabasco</td><td>2,471</td></tr>
<tr><td>Campeche</td><td>888</td></tr>
<tr><td>Yucatán</td><td>2,016</td></tr>
<tr><td>Quintana Roo</td><td>1,546</td></tr>
<tr><td>Nacional</td><td>120,128</td></tr>
</table>
Fuente de información:
Diagnóstico Básico para la Gestión Integral de los Residuos, 2020
https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf</td></tr>
<tr><td>Waste generation rate (kg/person/day)</td><td>
<table>
<tr><th>Estado</th><th>Generación de residuos per cápita (kg/hab/d)</th></tr>
<tr><td>Tamaulipas</td><td>1.047</td></tr>
<tr><td>Veracruz</td><td>1.003</td></tr>
<tr><td>Tabasco</td><td>0.867</td></tr>
<tr><td>Campeche</td><td>0.867</td></tr>
<tr><td>Yucatán</td><td>0.867</td></tr>
<tr><td>Quintana Roo</td><td>0.867</td></tr>
<tr><td>Nacional</td><td>0.944</td></tr>
</table>
Fuente de información:
Diagnóstico Básico para la Gestión Integral de los Residuos, 2020
https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf</td></tr>
<tr><td>Plastic waste generation amount (tons/day)</td><td>
<table>
<tr><td>Generación de residuos plásticos Nacional (t/d)</td><td>14,883.86</td></tr>
</table>
Estimado a través de la generación total de residuos y la composición de residuos (Plásticos=12.39%)</td></tr>
<tr><td>Waste collection amount (tons/day)</td><td>
<table>
<tr><th>Estado</th><th>Recolección de residuos (t/d)</th></tr>
<tr><td>Tamaulipas</td><td>3,054</td></tr>
<tr><td>Veracruz</td><td>6,102</td></tr>
<tr><td>Tabasco</td><td>1,991</td></tr>
<tr><td>Campeche</td><td>792</td></tr>
<tr><td>Yucatán</td><td>1,487</td></tr>
<tr><td>Quintana Roo</td><td>2,538</td></tr>
<tr><td>Nacional</td><td>100,751</td></tr>
</table>
Fuente de información:
Diagnóstico Básico para la Gestión Integral de los Residuos, 2020 (Con datos del Censo)</td></tr>
</table>

<table>
<tr><td></td><td>https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf</td></tr>
<tr><td>Waste collection coverage (%)</td><td>
<table>
<tr><th>Estado</th><th>Cobertura de recolección de residuos (%)*</th></tr>
<tr><td>Tamaulipas</td><td>85.05</td></tr>
<tr><td>Veracruz</td><td>78.10</td></tr>
<tr><td>Tabasco</td><td>80.57</td></tr>
<tr><td>Campeche</td><td>89.19</td></tr>
<tr><td>Yucatán</td><td>73.76</td></tr>
<tr><td>Quintana Roo</td><td>164.17**</td></tr>
<tr><td>Nacional</td><td>83.87</td></tr>
</table>
Fuente de información:
Diagnóstico Básico para la Gestión Integral de los Residuos, 2020
https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf
* Se consideró la cobertura en la recolección como la relación porcentual entre la generación estimada y la recolección de residuos reportada en CNGMD 2017.
** En algunas entidades federativas, como Baja California Sur, Nayarit y Quintana Roo, el índice de cobertura de recolección es superior al 100%, debido a que la cantidad de residuos recolectados que se reportan en el CNGMD 2017, posiblemente incluya los residuos generados en las actividades turísticas.</td></tr>
<tr><td>Recycling rate (%)</td><td>Estimado 6.44%

Según datos disponibles, en promedio ingresan 6,472 t/día de residuos a todas las plantas de selección de residuos reciclables, de los cuales se recuperan alrededor de 417.05 t/día, lo que equivale a un rendimiento del 6.44 %

Fuente de información: Diagnóstico Básico para la Gestión Integral de los Residuos, 2020
https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf</td></tr>
<tr><td>Recycling rate of plastic materials (%)</td><td>No se cuenta con cifras específicas para el reciclaje de materiales plásticos.

No obstante, en el caso de los envases de bebidas de PET (tereftalato de polietileno) la asociación civil ECOCE que entre otras cosas apoya la gestión de estos residuos post-consumo.
Informa que para el año 2016 se recuperó el 57% de los envases de PET.
https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf</td></tr>
<tr><td>Final disposal amount (tons/day)</td><td>
<table>
<tr><th>Estado</th><th>Disposición final de residuos (t/d)</th></tr>
<tr><td>Tamaulipas</td><td>3,133.70</td></tr>
<tr><td>Veracruz</td><td>5,956.80</td></tr>
<tr><td>Tabasco</td><td>2,000.70</td></tr>
<tr><td>Campeche</td><td>790.20</td></tr>
<tr><td>Yucatán</td><td>1,314.00</td></tr>
<tr><td>Quintana Roo</td><td>2,516.80</td></tr>
<tr><td>Nacional</td><td>86,352.70</td></tr>
</table>
Fuente de información:</td></tr>
</table>

	Diagnóstico Básico para la Gestión Integral de los Residuos, 2020 https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf
Waste composition (%)	**COMPOSICIÓN DE RESIDUOS A NIVEL NACIONAL**

Susceptibles de aprovechamiento (%)	Cartón	4.55
	Envase de cartón encerado	1.51
	Fibras sintéticas	0.34
	Hule	0.54
	Lata	0.98
	Material ferroso	0.88
	Material no ferroso	0.57
	Papel	5.07
	PET	2.63
	Plástico rígido y de película	7.66
	Poliestireno expandido	1.55
	Poliuretano	0.55
	Vidrio de color	1.6
	Vidrio transparente	3.13
Orgánicos (%)	Cuero	0.46
	Fibra dura vegetal	0.73
	Hueso	0.52
	Madera	0.79
	Residuos alimentarios	33.07
	Residuos de jardinería	10.84
Otros (%)	Algodón	0.15
	Loza y cerámica	0.46
	Material de construcción	0.7
	Pañal desechable	6.75
	Residuo fino	2.25
	Trapo	2.82
	Otros	8.9

Estado	**Susceptible de aprovechamiento (%)**	**Orgánico (%)**	**Otro (%)**
Tamaulipas	41.35	28.64	30.01
Veracruz	33.78	44.05	22.17
Tabasco	35.23	34.82	29.96
Campeche	35.23	34.82	29.96
Yucatán	35.23	34.82	29.96
Quintana Roo	35.23	34.82	29.96
Nacional	**31.55**	**46.42**	**22.03**

Fuente de información: Diagnóstico Básico para la Gestión Integral de los Residuos, 2020 https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf

C. Current Situation of SWM and MPL:

<table>
<tr><th>Item</th><th>Contents</th></tr>
<tr><td>1. Legal system</td><td>

Ley General del Equilibrio Ecológico y la Protección al Ambiente, 1988
Ley General para la Prevención y Gestión Integral de los Residuos, 2003
Reglamento de la Ley General para la Prevención y Gestión Integral de los Residuos, 2006.
Ley de Vertimiento en las Zonas Marinas Mexicanas, 2014.
Convenio Internacional para Prevenir la Contaminación por los Buques, de 1973 y su Protocolo de 1978 (MARPOL 73/78) y sus Anexos I, II y V.

<table>
<tr><th>Estado</th><th>Legislación</th><th>Prohibición productos plásticos de un solo uso</th></tr>
<tr><td>Tamaulipas</td><td>Código para el Desarrollo Sustentable del Estado de Tamaulipas, 2008
(Art. 36, numeral 5-7)</td><td>Bolsas</td></tr>
<tr><td>Veracruz</td><td>Ley de Prevención y Gestión Integral de Residuos Sólidos Urbanos y de Manejo Especial para el Estado de Veracruz de Ignacio de La Llave, 2004
(Art. 23 ter)</td><td>Bolsas, popotes</td></tr>
<tr><td>Tabasco</td><td>Ley de Protección Ambiental del Estado de Tabasco, 2015
(Art. 196, fracc. IX, X, XI)</td><td>Bolsas, popotes, contenedores de poliestireno expandido (unicel)</td></tr>
<tr><td>Campeche</td><td>Ley para la Gestión Integral de los Residuos Sólidos Urbanos, de Manejo Especial y Peligroso del Estado de Campeche, 2008</td><td></td></tr>
<tr><td>Yucatán</td><td>Ley para la Gestión Integral de los Residuos en el Estado de Yucatán, 2011
(Art. 13 bis, 31 fracc. XII)</td><td>Bolsas, popotes, contenedores de poliestireno</td></tr>
<tr><td>Quintana Roo</td><td>Ley para la Prevención, Gestión Integral y Economía Circular de los Residuos del Estado de Quintana Roo, 2019
(Art. 22, Art. 24 fracc. II)</td><td>Bolsas, popotes, envases desechables, productos derivados de poliestireno expandido, anillos de plástico para envases</td></tr>
</table>
A nivel municipal se encuentran los Reglamentos de Limpia.
</td></tr>
<tr><td>2. Policy/plan</td><td>

Programa Nacional para la Prevención y Gestión Integral de los Residuos 2020-2024 (en proceso de aprobación)
Programa Nacional para la Prevención y Gestión Integral de los Residuos de Manejo Especial 2020-2024 (en proceso de aprobación)
Visión Nacional hacia una Gestión Sustentable: Cero Residuos, 2019

Los gobiernos estatales y municipales deben elaborar los Programas Estatales para la Prevención y Gestión Integral de los Residuos (PEPGIR) y Programas Municipales para la Prevención y Gestión Integral de los Residuos (PMPGIR).
</td></tr>
<tr><td>3. Implementation system</td><td>

Esta Secretaría de Medio Ambiente y Recursos Naturales es la responsable de instrumentar los PNPGIR y PNPGIRME.
La Secretaría de Marina a través de la Unidad de Capitanía de Puertos y Asuntos Marítimos (UNICAPAM) es la responsable de registrar y autorizar a las empresas prestadores de servicios (particulares) para que brinden a las embarcaciones, instalaciones portuarias y artefactos navales los servicios de recolección, acopio, traslado y disposición final de hidrocarburos, mezclas oleosas, sustancias nocivas líquidas y basura generada.
En el caso de los residuos sólidos urbanos los responsables de su manejo son los

</td></tr>
</table>

<table>
<tr><th>Item</th><th>Contents</th></tr>
<tr><td></td><td>municipios, incluyendo la recolección, transporte, tratamiento y disposición final. (Nota 1)
● Por su parte, los gobiernos estatales a través de las Secretarías de Medio Ambiente, son las responsables de los residuos de manejo especial, en lo que concierne a normatividad y legislación, así como autorizaciones. El manejo de estos residuos puede realizarse a través de empresas particulares o bien de los gobiernos municipales.</td></tr>
<tr><td colspan="2">4. Technical system</td></tr>
<tr><td>Collection and transportation</td><td>● Waste from household:
La recolección de los residuos de las viviendas la realiza el municipio ya sea a través de su personal o bien puede concesionar el servicio a una empresa privada. En la mayoría de los casos este servicio no tiene costo para la población.
Las áreas responsables de la recolección de residuos en los Municipios generalmente son las Direcciones de Servicios Urbanos o de Servicios Públicos

Cada municipio establece el número de rutas de recolección, el tipo de recolección (acera, casa por casa, contenedores), así como la frecuencia y los horarios.

● Waste from commercial area:
La recolección de los residuos de las áreas comerciales, industriales y de servicios las puede realizar el municipio ya sea a través de su personal o bien puede concesionar el servicio a una empresa privada, y se cobran tarifas establecidas. También es posible que dichos establecimientos contraten el servicio directamente con una empresa particular.

● Separated collection system:
De los 2,457 municipios del país, solo 144 manifiestan realizar recolección separada.
Con respecto a los 6 estados de interés solo los siguientes municipios manifiestan llevar a cabo una recolección separada de residuos en orgánicos e inorgánicos:
<table>
<tr><th>Estado</th><th>No. total de municipios</th><th>Municipios con recolección separada</th></tr>
<tr><td>Veracruz</td><td>212</td><td>5</td></tr>
<tr><td>Tabasco</td><td>17</td><td>1</td></tr>
<tr><td>Yucatán</td><td>106</td><td>2</td></tr>
<tr><td>Quintana Roo</td><td>9</td><td>1</td></tr>
</table>
Fuente de información:
Diagnóstico Básico para la Gestión Integral de los Residuos, 2020
https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf

● Number of collection vehicles:
<table>
<tr><th>Estado</th><th>No. total de vehículos</th><th>De caja abierta</th><th>Con compactador</th><th>Otro</th></tr>
<tr><td>Tamaulipas</td><td>365</td><td>46</td><td>314</td><td>5</td></tr>
<tr><td>Veracruz</td><td>759</td><td>197</td><td>536</td><td>26</td></tr>
<tr><td>Tabasco</td><td>308</td><td>62</td><td>241</td><td>5</td></tr>
<tr><td>Campeche</td><td>93</td><td>36</td><td>49</td><td>8</td></tr>
<tr><td>Yucatán</td><td>334</td><td>235</td><td>93</td><td>6</td></tr>
<tr><td>Quintana Roo</td><td>164</td><td>13</td><td>149</td><td>2</td></tr>
<tr><td>Nacional</td><td>16,615</td><td>4,281</td><td>9,852</td><td>1,942</td></tr>
</table>
Fuente de información:
Diagnóstico Básico para la Gestión Integral de los Residuos, 2020</td></tr>
</table>

<table>
<tr><th>Item</th><th>Contents</th></tr>
<tr><td></td><td>https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf</td></tr>
<tr><td>Intermediate treatment</td><td>
<table>
<tr><th>Estado</th><th>Municipio</th><th>Centros de acopio</th></tr>
<tr><td>Tamaulipas</td><td>Ciudad Madero</td><td>2</td></tr>
<tr><td rowspan="5">Veracruz</td><td>Acayucan</td><td>1</td></tr>
<tr><td>Córdoba</td><td>28</td></tr>
<tr><td>Cosoleacaque</td><td>4</td></tr>
<tr><td>Orizaba</td><td>24</td></tr>
<tr><td>Uxpanapa</td><td>1</td></tr>
<tr><td>Tabasco</td><td>Comalcalco</td><td>2</td></tr>
<tr><td>Yucatán</td><td>Mérida</td><td></td></tr>
<tr><td>Quintana Roo</td><td>Cozumel</td><td>1</td></tr>
</table>
Fuente de información: Diagnóstico Básico para la Gestión Integral de los Residuos, 2020
https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf
https://www.gob.mx/cms/uploads/attachment/file/554383/ANEXOS-DBGIR-15-mayo-2020.pdf

Los detalles de las cantidades de residuos recuperados en las plantas, se puede consultar en el Anexo 13 del Diagnóstico Básico para la Gestión Integral de los Residuos (pg. 371)
<table>
<tr><th>Estado</th><th>Municipio</th><th>Planta</th></tr>
<tr><td>Veracruz</td><td>Teocelo</td><td>Planta de composta</td></tr>
<tr><td rowspan="2">Tabasco</td><td>Comalcalco</td><td>Planta de compactación /digestión anaerobia</td></tr>
<tr><td>Paraíso</td><td>Planta de separación de residuos</td></tr>
<tr><td>Yucatán</td><td>Mérida</td><td>Planta de separación de residuos</td></tr>
<tr><td>Quintana Roo</td><td>Isla Mujeres</td><td>Planta de separación de residuos y compactación</td></tr>
</table>
Fuente de información: Diagnóstico Básico para la Gestión Integral de los Residuos, 2020
https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf
https://www.gob.mx/cms/uploads/attachment/file/554383/ANEXOS-DBGIR-15-mayo-2020.pdf

Los detalles de las cantidades de residuos recuperados en las plantas, se puede consultar en el Anexo 14 del Diagnóstico Básico para la Gestión Integral de los Residuos (pg. 376)</td></tr>
<tr><td>Final disposal</td><td>
<table>
<tr><th>Estado</th><th>No. de sitios de disposición final</th></tr>
<tr><td>Tamaulipas</td><td>46</td></tr>
<tr><td>Veracruz</td><td>150</td></tr>
<tr><td>Tabasco</td><td>17</td></tr>
<tr><td>Campeche</td><td>28</td></tr>
<tr><td>Yucatán</td><td>116</td></tr>
<tr><td>Quintana Roo</td><td>44</td></tr>
<tr><td>Nacional</td><td>2,203</td></tr>
</table>
</td></tr>
</table>

Item	Contents
	Fuente de información: Diagnóstico Básico para la Gestión Integral de los Residuos, 2020 https://www.gob.mx/cms/uploads/attachment/file/554385/DBGIR-15-mayo-2020.pdf https://www.gob.mx/cms/uploads/attachment/file/554383/ANEXOS-DBGIR-15-mayo-2020.pdf Los detalles de los sitios de disposición final de cada estado, se puede consultar en el Anexo 16 del Diagnóstico Básico para la Gestión Integral de los Residuos (pg. 498). Asimismo, la ubicación de los sitios de disposición final puede ser consultada en: http://gisviewer.semarnat.gob.mx/geointegrador/index.html#
5. Financial system	● Ratio of SWM budget allocated within national budget: No se cuenta con información ● Main source of SWM costs: solo unos pocos municipios cobran a los residentes la tarifa de recolección de residuos. En el sitio de disposición final, cobran la tasa de disposición por peso. La principal fuente de gestión de residuos sólidos proviene del gobierno federal a los municipios. ● Cost required for collection/transportation: De acuerdo con el Diagnóstico Básico para la Gestión Integral de los Residuos, el costo promedio es de $434.03 pesos (aprox. 19.03 USD) por tonelada recolectada. Estos costos comprenden sólo la operación del servicio de recolección: que incluye los sueldos del personal, el combustible y, en algunos casos, el mantenimiento de las unidades de recolección. ● Cost required for intermediate treatment: No se cuenta con información ● Cost required for final disposal: El costo promedio es de $121.58 (aprox. 5.33 USD) por tonelada depositada en los sitios de disposición final. Este costo generalmente incluye sólo el salario de los trabajadores que laboran en el sitio y el combustible de la maquinaria que se utiliza en el sitio.
6. Donor support	● Banco Interamericano de Desarrollo (2019-2020): Diagnóstico Básico para la Gestión Integral de los Residuos. ● GIZ-Geocycle México (2018-2020): Proyecto OLAS Reducción de la entrada de residuos de plástico al océano, con el Gobierno del Estado de Quintana Roo https://coprocesamiento.org/reducir-la-entrada-de-residuos-de-plastico-al-oceano/ ● GIZ Proyecto regional Sistema de la Integración Centroamericana (SICA)/Mexico (en espera del encargo por el Ministerio Federal Alemán de Cooperación Económica y Desarrollo (BMZ)): “Prevención de residuos plásticos en América Central y Caribe” Duración 08.2020 al 07.2023 ● JICA: (2002 – 2015) se llevaron a cabo bajo la modalidad de cooperación triangular diversos cursos internacionales enfocados a la región latinoamericana sobre manejo de residuos sólidos y peligrosos, gestión integral de residuos con enfoque 3R y se capacitó a más de 250 funcionarios. https://www.gob.mx/inecc/es/articulos/la-colaboracion-japon-inecc-fundamental-para-seguir-fortaleciendo-las-capacidades-tecnico-cientificas-de-mexico-225538?idiom=es
7. Social consideration	● Policy or law for supporting the informal sector: Dentro de Programa Nacional para la Prevención y Gestión Integral de Residuos 2020-2024, se tiene contemplado promover la mejora en las condiciones del sector informal asociado con la gestión de los residuos promoviendo su integración en grupos formales, la dignificación de su actividad y su formalización laboral. ● Public awareness raising activities: A través de la Comisión para la Cooperación Ambiental, de manera trilateral se está desarrollando un kit de herramientas y una campaña para sensibilizar a la población sobre la contaminación marina y plásticos de un solo uso. (CEC Marine Litter: toolkit

Item	Contents
	and awareness campaign)
8. MPL issues	● La mayoría de los municipios, quienes son los responsables del manejo de los residuos sólidos urbanos, no cuentan con las capacidades técnicas e infraestructura apropiadas para un adecuado manejo de los residuos. ● La falta de caminos y la lejanía de las comunidades rurales con respecto a los centros urbanos, dificulta la posibilidad de brindar el servicio de recolección de residuos haciendo que dichas comunidades dispongan sus residuos en los cauces de ríos o los quemen. ● Durante la temporada de lluvias, los residuos acumulados en los cauces de los ríos son arrastrados hasta llegar a alguna presa o a los mares. ● No existe suficiente infraestructura para el tratamiento de residuos, ni un mercado fortalecido para el reciclaje.
9. Areas for improvement	● Capacidades de gestión de las autoridades locales: Se ha detectado que muchas de las autoridades municipales no cuentan con las capacidades administrativas y técnicas necesarias para plantear proyectos financieramente viables, socialmente aceptables y ambientalmente factibles para la gestión de sus residuos. ● Financiamiento: Las autoridades municipales requieren fortalecer sus capacidades administrativas para generar esquemas de cobro que les permitan contar con la solvencia económica necesaria para hacer financieramente sustentable el manejo de los residuos en su territorio. ● Infraestructura: Es necesario incrementar la infraestructura y el equipamiento para la recolección, acopio, tratamiento, reciclaje y disposición de los residuos. ● Aspectos sociales: Es necesario incrementar en la sociedad las campañas de educación y sensibilización para la separación de los residuos. ● Aspecto legal: México no cuenta con una legislación a nivel federal respecto al uso del plástico. En ese sentido es necesario crear un marco de referencia. ● A partir de la pandemia por Covid-19, el uso de productos desechables para el envío de comida a domicilio y el uso de equipo de protección personal como los cubrebocas, caretas y guantes desechables se ha incrementado, lo que pone de manifiesto la necesidad urgente de equipo e infraestructura adecuada para el manejo de este tipo de residuos.
10. Other candidates for interview	Se anexa el directorio de los Secretarios de Medio Ambiente de los 6 estados de interés. ● Alethia Vázquez Morillas, Dra en Ciencias e Ing. Ambientales, UAM-Azcapotzalco, Ciudad de México, alethia@azc.uam.mx ● ONG-Proyecto Fronterizo de Educacion Ambiental, Margarita Diaz-Directora Ejecutiva, margarita@pfea.org, pfea.margarita@gmail.com ● Community group- Km1, Orlando Anaya-Director ejecutivo, km1oficial@gmail.com ● ONG-Poyecto Bioregional de Educación Ambiental" (PROBEA A.C.), Ricardo Arana Camarena, https://www.facebook.com/ricardoarana ● ONG- Oceana México, https://mx.oceana.org/es ● Community group- Mares Mexicanos, http://maresmexicanos.com/?lang=en ● ECOCE (Asociación Civil) - Ing. Jorge Treviño A. Director General. jtrevino@ecoce.mx

Notas:

1. En México, de acuerdo con la Ley General para la Prevención y Gestión Integral de los Residuos existen tres tipos diferentes de residuos:

	Residuos sólidos urbanos	**Residuos de manejo especial**	**Residuos peligrosos**
Definición	Los generados en las casas	Son aquellos generados en los	Son aquellos que posean

	Residuos sólidos urbanos	Residuos de manejo especial	Residuos peligrosos
	habitación, que resultan de la eliminación de los materiales que utilizan en sus actividades domésticas, de los productos que consumen y de sus envases, embalajes o empaques; los residuos que provienen de cualquier otra actividad dentro de establecimientos o en la vía pública que genere residuos con características domiciliarias, y los resultantes de la limpieza de las vías y lugares públicos	procesos productivos, que no reúnen las características para ser considerados como peligrosos o como residuos sólidos urbanos, o que son producidos por grandes generadores de residuos sólidos urbanos	alguna de las características de corrosividad, reactividad, explosividad, toxicidad, inflamabilidad, o que contengan agentes infecciosos que les confieran peligrosidad, así como envases, recipientes, embalajes y suelos que hayan sido contaminados cuando se transfieran a otro sitio
Atribución	Gobierno municipal	Gobierno Estatal	Gobierno Federal
Manejo	Gobierno municipal o concesionado a empresa privada	Gobierno municipal o empresa privada	Empresa privada
Disposición final	Sitios de disposición final operados por el municipio, concesionados a una particular, o perteneciente a una empresa privada	Sitios de disposición final operados por el municipio, concesionados a una particular, o perteneciente a una empresa privada	Sitios confinados operados por empresas privadas

2. La mayor parte de la información relacionada con los residuos sólidos urbanos que se encuentra en el Diagnóstico Básico para la Gestión Integral de los Residuos 2020, fue retomada del Censo Nacional de Gobiernos Municipales y Delegacionales 2017 (Módulo 6: Residuos Sólidos Urbanos), realizada por el Instituto Nacional de Estadística y Geografía (INEGI).
   Los datos pueden consultarse en: https://www.inegi.org.mx/programas/cngmd/2017/

Este censo se realiza cada dos años en todos los municipios del país. El último Censo se realizó el año pasado, no obstante, aún no se presentan todos los resultados.

El mapa con los sitios de disposición final, entre otra información, puede consultarse en: http://gaia.inegi.org.mx/mdm6/?v=bGF0OjIzLjMyMDA4LGxvbjotMTAxLjUwMDAwLHo6MSxsOmMxMTFzZXJ2aWNpb3N8dGMxMTFzZXJ2aWNpb3M=

DIRECTORIO DE SECRETARIOS DE MEDIO AMBIENTE ESTATALES

ESTADO	TITULAR DE LA DEPENDENCIA DE MEDIO AMBIENTE	TELS.	DIRECCIÓN
TAMAULIPAS	**ING. GILBERTO ESTRELLA HERNÁNDEZ** **SECRETARIO DE DESARROLLO URBANO Y MEDIO AMBIENTE** seduma@tam.gob.mx gilberto.estrella@tam.gob.mx Srio. Part. Lic. Rosa Elena Pompa Caudillo rosa.pompa@tam.gob.mx	(834)107 8615 (834)107 8667	Centro Gubernamental de Oficinas. Parque Bicentenario Prolong. Blvd. Praxedis Balboa y Libramiento Naciones Unidas s/n, Piso 16 87083 Cd. Victoria, Tamps. (8:00 a 19:00 hrs.)
VERACRUZ	**LIC. MARIA DEL ROCÍO PÉREZ PÉREZ** **SECRETARIA DE MEDIO**	(228)818 1800 / 11 (228)817 7588 ext. 113	Francisco I. Madero No. 3 esquina Juárez

ESTADO	TITULAR DE LA DEPENDENCIA DE MEDIO AMBIENTE	TELS.	DIRECCIÓN
	AMBIENTE mrperezp@veracruz.gob.mx rocioperezperez26@gmail.com Srio. Part. Lic. Rafael Ceballos Ruiz rafaceballosruiz@gmail.com rceballosr@veracruz.gob.mx	Ext. 112	Zona Centro 91000, Xalapa, Ver. (9:00 a 15:00 hrs. 16:00 a 18:00 hrs.)
TABASCO	**LIC. MARIO RAFAEL LLERGO LATOURNERIE** **SECRETARIO DE BIENESTAR, SUSTENTABILIDAD Y CAMBIO CLIMÁTICO** sbscc_secretrio@tabasco.gob.mx Lic. Jorge Andrade Gutiérrez sbscc_secretario@tabasco.gob.mx	01 (993) 310 0350/51 Ext. 40003 y 40006	Paseo de la Sierra # 425 Col. Reforma, C.P. 86080 Villahermosa, Tabasco, MX Lunes a Viernes de 8:00 a 15:00 hrs
CAMPECHE	**LIC. ROBERTO IVAN ALCALÁ FERRAEZ** **SECRETARIO DE MEDIO AMBIENTE Y RCURSOS NATURALES** roberto.alcala@campeche.gob.mx Lic. Monica Alejandra Sosa Rodríguez monissosa93@gmail.com	(981)816 1142 Dir. (981)811 9730 Ext. 44102/44100	Av. Patricio Trueba de Regil esq. Con calle Niebla P.A. Fracciorama 2000 24090, San Francisco de Campeche, Camp. (8:00 a 16:00 hrs.)
YUCATÁN	**MTRA. SAYDA MELINA RODRÍGUEZ GÓMEZ** **SECRETARIA DE DESARROLLO SUSTENTABLE** sayda.rodriguez@yucatan.gob.mx Sria. Part. C. Karina Garrido May karina.garrido@yucatan.gob.mx	(999)930 3388 Dir. (999)930 3380 ext. 44008 44007 (directa)	Calle 64 No. 437 por 53 y 47 Letra "A" Col. Centro 97000, Mérida, Yuc. (8:00 a 21:00 hrs.)
QUINITANA ROO	**BIOL. ALFREDO ARELLANO GUILLERMO** **SECRETARIO DE ECOLOGÍA Y MEDIO AMBIENTE** alfredo.arellano@qroo.gob.mx Sria. Part. C. Claudia Elizabeth Espinoza González clauesgo@hotmail.com	(983)129 2101 (983)129 2187 (983)835 0500 (983)835 0650 Ext. 205	Av. Efraín Aguilar No. 418, Piso 2 Col. Campestre 77030, Chetumal, Q. Roo Entre Dimas Sansores y Retorno 3 (9:00 a 17:00 hrs.)

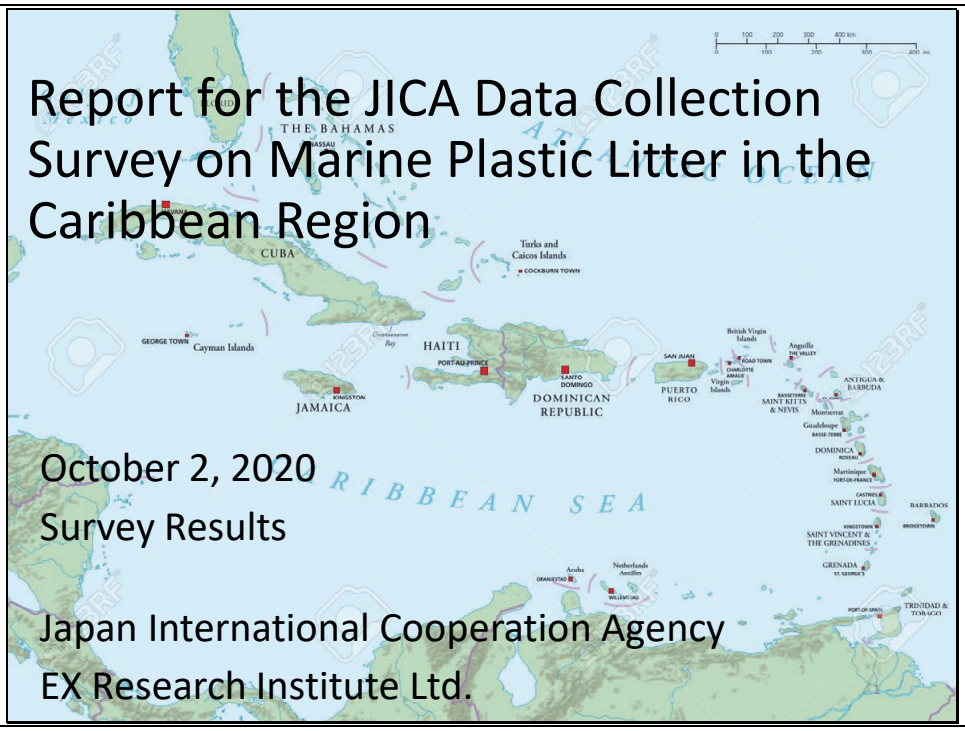
Current Situation of Solid Waste Management (SWM) and Marine Plastic Litter (MPL) in Tamaulipas, United Mexican States

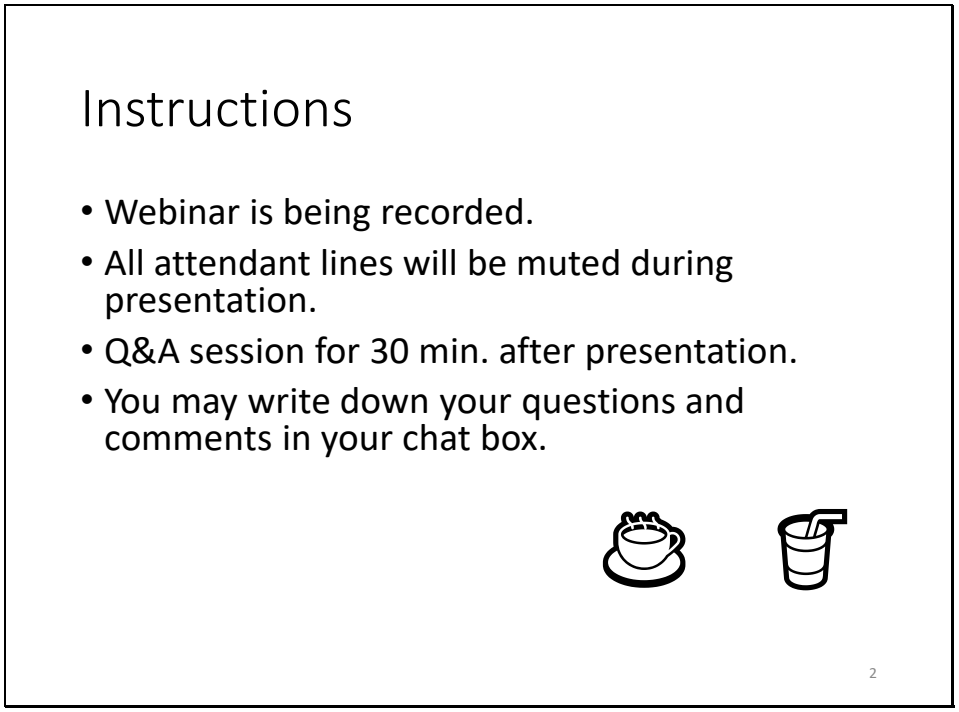
Respondent: Ing. Gilberto Estrella Hernández
Position: Secretario de Desarrollo Urbano y Medio Ambiente
Organization: Secretaría de Desarrollo Urbano y Medio Ambiente del Estado de Tamaulipas

Item	Contents
1. Financial system	● Ratio of SWM budget allocated within national budget: ●●% En el presupuesto nacional, no se especifica el porcentaje destinado a la gestión de los residuos sólidos para las entidades federativas. ● Main source of SWM costs: e.g. collection fee, tax charge Los recursos para el manejo integral de residuos provienen del presupuesto de egresos de cada municipio del Estado; no se cobra por el servicio de recolección. ● Cost required for collection/transportation: ●●USD/ton Costo aproximado de 25.00 USD/ton ● Cost required for intermediate treatment: ●●USD/ton No se cuenta con esta información. ● Cost required for final disposal: ●●USD/ton Costo aproximado de 16.00 USD/ton
2. Donor support	● Ninguna.
3. Social consideration	● Public awareness raising activities: Los 43 municipios del Estado, son los responsables del manejo integral de los residuos sólidos urbanos, por lo cual, el Gobierno del Estado y sus municipios llevan a cabo programas de educación ambiental y capacitación, dirigidos a los diferentes sectores de la sociedad con el propósito de concientizarlos sobre la correcta disposición final de los residuos, además de dar a conocer los lineamientos a seguir para impulsar una cultura que contribuya a disminuir los residuos generados desde la fuente, mediante la separación, reutilización, reciclaje, revalorización y otras formas de aprovechamiento.
4. MPL issues	Uno de los problemas que se enfrenta actualmente a nivel estatal, son los altos niveles de contaminación y degradación de los recursos naturales; esto derivado del incremento de las actividades económicas y crecimiento demográfico en las grandes ciudades o zonas metropolitanas, lo que ha ocasionado un mayor consumo de productos y por ende una elevada generación de residuos sólidos urbanos (RSU) y de manejo especial. La falta de control en las últimas décadas de las grandes cantidades en materia de generación de residuos ha impactado en la calidad de vida de la población por los cuantiosos daños que han sufrido los recursos naturales y en consecuencia la salud; situación por la cual, las políticas públicas nacionales y estatales en materia de gestión ambiental se han concentrado entre otros factores, en el manejo integral de los residuos sólidos urbanos y de manejo especial, con lo cual se busca una adecuada disposición final de los mismos, y con ello, evitar que dichos residuos terminen en áreas naturales o en los océanos.
5. Areas for improvement	Implementar el sistema del manejo integral de los residuos sólidos urbanos y de manejo especial (centros integrales), a través de la construcción de infraestructura y equipamiento para la recolección, traslado, aprovechamiento y disposición final de los residuos en el Estado de Tamaulipas; mejorando así la calidad de vida de los habitantes al disminuir la contaminación de los recursos naturales. Respecto a la basura plástica marina, actualmente existen proyectos con una visión integral la cual es crear conocimiento, conciencia, y cultura sobre la problemática; favorecer la jerarquía en la gestión de residuos en un esquema de reducir el uso, reutilizar y reciclar los plásticos y operar dentro de una economía circular para que los residuos sirvan como materia prima para otros procesos productivos. El proyecto no busca reducir la cantidad de basura marina flotante o extraer la que ya existe en playas y costas. En vez, propone la aplicación de tecnologías como el

Item	Contents
	procesamiento para el tratamiento de residuos de plástico que no son reciclables antes de que lleguen al mar. Asimismo, implementa iniciativas innovadoras para mejorar los sistemas de gestión de residuos sólidos en tierra y reincorporarlos a la actividad productiva como un recurso. Los cambios que actualmente se observan debido al Covid-19, es el incremento en la generación de residuos sólidos urbanos, particularmente y la disposición final inadecuada de residuos peligrosos como lo son los cubrebocas, los cuales en muchos de los casos son desechados en la vía pública.

Appendix 3　Seminar materials for the countries of in-depth survey





Agenda

UTC+9	UTC-5	UTC-4	Item	Presenter
23:50	9:50	10:50	Login	
24:00	10:00	11:00	Greeting	Participant self-introduction
0:05	10:05	11:05	Opening Remarks	JICA
0:10	10:10	11:10	Presentation	Survey team
1:10	11:10	12:10	Question and answer	Survey team
1:30	11:30	12:30	END/Logout	

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Contents

1. Background of the Survey
2. Methodology
3. Results
4. Cooperation Needs
5. Possible Idea of Approach
6. Efforts for Marine Plastic Litter in Japan
7. Japanese Technology
8. Examples of JICA's Cooperation
9. Q & A

4

1. Background of the Survey

GLOBAL (Ellen Macarthur Foundation. 2017)

- Plastic Production
  Increase from 15 million tons (1964) to 311 million tons (2014)
- Amount of plastic released into the ocean
  Macroplastics (more than 5 mm) : about 8 million tons (2015)
- Leak from land via rivers due to improper treatment of MSW:
  7.36 million tons

CARIBBEAN COUNTRIES

- Marine pollution caused by plastic litter directly affects the economic and social activities
- ✓ Surrounded by or facing the ocean
- ✓ One of the important industries: tourism and fisheries

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1 . Background of the Survey

Year	International trends related to the problem of MPL
2015	"G7 Action Plan to Combat Marine Litter" was formulated at the G7 Summit in Elmau.
2016	Ellen MacArthur Foundation published a report advocating for the transition to the New Plastics Economy in collaboration with the World Economic Forum.
2017	China (the largest importer of plastic waste) began regulations on imports of waste and banned the imports in 2018.
2018	The EU developed the "Plastic Strategy".
2018	G7 leaders, besides Japan and the U.S., signed the "Ocean Plastics Charter" at the G7 Summit in Charlevoix.
2019	The resolution "Marine Plastic Litter and Microplastics" was adopted at the 4th session of the UN Environment Assembly (UNEA4).
2019	The Japanese government formulated the "Plastic material recycling strategy".
2019	The EU approved the "Single-Use Plastics Directive".
2019	At the G20 Summit in Osaka, it was agreed to establish the "Implementation Framework for Actions on Marine Plastic Litter", and the "Osaka Blue Ocean Vision" was shared. The Japanese government launched the "MARINE Initiative" and announced its support for capacity building related to waste management and infrastructure development in developing countries.

6

1 . Background of the Survey

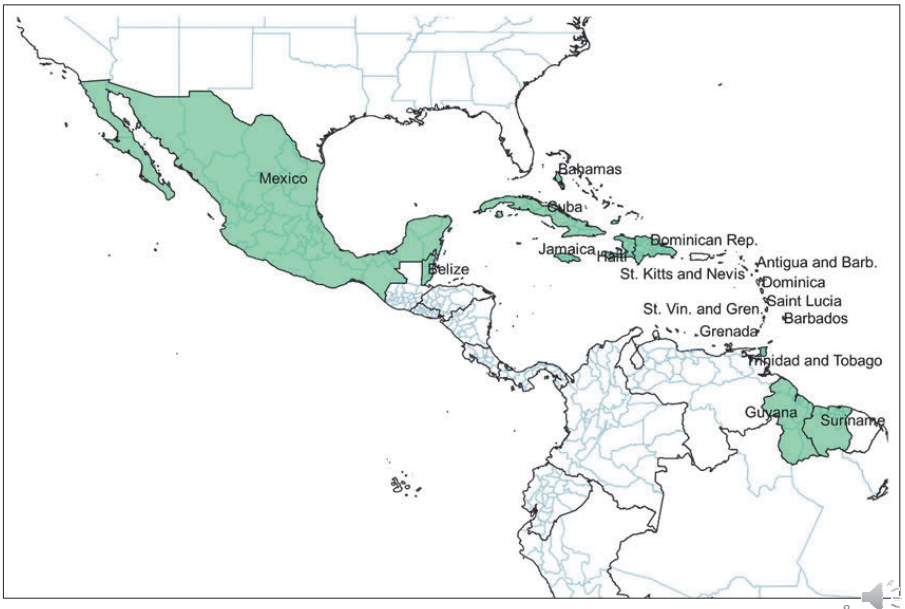
- JICA has been providing assistances on SWM to the Caribbean countries and Mexico for decades.
- In response to such serious situation and international efforts, JICA considers restructuring the efforts to contribute more to the **MPL issues**.

- Member of the Survey Team

Area of responsibility	Name	Company
Project leader / Waste management 1	Hiroshi KATO (Mr.)	EX Research Institute Ltd.
Waste management 2	Tadaya YAMAMOTO (Mr.)	EX Research Institute Ltd.
Marine environment	Mie NAGAYASU (Ms.)	EX Research Institute Ltd.
Marine plastic waste / Information collection on waste management in each country	Chiharu IIDA (Ms.)	EX Research Institute Ltd.

7

1. Background of the Survey



8

MAP: 17 Target Countries in Basic Survey

Estimated Amount of Marine Plastic Litter Released from the 17 surveyed countries

Country of the in-depth survey	Min	Max
Republic of Guyana	2,079	12,496
Grenada	297	3,294
Jamaica	7,834	27,823
Saint Christopher and Nevis	140	3,675
Saint Lucia	485	4,301
United Mexican States	27,869	177,189

Unit: ton/year

Primary Unit
16 countries other than Mexico
- 2.68 kg/person/year
- 27.22 ton/km/year

Mexico
- 1.42 kg/person/year
- 2.99 ton/km/year

The others	Min	Max
Antigua and Barbuda	256	4,165
Republic of Cuba	30,412	101,682
Republic of Suriname	1,530	10,508
Saint Vincent and the Grenadines	295	2,287
Commonwealth of Dominica	192	4,029
Dominican Republic	28,196	35,065
Republic of Trinidad and Tobago	3,712	9,855
Republic of Haiti	29,454	48,218
Commonwealth of The Bahamas	1,024	96,427
Barbados	768	2,559
Belize	1,008	10,508

Unit: ton/year

Source: UNEP.2018b.Mapping of global plastics value chain and plastics losses to the environment – with a particular focus on marine environment., World Bank Group. World Development Indicators., CIA. The World Fact Book.

2. Methodology

1st STAGE: Basic Survey

- Literature Review on **17 countries**
  - ✓ Socio-economic situation
  - ✓ Information on marine plastic litter
  - ✓ Current situation of SWM
- Survey on Japanese Technology applicable for Caribbean reagion

2nd STAGE: In-Depth Survey

- Information collection through a questionnaire survey and online interviews for **6 selected countries**
  - ✓ Grenada
  - ✓ Saint Christopher and Nevis
  - ✓ Saint Lucia
  - ✓ Republic of Guyana
  - ✓ Jamaica
  - ✓ United Mexican States
- Recommendation for the future cooperation based on cooperation needs, donor's activities, and Japanese applicable technology.....

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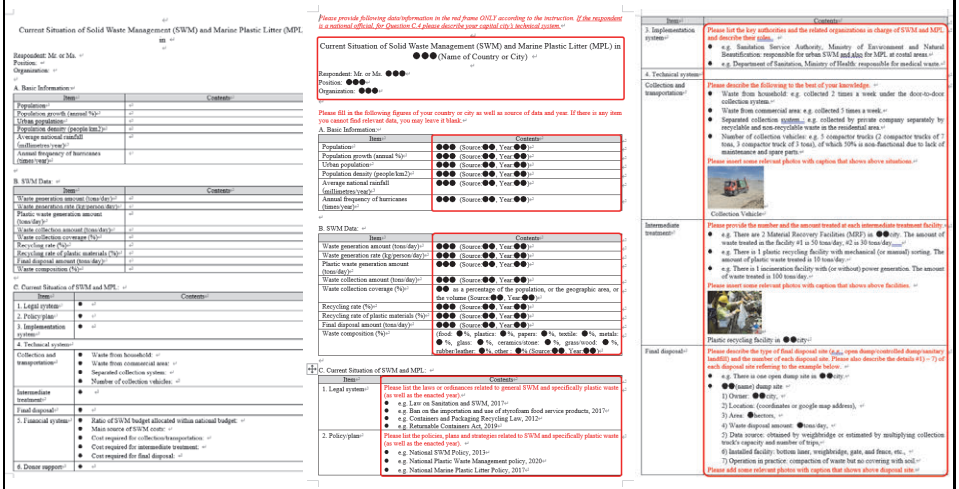
2. Methodology

Country	Organisation
Grenada	Grenada Solid Waste Management Authority
	Ministry of Climate Resilience, the Environment, Forestry, Fisheries, Disaster Management and Information
Saint Christopher & Nevis	Solid Waste Management Corporation
	Department of Environment
	Ministry of Health, Nevis
Saint Lucia	St. Lucia Solid Waste Management Authority
	Department of Sustainable Development, Ministry of Education, Innovation, Gender Relations and Sustainable Development
Republic of Guyana	Ministry of Communities
Jamaica	National Solid Waste Management Authority
	National Environment and Planning Agency
	Maritime Authority of Jamaica
Donor Agency	UNEP Jamaica
	Caribbean Development Bank
	Inter- American Development Bank
	Organisation of Eastern Caribbean States

2. Methodology



Questionnaire and Instruction sheet

2. Methodology

- Contents of the Questionnaire

A: Basic Information
- ✓ Population, Population growth, Urban population, Population density
- ✓ Average national rainfall, Annual frequency of hurricanes

B: SWM Data
- ✓ Waste generation amount, Waste generation rate, Plastic waste generation amount
- ✓ Waste collection amount, Waste collection coverage
- ✓ Recycling rate, Recycling rate of plastic materials
- ✓ Final disposal amount
- ✓ Waste composition

C: Current Situation of SWM and MPL
- ✓ Legal system
- ✓ Policy/plan
- ✓ Implementation system
- ✓ Technical system (Collection and transportation, Intermediate Treatment, Final disposal)
- ✓ Financial system
- ✓ Donor support
- ✓ Social consideration
- ✓ MPL issues
- ✓ Areas for improvement

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3. Results

Results of A. Basic Information and B: SWM Data

Item N/A	Grenada	Saint Lucia	Republic of Guyana	Jamaica
Population	110,000	179,995	746,955	2,726,667
Population growth(annual %)	2.3%	0.73%	-0.04	-0.1
Urban population	3,100	34,990	191,810	477,201
Average national rainfall (millimeters/year)	979.3	1,491.9	2,200	1,773
Waste generation amount (tons/day)	126.319	216	N.A.	2,781
Waste generation rate (kg/person/day)	1.9	1.2	0.61-1.35	1.02
Plastic waste generation amount (tons/day)	19	N.A.	N.A.	0.16 (t/p/d)
Waste collection amount (tons/day)	126.31	90.95 tons/day (household waste)	N.A.	2,641
Recycling rate(%)	N/A	N/A	0	N/A
Waste collection coverage (%)	98	100 for residential waste	N.A.	70
Final disposal amount	N.A.	215	400-450 at Haags Bosch SLF	2,641

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3. Results

Results of C. Current Situation of SWM and MPL

Country	Legal system related to MPL
Grenada	• Grenada Solid Waste Management Authority Act #11 1995 • The Waste Management Act 2001: stipulates the definition of each type of waste. • The Abatement of Litter Act #24 2015 • The Environmental Levy Act 1997 • The Physical Planning and Development Control Act#25 of 2002 • The Non-Biodegradable Waste Control Act 2018
Saint Lucia	• Waste Management Act #8 of 2004 • Styrofoam and Plastic Food Services Containers (Prohibition) Act No. 22 of 2019: partially banned for importation in 2019 and totally banned for use by August 1st, 2020. • Returnable Containers Bill: drafted by Dept. of Sustainable Development but waiting for approval. • Public Health Act No. 8 of 1975: enforced by the Ministry of Health. It also includes SWM in health aspect. • St Lucia is Party to the MARPOL Convention and accepts Ship Waste for Management on Island.

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3. Results

Results of C. Current Situation of SWM and MPL (cont.)

Country	Legal system related to MPL
Republic of Guyana	• Environmental Protection Act, Chapter 20:05, Laws of Guyana • Environmental Protection litter enforcement regulations, 2013 • Public Health Ordinance, Chapter 145, Laws of Guyana • Draft Solid Waste Management Bill, 2014 • Regulations No. 8 of 2015 - The Environmental Protection (Expanded Polystyrene Ban) Regulations, 2015
Jamaica	• National Solid Waste Management Act, 2001 • NSWM (Disposal of Hazardous Waste) Electronic & Electrical, 2020 • NSWM (Public Cleansing) Regulations, 2020 • The Trade (Plastic Packaging Materials Prohibition) Order, 2018 • The Natural Resources Conservation Authority (Plastic Packaging Materials Prohibition) Order, 2018: to ban the importation, distribution, manufacture and commercial use of certain types of single use plastics beginning January 1st, 2019.

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4. Cooperation Needs (1)

Grenada	
Field	Needs
Reduction of Ocean Leakage: none	
Legal system / policy and plan	Stricter enforcement of laws relating to waste management, such as the Waste Management Act and the Abatement of Litter Act
Finance	Maintaining dependable financial resources for waste management
Solid waste management technology	
Discharge	Improving education and public awareness about proper management of waste
Collection	Updating the GSWMA's collection machinery and improving maintenance capacity
Treatment	• Considering the possibility of introducing WTE (providing grounds for judging whether WTE is suitable technology) • Promoting proper recycling • Establishing policy and legislation to support private-sector recycling business
Disposal	Proper operation and management of final disposal sites, and preventing plastic from scattering from disposal sites
Collection of marine plastic litter: none	

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4. Cooperation Needs (2)

Saint Lucia	
Field	Needs
Reduction of Ocean Leakage: none	
Finance	Maintaining financial resources for waste management
Solid waste management technology	
Collection	Establishing collection systems for green waste (trimmings)
Treatment	Establishing a sustainable recycling system by promoting segregation through the Rewarding System (incentive)
Disposal	Implementation of regular maintenance of heavy equipment at the final disposal site
Collection of marine plastic litter	
	Taking measures against floating waste in Castries Harbour.

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4. Cooperation Needs (3)

Republic of Guyana	
Field	Needs
Reduction of Ocean Leakage: none	
Legal system / policy and plan	• Establishing a legal framework for the proper SWM. • Establishing regulations to deal with the 3Rs and marine plastic waste problems
Organization / implementation system	Improving capacity for promoting the implementation of proper solid waste management
Finance	Establishing fee collection systems to cover the expense of waste collection and disposal
Solid waste management technology	
Overall	Compiling basic, comprehensive data on waste collection, including volumes of waste generated, collection rates, etc.
Discharge	Promoting public awareness and education to prohibit littering and change residents' behavior.
Collection	Prevention of scattering and outflow of uncollected solid waste
Treatment	• Ensuring plastic recycling facilities and a market for them • Establishing facilities for processing commercial waste and hazardous waste
Disposal	Prevention of waste scattering and outflow from the disposal site in the rainy season
Collection of marine plastic litter: none	

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4. Cooperation Needs (4)

Jamaica	
Field	Needs
Reduction of Ocean Leakage	
	None
Solid waste management technology	
Overall	WACS to confirm if there have been actual reductions in the waste stream by the end of the 2021 for the effective implementation of the plastic ban through all phases.
Discharge	• Public awareness and education to improve residents' awareness of solid waste management (including illegal dumping). • Persistently encouraging proper waste discharge among poor people, whose purchasing power is weakened by fees for plastic bags.
Collection	Improvement of low collection rates in low-income rural areas.
Treatment	Development of WTE
Disposal	Proper operation and management of final disposal sites
Collection of marine plastic litter	
	• Proper waste management in channels. • Tackling with floating waste in Kingston Harbour.

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5. Possible idea of Approach (1)

- Life cycle of Plastic and areas in which cooperation needs have been identified

	Production	Use	Discharge	Treatment/ Disposal	Ocean Leakage
Cooperation Needs	-	-	✓	✓	✓

- Examples of cooperation need, and correspondent scheme approaches provided by JICA

Areas / Approaches	Discharge/Collection	Treatment/Disposal	Ocean Leakage
Technical Cooperation Project	- Awareness raising activities - Improvement of collection efficiency - Improvement of collection coverage	- Development of policies and regulations to back up the private recycling business - Improvement of operation and management of final disposal sites	- Monitoring of released MPL - Prevention of ocean leakage
Individual Expert Dispatch			
SDGs Business Supporting Surveys	-	- Introduction of plastic recycling technologies	- Recovery of waste from waterway or river

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5. Possible idea of Approach (2)

- Examples of cooperation by JICA Technical Cooperation Project (1)

Analysis of current situation and Support for capacity development

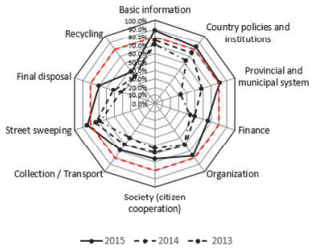
Resident awareness survey

Current situation of collection

Current situation of disposal

Discussion with C / P

Capacity assessment of C / P



Setting measures to improve capacity

Counterpart(s)

Support for capacity development by JICA expert(s)

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5. Possible idea of Approach (3)

- Examples of cooperation by JICA Technical Cooperation Project(2)

Awareness raising activities

Development of materials for public awareness

Distribution, and explanation of pamphlets for public awareness

Execution of public awareness-raising activities

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5. Possible idea of Approach (4)

- Examples of cooperation by JICA Technical Cooperation Project(3)

Conduct time and motion survey

Improvement of collection efficiency
Improvement of collection coverage

Analysis of current collection routes

Design of optimal collection route

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5. Possible idea of Approach (5)

- Examples of cooperation by JICA Technical Cooperation Project(4)

Improvement of final disposal site

Analysis of current situation

Implementation of improvement

After improvement

On-site workshops for landfilling

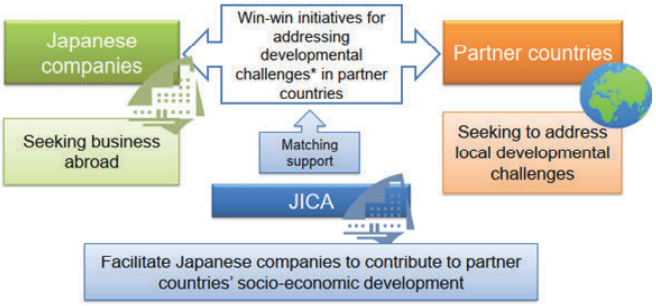
5. Possible idea of Approach (6)

Overview of Scheme of SDGs Business Supporting Surveys (1)

JICA's Partnership with the Japanese Private Sector (1)

Aware of the limitations of conventional ODA, JICA has sought to address the socio-economic challenges faced by partner countries through business in partnership with private companies.

JICA helps partner countries match their development needs with the appropriate products and technologies provided by Japanese companies.

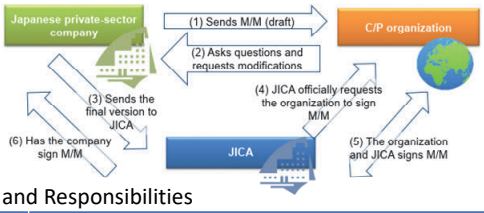


5. Possible idea of Approach (7)

Overview of Scheme of SDGs Business Supporting Surveys (2)

JICA's Partnership with the Japanese Private Sector (2)

- Creating an agreement to the framework of the program (not legally binding)
- The purpose of M/M is to define the activities and division of roles



Division of Roles and Responsibilities

Roles and responsibilities of the JICA team (examples)	Roles and responsibilities of the C/P (examples)
• Provide the products and services required for the surveys and demonstrations (and associated shipping costs from Japan) • Survey expenses • The expenses for activities in partner country • Seminar and workshop expenses	• Utilities expenses • Personal expenses for this program • Assist with the procedure for the tax exemption related to the equipment • Offer demonstration sites • Provide data • Sign a Certificate of Hand Over for the equipment by the completion of the program • Manage and maintain the equipment after the completion of the program

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6. Efforts for marine plastic litter in Japan

- Material flow of plastic waste in Japan

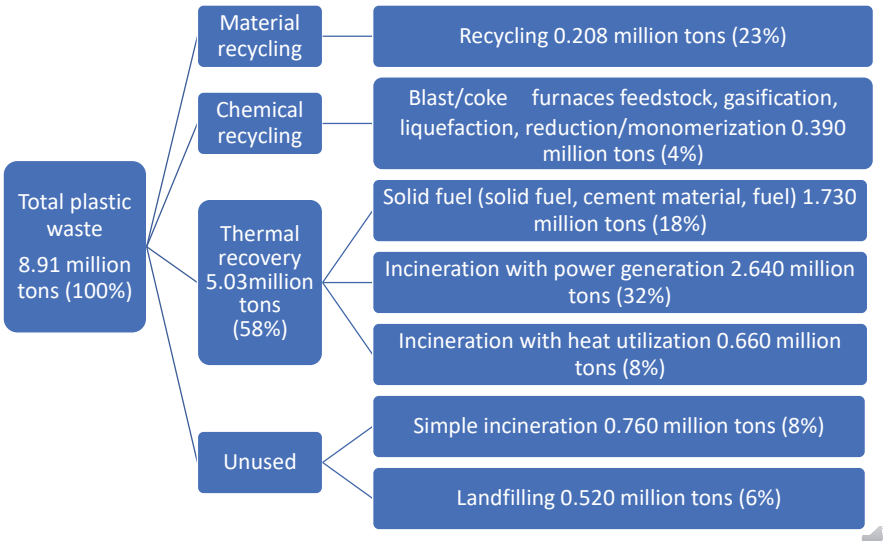

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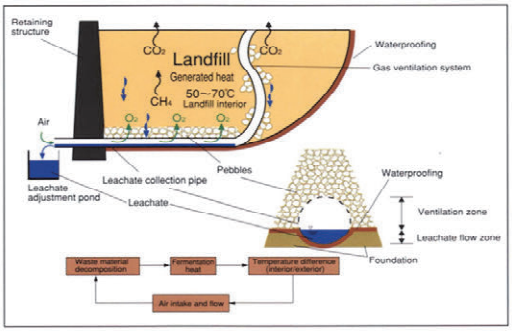
Fig: Material flow of plastic waste in Japan

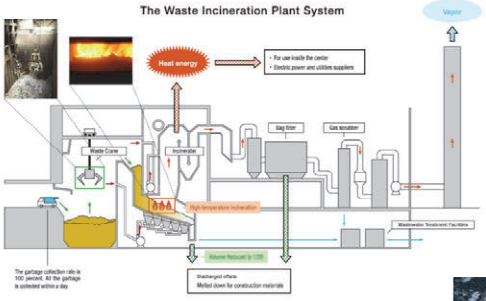
7. Japanese Technology (1)

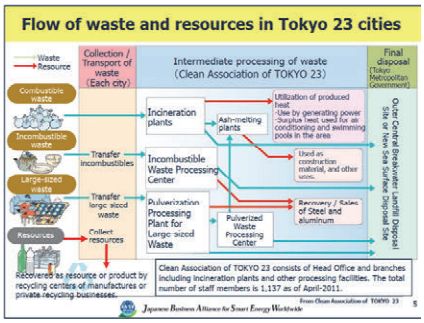
- Semi-aerobic Landfill Technology (Fukuoka Method)
  - The Fukuoka method is a technology offering improved landfill sites simply and at low cost utilizing materials and methods readily available in developing countries to install leachate drainage pipes and gas vents, thereby enlarging the aerobic region in the landfill waste layers.
  - The Fukuoka Method also minimizes impact on the environment surrounding the site because it promotes the degradation of landfilled waste, rapid landfill stabilization and leachate is drained promptly from the landfill.
  - In addition the volume of methane gas emitted by the landfill is reduced, contributing to efforts to prevent global warming.

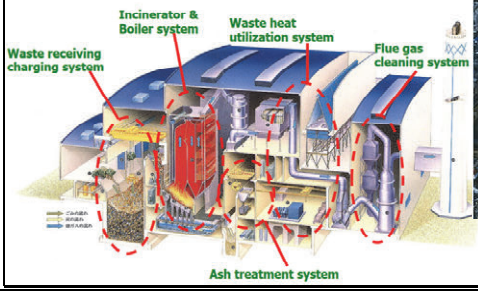


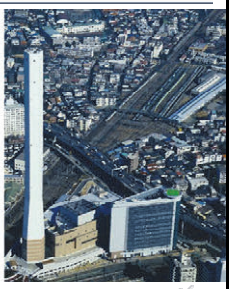
7. Japanese Technology (2)

- Incineration with power generation









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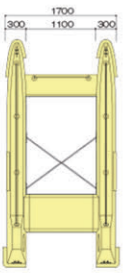
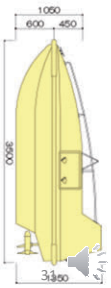
7. Japanese Technology (3)

- Collection technology for floating debris

Floating litter collection ship

Small radio-controlled floating litter collection ship





7. Japanese Technology (3)

- Waste Plastics to Fuel ---> See Examples of JICA's cooperation

8. Examples of JICA's cooperation (1) Example of **Technical Cooperation Project**

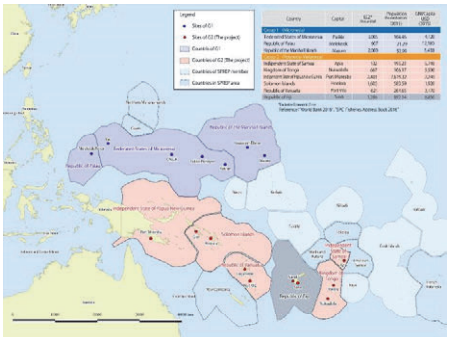
J-PRISM II project (Japanese Technical Cooperation Project for Promotion of Regional Initiative on Solid Waste Management in Pacific Island Countries Phase 1 (2011to2016), Phase 2(2017 to 2022)

Project Purpose (Phase 2)
Integrated Project Purpose

- Human and institutional capacity base for sustainable Solid Waste Management in the Pacific region is strengthened through implementation of Cleaner Pacific 2025.

Expected achievement of J-PRISM II as a whole

- Human and institutional capacity base for sustainable waste management is strengthened through the Project by formulating framework for regional cooperation, conducting pilot survey and others associated to realize "3R+Return" in Pacific region.



- The Project expects member countries to ultimately establish sustainable solid waste management system
- Capacity development (CD) at the level of Individual, Organizational, and Social is particularly important in order to solve waste problems by yourself

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8. Examples of JICA's cooperation (2) Example of **Technical Cooperation**

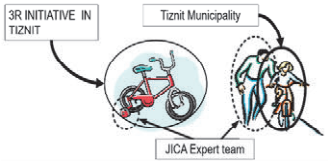
THE PROJECT FOR CAPACITY DEVELOPMENT FOR SOLID WASTE MANAGEMENT IN TIZNIT AND NEIGHBORING COMMUNES IN THE KINGDOM OF MOROCCO The project period : April 2013 to February 2016

Outputs

1. Capacity to analyze the current status of SWM in Tiznit Province is improved.
2. Capacity to modernize the SWM including 3R activities in Tiznit Municipality is improved.
3. Capacity to manage the existing dump site in Tiznit Municipality is improved.
4. Capacity to develop and manage a new sanitary landfill by Tiznit Municipality is improved.
5. Capacity to collect and transport solid waste in selected communes other than Tiznit Municipality is improved.
6. Capacity to manage the existing dump sites in selected communes other than Tiznit Municipality is improved.
7. Capacity to formulate an Inter-communal SWM plan based on the Provincial Master Plan (M/P) is improved.
8. Awareness for SWM is raised among the residents of the Project sites.

Implementing Policy

Tiznit Municipality take ownership in executing the project while Japanese expert team supports to the Tiznit Municipality.

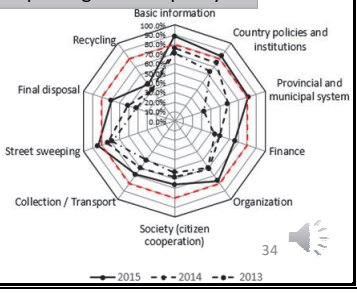


Conclusions

Some results
Collection and social aspect

- Collection rate 93.05 to 96.3% (Sept. 2015) 3.3% improved
- Waste reduce rate in the pilot area 7% to 10%

Improving of the capacity



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8. Examples of JICA's cooperation (3) Example of **Individual Expert Dispatch**

Introduction of Semi-aerobic Landfill Technology (Fukuoka Method)

- The semi-aerobic sanitary landfill system was developed jointly by Fukuoka City and Fukuoka University in Japan.
- This system is a standard for municipal disposal sites in Japan.
- The Fukuoka Method is fit local conditions in developing countries at relatively low cost.
- This model is replicated in Palau, Vanuatu, and FSM(Federated States of Micronesia)and is expected to be replicated further in similar volcanic and high-altitude islands in the Pacific region.

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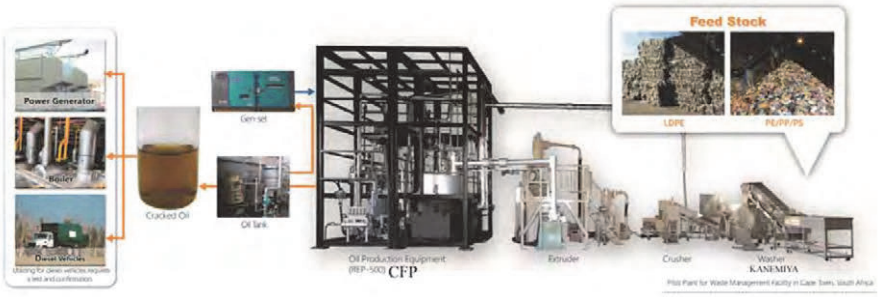
8. Examples of JICA's cooperation (4) Example of **SDGs Business Supporting Surveys**

Republic of South Africa (RSA):Pilot Survey for Disseminating SME's Technologies for the Co nversion of Waste Plastics to Fuel towards Sustainable Waste management



- The pilot plant of waste plastic to the oil production system is set up in the Kraaifontein waste management facility of the City of Cape Town.
- In order to demonstrate that the cracked oil generated from waste plastics (PE, PP, PS) can utilize fuel for a diesel generator.
- By improving the recycling rate of waste plastics, environmental issues are improved by reducing landfill waste. And creating a new source of energy that produces electricity from waste plastics. In addition, new jobs will be created by waste plastic to the energy business.

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8. Examples of JICA's cooperation (5)

Example of **SDGs Business Supporting Surveys**

- Medical waste incinerator

Verification Survey with the Private Sector for Disseminating Japanese technologies for Installation of Smokeless Incinerators for Medical Wastes at Public Hospitals in Regional hub cities. Survey duration: from Feb. 2019 to Mar. 2022
Target area: Khénifra Provincial Hospital Centre, Derâa Tafilalet Regional Hospital Center

Concerned Development Issues in Morocco

- In Morocco, the amount of medical wastes has been growing, but national and other public hospitals and health centers in rural areas have not established a system to dispose of and collect medical wastes. Therefore, such wastes are often stored in the facilities for a long time and the risk of bad odor and secondary infection is growing.
- The Ministry of Health is required to promptly present effective measures and policies for the disposal of medical wastes in rural areas.

The main body has a double jacket structure with all water-cooled steel plates.
- Plastic wastes can be incinerated without smoke in a multi-nozzle incineration method.
- With CHUPROCE system, a waste gas control system unique to the proposing company

Implemented Activities in the Survey

- Introduce smokeless incinerators for medical wastes to two national/public hospital in rural areas to demonstrate that medical wastes can be incinerated in an appropriate environment.
- Transfer proper knowledge and techniques concerning the operation and maintenance of the incinerators to the hospital staff. Establish a system to manage and utilize the incinerators in the hospitals in Morocco.
- Build a foundation to expand the use of the incinerators among medical facilities in rural areas, and establish a business development plan.

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8. Examples of JICA's cooperation (6)

Example of **SDGs Business Supporting Surveys**

Verification Survey with the Private Sector for Disseminating Japanese Technologies for Compact Environmentally Friendly Incinerators
Survey duration: Aug. 2016 to Feb. 2019
Target area: Wangaya Comprehensive Hospital

Concerned Development Issues in Indonesia
Medical waste problem
(1) Improper disposal (2) Load on landfills (3) Risk of spreading infectious diseases
Environmental problems due to incineration
(1)Air pollution (2)Impact of incinerators on surrounding residents and inpatients

Implemented Activities in the Survey

- Replace the existing incinerator with Compact Environmentally Friendly Incinerator (name is CHIRIMESER) and-verify its mummy with local standards
- Propose a method to properly process medical waste and implement it
- Leveraging this project as a model case, conduct activates for disseminating the demonstration results to other medical institutions, and facilities and communities that have a need for processing waste

CHIRIMESER TGII-29

- Incinerator that does not emit smoke
- Fully automatic operation
- Mitigate the emission of toxic substances
- Easy installation

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8. Examples of JICA's cooperation (7) Example of **SDGs Business Supporting Surveys**

Verification Survey with the Private Sector for Disseminating Japanese Technologies for Plastic Recycling System to Convert Waste to Eco-Product
Survey duration: May 2018 to Aug. 2020
Target area: Svay Rieng City

Concerned Development Issues in Cambodia

- Improvement of waste management to treat increasing waste in an appropriate manner
- Minimization of waste amount to be treated at a final disposal site
- Reduction of plastic waste amount

Implemented Activities in the Survey

- Verification on advantage of PB530 products (plastic timbers) in comparison with competitive products in Cambodia.
- Test marketing of PB530 timbers and development of improved products.
- Development of new PB530 products such as plastic furniture.
- Promotion of PB530 products through exhibition and seminars.

PB530 (Plastic Blend technology for zero waste) equipment and products
Lower initial investment cost : Recycling plastic wastes without process such as segregation by category and/or washing away stain and dirt
Higher quality : Keeping better hardness and durability than competitive plastic products.

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Thank you for your attention

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Reference

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R-1. Efforts for marine plastic litter in Japan (1)

- History of regulations related to waste management and recycling

  - The "Act on the Promotion of Effective Utilization of Resources" was enforced in 1991 as a legal measure for resource recycling including plastics.
  - In 2000, the "Basic Act on Establishing a Sound Material-Cycle Society" was enforced.
  - In 2001, the "Law for the Promotion of Effective Utilization of Resources" was enforced.

- Plastic resource circulation policy

  - The Plastic resource recycling strategy was formulated in May 2019, and measures based on it are being promoted.
  - In this strategy,
    - Reduction of plastic use that contributes to the reduction of environmental loads such as reduction of disposable containers and packaging
    - Thorough, effective, and efficient collection and recycling of used plastic resources including unused plastic
    - It will comprehensively promote the improvement of the practicality of bioplastics and the promotion of replacement of fossil fuel-derived plastics.

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R-2. Efforts for marine plastic litter in Japan (2)

- Collaboration of Industry-government-academia marine plastic litter

- In order to solve the marine plastic problems, it is indispensable for a wide range of entities such as ministries, local governments, companies, NGOs, and research institutes to collaborate and cooperate to promote countermeasures.
- Ministry of the Environment formed "Plastic Smart"
- Ministry of Economy, Trade, and Industry formed "Clean Ocean Material Alliance“

Implementing entity	Name	Overview
Ministry of the Environment	Plastic smart	The alliance was launched in January 2019. It is 506 organizations are participating in this alliance as February 20, 2020. The purpose of this alliance is to promote countermeasures by collecting and sharing information on plastic waste reduction. A number of case studies currently being aggregated will be sent to the world at the G20 and other opportunities.
Ministry of Economy, Trade and Industry	Clean Ocean Material Alliance	The alliance was launched in January 2019 with the participation of 159 companies and organizations. It was established with the aim of strengthening cooperation among related businesses in order to accelerate the more sustainable use of plastic products and the development and popularization of alternative materials such as biodegradable plastics in order to reduce marine plastic waste. In the future, we will promote technology dissemination and cooperation at places such as the Promotion Subcommittee and the International Cooperation Subcommittee.

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R-3. Efforts for marine plastic litter in Japan (3)

- Measures against marine drifting and drifted wastes

- The “Act on Promoting the Treatment of Articles that Drift Ashore” was revised in 2018 to promote the treatment of drifted wastes in and address the issue of marine plastic litter.
- The points of the revision are as follows.
  - Added the viewpoint of marine environment conservation.
  - Addition of drifted wastes article and promotion of smooth disposal of drifted wastes.
  - Suppressing the occurrence of beach drifted wastes by promoting the 3Rs.
  - Measures against microplastics (It is stipulated that businesses are obliged to make efforts to restrict use and emissions and that the government will promptly consider measures to restrict microplastics and take measures based on the results).
  - Ensuring international cooperation and promoting international cooperation

- Collaboration of Industry-government-academia for drifting and drifted wastes

A platform by the Ministry of the Environment and the Nippon Foundation has been launched to promote information gathering and dissemination in collaboration with various actors in measures against drifting and drifted waste. All-Japan initiatives such as "Marine Litter Zero Week" are being implemented.

Implementing entity	Name	Overview
Ministry of the Environment and the Nippon Foundation	CHANGE FOR THE BLUE	A project to create a marine debris reduction model in collaboration with 12 organizations consisting of industry, government, academia, and the private sector, and disseminate it domestically and internationally. It was launched in November 2018. In collaboration with the Ministry of the Environment, Plastic Smart, we are holding "Marine Litter Zero Week," "Marine Litter Zero Award," a... "Marine Litter Zero International Symposium."

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R-4 Reference

Ellen Macarthur Foundation. 2017. The New Plastics Economy: Rethinking the Future of Plastics & Catalysing Action. Retrieved from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/NPEC-Hybrid_English_22-11-17_Digital.pdf (Available on 27 May 2020)

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