

## Commencement Workshop for the “Technical Cooperation Project on Advisor for Marine Plastic Litter Management in the Caribbean Region”

### Objectives of the workshop

This is the workshop to commence the “Technical Project on Advisor for Marine Plastic Litter Management in the Caribbean Region” setting the objectives as below.

- To confirm the current situation of solid waste management in each country,
- To identify issues/areas to which this project will address in each country,
- To plan concrete activities which will be conducted in the Stage 2 and the Stage 3 in this project in each country, and
- To share information and knowledge among participants.

### Output of the Workshop

- Work Plan (Version 2): The Version 1 will be updated based on discussions during the workshop.

### Participants

Antigua and Barbuda	Mr. F. Daryl Spencer, General Manager, National Solid Waste Management Authority
Grenada	Ms. Myrna Julien, Communications Manager Grenada Solid Waste Management Authority
Guyana	Mr. Satrohan Nauth, Director of Sanitation Ministry of Local Government & Regional Development
Saint Lucia	Mr. Laurianus Lesfloris, Deputy General Manager, Saint Lucia Solid Waste Management Authority (SLSWMA) Ms. Emlyn Jean, Information and Communication Manager, SLSWMA (Further participants expected)
JICA Saint Lucia	Mr. Hiroyasu Tonokawa, Chief Representative, JICA Saint Lucia Office Ms. Hitomi Urushihata, Project Formulation Advisor Mr. Terumasa Matsuzaki, Representative
JICA Advisory Team	Mr. Ikuo Mori, Leader Mr. Makoto Yamashita, Sub-leader Mr. Satoshi Higashinakagawa, in charge of collection, transport and recycling Mr. Yukihiisa Sakata, in charge of final disposal operation and maintenance Mr. Taisuke Watanabe, in charge of organization and institution analysis
Observer	Mr. Vincent Sweeney, Head, Caribbean Sub-Regional Office, United Nations Environment Programme

Program:

Date	Time	Activity	Remarks
3/14 Mon	09:00	Opening remarks by Mr. Hiroyasu Tonokawa, Chief Representative, JICA Saint Lucia Office Welcome speech by Ms. Emlyn Jean, Information and Communication Manager, SLSWMA	Venue: Lantana Conference Room, Bay Gardens Hotel
	09:30	Explanation of the Project by Mr. Ikuo Mori, JAT	
	10:15	Coffee Break	
	10:30	Presentation about the current situation of solid waste management and support needs (each country has about an hour for presentation and discussion) 1. Grenada: Ms. Myrna Julien Communications Manager Grenada Solid Waste Management Authority	
	12:00	Lunch	
	13:00	Continuation of the presentation 2. Antigua and Barbuda: Mr. F. Daryl Spencer General Manager National Solid Waste Management Authority 3. Guyana: Mr. Satrohan Nauth Director of Sanitation Ministry of Local Government & Regional Development	
	15:15	Coffee Break	
	15:30	Continuation of the presentation 4. Saint Lucia Mr. Cassian Henry, Zonal Supervisor, SLSWMA	
	16:30	Closure with explanation of the field trip on Tuesday	
3/15 Tue	09:00 All day	Leave Bay Gardens Hotel for the site visit (disposal site, transfer station, waste collection, etc.) Vieux Fort Transfer Station Deglos Sanitary Landfill	
3/16 Wed	09:00	Formulation of an Integrated Solid Waste Management Plan by Mr. Ikuo Mori, JAT	Venue: Lantana Conference Room, Bay Gardens Hotel
	10:15	Coffee Break	
	10:30	Overview of actions to prevent marine plastic litter and microplastics in the Caribbean Mr. Vincent Sweeny, Head, Caribbean Sub-Regional Office, UNEP	
	12:00	Lunch	
	13:00	Treatment and Disposal, by Mr. Yukihiisa Sakata, JAT	
	14:30	Coffee Break	
	14:45	Collection and Transport, Recycling by Mr. Satoshi Higashinakagawa, JAT	
	16:00	Closure	
3/17 Thu	09:00	Introduction of Legal System for Extended Producer Responsibility in Japan by Mr. Taisuke Watanabe All day: Discussion on what we will do in the 2nd stage and in the 3rd stage	Venue: Lantana Conference Room, Bay Gardens Hotel
	10:30	Coffee Break	
	10:45	Discussion on waste minimization in Japan, Waste Amount and Composition Survey, etc.	
	12:00	Lunch	
	13:00	Discussion on what we will do in the 2nd stage and in the 3rd stage	

Date	Time	Activity	Remarks
	14:45	Coffee Break	
	15:00	Discussion on what we will do in the 2nd stage and in the 3rd stage	
	16:00	Closure	
3/18 Fri	09:00	(COVID-19 Test)	Venue: Lantana Conference Room, Bay Gardens Hotel
	10:30	Revision of the Work Plan (Version 1) and confirmation of the revised Work Plan	
	12:00	Farewell remarks from each country	
	13:00	Lunch	
	14:00	(JAT internal meeting for reviewing the workshop)	
	16:00	Closure of the Workshop	

#### Zoom Links:

Time: 14 March 2022, 09:00 St Lucia

Topic: Commencement Workshop - JICA Marine Plastic Litter Management Mar.14 AM

<https://us06web.zoom.us/j/82314182264>

Time: 14 March 2022, 13:00 St Lucia

Topic: Commencement Workshop - JICA Marine Plastic Litter Management Mar.14 PM

<https://us06web.zoom.us/j/81570265846>

Time: 16 March 2022, 09:00 St Lucia

Topic: Commencement Workshop - JICA Marine Plastic Litter Management Mar.16 AM

<https://us06web.zoom.us/j/82575454884>

Time: 16 March 2022, 13:00 St Lucia

Topic: Commencement Workshop - JICA Marine Plastic Litter Management Mar.16 PM

<https://us06web.zoom.us/j/89944735473>

Time: 17 March 2022, 09:00 St Lucia

Topic: Commencement Workshop - JICA Marine Plastic Litter Management Mar.17 AM

<https://us06web.zoom.us/j/81084741760>







Commencement Workshop  
for  
the “Technical Project on Advisor for Marine Plastic Litter  
Management in the Caribbean Region

- Opening -

14 March 2022

JICA Advisory Team



**NIPPON KOEI**

## Opening

- Self introduction
    - From the floor and the internet
  - Opening remarks
    - by Mr. Hiroyasu Tonokawa, Chief Representative, JICA Saint Lucia Office
  - Welcome speech
    - by Ms. Emlyn Jean, Information and Communication Manager, SLSWMA
  - Self introduction
    - by participants
-

# Covid-19 Control and Prevention

- Wear a mask
    - Always wear a mask. Keep quiet during eating snacks and lunch.
  - Avoid close contact each other
  - Clean and disinfect
  - Monitor your health daily
- 

3

## Webinar

Some of programs are accessible for colleagues of the participants through the internet.

- Webinar is being recorded.
  - To remote participants. Please write down your name, institution, position and email address.
  - All attendant lines will be muted during presentation.
  - You may write down your questions and comments in your chat box
- 

4



Commencement Workshop  
for  
the “Technical Project on Advisor for Marine Plastic Litter  
Management in the Caribbean Region

- Explanation of the Project -

14 March 2022

JICA Advisory Team



**NIPPON KOEI**

## Background and Objectives of the Project

- Data Collection Survey on Marine Plastic Litter in the Caribbean Region (Basic Survey) was conducted in 2020.
- Antigua and Barbuda, Grenada, Guyana, Jamaica and Saint Lucia made requests for Japan’s Technical Cooperation were made at the end of the Basic Survey.
- The Basic Survey collected information about the current situation of marine plastic litter problems and solid waste management in general. Also, it presented “Cooperation Needs” from the JICA Team’s viewpoint.
- This Project is to confirm support needs, to set challenges, to prepare plans to tackle the challenges, to implement the plans, and finally to share knowledge and experiences not only among 5 countries but also with other countries in the Caribbean Region.

# Goal and Outcomes

<b>Goal</b>	To prevent the outflow of plastic waste into the ocean, the capacity to respond to waste management priorities will be strengthened in the target countries, and the achievements and lessons learned from each country's efforts will be shared in the Caribbean region.
<b>Outcome</b>	<p><b>Outcome 1:</b> Waste management bodies in each country (central ministries, local governments, waste management corporations, etc.) grasp the current status and priority issues of waste management.</p> <p><b>Outcome 2</b> Technologies and methods applicable to solving problems identified in each country will be shared, and plans for their implementation will be formulated in some countries.</p> <p><b>Outcome 3</b> In some countries, pilot projects will be implemented to improve waste management to prevent the outflow of plastic waste into the ocean.</p> <p><b>Outcome 4:</b> Information sharing on waste management will be promoted between the target countries and other Caribbean countries.</p>

3

# Activities

<b>Activities</b>	<p><b>Activity 1-1:</b> Understanding the current situation and analysing problems</p> <p><b>Activity 1-2:</b> Prioritizing issues</p> <p><b>Activity 2-1:</b> Sharing of technologies and methods applicable to issues, and Japanese knowledge and experience</p> <p><b>Activity 2-2:</b> Waste management plan or action plan formulation</p> <p><b>Activity 3-1:</b> Selection of pilot projects or activities</p> <p><b>Activity 3-2:</b> Implementation of pilot projects or activities</p> <p><b>Activity 3-3:</b> Evaluation and analysis of the results of pilot projects or activities</p> <p><b>Activity 4-1:</b> Preparation of seminar presentation materials</p> <p><b>Activity 4-2:</b> Arrangement of issues, lessons learned, and solutions common to the Caribbean region</p> <p><b>Activity 4-3:</b> Examination of information sharing framework in the Caribbean region</p> <p><b>Activity 4-4:</b> Holding an information sharing seminar</p>
-------------------	--

4

# Counterparts

Country	Institution	Person
Antigua and Barbuda	National Solid Waste Management Authority (NSWMA)	Mr. F. Daryl Spencer, General Manager, National Solid Waste Management Authority
Grenada	Grenada Solid Waste Management Authority (GSWMA)	Ms. Myrna Julien, Communications Manager Grenada Solid Waste Management Authority
Guyana	Ministry of Local Government & Regional Development	Mr. Satrohan Nauth, Director of Sanitation Ministry of Local Government & Regional Development
Saint Lucia	Saint Lucia Solid Waste Management Authority (SLSWMA)	Mr. Laurianus Lesfloris, Deputy General Manager, Saint Lucia Solid Waste Management Authority (SLSWMA) Ms. Emlyn Jean, Information and Communication Manager, SLSWMA
Jamaica	National Environment and Planning Agency	
	National Solid Waste Management Authority	

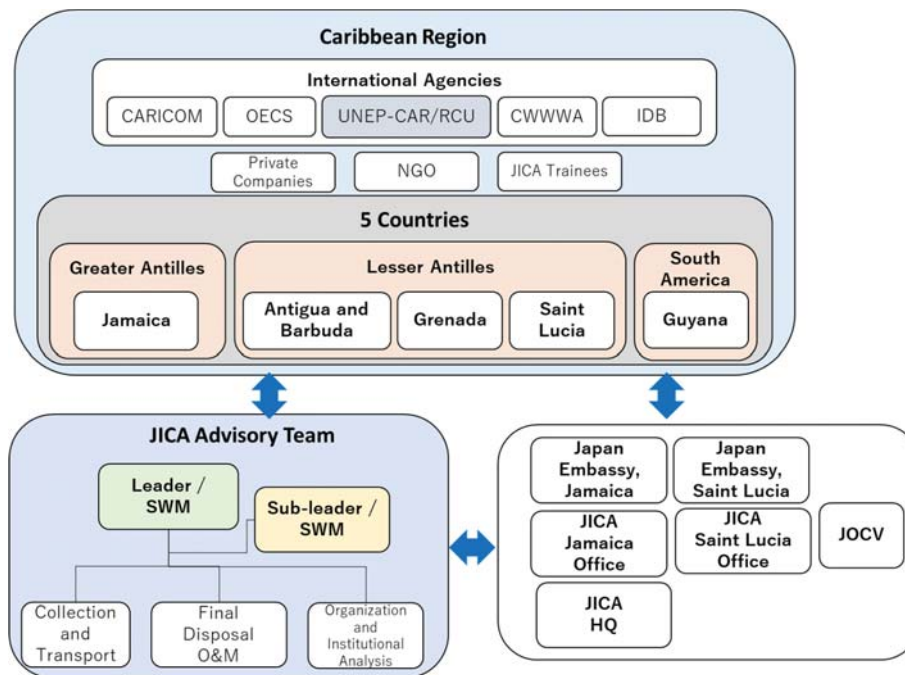
5

# JICA

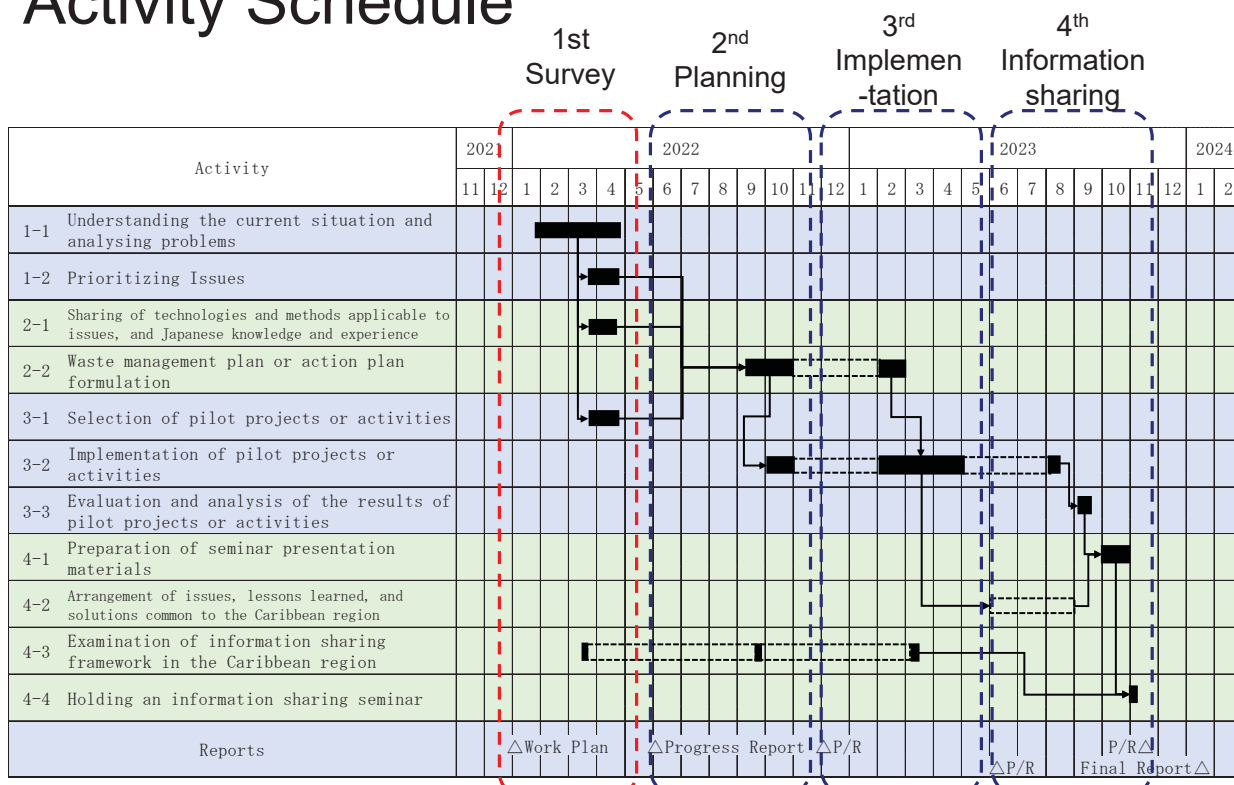
Institution, Position	Person
JICA Advisory Team (JAT)	-
Leader / Solid Waste Management	Ikuo MORI
Sub-leader / Solid Waste Management	Makoto YAMASHITA
Collection and Transport	Satoshi HIGASHINAKAGAWA
Final Disposal Operation and Maintenance	Yukihisa SAKATA
Organization and Institution Analysis	Taisuke WATANABE
JICA Headquarters	-
Chief manager	Chie SHIMODAIRA
Staff in charge	Keita HARADA
JICA Saint Lucia Office	-
President	Hiroyasu TONOKAWA
Staff in charge	Terumasa MATSUZAKI
Staff in charge	Hitomi URUSHIBATA
JICA Jamaica Office	-
President	Toru TOGAWA
Staff in charge	Hiroyuki OKAZAKI

6

# Project Stakeholders



## Activity Schedule



# JICA Advisory Team Assignment Schedule

This will be changed as appropriate depending on the content and progress of the activities.

Position	Name	2021		2022												2023												
		11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
Leader / Solid Waste Management	Ikuo MORI																											
Sub-leader / Solid Waste Management	Makoto YAMASHITA																											
Collection and Transport	Satoshi HIGASHINAKAGAWA																											
Final Disposal Operation and Maintenance	Yukuhisa SAKATA																											
Organization and Insitution Analysis	Taisuke WATANABE																											

## Project Report (main report)

Category	Item	Contents
Current situation	Solid waste management system	Legal system, organization, technology, finance, resident cooperation, environmental and social considerations, etc.
	Problems to be solved	-
	Actions to solve the problems	-
SWM Plan (five-year plan or action plan)	Surveys for planning	Waste amount and composition survey, recycling survey, time and motion survey, etc.
	Five-year plan	Legal system, organization, technology, finance, resident cooperation, environmental and social considerations, etc.
	Action plan	Plan for specific them such as introduction of separate collection and improvement of dumping site
Pilot project (improvement activity)	Pilot project	Implementation of improvement plans extracted from the five-year plan
	Improvement activity (smaller scale than the pilot project)	Implementation of the action plan
Lessons and recommendations	Lessons and recommendations learned from the above activities	-
Information sharing seminar	Materials for information sharing seminar	-

# Project Report (annex)

JAT will prepare the materials shown in the table below through the project, provide them to the counterparts through workshops and daily work, and finally use them as annexes to the project report.

Items and contents are subject to change according to activities conducted in the project.

Item (example)	Contents (example)
Waste Flow	How to prepare a waste flow conducting WACS, public opinion survey, etc.
Formulation of a SWM plan	How to formulate a SWM plan; future forecast (waste generation amount, collection amount), future waste flow, infrastructure, etc.
Recycling regulations in Japan and other countries	Various recycling laws (from the viewpoint of EPR) Collaboration with industry for law formation
Collection and transport	Types of storage and discharge and their strengths and weaknesses Types of separate collection and their strengths and weaknesses Collection and transport planning and monitoring method Transfer transport
Recycling and treatment	Introduction of plastic recycling Introduction of intermediate processing method Types of incinerators and their strengths and weaknesses
Final disposal	Types, functions, and equipment of disposal sites Operation monitoring method of disposal site
Waste management and public awareness in island countries	Understanding common issues and efforts in waste management in island countries based on the example of Oceania Deposit system in Oceania
Public Private Partnership	Contract type and advantages / disadvantages
Finance	Income and expenditure in waste management Economic level and waste management
Others	According to the needs of 5 countries

11

## Basic Principles

- BP1: Support the improvement of waste management which is proactively conducted by each country
- BP2: Maximize the project outcomes while keeping in mind the restrictions imposed by the COVID-19

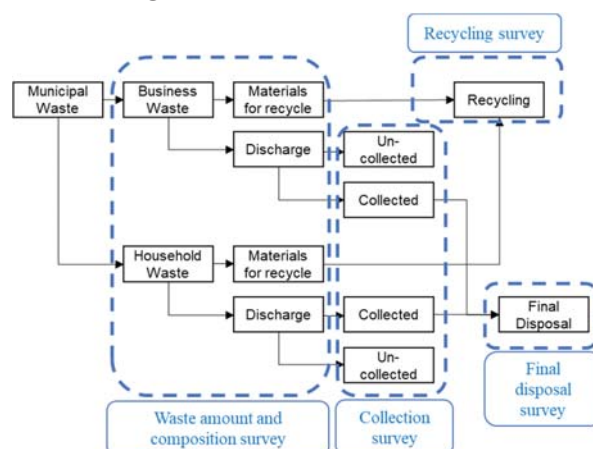
Item	Main field	Subfield
Country	Jamaica, Saint Lucia	Antigua and Barbuda, Grenada, Guyana
Stage 1. Survey	Survey on the site	Remote survey
Stage 2. Planning	Comprehensive five-year solid waste management plan	specific improvement action plan (only collection or final disposal, etc.)
Stage 3. Implementation	Implementation of a pilot project extracted from the SWM plan	Implementation of an action plan
Stage 4. Information sharing	Organizing the process and results from planning to implementation of improvement Knowledge sharing through seminar presentations	
JAT support	Long stay	Short visit
Complementary financial support	For conducting surveys and implementing pilot projects, if necessary	travel costs for participating seminars, workshops, and visiting pilot projects, if necessary

12



# Basic Principles

- BP 3: Support the acquisition of capacity through consistent efforts from the formulation of waste management plans to the implementation of pilot projects



- BP 4: Collaborate with institutions operating in the Caribbean Region on the marine plastics issue  
– CARICOM, OECS, UNEP, etc.

13

## Activity 1-1: Understanding the current situation and analysing problems

Output	<ul style="list-style-type: none"> <li>• Waste management information for each country</li> <li>• Issues that each country should tackle</li> <li>• Identification of counterpart organizations and persons in charge in each country</li> </ul>
Method	<ul style="list-style-type: none"> <li>• Each country will update the basic survey results and organize the latest waste management information.</li> <li>• Based on the latest waste management information, each country clarifies the problems to be solved or addressed (what, when, and how).</li> <li>• Each country sets actions (issues) to be taken to solve the problem.</li> <li>• JAT gives advice from a professional standpoint, such as the importance of problems and the feasibility of actions.</li> </ul>
Remarks	<ul style="list-style-type: none"> <li>• Problems shall be quantified and visualized preparing municipal waste flow, plastic waste flow, stakeholder map, etc.</li> <li>• As for Antigua and Barbuda, detailed waste management information was not organized at the time of the basic survey, so it will be newly prepared.</li> </ul>

14

## Activity 1-2: Prioritizing issues

Output	<ul style="list-style-type: none"> <li>● Prioritized actions/issues</li> <li>● Actions to be conducted in each country from the Stage 2 such as formulating a medium-term solid waste management plan/a specific action plan and implementing a pilot project/an action plan</li> </ul>
Method	<ul style="list-style-type: none"> <li>● Each country should organize the actions according to the time (short term (1 to 2 years), medium term (within 5 years), long term (6 years or later)).</li> <li>● Analyse the feasibility of actions classified in the short term (the project period).</li> <li>● Consider what each country will conduct from the Stage 2.</li> </ul>
Remarks	<ul style="list-style-type: none"> <li>● For short-term actions, analyse the feasibility of short-term actions from multiple perspectives, such as the understanding of stakeholders (executing agencies and residents) and finance (Capital, O &amp; M).</li> </ul>

15

## Activity 2-1: Sharing of technologies and methods applicable to issues, and Japanese knowledge and experience

Output	<ul style="list-style-type: none"> <li>● Workshop materials</li> <li>● Workshop participant list</li> <li>● Record of Q &amp; A and comments at the workshop</li> </ul>
Method	<ul style="list-style-type: none"> <li>● Basically, the workshop focuses on lectures on waste management plan formulation methods. In addition, knowledge and experience from Japan and other countries will be shared.</li> <li>● Five target countries will be divided in to three groups: (1) Jamaica, (2) Antigua and Barbuda, Grenada, Saint Lucia, and (3) Gaiana. The workshops will be held for about five days at each group.</li> </ul>
Remarks	<ul style="list-style-type: none"> <li>● Use tools such as Zoom and Teams to record workshops, exchange opinions using the chat function, and upload materials. The online site will be continuously opened during this work, and the waste management plan and related information to be formulated will be accumulated and made accessible to the concerned parties.</li> <li>● At the time of the first trip, the contents of the workshop will be discussed with the C/P. For countries where there is no need to formulate a waste management plan, the contents will be designed according to their needs.</li> </ul>

16

## Activity 2-2: Waste management plan or action plan formulation

Output	<ul style="list-style-type: none"><li>● Waste management plans in two countries (including pilot project plans)</li><li>● Action plans in 3 countries</li><li>● Waste flow preparation manual, etc.</li></ul>
Method	<ul style="list-style-type: none"><li>● For Jamaica and Saint Lucia, develop a waste management plan for 5 years. Contents of the waste management plan is assumed to be as follows, but the specific contents and the formulation body will be decided based on the field surveys of each country.</li><li>● For Antigua and Barbuda, Grenada and Guyana, contents of the action plans will be limited to improvement of a specific field such as collection improvement and disposal site improvement.</li><li>● When conducting WACS (Waste Amount and Composition Survey), Public Opinion Survey (POS), recycling survey, etc. necessary for preparing waste flow, a manual that records the survey implementation method and includes videos and photos will be prepared. The survey cost is assumed to be partly allocated by the pilot project cost.</li></ul>
Remarks	<ul style="list-style-type: none"><li>● JAT mainly supports the formulation of waste management plans in the two countries, but also visit the three countries to support for preparing action plans.</li><li>● Hold a progress report meeting for planning and share information online.</li></ul>

17

## Activity 3-1: Selection of pilot projects or activities

The selection of the actual pilot project or improvement activity will be carried out in "Stage 1: Survey". The following points are to be considered for the selection.

- Effect manifestation: Can the effect be measured in a practically one year? Is it a widely recognized effect?
- Feasibility: Are resources (human resources, equipment, land, costs, etc.) sufficient? Can stakeholder consensus be obtained?
- Sustainability: Can the activity be sustained even after the pilot project is completed?

18

## Activity 3-2: Implementation of pilot projects or activities

Output	<ul style="list-style-type: none"><li>● Pilot project implementation monitoring record</li><li>● Improvement project implementation monitoring record</li></ul>
Method	<ul style="list-style-type: none"><li>● In the two countries (main field), the pilot project plan extracted from the formulated waste management plan will be refined and implemented.</li><li>● In the three countries (subfield), the action plan will be refined and implemented.</li></ul>
Remarks	<ul style="list-style-type: none"><li>● Keep in mind that it may take some time to procure materials and equipment.</li></ul>

19

## Activity 3-3: Evaluation and analysis of the results of pilot projects or activities

Output	<ul style="list-style-type: none"><li>● A product (project report) that summarizes the results, evaluation / analysis, and lessons learned from the pilot project.</li><li>● Manuals used in the pilot project, etc.</li></ul>
Method	<ul style="list-style-type: none"><li>● Evaluate and analyze the results of the pilot project, considering the effectiveness of improvement measures, then reflect them in the waste management plan being formulated.</li><li>● Organize the process of the pilot projects (planning, implementation, results), lessons learned, etc. so that it can be used as a reference for other countries with similar issues in the Caribbean region.</li></ul>
Remarks	<ul style="list-style-type: none"><li>● Summarize the results with the utilization in activity 4-4 regional seminars in mind.</li></ul>

20

## Activity 4-1: Preparation of seminar presentation materials

Output	● Materials presented by the C/P of each country at the seminar
Method	● Each country organizes the efforts in the project (understanding the current status of waste management, planning, implementing pilot projects, learning in these processes).
Remarks	● Organize the results of activities conducted (survey results, plans, activity implementation records, photographs, etc.) on the online site so that presentation materials can be easily created.

21

## Activity 4-2: Arrangement of issues, lessons learned, and solutions common to the Caribbean region

Output	● Materials presented by JAT at the seminar
Method	● JAT will summarize the overview of waste management of the Caribbean countries, the analysis results of issues and improvement measures, the background and results of the pilot projects, and how to utilize tools such as manuals prepared based on lessons learned.
Remarks	● Organize the results of activities conducted (survey results, plans, activity implementation records, photographs, etc.) on the online site so that presentation materials can be easily prepared.

22

## Activity 4-3: Examination of information sharing framework in the Caribbean region

Output	<ul style="list-style-type: none"> <li>● A record of discussions with organizations related to information sharing in the field of waste management in the Caribbean region.</li> <li>● Determination of regional organizations to jointly implement the seminars of Activity 4.4</li> </ul>
Method	<ul style="list-style-type: none"> <li>● Consider a framework for effective waste management information sharing in each country in the Caribbean region. It is required to work with countries and regional organizations that may be the core of future cooperation in the Caribbean region. Such organization will be: <ul style="list-style-type: none"> <li>- CARICOM</li> <li>- OECS</li> <li>- UNEP</li> <li>- Caribbean Water, Wastewater and Waste Association</li> </ul> </li> </ul>
Remarks	<ul style="list-style-type: none"> <li>● In the Caribbean region, it is thought that many countries have similar issues, so it is aimed to build a framework that will continue to contribute to solving the issues in the entire region in the future.</li> <li>● This activity will be conducted from the Stage 1 not only at the Stage 4.</li> </ul>

23

## Activity 4-4: Holding an information sharing seminar

Output	<ul style="list-style-type: none"> <li>● Seminar materials</li> <li>● List of seminar participants</li> <li>● Record of Q &amp; A and comments at the seminar</li> <li>● Recommendations for the continuation and development of waste management improvement activities</li> </ul>
Method	<p>The content of the seminar is assumed to be as follows.</p> <ul style="list-style-type: none"> <li>● Presentation by 5 countries</li> <li>● Presentation by JAT</li> <li>● Presentation by the seminar co-sponsor (regional organization)</li> <li>● Presentation by JICA (Future cooperation framework)</li> <li>● Summary of recommendations for the continuation and development of waste management and improvement activities</li> </ul>
Remarks	<ul style="list-style-type: none"> <li>● Make sure to get a wide range of participants by allowing online participation.</li> </ul>

24



Commencement Workshop  
for  
the “Technical Project on Advisor for Marine Plastic Litter  
Management in the Caribbean Region

- Explanation of the Workshop -

14 March 2022

JICA Advisory Team



**NIPPON KOEI**

## Explanation of Workshop

### Objectives of the workshop

- To confirm the current situation of solid waste management in each country,
- To identify issues/areas to which this project will address in each country,
- To plan concrete activities which will be conducted in the Stage 2 and the Stage 3 in this project in each country, and
- To share information and knowledge among participants.

### Output of the Workshop

- Work Plan (Version 2): The Version 1 will be updated based on discussions during the workshop.



# Outline of the workshop

- 1<sup>st</sup> day (14, Monday)
    - Presentation of the current situation of solid waste management in your countries.
  - 2<sup>nd</sup> day (15, Tuesday)
    - Site visits: Vieux Fort Transfer Station, Deglos Sanitary Landfill.
  - 3<sup>rd</sup> day (16, Wednesday)
    - Presentation by JAT, what we could do in the Project.
  - 4<sup>th</sup> day (17, Thursday)
    - To update the information of the current situation of solid waste management in your country (update the section A.1 of the Work Plan Annex)
    - To identify issues/areas to which this project will address in each country
  - 5<sup>th</sup> day (18, Friday)
    - To plan concrete activities which will be conducted in the Stage 2 and the Stage 3 in this project in each country
- (Note: Activities planned above are subject to JICA HQ approval.)

3

## What JICA/JAT can do for you

No.	Support Needs / Problems	Reasons
1	ex. Separate collection	To reduce amount of waste to disposed of
2		
3		
4		
5		

Item	Main field	Subfield
Country	Jamaica, Saint Lucia	Antigua and Barbuda, Grenada, Guyana
Stage 1. Survey	Survey on the site	Remote survey
Stage 2. Planning	Comprehensive five-year solid waste management plan	specific improvement action plan (only collection or final disposal, etc.)
Stage 3. Implementation	Implementation of a pilot project extracted from the SWM plan	Implementation of an action plan
Stage 4. Information sharing	Organizing the process and results from planning to implementation of improvement Knowledge sharing through seminar presentations	
JAT support	Long stay	Short visit
Complementary financial support	For conducting surveys and implementing pilot projects, if necessary	travel costs for participating seminars, workshops, and visiting pilot projects, if necessary

4



Your counterpart of JAT member during the Workshop

- Antigua and Barbuda
  - Taisuke WATANABE
- Grenada
  - Yukihiisa SAKATA
- Guyana
  - Satoshi HIGASHINAKAGAWA
- Saint Lucia
  - Makoto YAMASHITA

JAT Member will work with you to confirm the problems and to clarify support needs.

# Commencement Workshop

Technical Cooperation Project on Advisor for  
Marine Plastic Litter Management in the Caribbean Region

Grenada Solid Waste Management Authority

Ms. Myrna Julien  
Communications Manager



# In this Presentation

Brief on the Grenada Solid Waste Management Authority - Governance /Structure.

1. Legislations supporting Solid Waste Management
2. Service provision.
3. Our waste stream
4. Current situation in Grenada Re Solid Waste Management
5. Current projects
6. Challenges
7. Support Needs.

## Established 1995

Grenada Solid Waste Management Authority was established by an Act of Parliament 11. of 1995.

**Grenada Solid Waste Management Authority Act.**

**Ministry of Tourism, Civil Aviation, Climate Resilience and Environment**

## Legislation to support Solid Waste Management.

### 1. The Environmental Levy Act 1997.

- Householders through Electricity bill
- Visitors - Cruise Port & Airport.
- Levy on Goods such as Beverage containers, Vehicles, Appliances etc.

Recently Adjusted and effected on Feb 1st 2022.

2. Waste Management Act #16. 2001 - Proper waste management - Contains certain prohibitions and offers guidance for proper waste management- waste handling licenses, vending, transportation,

**Enforcement lies with the RGPF and EHO MOH.**



## Supporting legislation ctd.

- ▶ 3. 2015 Abatement of Litter Act #24.
  - ▶ Seeks to address the problem of littering & other forms of indiscriminate waste disposal.
  - ▶ **Enforcement- Police & Litter Prevention Wardens**
- ▶ 4. 2018 Non Biodegradable Waste Control Act.
  - ▶ Prohibits the import, Manufacture, offer for sale or retail of certain products. Styrofoam food service containers, Single use Plastic bags, Single use Plastic food service products and utensils etc.
- ▶ 5. 2002 The Physical Planning and development Control Act #25

## Our Mandate/services

- A. Landfill development & management
- B. Garbage Collection/transportation.  
*Recent revision*
- C. Street Cleaning/ Towns only
- D. Monitoring/supervision of services.
- E. Public Education
- F. Integrated Resource Recovery



## How are our services provided

### ► Garbage collection

- 9 Private waste haulers. How, when, where, Who.

*Supervision of service*

### ► Street Cleaning.

4 Private Janitorial companies. Who, when, where, how.

*Supervision of Service*

### ► Landfill Management.

-Where- Grenada

3 sites . Landfill, Disaster derived debris site, Old Dumpsite.

and Carriacou - Dumfries Landfill

Commissioned in 2001

### ► Intergated Resource Recovery

### ► Public Education

## Benefits of our Privatized services

1. Improved collection coverage 56% to 98% households.
2. Greater Efficiency- compliance to contract.
3. Better Equipment- Less down times/timely and regular collection services
4. Cost effective
5. Greater coverage
6. Better administration
7. Satisfied consumers.



## What is in our waste stream

Despite our efforts aimed at waste diversion, we have seen a steady increase in our waste stream.

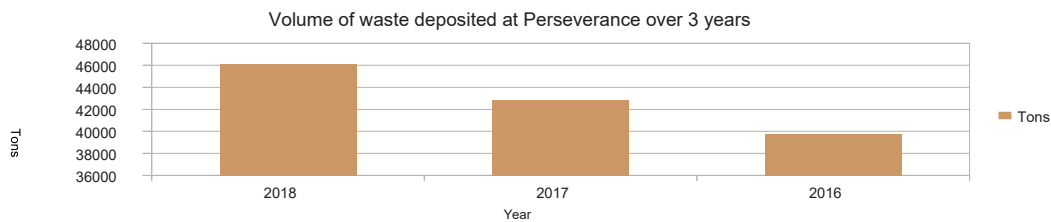
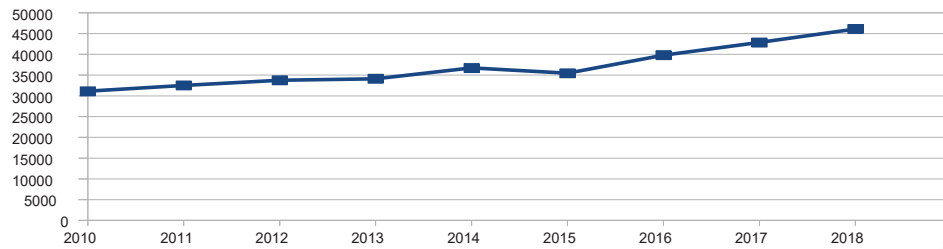


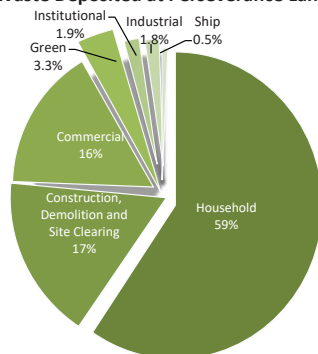
Chart shows the volume of waste in tons deposited at the Perseverance Dumpsite over a 3 year period  
**2018 – 46,106.72 short tons, 2017 – 42,868.06 short tons 2016- 39,789.83 short tons**

The Chart below shows a record of waste arrivals at the Perseverance for 2010 to 2018



## Our waste generation Trends

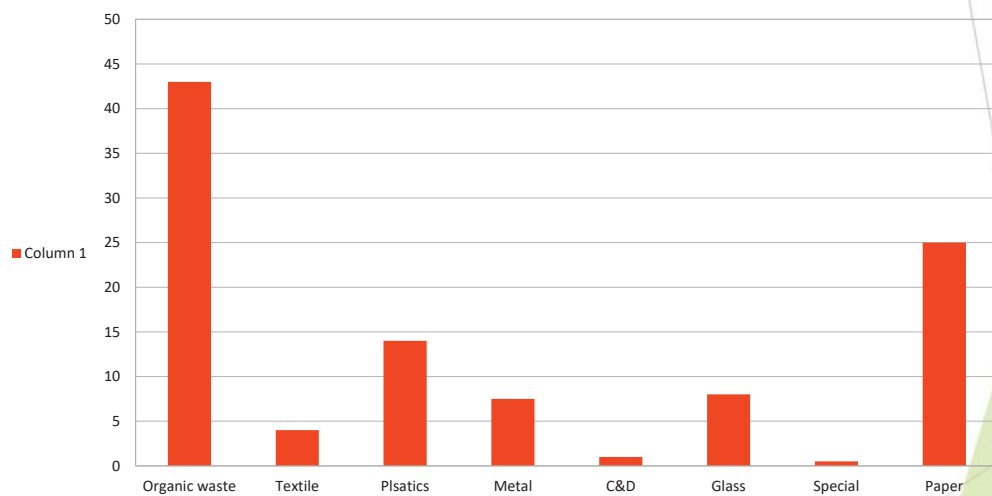
Solid Waste Deposited at Perseverance Landfill



46,000 Tonnes 2019.  
 Population, 110,000.

## What is in our Waste Stream

Approximately 29,000 in 2000 to 46,000 tonnes 2019



## What is Current

- ▶ 1.CDB/GoGr funded "Integrated Solid Waste Management Project"
- ▶ Consultancies for -
- ▶ a.Perseverance Landfill Project.
  - ↻ -Re design and construction of the Final Perseverance Landfill Cell.
  - ↻ -Leachate/ storm water treatment facilities
  - ↻ -Closure and rehabilitation of open Dump
  - ↻ -Rehabilitation of old Landfill cells
  - waste pickers facility.



## Perseverance Landfill project



## CDB/GoGR ISWMP. Ctd.

- ▶ B. Review of 5-Year National Waste Management Strategy.
- ▶ C. Monitoring and Evaluation of Project.
- ▶ D. Institutional Strengthening and Capacity Building
- ▶ E. Public Awareness and Education
- ▶ F. Composting feasibility study
- ▶ G. Landfill Equipment Upgrade.



## 2. Integrated Resource Recovery.

### Establishment of a new department within the GSWMA

Basic functions being to forecast and have a clear understanding of Grenada's waste stream, offer directions for sustainable waste diversion initiatives and plan in consultation with stakeholder institutions including private partners, government ministries, institutions, projects aimed at waste reduction in conformity with the best practices and sound environmental standards.

- ▶ a. Plastic waste recycling in Carriacou. NSU/Paddies/GSWMA -Pilot - Funded by UNDP & GIZ. - Current Status - Expansion of project - PPP.
- ▶ b. Regularization of waste pickers.
- ▶ c. PPP for waste oil refinery.
- ▶ d. Launch of National Derelict Vehicle Clean-Up Project- GoGR, Min of Health, Min of Infrastructure Development/Works, RGPF & GSWMA. PPP with Private Regional entity March 2<sup>nd</sup> 2022.
- ▶ e. Home Composting promotion

## Composting promotion activities

Schools

Hotels

Large  
generators of  
green waste

Householders

Farmers  
organizations

Clubs

### Protein from waste

- ▶ Engagements with local private entity to re introduce the manufacture of animal feed from food waste from fisheries, poultry, brewery and fresh produce farmers. Eg MNIB.

## Composters



## Ongoing projects engagements

- ▶ ICUN Plastic waste free islands.
- ▶ - Prospects for preventing plastic leakage into the marine environment and establishing businesses out of waste, eg manufacture of plastic slabs for park benches, chairs etc.
- ▶ ReMIit -OECS project.
- ▶ Pilot waste separation to retrieve plastics and recycle in some form.  
*Colour coded litter bins*
- ▶ ReMIit Ctd
- ▶ Public Awareness education
- ▶ Clean-up initiatives
- ▶ Promotional material

## Evaluation of collection systems.

- ▶ -Boundary definition
- ▶ -Amalgamation of Street cleaning and collection
- ▶ -Expansion of collection services.
- ▶ -Decommissioning of communal collection points.
- ▶ -Introduction of Contract Compliance system- BOQ relative to service provision.
- ▶ -Enforcement support



## Public Awareness & Education

- ▶ We have re branded.
- ▶ General Public Awareness.
- ▶ Departmental Support-
  - ▶ -Landfills
  - ▶ -Operations
  - ▶ -Integrated Resource Recovery
- ▶ EFSI
- ▶ Stakeholder engagements
- ▶ -Staged Activities- ALAW.
- ▶ -Int'l Sector Day observances.
- ▶ -Workshops
- ▶ - Public presentations
- ▶ -Use of Social Media

## Despite our best efforts we are still challenged by and look for solutions to:

- ▶ Our growing waste stream. Including new challenging waste types - e-waste, tyres, metal waste, C&D, Derelicts, green waste, Plastic packaging inc Beverage bottles.
- ▶ Enforcement of supporting legislation.
- ▶ Capacity to effectively and efficiently conduct landfill operations. Semi Aerobic Filling plan.
- ▶ Public compliance to established waste disposal procedures including Commercial, construction, manufacturing
- ▶ Limited space for landfilling and landfill development.
- ▶ Frequent Disposal site fires.
- ▶ Need for specialized equipment for waste processing including replacing aging stock. Eg metal baling, tyre processing, C&D waste, Wood Chipping, Plastic and paper processing, waste compaction,
- ▶ Litter prevention and management island wide including in towns, Beaches, coastal communities, festivals, attractions & commercial centres

## Challenges ctd.

- ▶ Illegal dumping.
- ▶ Inability to find a sustainable solution to one of our most recent and common challenge -Sargassum sea weed.
- ▶ Non-waste management issues which impact our services. Eg Road access, damaged drainage systems in our towns & sidewalks,



## Support Needs

- ▶ Medium to High Priority areas.
- ▶ - Capacity building to strengthen enforcement. WM Act. LA Act.
- ▶ - Review of EVL in an effort to sustain dependable revenues to facilitate provision of effective waste management services.
- ▶ - Implementation of technologies geared at improving the delivery of public education. Waste reduction, litter and pollution prevention
- ▶ -Upgrading GSWMA's collection machinery and improving capacity to maintain - training.
- ▶ - Feasibility study, including the necessary data to determine considerations for the introduction of WTE.
- ▶ - Training of Landfill staff for efficient application of standards specific to a number of areas critical to landfill operations inc. Ground water monitoring and leachate treatment, application of SA filling plan, heavy equipment maintenance, gas venting, standards for handling specific waste types, waste classification fundamentals, organizational structure, OHS standards specific to landfills, quality assurance.

- ▶ Medium to High Ctd.
- ▶ -Policy and legislative review to encourage private sector recycling targeting paper and plastics.
- ▶ -Disposal site management procedures to prevent plastic leakage into neighbouring water systems. Also the prevention of fires and land slippage.
- ▶ Low.
- ▶ Reducing plastic usage.- needs to be revisited. NBDWCA. Testing of alternatives.
- ▶ Strengthening of regulations to help prevent littering with plastic beverage containers and other single use plastics at sporting and other street/beach events. (Vendors & patrons)



► Low ctd.

► Legislative review to encourage clean-up of areas outside of the GSWMA jurisdiction. Eg areas outside of the towns, coastal areas, private /abandoned properties etc.

The Grenada Solid Waste Management Authority is looking forward to successful engagements over the next five days and beyond to help us to address our many challenges with solid waste management and in particular addressing the sore issue of marine litter.

Wkdqnr#rx



# Antigua and Barbuda Current situation

Presented By : F Daryl Spencer

14<sup>th</sup> March 2022

## Introduction

- ▶ The National Solid Waste Management Authority in keeping with the governments zero waste policy has launched number of projects aimed on optimizing waste management and simultaneously retrieve the usable components within the waste management stream.
- ▶ The authority has also sought to promote entrepreneurship through opportunities carved out from the repurposing, reuse and recycling of waste materials
- ▶ Moreover, the National Solid Waste Management Authority continues to work towards fulfilling its mandate as outlined by the National Solid Waste Management Act of 1995 and 2005 respectively. The authority continues to research and attempt to implement improved waste management practices leading to sound management of waste thereby reducing environmental degradation and improving the burden on the public's safety and health

## Intro cont.

- ▶ NSWMA developed by an act of parliament with responsibility for solid waste, storage, collection, treatment and disposal; and for matters incidental and connected therewith
- ▶ NSWMA Act 1995
- ▶ community based, insanitary waste disposal systems.
- ▶ Burning of solid waste was a common occurrence and very little was done in the area of environmental monitoring
- ▶ Cooks landfill has been designated the Antigua's lone approved waste disposal site,
- ▶ Plantation landfill site was designated as the only approved site for Barbuda

## Projects undertaken by NSWMA

- ▶ Mercury Phase out project
- ▶ Strengthening Coastal And Marine Climate Resilience Through Upland and Coastal Ecosystem-Based Adaptation (EBA) and Community Engagement (Vetiver Project)
- ▶ Development and Implementation of a sustainable Management Mechanism for Persistent Organic Pollutants in Antigua and Barbuda... Launch of a Compost Pilot Project at Cooks Landfill
- ▶ Marketing and Sale of Compost and Mulch processed at Cooks Landfill
- ▶ Construction of a temporary Hazardous Waste Storage Facility at Cooks landfill
- ▶ Plastics management, IUCN
- ▶ Derelict vehicle processing
- ▶ Tyre shredding programme
- ▶ Cardboard collection



# Mercury Phase out Project

- ▶ Implemented by NSWMA in collaboration with NGO's and private sector stakeholders
- ▶ 40 postered bins distributed to major suppliers and other participating partners throughout Antigua and Barbuda
- ▶ Targeted adds on electronic and print media. Intense social media campaign





Bulb storage containers



NSWMA distributing bulb storage containers







Bulb Storage containers distributed to the Barbuda Council during project launch in Barbuda

## Strengthening Coastal And Marine Climate Resilience Through Upland and Coastal Ecosystem-Based Adaptation (EBA) and Community Engagement (Vetiver Project}

- ▶ A collaborative project between IICA, National Solid Waste Management Authority, MoA Forestry Division, MoA Analytical Services Department and GARD Center
- ▶ 35,000 plants transplanted at Cooks' landfill to improve slope stability while also functioning to remove heavy metals and other pollutants from leachate which may otherwise enter the aquatic environment





Vetiver Grass cutting ready for transplanting



Concept for the slopes at Cooks Landfill



Planting of vetiver grass in the flashes west of the old landfill site





## Development and Implementation of a sustainable Management Mechanism for Persistent Organic Pollutants in Antigua and Barbuda... Launch of a Compost Pilot Project at Cooks Landfill

- ▶ The release of Unintentional Organic Pollutants (UPOPs) at landfills occur when burning occurs. The absence of a large scale separation at source programme allows for organic materials and other bulky type materials to be deposited on the tipping phase of the landfilling operation. Furthermore inappropriate landfill equipment does not provide adequate compaction capability to remove oxygen from the process.
- ▶ Antigua and Barbuda is quite unique in that 40- 45% of all waste being deposited at the landfill is green waste (organics)
- ▶ Removal of green waste from the landfilling operation will significantly reduce the quantum of waste deposited on the landfill and also remove organic material that fuels landfill fires
- ▶ Moreover, compost generated from this project have been proven a verfy valuable soil enhancer





Green waste being diverted from the landfilling operation and prepared for composting



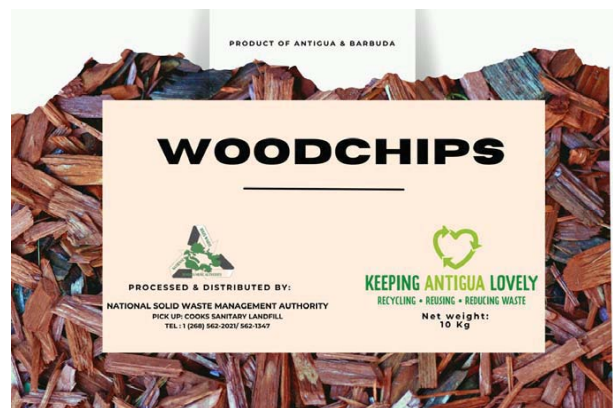
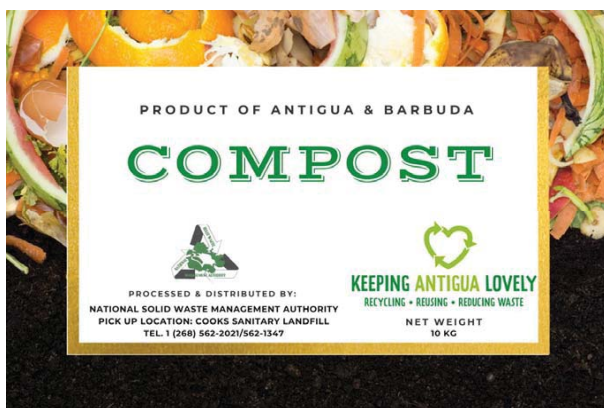


Construction of windrow compost pile in progress



# Marketing and Sale of Compost and Mulch processed at Cooks Landfill

- ▶ Large quantities of green waste entering Cooks landfill is mulched daily
- ▶ Good quality mulch is made available to the general public for use as soil enhancer, while large chunks, small fragments and mulch likely to contain parasites are further processed into high quality compost
- ▶ Both compost and mulch are available to the general public for a small fee





## Construction of a temporary Hazardous Waste Storage Facility



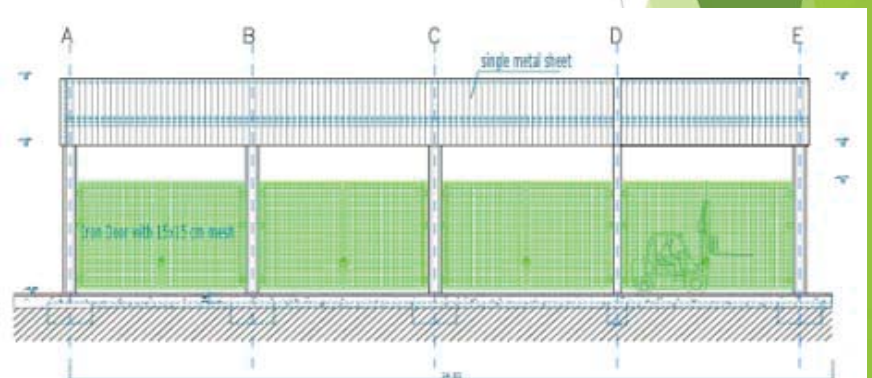
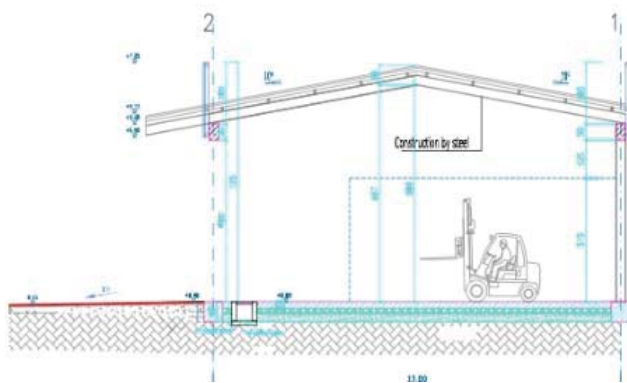
## Construction of a temporary Hazardous Waste Storage Facility

- ▶ Antigua and Barbuda is signatory to many international conventions and treaties. Furthermore, Small Island States like Antigua and Barbuda from lack the necessary infrastructure to adequately manage this category of waste.
- ▶ Need for a regional approach to managing difficult waste types





Example of basic housed storage facility for hazardous materials/waste





## Legal framework

- ▶ Public Health Ordinance
- ▶ Solid Waste Management Act 1995
- ▶ Environmental Protection Levy 2002
- ▶ Solid Waste Management Act
- ▶ Environmental Protection and Management Act 2015
- ▶ Litter Prevention and Control Act 2019

## Landfill Data

Item	Contents
Waste generation amount (tons/day)	393.29 (this was calculated based on per person generation and population) see attached breakdown.
Waste generation rate (kg/person/day)	3.54 (Source: NSWMA waste characterization study, Year: 2017)
Final disposal amount (tons/day)	369.23 (Source: NSWMA, Year: 2020)
Plastic waste generation amount (tons/day)	18.68 (calculation based on 2017 NSWMA data)
Waste collection coverage (%)	97 % (Source: NSWMA, Year: 2017)
Recycling rate (%)	N/A
Recycling rate of plastic materials (%)	N/A
Main types of recycled materials	Glass bottles, aluminum cans, steel cans, PET bottles, tyres, metals (derelict vehicles)

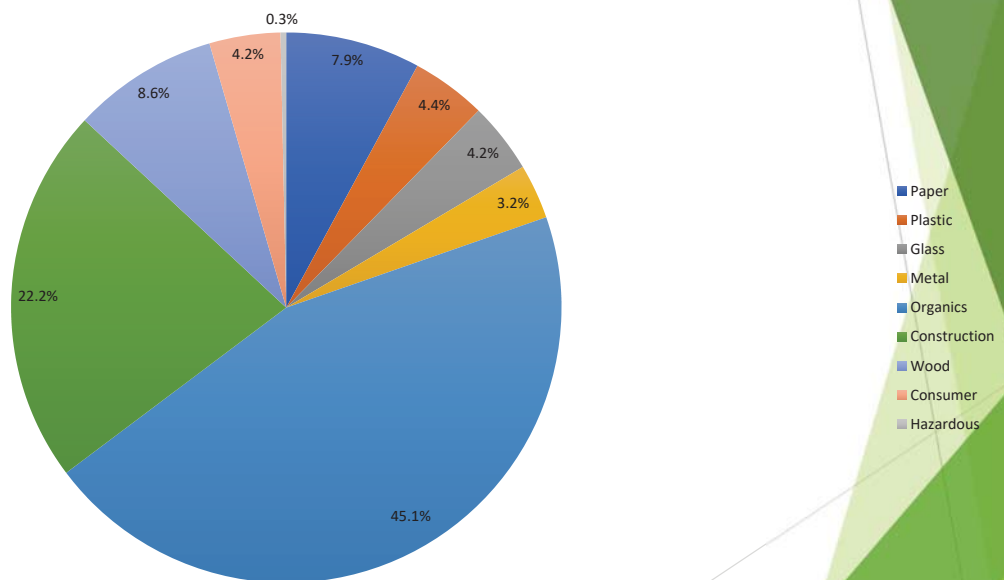
## Landfill data cont.

Waste Category	Total Weight (lb)	Mean (%)	Lower Bound (%)	Upper Bound (%)
Paper	4029.35	7.9%	6.7%	9.1%
Plastic	2178.1	4.4%	3.8%	5.0%
Glass	2023.17	4.2%	3.5%	4.9%
Metal	1695.48	3.2%	2.6%	3.8%
Organics	40072.25	45.1%	40.5%	49.7%
Construction	39796.01	22.2%	16.5%	27.8%
Wood	4750.53	8.6%	6.9%	10.3%
Consumer	1869.47	4.2%	3.3%	5.1%
Hazardous	125.29	0.3%	0.2%	0.4%



I l j x u h # 1 # 2 d w h # 1 h q h u d w i r q # | # 2 d w h # 2 d w h j r u |

Waste Categories



## Implementation systems

- NSWMA
- Central Board of Health
- Department of Environment
- Royal Police Force of Antigua and Barbuda
- National Parks Authority
- Ministry of Agriculture
- Department of analytical Services

## Collection System

1. Waste from household collected once a week, curbside
2. Waste from urban communities collected 2- 3 times weekly.
3. Waste in the St. Johns Commercial district collected twice daily
4. Separate collection system of collection of PET bottles throughout the island.
5. Separate system of collection for cardboard in St Johns commercial district. Fall in global prices have led to the recycler refusing to accept, cardboards are collected and stockpiled.
6. Bulk waste collection scheduled developed
7. Designated trucks for collecting and transporting sanitation (green) waste

## Transportation System

1. Private haulers to authority equipment reflects an 80% -20% arrangement
2. Sixteen contracts issued to private haulers for residential waste collection
3. The NSWMA has custody of seven (7) compactor trucks, four (4) operational
4. 1 crane truck (mechanical issues)
5. The NSMWA current has NO open back trucks
6. Transportation cost is high and not sustainable
7. Barbuda contracts a waste hauler to transport waste

## Final Treatment

- ▶ Sanitary site commissioned in 1999, however reached capacity in 2016
- ▶ Now using old disposal site at Cook
- ▶ Preparation made to commission new sanitary cell but funding in a major issue
- ▶ 25 acres currently used by NSWMA, gov. commitment to acquire an additional 20 acres
- ▶ Partially fenced compound, prone to vandalism and destruction of landfill equipment
- ▶ Fires
- ▶ Old site on fire for decades
- ▶ Access road a major concern for users
- ▶ **Barbuda!**
- ▶ Weighbridge breakdown

## Financial support

1. A portion of the Central Board of health's budget is allocated for residential waste collection. The fund for the allocation is collected when householders pay property taxes
2. NSWMA also receives funding from what is referred to as the head tax, collected at air and seaports. Each visiting non-Caricom passenger to Antigua pays between US\$1- US\$1:50, while Caricom visitors pay xcd\$1:00
3. NSWMA also received revenue from what is called the Bottle Can Levy. This is limited however as only imported beverages containers are covered under this act
4. Tipping fees
5. Barge services to cruise ships
6. In recent times, since 2014, NSWMA received funding from the Citizen by Investment Programme (CIP). The CIP funds the Beautification Programme managed by NSWMA



## Donor support

1. GEF5558 management of POPs and UPOPs
2. OECS ReMLit: Reduction of Marine Litter
3. ZWAB: Zero Waste Antigua Barbuda
4. British High Commission
5. Caribbean Union of Churches
6. Japan International Cooperation Agency (JICA)
7. Japan International Cooperation systems (JICS)
8. Department of Environment, Antigua and Barbuda

## Marine Plastic Issues

- ▶ Transboundary movement of plastic waste... esp. during storms
- ▶ Land based pollution affecting aquatic and coastal areas during times of flooding or increase wind speeds
- ▶ Littering of ghuts, streams and coastal areas
- ▶ Plastics should be clearly defined, although there is an urgency to manage single use plastics, importers are targeting fence-line products which have proven difficult to categorize
  - ▶ New categories of products littering environment

## Social consideration

1. Informal waste pickers sector as it relates to safety on the landfill and the management and consequences of POPs and UPOPs
2. Waste separation during a global pandemic
3. Entrepreneurship within the waste sector
4. Public awareness campaigns geared towards environmental education and waste management



# Solid Waste Management in Guyana



# Background

❑ On the north Atlantic coast of South America lies the land of many waters.

❑ 214,970 km<sup>2</sup> in area

❑ Bounded by:

- Venezuela to the west,
- Suriname to the east,
- Brazil to the west & south
- Atlantic Ocean to the north



## Guyana

❑ 90% of the country's population lives on the low coastal plain

❑ 80% tropical rainforest

❑ Population of 747,884



# Ministry of Local Government & Regional Development

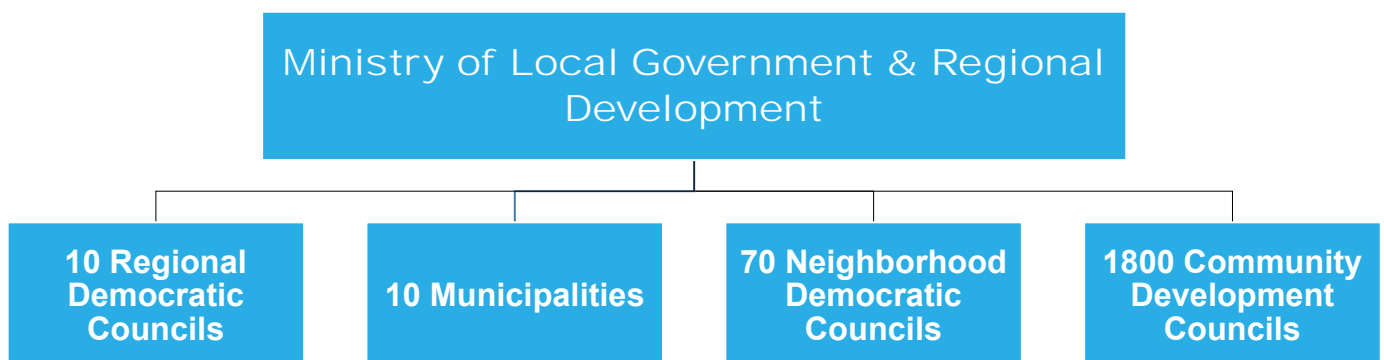
**Vision:** “To collaborate and transform communities across Guyana”

**Mission:** “To supervise and maintain the legal and regulatory framework of the system of local and regional administration; to encourage and facilitate the development of the regions and local organs; and to support the continued integration and development of the hinterland communities.”

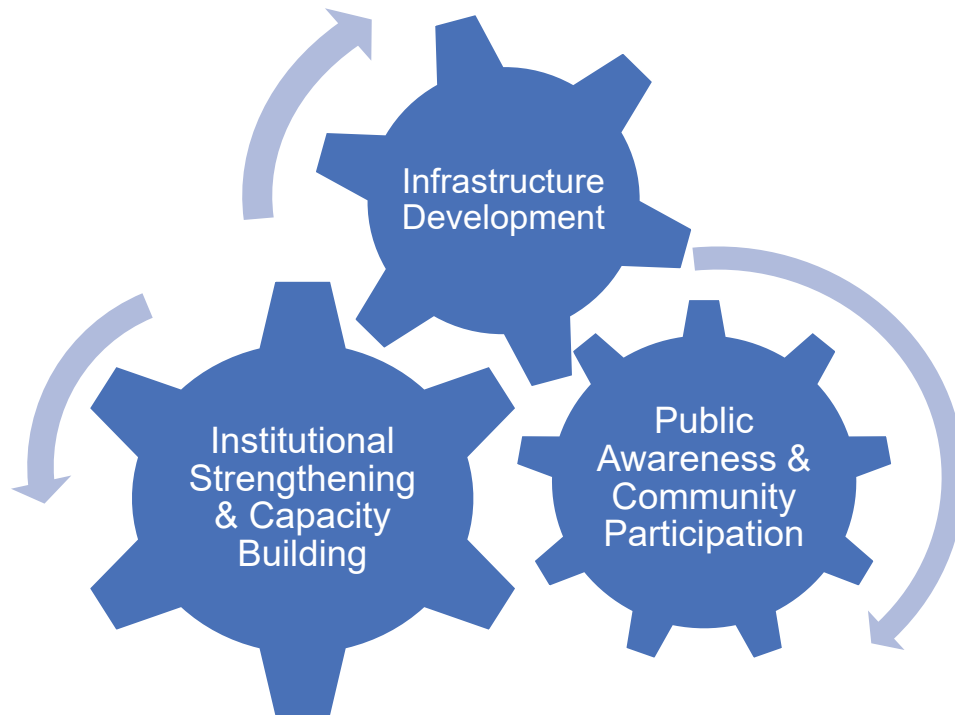


## Organization Roles & Responsibilities

**Goal:** To support and strengthen Local Democratic Organs in the provision of quality services to the nation.



# Sanitation Functions



## Policy Context



“To strengthen the solid waste management programme at the local level to deliver timely collection, appropriate treatment and disposal of waste”



# Legal System

- Municipal and District Councils Act, Chapter 28:01
- Environmental Protection Act, Chapter 20:05
- Public Health Ordinance, Chapter 145
- Draft Solid Waste Management Bill



## Solid Waste Management Bill

- **Waste Management Authority**
- **Waste Management Strategy**
  - Develop and implement an Integrated Solid Waste Management Policy
    - Reduction strategy
    - Reuse strategy
    - Recovery strategy
      - Recycling, composting and energy
    - Separation at source
    - Final Disposal Strategy
      - Landfill, incineration etc
  - Cost Recovery



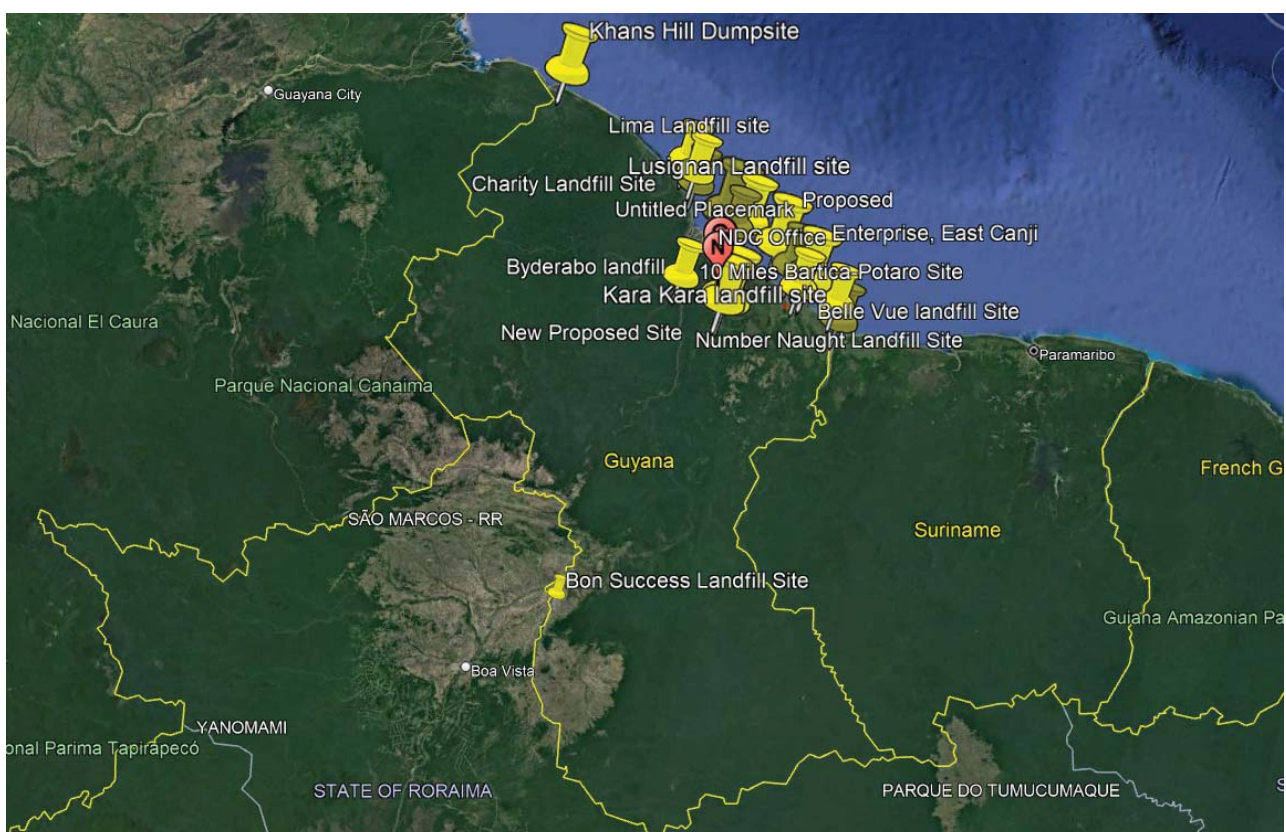


# Situation

- Waste increased exponentially due to Oil & Gas Boom
- Need for Industrial & Hazardous Waste Landfills
- Storage – Comingled, no separation at source
- Collection – Local authorities and Private Collectors
- Treatment – Private treatment facility for O&G waste
- Disposal – uncontrolled dumping, controlled landfill and sanitary landfill



## Landfill Sites



# Landfills Operated by MLGRD

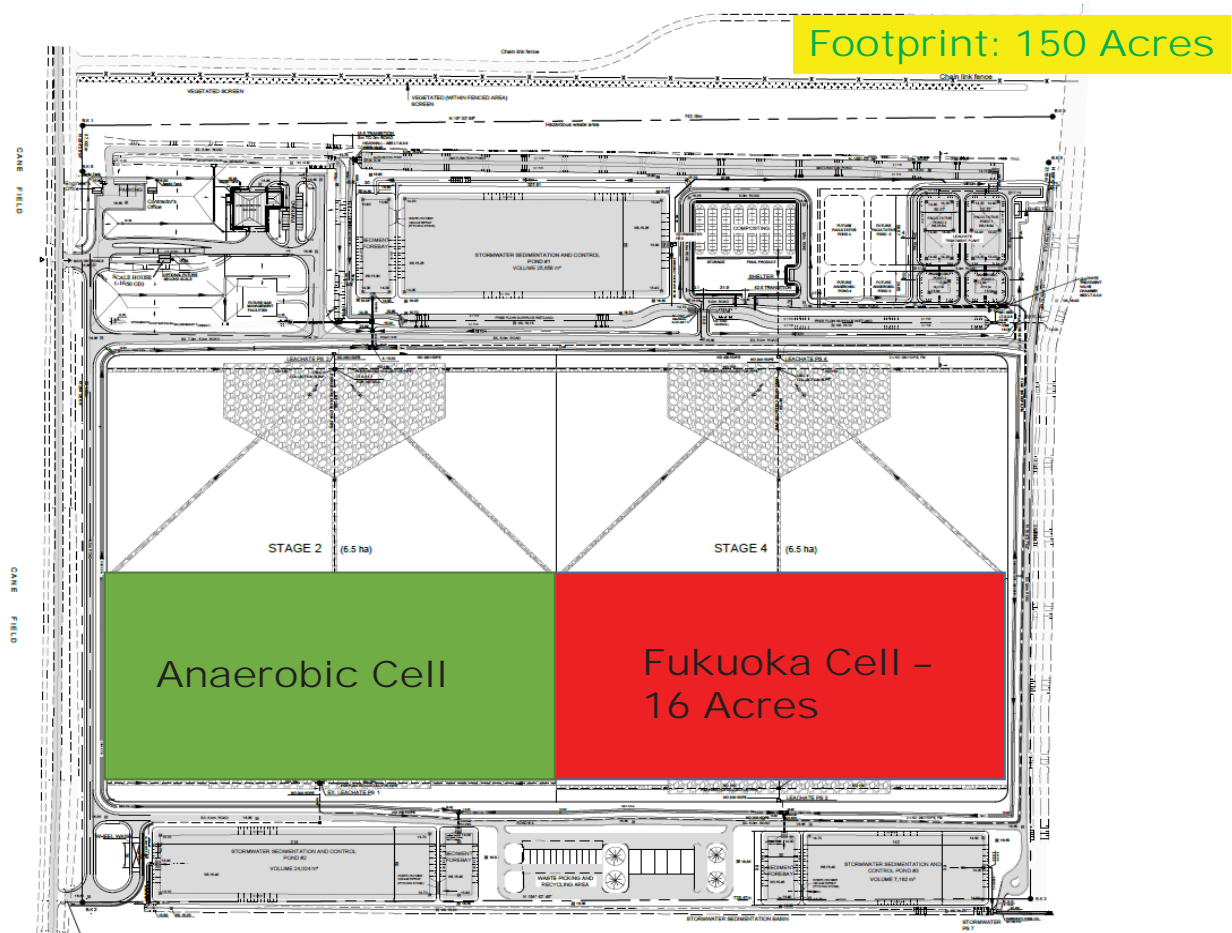
	Landfill	Region	2021 Amount (tons)
1	Lima, Essequibo Coast	2	17,062
2	Charity, Essequibo Coast	2	8,904
3	Haags Bosch, Eccles	4	257,809
4	Lusignan, ECD	4	94,560
5	Esplanade, New Amsterdam	6	25,200
6	Rose Hall, Corentyne	6	7,840
7	Byderabo, Bartica	7	9,812
8	Bon Success, Lethem	9	21,600
	<b>Total</b>		<b>442,787</b>

## Proposed Waste Management Facilities

	Location	Region
1	Zorg-en-Vlygt, Essequibo Coast	2
2	East Coast Demerara	4
3	East Bank Demerara	4
4	Blairmont, WCB	5
5	Belle Vue, EBB	6
6	Corriverton, Corentyne	6
7	9 Miles, Bartica	7



# Haags Bosch Sanitary Landfill

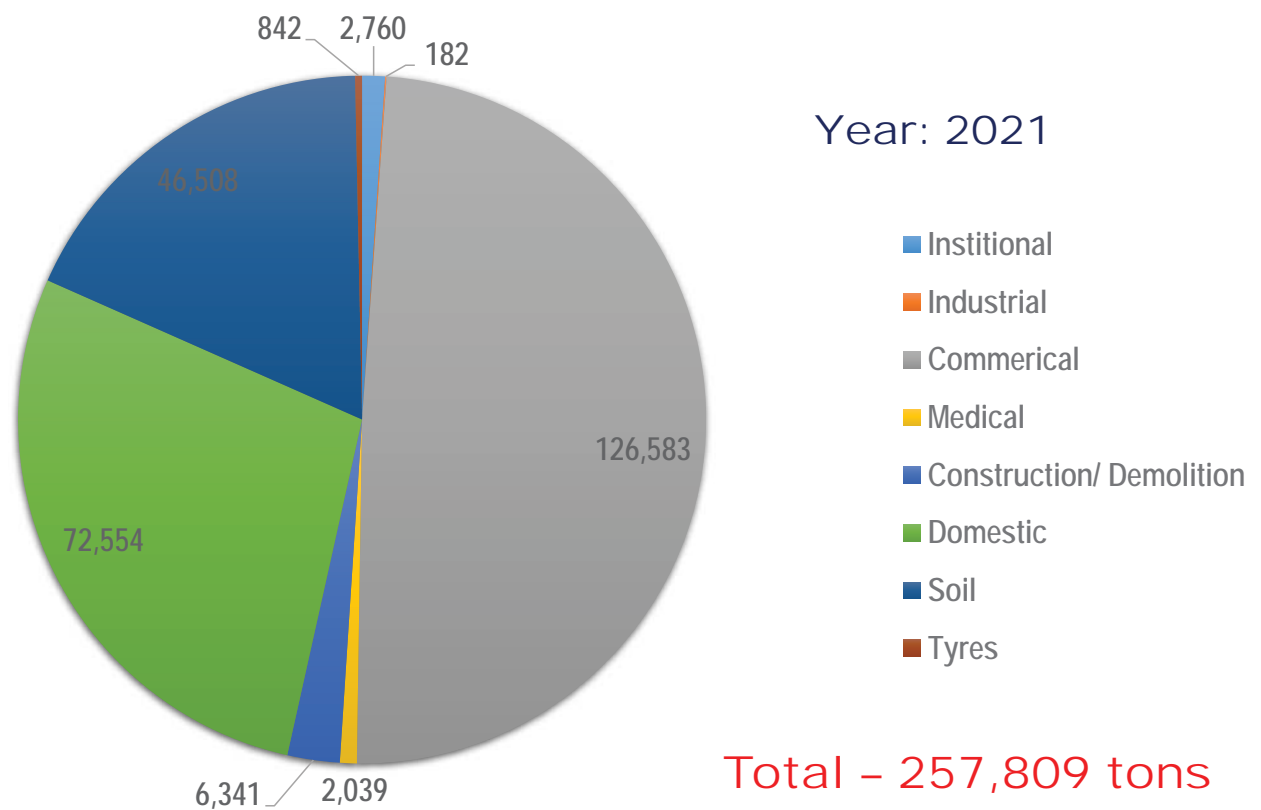


## HBSLF Stats

- Commenced operations in 2011
- Design Life: 25 years
- Average of 600 tons/day
- Leachate Treatment Facility
- Stormwater Ponds
- Approx. 8% to 12% of waste being recovered



# Waste Disposed at HBSLF



## Waste Separation

- ☐ Metal
- ☐ Wood
- ☐ Tyres
- ☐ Glass bottles
- ☐ White goods
- ☐ Cover materials – construction waste, sludge, soil, rice husks, saw dusts, etc.





# HBSLF Con't



## Construction of Cell No.2





# Leachate Treatment Facility



## Short-term Strategy

- Enact SWM Bill
- Construction of Cell No.3
- Increase waste collection
- Transition existing dumpsites to control landfills
- Close dumpsites that are in areas deemed not suitable
- Site selection for new WM development



# Long-term Landfill Strategy

- Develop waste management facilities in all 10 Regions:
  - Municipal Solid Waste Landfill
  - Industrial Waste Landfill
- Waste diversion initiatives
  - Source separation
  - Composting
  - WTE



## Key issues

- Local Government Capacity
- Political Commitment
- Finance and cost recovery mechanism
- Landfill Gas Management
- Institutional roles and responsibilities
- Land allocation
- Derelict Vehicles & Tires
- Indiscriminate littering & illegal dumping



# Support Needs

- Oil & Gas waste
- Hazardous Waste Treatment facilities
- Medical Waste
- Recycling Business Model
- Public awareness campaign
- Cost Recovery Mechanisms
- Waste to Energy
- Landfill Design & Efficient Operations
- Transfer Stations



## Key Agencies:

- Ministry of Local Government & Regional Development
- Guyana Lands & Survey Commission
- Ministry of Housing & Water
- Environmental Protection Agency
- Service Providers



# Thank You!

*“Solid Waste Management: a good choice today for a healthier tomorrow”*



## Waste Management in Saint Lucia



**Saint Lucia Solid Waste  
Management Authority**

March 15, 2022

# CONTENTS

- BACKGROUND
- REVENUE
- LAWS/REGULATIONS
- WASTE COLLECTION
- WASTE DISPOSAL
- PUBLIC AWARENESS & INFORMATION
- WAY FORWARD



## BACKGROUND

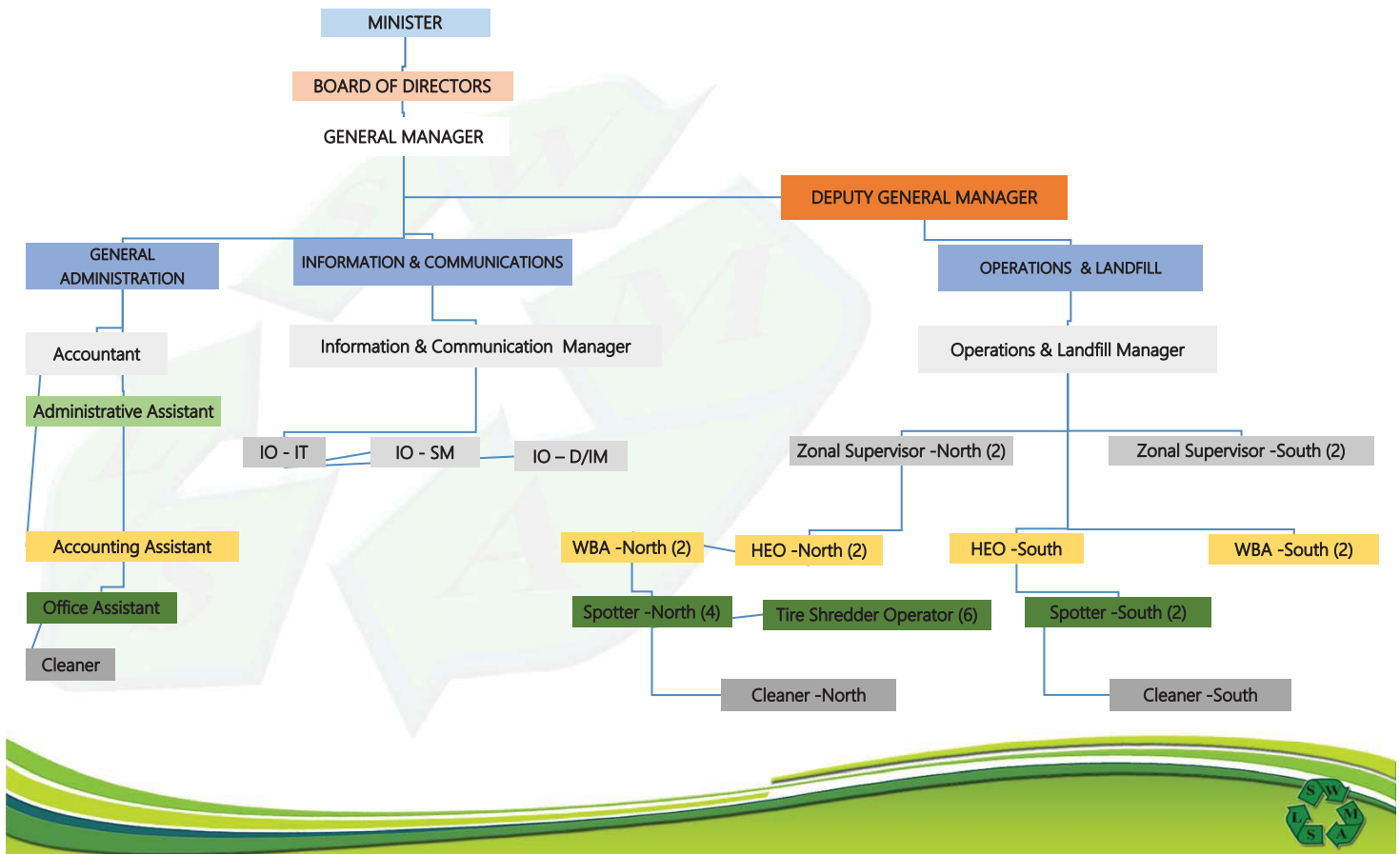
Established in 1996 under the OECS Solid and Ship-Generated Waste Management Project

Responsible for providing coordinated and integrated systems for the collection, treatment, recycling and disposal of solid and hazardous waste and to establish and manage sanitary landfills.





# Organizational Chart



## REVENUE

- Government subvention – 65%
- Environmental levy on visitors – 32%
- User fees – for special waste disposal – 3%
- Waste haulers licence – as above

# LAWS/REGULATIONS

- Waste Management Act No. 8 of 2004
- Waste Management (Amendment) Act No. 10 of 2007
- Environmental Levy Order No. 68 of 1996
  - Head tax on visitors
- Styrofoam & Plastics Food Service Container Act of 2019



## COLLECTION

- Residential & Institutional Waste
  - 11 waste collection zones
  - All collection privatized
  - Twice weekly regular waste collection
  - Once monthly bulky waste collection
- Commercial Waste
  - Sector responsible for collection & disposal of waste generated
  - No fee charged for disposal





# COLLECTION

- Healthcare Waste
  - Privatized
  - Collected from public, private establishments
  - Collected from cruise ships
  - Private sector and cruise ships pay for collection & treatment



## DISPOSAL – Deglos Landfill

- Engineered landfill commissioned in 2003 with a 20-year design lifespan
- Tyre shredder
- Biomedical Waste Treatment Facility
- Leachate treatment
- Material Recovery Building
- Maintenance building
- Wheelwash



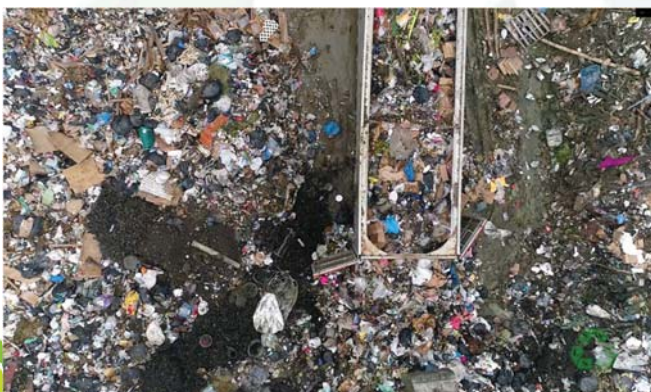


# DISPOSAL - Vieux-Fort Solid Waste Management Facility

- Operates as a transfer station for residential, institutional and commercial waste and tires
- Disposal of green waste and bulky waste undertaken
- Waste transported to Deglos Sanitary Landfill using walking floor trailers



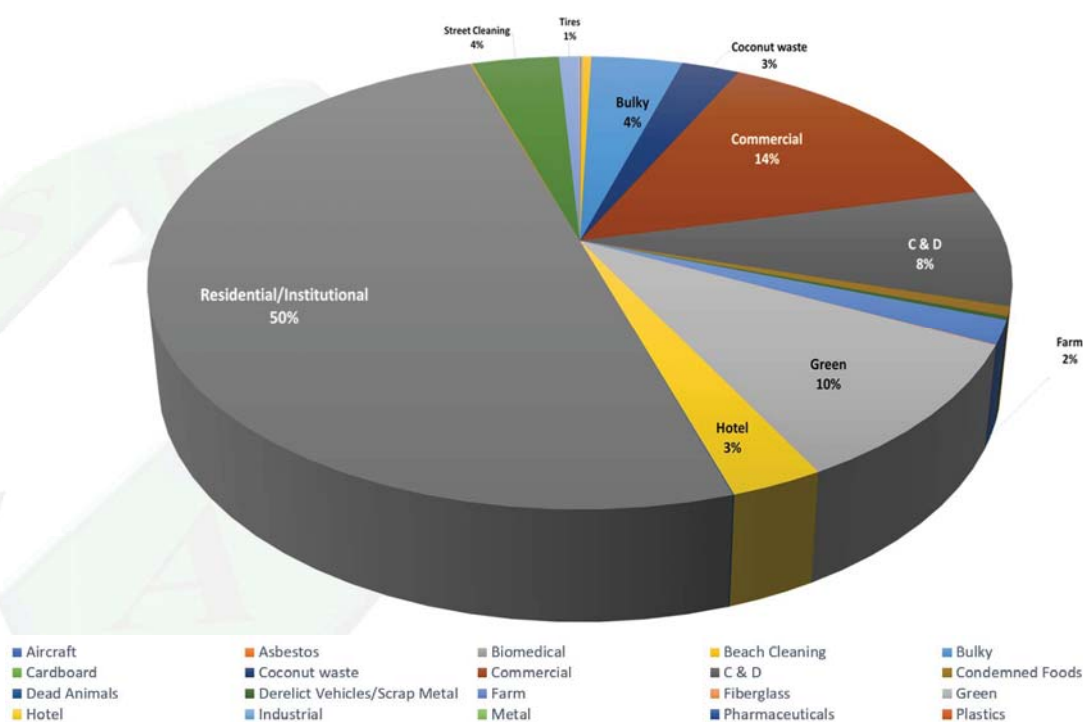
## DISPOSAL - Vieux-Fort Solid Waste Management Facility





# Waste Quantities Disposed at Landfill

Category	2018/19	2020/21
Aircraft	66	25
Asbestos	25	3
Biomedical	48	51
Beach Cleaning	379	258
Bulky	3029	2683
Coconut waste	2142	1706
Commercial	12538	9236
C & D	8159	5505
Condemned Foods	234	437
Derelict Vehicles/Scrap Metal	302	171
Farm	1188	1114
Fiberglass	15	25
Green	6736	6556
Hotel	6415	1932
Pharmaceuticals	25	22
Residential/Insti	30328	32791
Ship	1971	59
Street Cleaning	3404	2559
Tires	830	577
Other	630	38
<b>Total</b>	<b>784617</b>	<b>65746</b>



\*Data obtained from the Weighbridge at the Deglos Sanitary Landfill

## DISPOSAL

- Procured 20 Kurina waste decomposition machines for the south
- 4 machines operational from February 2021 to December 2021
- Treatment facility shut down in December 2021 due to numerous issues including:
  - Too frequent maintenance required
  - Failure of pumps
  - Failure of blowers
  - Broken temperature probes
  - Worn out door seals
  - Leaky joints
  - Electrical problems
  - Deterioration/disintegration of refractory
  - Attainment of low temperatures
  - Excessive smoking of machines



# DISPOSAL

- Derelict Vehicle ID & Removal Program
- Remediation of illegal dumps
- Mercury light bulbs



# RESOURCE RECOVERY

- Recyclers
  - Metals
  - Plastics – RePlast project
  - ULABs
  - Used oil
- Composting – GEF pilot project at DSL
- Used tires

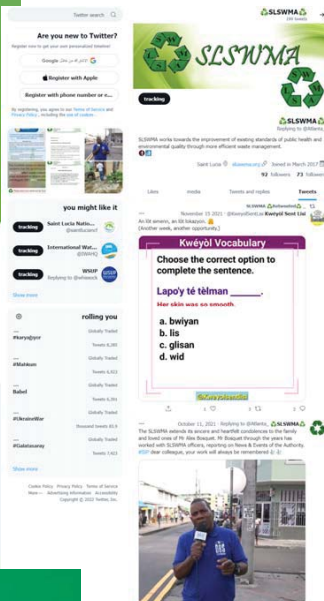
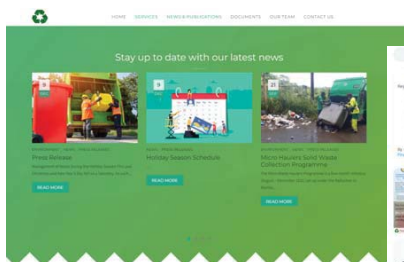


# Public Information & Awareness

**Fulcrum** is a mobile data collection platform that allows one to quickly conduct field data collection on Android and iOS platform

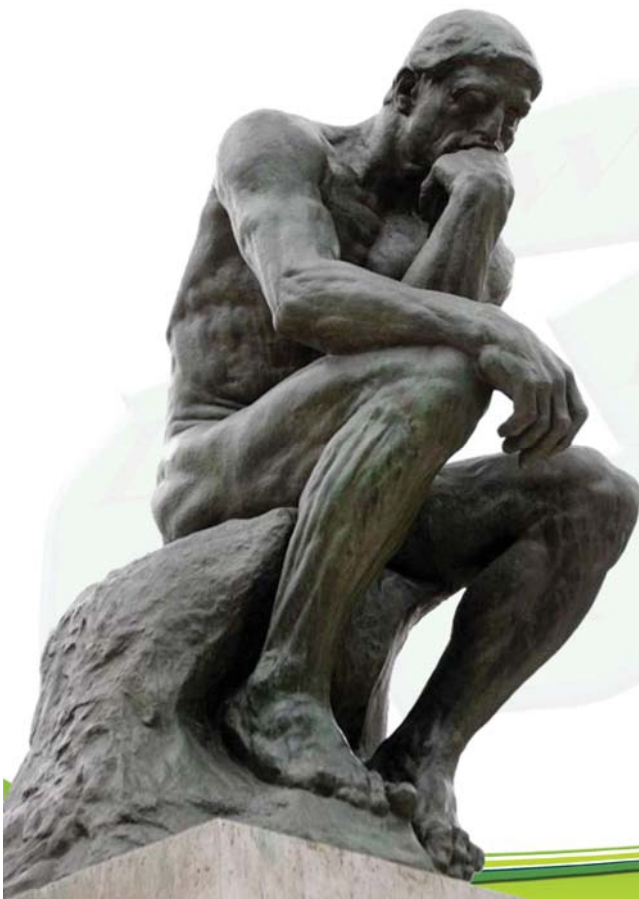
- Derelict vehicles
- Illegal dumps
- Auto garages
- Communal bins
- Signage

# Public Information & Awareness





# Public Information & Awareness



## WAY FORWARD



# WAY FORWARD

- Development of a Waste Management Strategy (WB)
- Construction of sanitary landfill in the south
- Remediation of Deglos Sanitary Landfill
  - Rehabilitation of leachate collection & treatment system
  - Extension of landfill footprint
  - Desilting of balancing pond
  - Covering of exposed waste
  - Improving drainage
  - Installation of gas vents
  - Installation of fire hydrants
- Assistance in implementing Fukuoka method at DSL
  - Accelerates decomposition
  - Reduces concentration of leachate
  - Reduces emission of GHG
  - Prolongs the life of a landfill



# WAY FORWARD

- Source separation –
  - Secure funding for at least three specialized waste collection vehicles to undertake collection of organics and recyclables.
  - Undertake source separation in selected collection zones
  - Secure funding for balers and chippers for plastics (PET, HDPE, etc.) to be used at DSL and a location in the south
  - Divert incoming recyclable waste at Deglos Landfill to the MRF building
- Composting –
  - Expand composting at DSL in the north and implement at a facility in the south
  - Procure heavy-duty wood chippers for both locations
  - Promote composting at the household level
  - Encourage private sector to undertake composting (Provide incentives, etc.)





# WAY FORWARD

- Review of Waste Management Act of 2004
- Enactment of Legislation – Management of Beverage Containers bill, etc.
- Develop and implement a comprehensive public information and awareness program
- Engage recyclers to provide support for their activities
  - Divert waste from landfills
  - Provide source-separated material
- Implement program to address MAP
- **COST RECOVERY**



# THANK YOU!





Commencement Workshop  
for  
the “Technical Project on Advisor for Marine Plastic Litter  
Management in the Caribbean Region

- Formulation of an Integrated Solid Waste Management Plan -

16 March 2022

JICA Advisory Team



**NIPPON KOEI**

Planning of  
solid waste  
management

- “Planning in the field of solid waste management may be defined as the process by which community needs regarding waste management are measured and evaluated and workable alternatives are developed for presentation to decision makers.”
- “Planning in the field of solid waste management is both exciting and challenging, because most of the technical, environmental, economic, social and political factors, and the interrelationships that are involved, are now only partially understood.”

(Tchobanoglous, et al., 1993. Integrated Solid Waste Management)

## Formulation of a Master Plan

- It consists of the following two parts;
  - Study on the current situation, and
  - Formulation of a future plan

## Workflow: Study on the current situation

### Scope of the Study

- Target waste
- Study area

### Study on the current situation

- Service quality
- Service system
- Legal and administration system.

### Field studies

- Analysis of weighbridge data
- WACS
- Recycle market
- Questionnaire

### Evaluation of the current situation

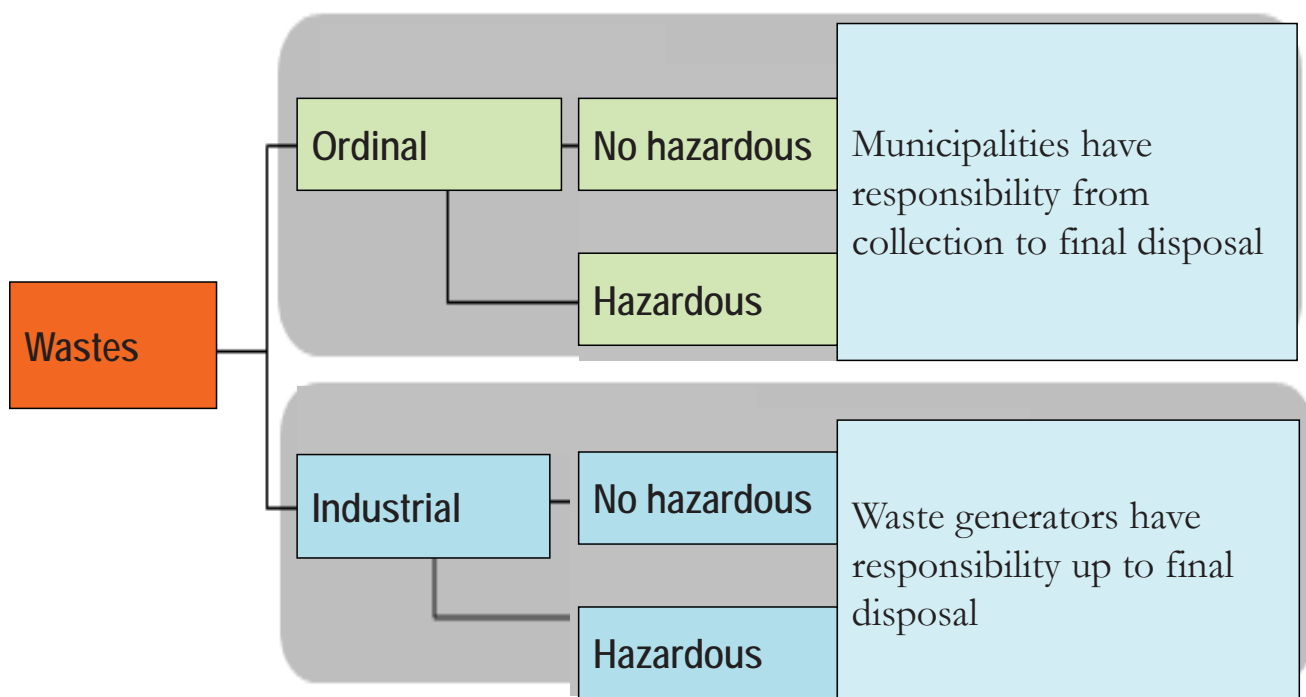
- Strengths, weakness, opportunities and threatens

# Scope of the Study

- Target wastes
  - Urban wastes, healthcare waste, industrial waste, hazardous wastes, etc.
- Target area
  - Only urban area? Include rural area?
  - Industrial area?
  - Other municipalities? etc.
- Organization structure and budget for carrying out the study
  - Principal actor; a government office in charge
  - Other authorities concerned
  - Civic organizations, interest groups, etc.

## Target waste

Definition of solid waste (in Japan)



## Study on the current situation

- Policies and laws concerned
- Social situation (population, economy, poverty, etc. )
- Natural environment (precipitation, temperature, watershed, geology, etc.)
- Service quality (storage, discharge, collection, treatment, final disposal, recycle, etc.)
- Supervision system of the service

## Study on the current situation

- Type of houses vs. Storage/discharge
- Urban structure vs. Collection equipment
- Financial resources: general tax, fee collection, etc.



## Field studies on the current situation

- Study on weighbridge data at final disposal site
- Waste amount and composition survey (WACS)
- Public opinion survey (POS)
- Recycle market survey
- Time and motion survey
- Clandestine disposal sites, and others
- Others

## Weighbridge data

Date	Hour	Plate	Collection area	Weight (kg)
2014.02.05	10:05	VE1001	B	5.025
2014.02.05	10:09	AP1598	C	3.243
2014.02.05	10:25	GR2005	Industrial	7.498



# Time and Motion Survey

## Time and Motion Survey



Survey of collection works



Survey of collection works



Survey of collection works



Interview with waste collection truck driver

# Public Opinion Survey

## Encuesta de Opinión Pública (EOP)



Entrevista en las viviendas



Entrevista en las viviendas



Entrevista de compañías privadas



Entrevista de compañías privadas

# Recycle Market Survey

## Survey of Recycling Market



Scavengers recovering metals around Duquesa landfill to sell them to recycling companies.



Metal melting at local smelting companies .



Packaging of paper for recycling



Plastic recycling companies.

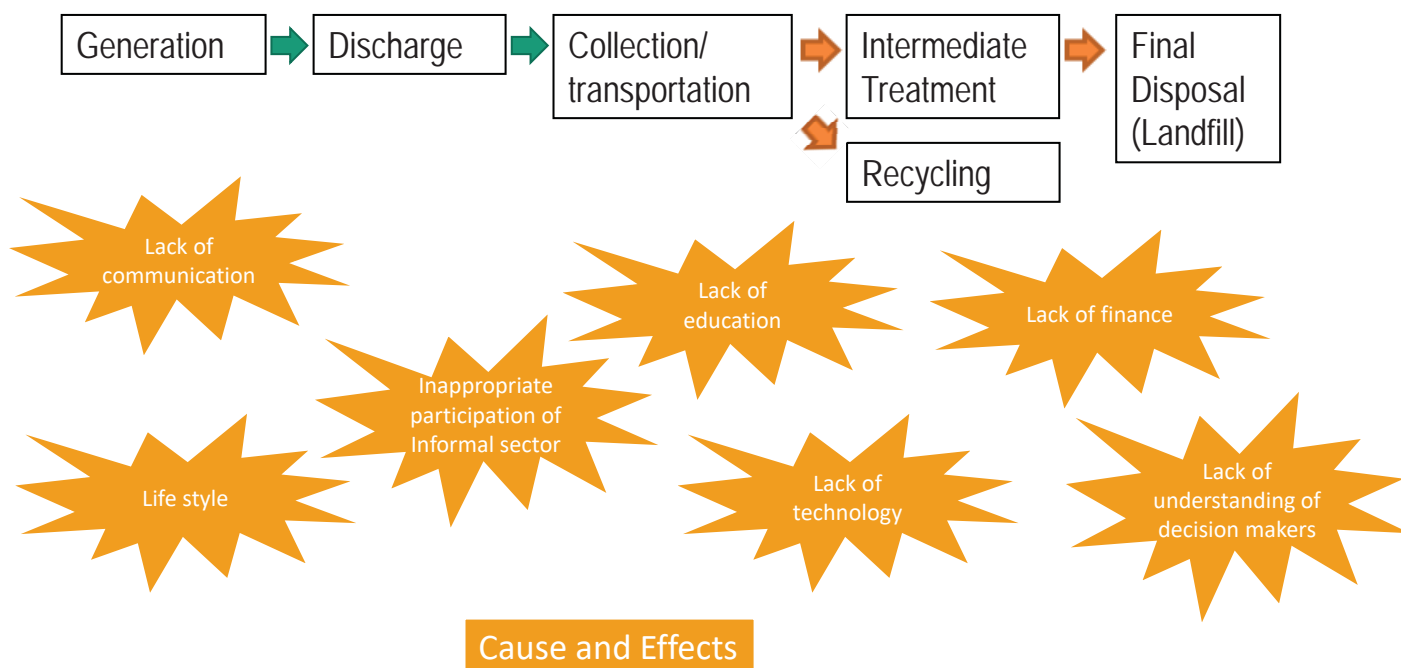
## Evaluation of the current situation / Setting challenges

- Evaluation of the current situation
  - Strong and weak points in the current system
  - Opportunities and threatens
- Setting challenges (the current waste flow may imply challenges to be tackled in the future)
  - Collection
  - Final Disposal
  - Minimization

## Evaluation of the current situation (example)

Current	Strong Points	Weak Points
	<ul style="list-style-type: none"> <li>- Organization system is well established.</li> <li>- High fee collection rate is archived.</li> </ul>	<ul style="list-style-type: none"> <li>- It is difficult to timely take measures due to political changes.</li> </ul>
Future	Opportunities	Threatens
	<ul style="list-style-type: none"> <li>- There is a possibility to improve efficiency with participation of the private sector.</li> <li>- High consciousness of citizens promote waste minimization.</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of competence and decrease of efficiency.</li> <li>- High operation costs may destroy the whole system of the service.</li> </ul>

## Description of the Current Waste Stream





# Workflow: Formulation of a plan

## Direction of the Master Plan

- Objective of the Master Plan
- Target year
- Target wastes

## Comparison of Alternatives

- Goals: minimization rate, landfill capacity, etc.
- Methodology of minimization, collection, etc.
- Capacity to pay

## Detailed Planning

- Technical system
- Legal and organization system

## Evaluation of the Master Plan

- Economic and financial evaluation
- Social and environmental evaluation

## Direction of the Master Plan

- Target wastes
- Target year
- Objectives
  - Public Health: Collection
  - Appropriate disposal: Sanitary landfill
  - Securement of landfill capacity: minimization



# Target Year

- Usually between 10 and 15 years, and review each 5 years
- For planning landfill, a period of approx. 30 years is considered.

## Comparison of Alternatives

- Numerical goals
  - Collection rate, rate of appropriate final disposal, minimization rate
- Methodology
  - Collection; door to door vs. point collection, separation vs. no separation
  - Transport; direct vs. transfer
  - Recycle, Treatment; material recycle, compost, RDF, Methane Fermentation, Incineration, etc.
  - Final disposal; sanitary landfill, leachate treatment, landfill gas treatment, etc.
- Comparison of alternatives
  - Technical feasibility
  - Financial feasibility

# Detailed Planning

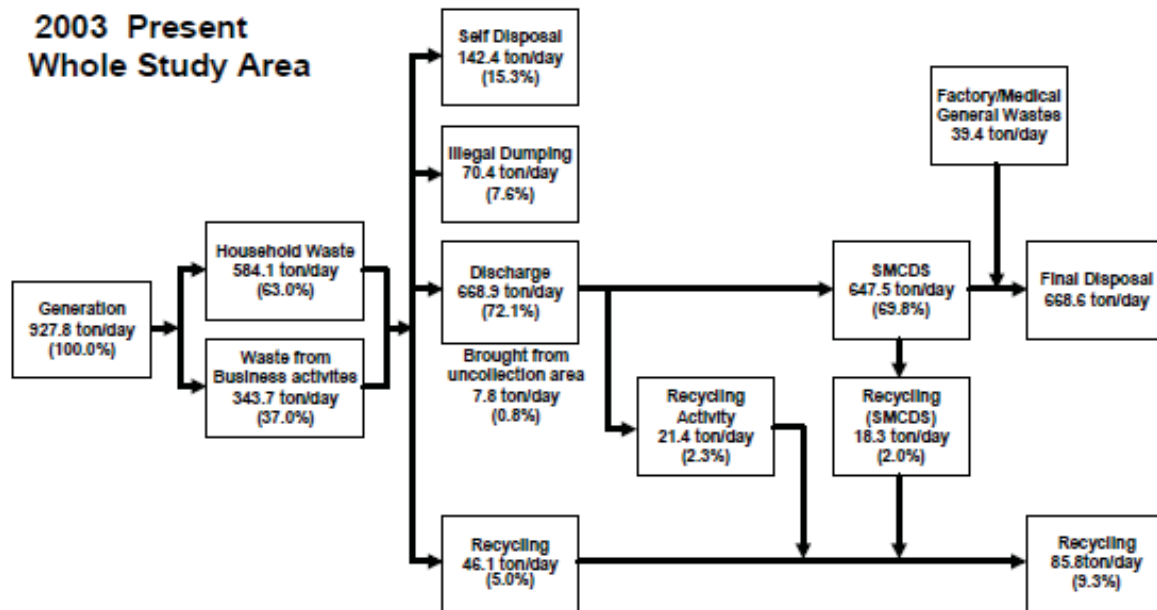
- Technical Aspect:
  - Collection (type of equipment, size, volume, etc.)
  - Recycle, Treatment (location, type, scale, etc.)
  - Landfill (capacity, specifications, etc.)
- Administrative Aspect:
  - Principal organization
  - System of supervision and control
  - Involvement of community
  - Establishment and/or revision of laws, etc.
- Financial Aspect:
  - Fee collection method
  - Other financial sources

## Physical Composition

Unit: %

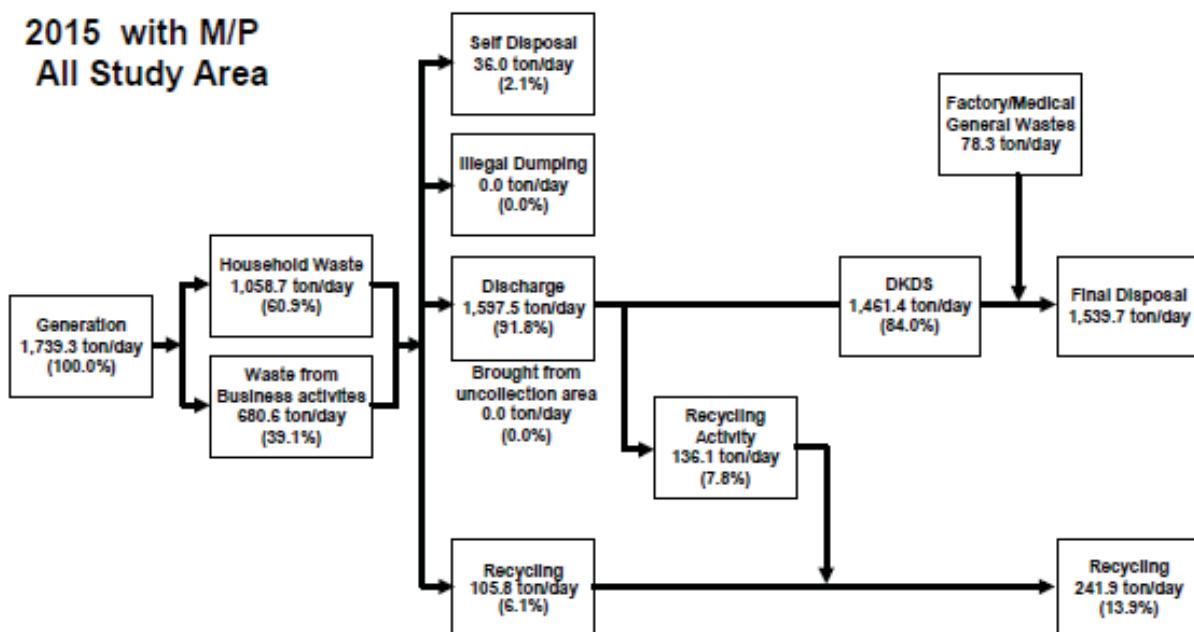
Item	Household	Commercial			Institutional	Recyclable
		A	B	Average		
Food	60.56	28.86	70.34	46.48	27.05	Non-recyclable
Garden	0.87	5.59	0.00	3.23	8.63	Non-recyclable
Paper and Cardboard	7.10	17.39	4.49	11.91	22.56	Recyclable
Plastic	10.45	19.10	16.11	17.83	19.15	Recyclable
Rubber and Leather	0.42	1.43	0.20	0.91	0.23	Non-recyclable
Textile	1.89	2.94	0.56	1.93	0.91	Recyclable
Wood	0.32	4.31	1.01	2.91	0.49	Non-recyclable
Metal	0.85	1.72	1.35	1.57	0.87	Recyclable
Glass	2.08	4.84	2.57	3.88	2.57	Recyclable
Ceramics, etc.	1.19	1.91	0.12	1.15	0.24	Non-recyclable
Hazardous	12.94	10.15	2.61	6.95	16.51	Non-recyclable
Others	1.32	1.76	0.61	1.27	0.04	Non-recyclable
Total	99.99	100.00	99.97	100.02	99.25	-
Recyclable	22.37	45.99	25.08	37.12	46.06	-
Non-recyclable	77.62	54.01	74.89	62.90	53.19	-
Total	99.99	100.00	99.97	100.02	99.25	-

## Waste Stream (current status)



22

## Waste Stream (goal with M/P)



23

## Evaluation of the Master Plan

- Economic and Financial Analysis
  - Financial feasibility
  - Economic appropriateness
- Social and environmental considerations
  - Environmental impacts (air, water, soil, noise, wildlife, etc.); prevention and mitigation measures
  - Social impacts (poverty, employment, community, etc. ); prevention and mitigation measures

Then,  
what is a  
master  
plan?

- ???????

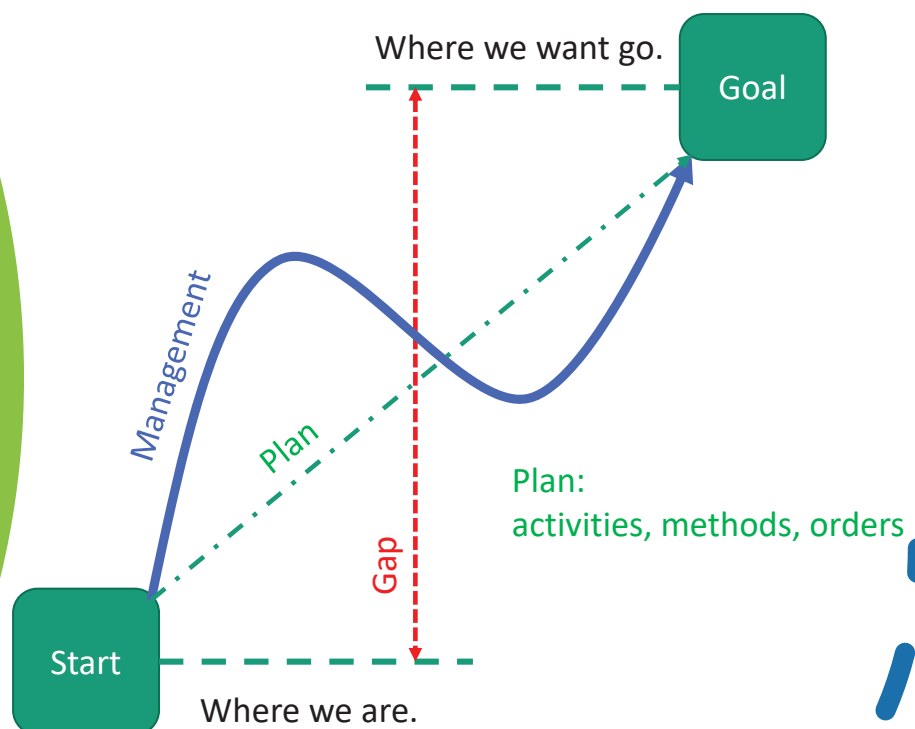


## What is a plan?

- Something that you intend to do or achieve
- A set of things to do in order to achieve something
- (Oxford Advanced Learner's Dictionary 7<sup>th</sup> edition)

26

## What is a plan?



27

Example

Bogota, Colombia



28



Thank you for your attention.

29



Commencement Workshop  
for  
the “Technical Cooperation Project on Advisor for Marine Plastic  
Litter Management in the Caribbean Region”

- Treatment and Disposal -

16, March, 2022  
JICA Advisory Team



**NIPPON KOEI**

## Contents

1. Available technology for final disposal
  - 1-1. Investing items
  - 1-2. Daily practices
  - 1-3. Landfill safe closure
2. Available technology for intermediate treatment
3. WTE technology variety

# 1.Available technology for final disposal

3

## 1-1. Investing items

### 1-1-1 Life expectancy

- It is the most important to consider the life expectancy of a current landfill site in each area.
- In a waste stream in the target area, in any cases, or in any system, final disposal shall be operated.
- It approximately takes 10 years to build a landfill site from an initial planning of final disposal.  
Therefore, if you need a new final disposal site, you should secure a lead-time for 10 years' life expectancy of the current landfill.
- Even though you miss the lead-time (it probably happens), final disposal plan should be formulated.  
In the meantime, in this case, you should consider how prolong the life expectancy of the landfill.

**(TIMELINE FOR FINAL DISPOSAL INSTALATION)**

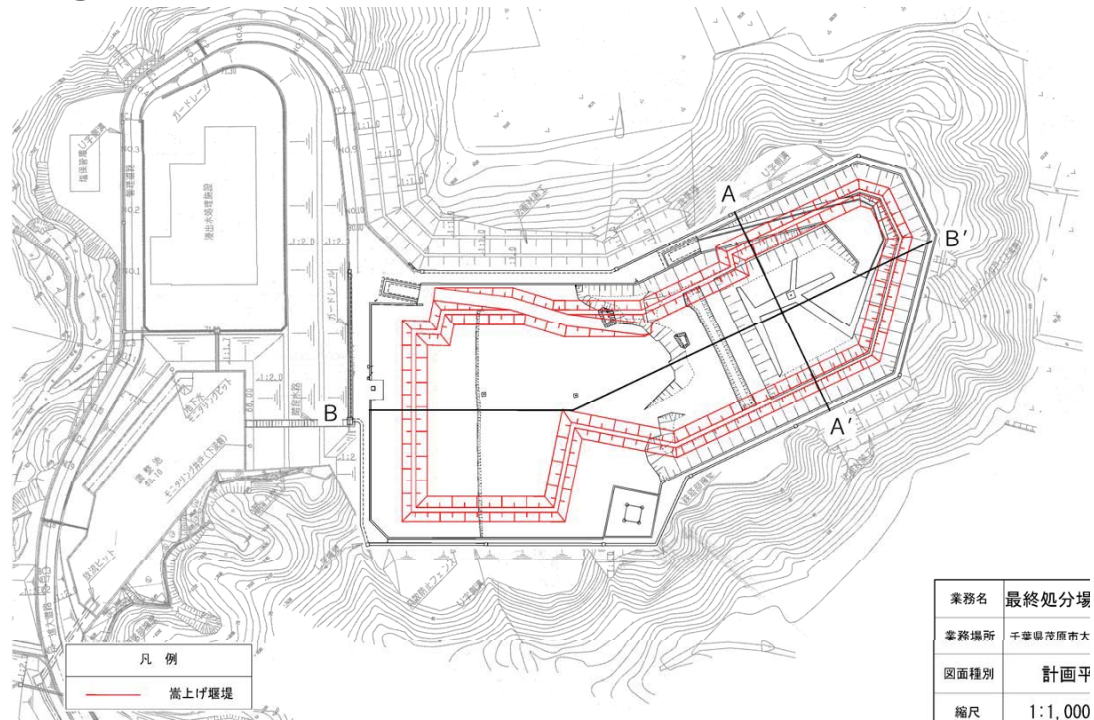
4



# 1-1. Investing items

1-1-2

Capacity increase  
(Mobara city, Chiba)

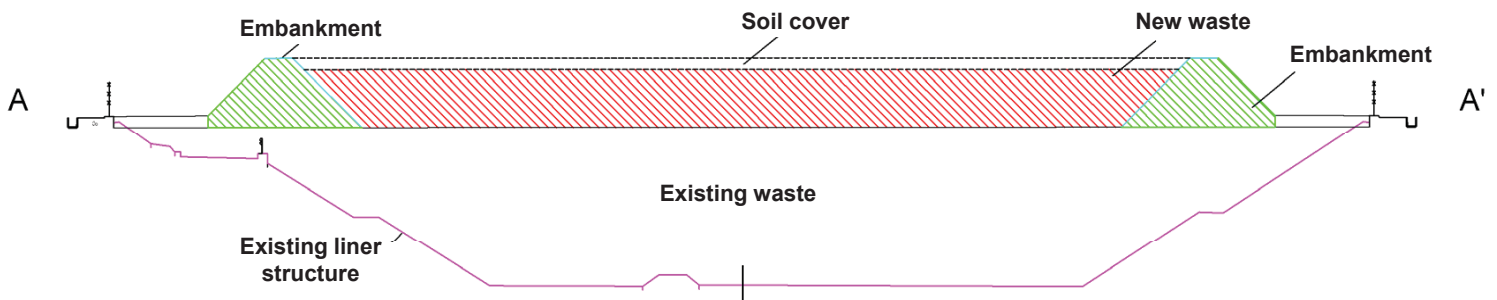


業務名	最終処分場
事業場所	千葉県市大
図面種別	計画平
縮尺	1:1,000

5

# 1-1. Investing items

Capacity increase (Mobara city, Chiba)



6

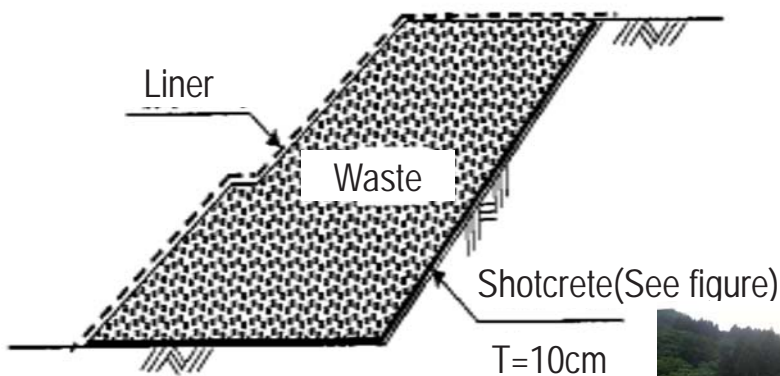
# 1-1. Investing items

## Example of landfill rehabilitation

- Outline of the existing landfill
  - Location: Shimotsu, Wakayama, Japan
  - Operation start: 1973 –
  - Capacity: 85,000 m<sup>3</sup>
  - Liner structure: No
  - Leachate treatment: No
- Outline of the new landfill cell
  - Cell-1: 24,100m<sup>3</sup>
  - Cell-2: 76,900 m<sup>3</sup>
  - Leachate treatment: 30m<sup>3</sup>/día
    - Pre-treatment →biodegradation
    - sedimentation
    - filtering
    - advanced treatment (activated carbon)
    - chelate injection
    - disinfection

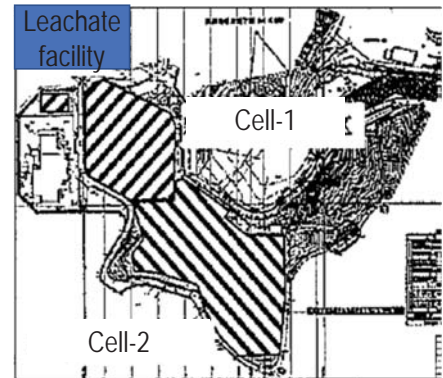
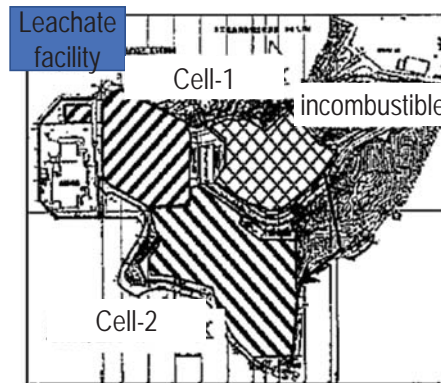
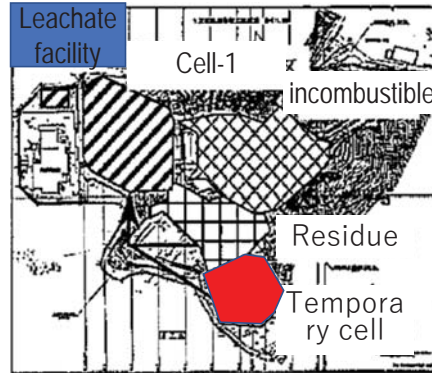
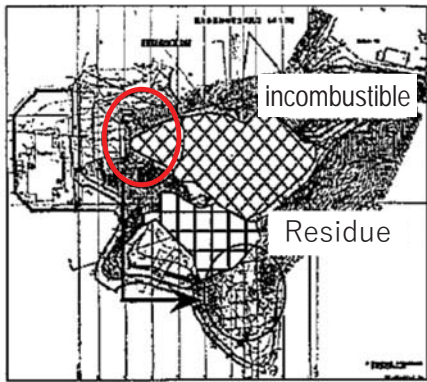
7

## Temporary cell



Source: Daichi Corporation

8



9

## Preparatory study for rehab.

- Waste characterization survey (4m deep in the landfill layer)
- Specific gravity (weight)
- Gas generation rate survey from landfill layer
- Pollutant analysis in water phase of landfilled waste
- Underground water analysis from 2 well points (upstream/downstream)

# 1-1. Investing items

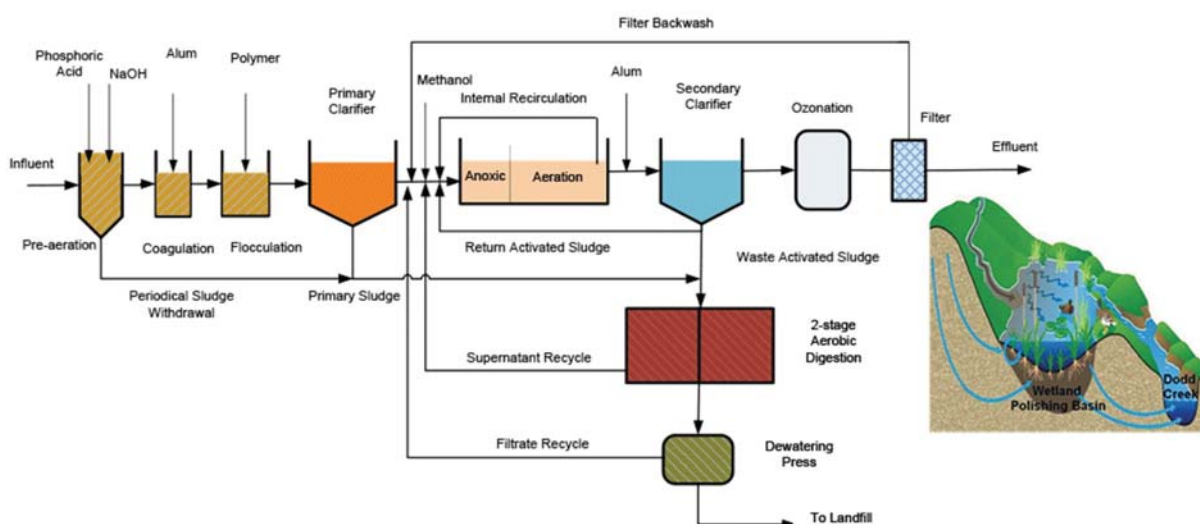
## 1-1-4 Gas ventilation in rehabilitation



11

# 1-1. Investing items

- 1-1-4 Leachate treatment system installation in rehabilitation



12



# 1-1. Investing items

- 1-1-4 Leachate treatment system installation in rehabilitation



13

## Monitoring for landfill

Once the operation of a landfill is started, periodical monitoring should be implemented.

Monitoring of landfill consists of the table below.

Category	Content	Item to be measured	Frequency	Method
Landfilling cell	Meteorology	Precipitation, wind	Continuous	Given by the near weather station
	Leachate amount	amount	1/day	Visual observation of pond level
	Landfill gas amount	amount	2/year	portable gas detector
	Landfill gas content	gas composition	2/year	portable gas detector
	Landfill gas temperature	temperature	1/day	thermometer
Water quality	Leachate	pH, SS	1/month	portable devices
		BOD, COD, SS, T-N	1/month	Lab analysis
	Groundwater*	pH, EC	1/month	portable devices
		BOD, COD, SS, E-coli	1/month	Lab analysis
Groundwater	Groundwater level*	Level	4/year	measure tape

14

# Effluent standards in Japan

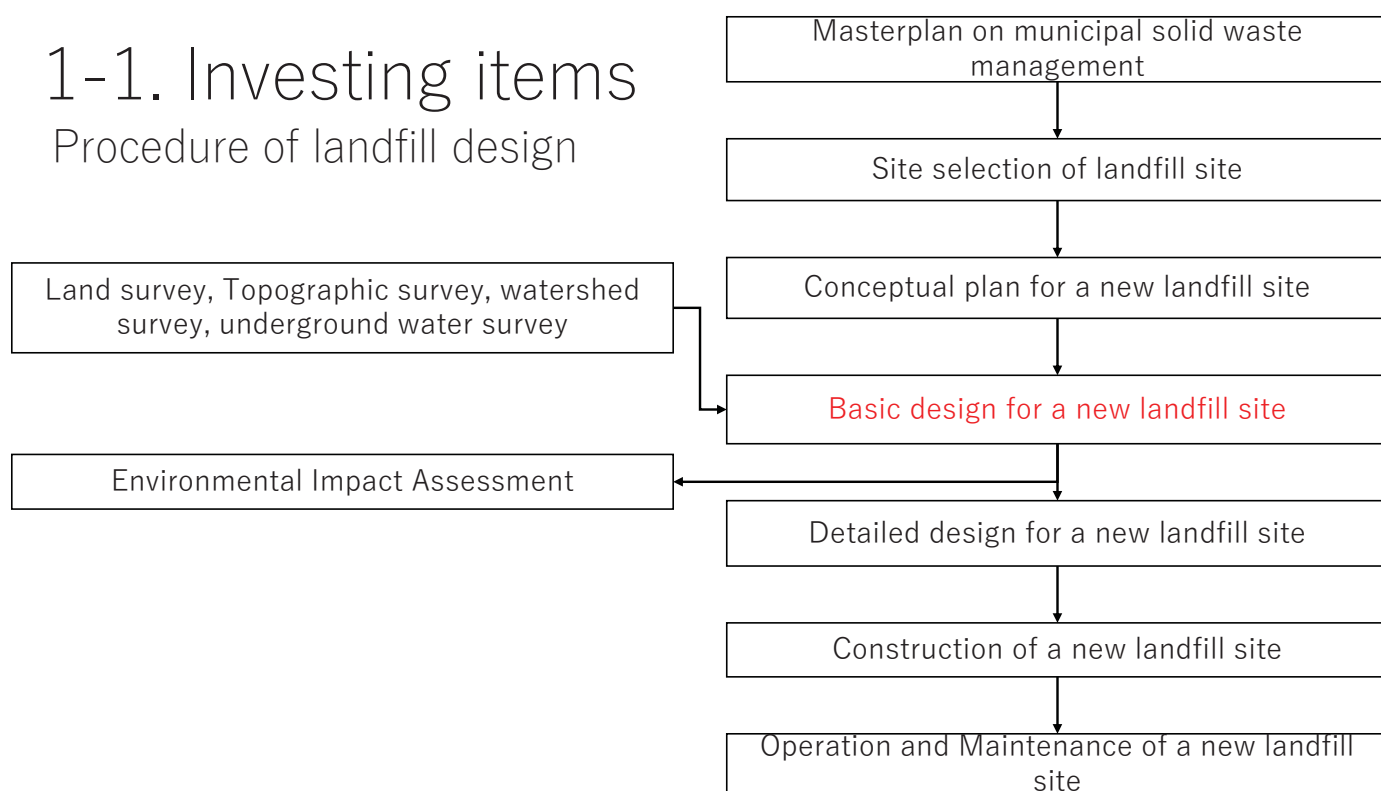
c Parameters	Unit	Effluent Standards
pH	-	5.8-8.6
Suspended Solid	mg/L	60
BOD <sub>5</sub>	mg/L	60
COD <sub>Cr</sub>	mg/L	90
Br	mg/L	230
F	mg/L	15
NH <sub>3</sub> -N	mg/L	200
n-hexane (mineral oil)	mg/L	5
n-hexane (vegetable oil)	mg/L	30
Phenol	mg/L	2
T-N	mg/L	120
P	mg/L	16
E-Coli	/mL	3,000

s c Parameters	Unit	Effluent Standards
Alkyl-Hg	mg/L	N/D
Cd	mg/L	0.1
Pb	mg/L	0.1
Cr <sup>6+</sup>	mg/L	0.5
As	mg/L	0.1
CN	mg/L	1
Benzene	mg/L	0.1
Se	mg/L	0.1
Cu	mg/L	3
Zn	mg/L	2
Fe	mg/L	10
Mn	mg/L	10
T-Cr	mg/L	3
Hg s	mg/L	0.005

15

## 1-1. Investing items

### Procedure of landfill design

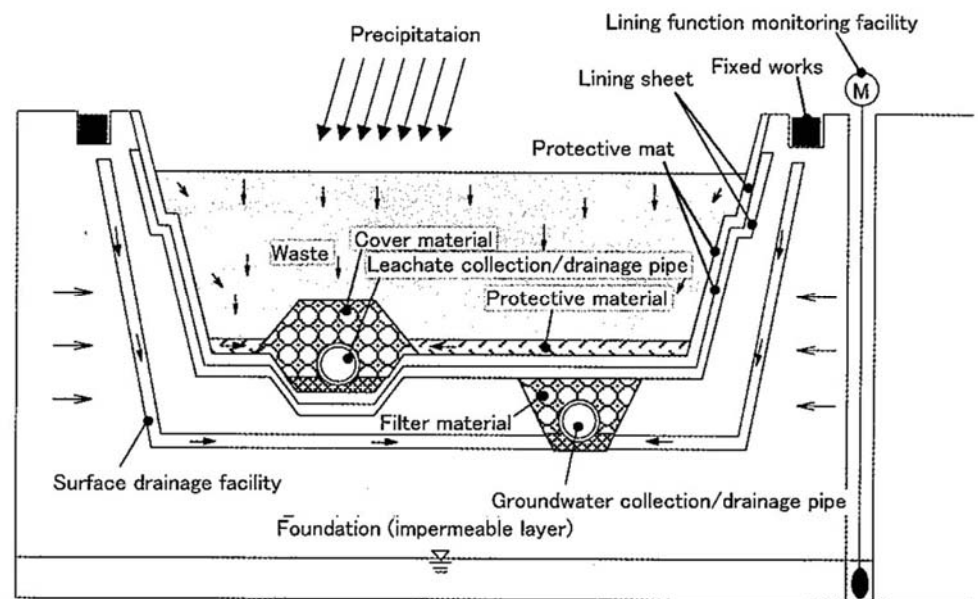


16

# 1-1. Investing items

A newly built landfill

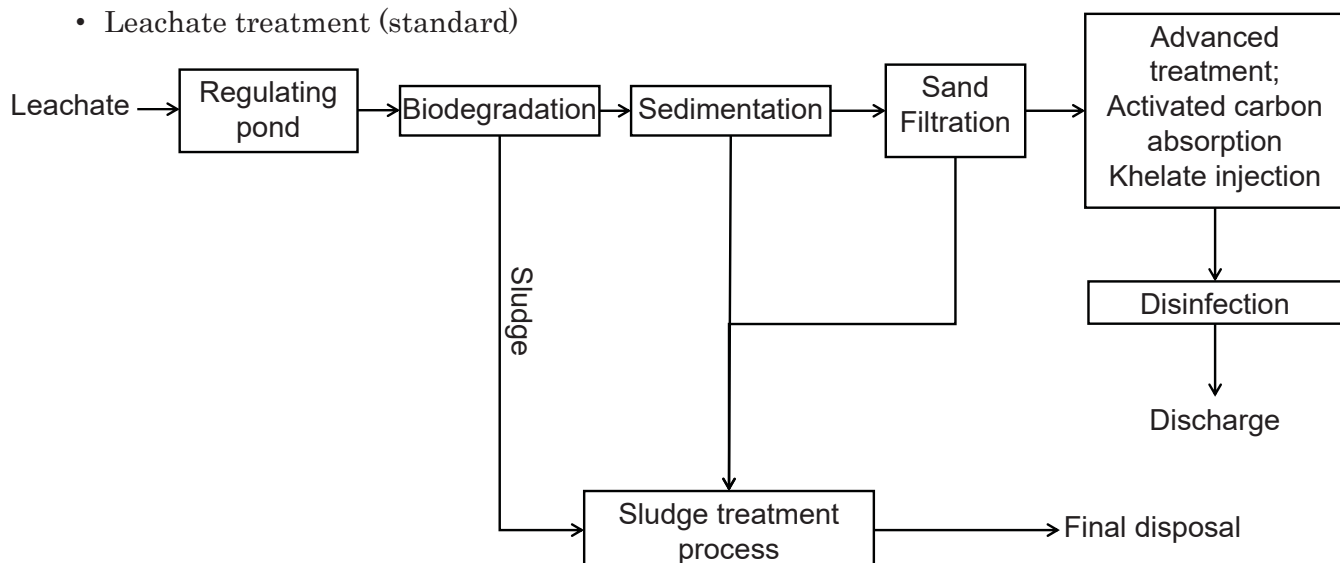
Liner structures



17

# 1-1. Investing items

- A newly built landfill
- Leachate treatment (standard)



18

# 1-1. Investing items

- A newly built landfill
- Leachate treatment (Simplified)

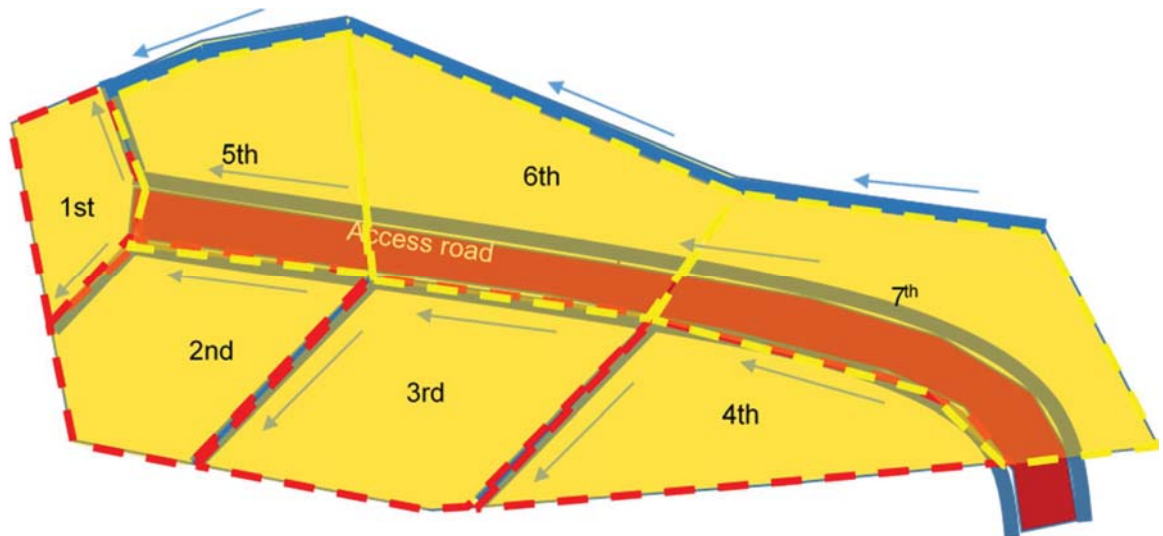


19

# 1-1. Investing items

- 1-2-2 Improvement of daily practices

## LANDFILLING PLAN (TENTATIVE)



20



# 1-1. Investing items

- 1-2-2 Improvement of daily practices
- Daily soil cover

Covering material should be procured within the site premises if possible. However most of the accumulation resembling red soil consists of burnable waste. Accordingly, it is suggested to procure red soil as covering material from construction sites or some other sites outside.

Soil cover is done daily/ weekly to a thickness of 20cm. The covered area is assumed first and it is then necessary to store the soil for several weeks since it would be difficult to procure the soil within the premises of the site.

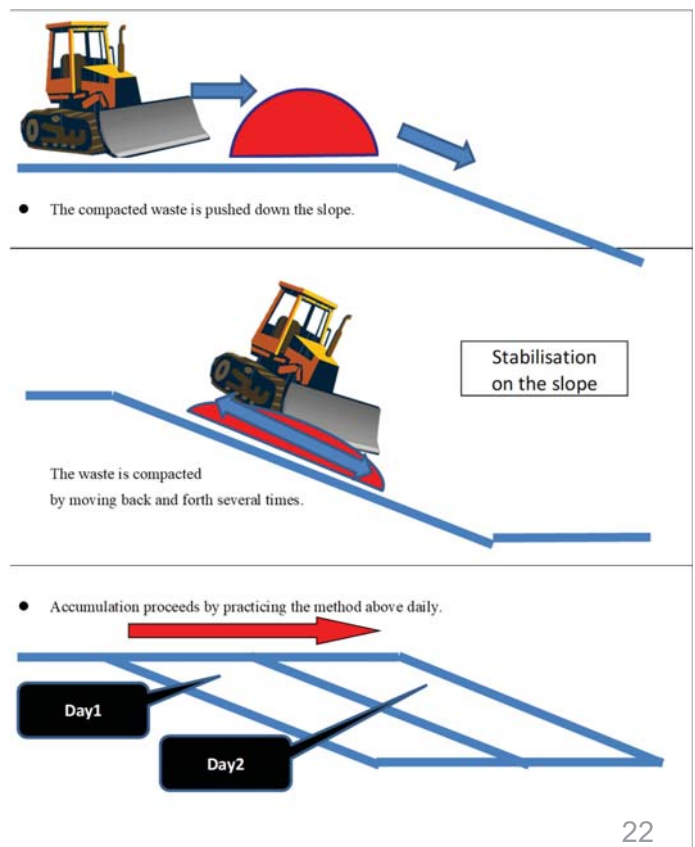
Cover Material Managing Sheet							
as of XX/XX/2016							
	Stockpile	Cell1	Cell2	Cell3	Cell4	Cell5	Cell6
Storage1	XXXX	20	0	0	0	0	0
Storage2	XXXX	10	50	0	0	0	0
Storage3	XXXX	0	0	10	10	10	0
Storage4	XXXX	0	0	0	0	5	5

Note: The table should be updated daily

21

# 1-1. Investing items

- 1-2-2 Improvement of daily practices
- Dumped waste compaction



22

# 1-1. Investing items

- 1-2-2 Improvement of daily practices
- Heavy equipment maintenance

## [Backhoe daily inspections]

- Engine oil (quantity and contamination)
- Hydraulic oil (quantity and contamination)
- Hydraulic oil filter soot
- Cylinder oil leak
- Revolving reduction gear oil
- Cooling water and clogging of radiators
- Air element
- Fuel & dehydration
- Shoe tension adjustment
- Grease
- Leaking fluid under the car

## [Dozer daily inspections]

- Engine oil (quantity and contamination)
- Hydraulic oil (quantity and contamination)
- Cylinder oil leak
- Transmission oil
- Cooling water
- Air cleaner
- Fuel & dehydration
- Shoe tension adjustment

# 1-1. Investing items

- 1-2-2 Improvement of daily practices
- Landfilling record with block number

## [Purpose]

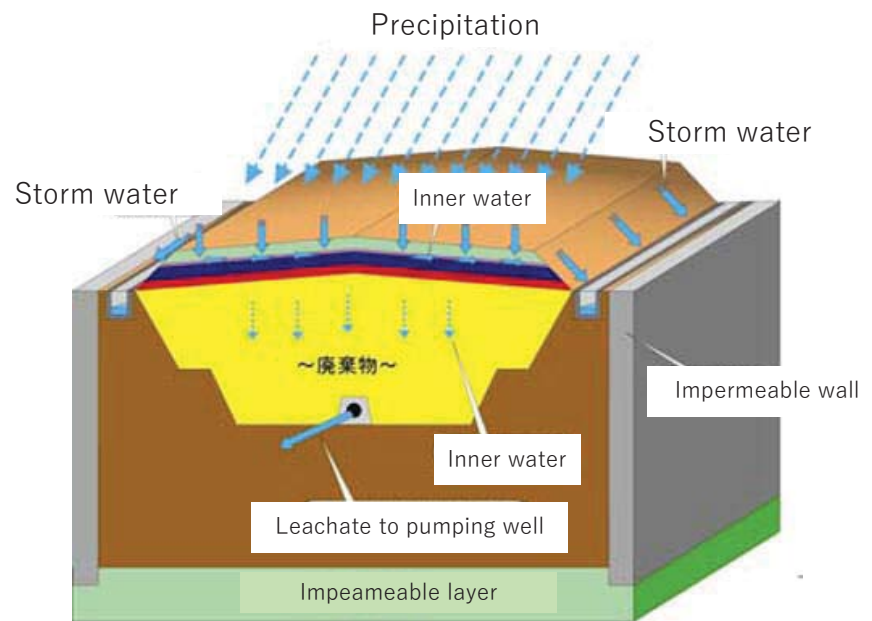
- To grasp the landfilled waste profile through the whole service life of the landfill
- To stabilize the waste layer by accumulating various kinds of waste
- To identify specific landfilled waste

Waste profile can be clarified by each block ID in a cell as shown in the right.

A-1	A-2				
B-1	B-2				

# 1-1. Investing items

- 1-2-3 Safe closure of landfill



25

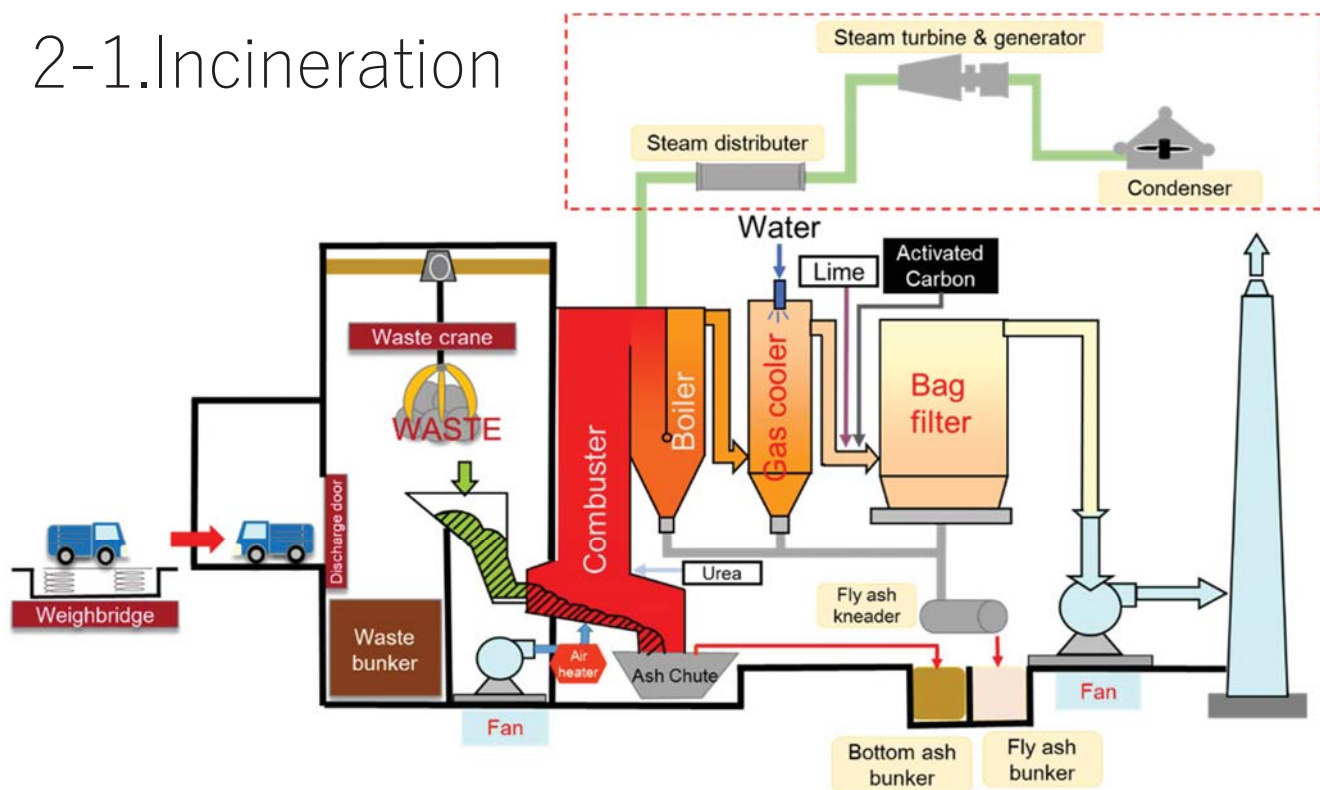


26

## 2. Available technology for intermediate treatment

27

### 2-1. Incineration



28



## 2-2.Auto crave

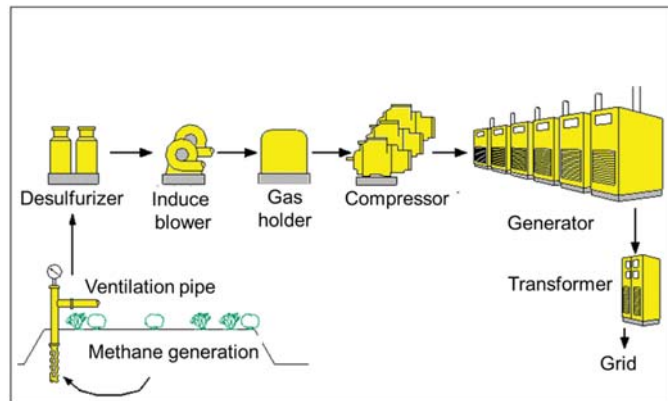


29

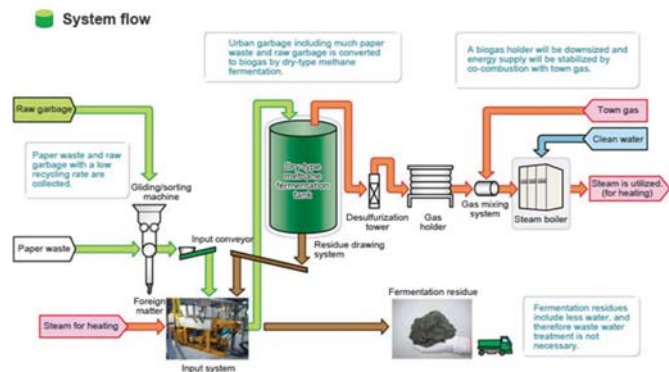
## 3. WTE technology variety

30

## Landfill Gas Recovery Technology

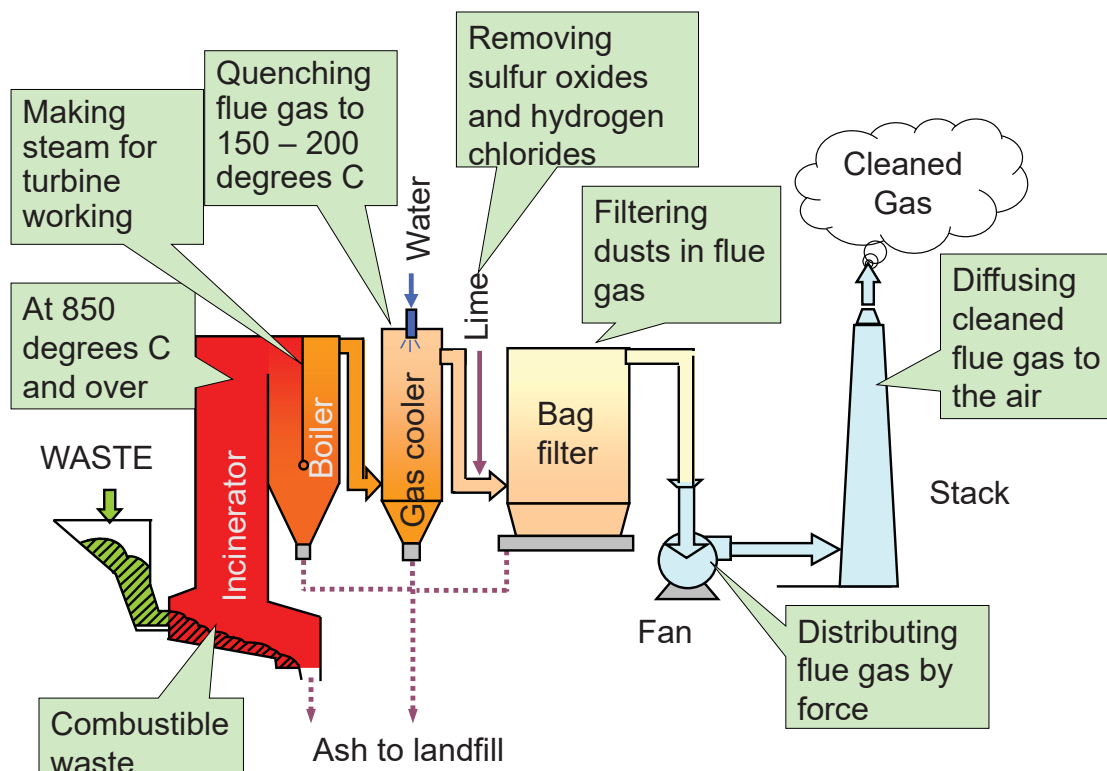


## Bio-gasification Technology



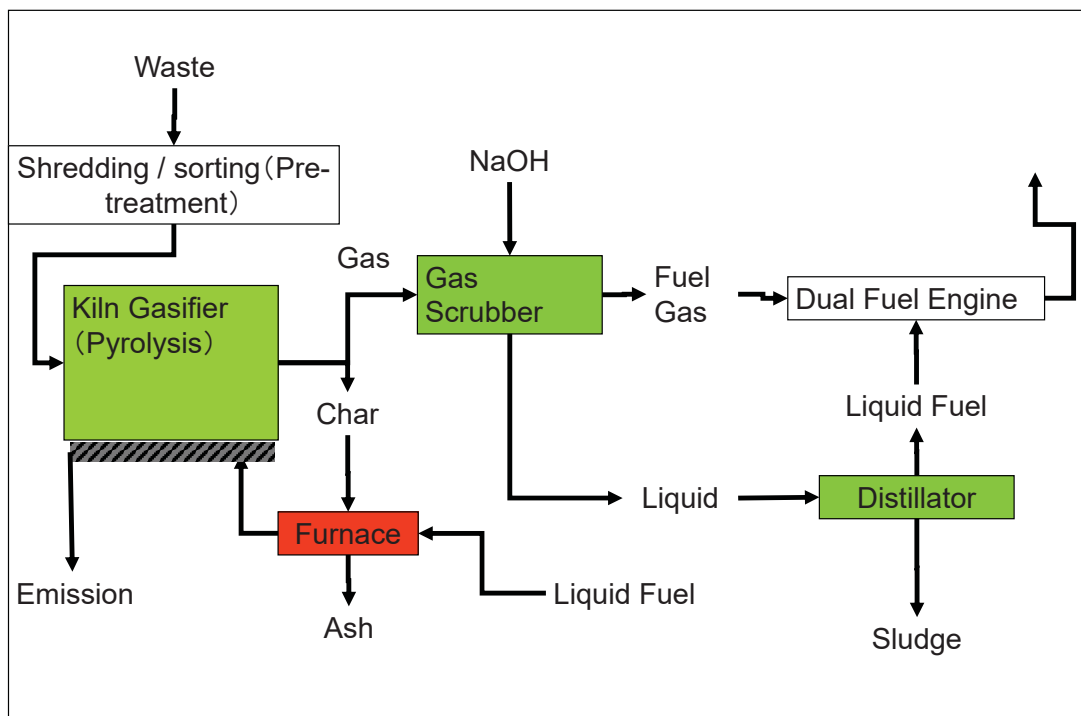
31

## Waste Incineration Technology



32

# Gasification Technology



33

## Alternatives of Technology

Method	Availability for Component		
	Organic matter	Plastics	Inorganic matter
Landfill gas power generation	○	×	-
Organic waste methane Fermentation	○	×	△
Incineration with power generation	○	○	△
Gasification with power generation	○	○	△

## Power Generation Rate (Example)

Method	Organic matter (60%)	Plastics & Others (40%)	Total kWh/t
Landfill gas power generation	100kWh/t-waste		100
Organic waste methane Fermentation	200kWh/t	0	120
Incineration with power generation	350kWh/t-waste		350
Gasification with power generation	350kWh/t-waste		350

05/08/2015

35

## WtE Technical Comparison (Example)

Method	Experience for 500t-MSW/d up	Additional Fuel	Initial Cost	Power Sales	Volume Reduction Rate
Landfill gas	+++	-	+++	+	+ 50%
Methane Fermentation	+	+	++	++	+ 60%
Incineration	+++	+++	+	+++	+++ 95%
Gasification	+	+	+	+++	+++ 95%

+++;Excellent ++;Good +;Fair

05/08/2015

36



# WtE Comparison Criteria (Example)

[Experience] Waste treatment is “experiential engineering.”

- Number of MSW Treatment Plants in Operation with a Certain Capacity

→Incineration: 500up

Methane fermentation: 100up

....Number of bio-gasification plants in operation over 10years is still few.

Gasification: 50up

....No procurement in the last few years

without

Japanese market.

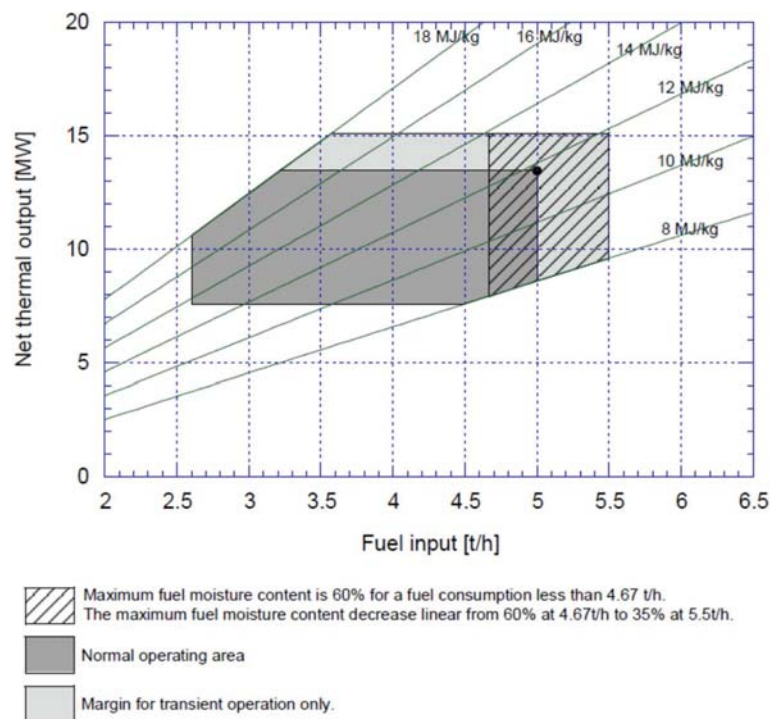
[Energy Saving]

- Additional Fuel Consumption Rate for

1,000 – 1,400 kcal/kg-MSW

And [Cost/Revenue] [Environment Protection]

37



Source: Energos

38

# Heat Utilization

## 1) Heat recovery rate

In case at the capacity of 100t-waste/day

Here,

LHV: 1,500 kcal/kg

Boiler efficiency: 85%

Recovered heat is calculated

$$100\text{t/d} \times 1,000\text{kg/t} \times 1,500\text{kcal/kg} / 24\text{hr/d} \times 85\% \\ = 5,300,000 \text{ kcal/hr}$$

05/08/2015

39

# Heat Utilization

## 2) Heat Utilization Variety

Media	Measures
<ul style="list-style-type: none"><li>- Steam</li><li>- Heated water</li><li>- Heated gas</li></ul>	<ul style="list-style-type: none"><li>- Internal processing</li><li>- Power Generation</li><li>- Road Heating</li><li>- Hot Water Supply</li><li>- Air Conditioner</li><li>- Swimming Pools</li><li>- Greenhouses</li><li>- Skating Rinks</li><li>etc.</li></ul>

09/04/2015

40

# Heat Utilization

## 3) Power Generation via Steam Turbine

Recovered heat by Boiler:  
5,300,000 kcal/hr

Here,  
Turbine Efficiency : 22%

Power Generation Capacity :  
 $5,300,000 \text{ kcal/kg} \times 22\% / 860$   
 $= 1,356 \text{ kW}$

Internal Consumption of Power : 35%  
 $1,356 \text{ kW} \times (1 - 30\%) = 950 \text{ kW}$

41

# Heat Utilization

## 4) Direct Heat Utilization

Recovered heat by Boiler:  
 $5,300,000 \text{ kcal/hr} = 22,200 \text{ MJ/hr}$

In order to utilize the recovered heat, it should be considered how to consume all the recovered heat “continuously.”

Sufficient demand is a must for direct heat utilization.

Example:  
Heat consumption rate of fuel in households is 10 – 15 MJ/hr/household  
In this case 1,500 – 2,200 households is necessary.

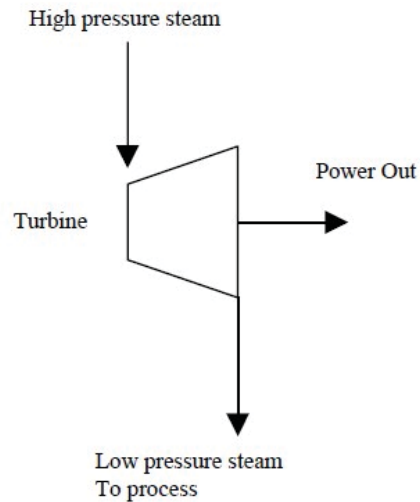
42

# Heat Utilization

## 5) Combined Heat Utilization

Generally combined heat utilization is introduced for WtE plant

High temp. /  
high pressure steam:  
Power Generation  
Low temp. /  
low pressure steam:  
Direct Heat Utilization



<http://www.turbinesinfo.com/types-of-steam-turbines/>

43



## Commencement Workshop for

the "Technical Cooperation Project on Advisor for Marine Plastic  
Litter Management in the Caribbean Region

- Collection and Transport, Recycling -

16, March, 2022

JICA Advisory Team



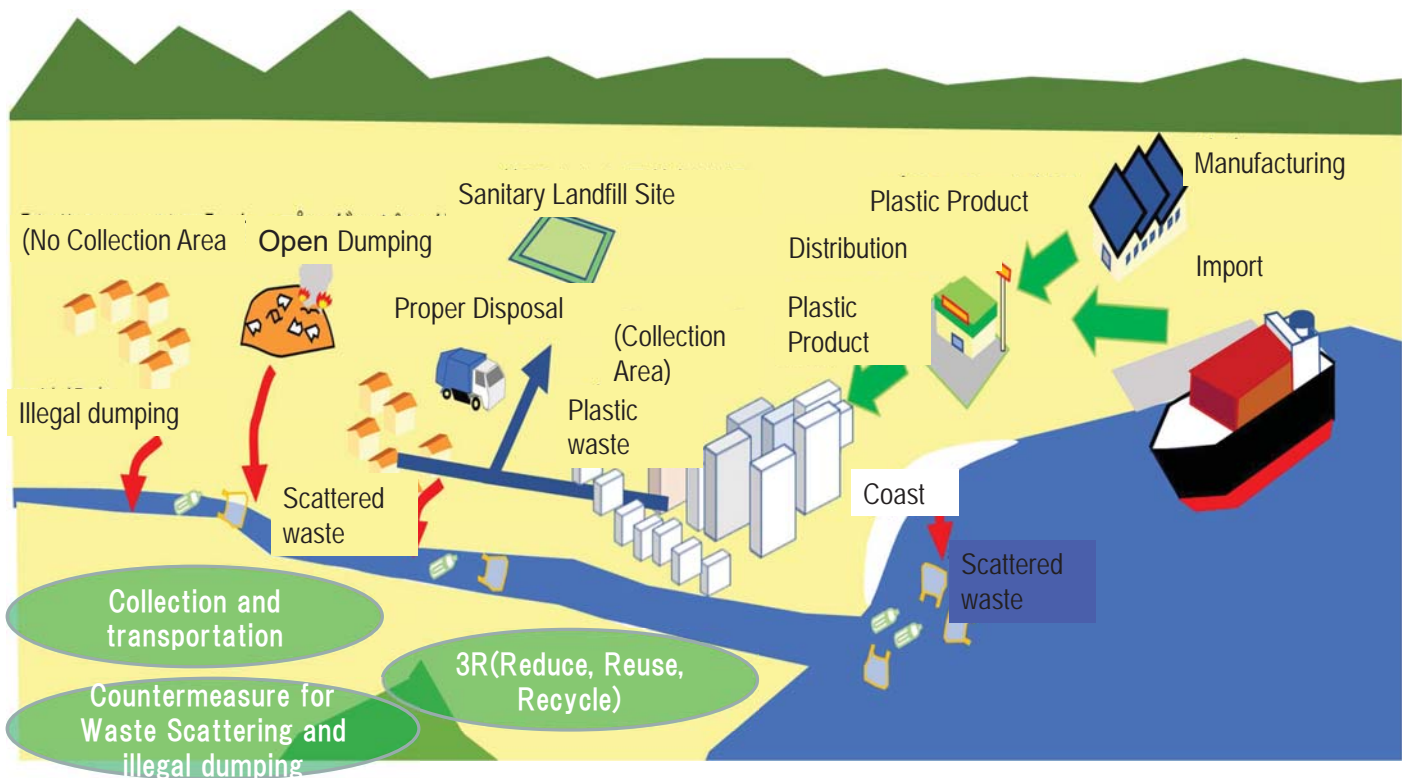
**NIPPON KOEI**



# Contents

1. Measure of collection and transportation
2. Measure of Recycling
3. Countermeasure for prevention of waste scattering and illegal dumping

2



## Measure of Collection and Transportation (Comparison of System)

- Comparison of Collection System
- Discharge Method of Waste
- Primary Collection
- Waste Transfer from primary collection to secondary transportation
- Secondary transportation
- Improve the efficiency of collection and transportation
- Waste transfer
- Collection for considering recyclable segregation




4

## Measure of Collection and Transportation (Comparison of System)

Item	Door to Door	Station	Container
Method	Put waste in front of the house or business establishment at fixed time with plastic bag or garbage bin	Put waste at station at fixed time with plastic bag or garbage bin	Put waste at any time directly
Service for waste discharger	Possible to put waste near Necessary to use plastic bag or waste bin	Necessary to bring waste to the station Necessary to use plastic bag or waste bin for discharge	Necessary to bring waste to the location of container
Burden for service provider	Relatively high cost due to many collection points	Relatively low cost due to fewer collection points	Relatively low cost due to fewer collection points
Monitoring	Easy for monitoring due to easy identification of waste discharges	Relatively difficult to monitor the station	Difficult to monitor surrounding area of containers





5

## Measure of Collection and Transportation (Waste Discharge Methods)

Contents	Picture	Feature
Discharge by plastic bag		<ul style="list-style-type: none"> <li>- Easy to discharge from house</li> <li>- Possibility of plastic waste increase</li> <li>- Not suitable for waste including high moisture content</li> </ul>
Discharge by waste bucket		<ul style="list-style-type: none"> <li>- Relatively easy to discharge from household</li> <li>- Necessary to wash waste bin</li> <li>- Suitable for all kind of waste</li> </ul>
Discharge to container		<ul style="list-style-type: none"> <li>- Easy to discharge from house</li> <li>- Suitable for all kind of waste</li> </ul>


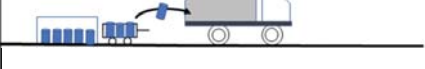

6

## Measure of Collection and Transportation (Primary Collection for door to door collection)

Contents	Picture	Feature
Door to door collection with direct waste collection by handcart directly		<ul style="list-style-type: none"> <li>- Easy to discharge from house</li> <li>- Waste handling is difficult after collection</li> </ul>
Door to door collection Put waste into bins in handcart		<ul style="list-style-type: none"> <li>- Easy to discharge from house</li> <li>- Need to put bin</li> </ul>
Door to door collection Put waste packed by packing material such as plastic bag into handcart directly		<ul style="list-style-type: none"> <li>- Easy to discharge from house</li> <li>- Need to pack the waste before discharge</li> </ul>
Door to door collection by auto cycle		<ul style="list-style-type: none"> <li>- High collection efficiency</li> </ul>




7

## Measure of Collection and Transportation (Waste Transfer from Hand Cart to Collection Vehicle)

Contents	Picture	Feature
Utilize the platform with slope for smooth transfer		- Due to using container bins it is not difficult to transfer the waste
Utilize waste bin without unloading transfer stations due to being set before		- Taking the time and scattering the waste in the site
Utilize heavy equipment to transfer from rikshaw van to secondary transportation vehicle like dump truck		- Need heavy equipment

8

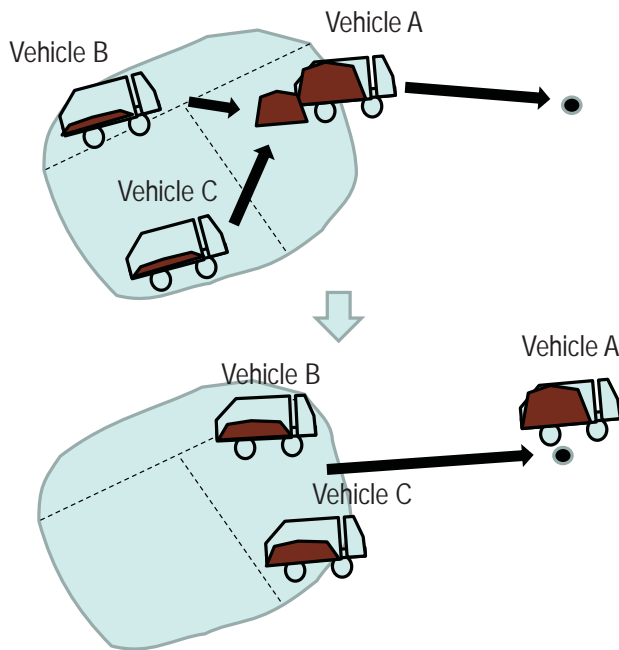
## Measure of Collection and Transportation (Waste Collection and Transportation from Collection Area to Waste Treatment and Disposal Facilities)

Contents	Picture	Feature
Transport by compactor vehicle after the compaction of receiving waste in the vehicle		- Transport waste efficiently by waste compaction - Loading is not so difficult due to lower bucket
Transport by dump truck after the receiving waste in some transfer stations by manual or equipment		- Collect various type of waste such as bulky waste or glass bottle - Not transport waste effectively
Transport by skip container / container carrier		- Collect various type of waste such as bulky waste or glass bottle - No need of loading waste but loading skip or container carrier of each waste

9



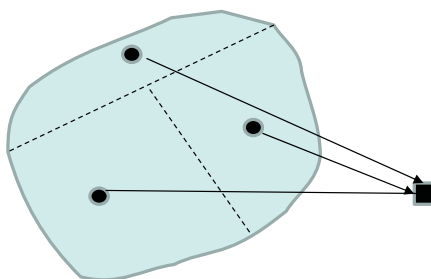
## Measure of Collection and Transportation (Information Sharing among Vehicles of Collection Information)



- Collection route is determined in the area and Some vehicles (three vehicles in left vehicle) collect the waste simultaneously.
- If area is determined, a vehicle (ex. vehicle A) is full, the vehicle communicates the center or other vehicles to assist the area.
- After that the other collection vehicle (vehicle B) will collect the waste
- In that case, the collection and transportation time will be reduced because collection B will start the remaining waste collection in the area of collection A before the collection A returns back from landfill site

10

## Measure of Collection and Transportation (Waste Transfer)

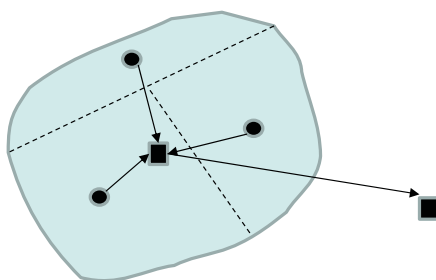


(1) Direct transportation (without waste transfer)

$$T_{Ca} = C_1 + C_2 + C_3$$

$T_{Ca}$  : Total cost from collection area No. 1 – 3 to waste disposal facility in case of direct transportation

$C_1, C_2, C_3$  : Collection and transportation cost from collection area No.1 to No. 3 to waste disposal facility



(2) Waste Transfer

$$T_{Cb} = C_1 + C_2 + C_3 + R_c + c_4$$

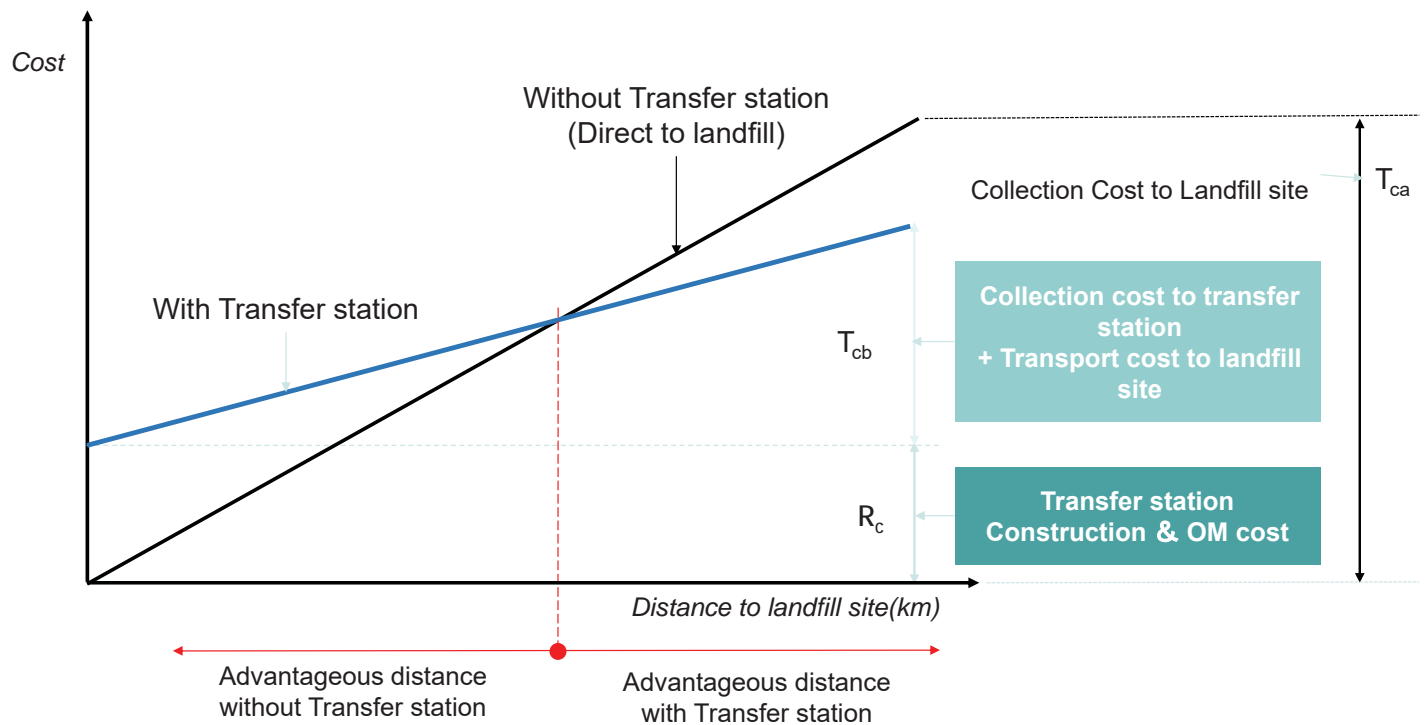
$T_{Cb}$  : Total cost from collection area No. 1 – 3 to waste disposal facility in case of waste transfer

$C_1, C_2, C_3$  : Collection and transportation cost from collection area No.1 to No. 3 to transfer station

$R_c$  : Construction, operation and maintenance cost of transfer station

$c_4$  : Transportation cost from transfer station to waste disposal facility

## Measure of Collection and Transportation (Waste Transfer)

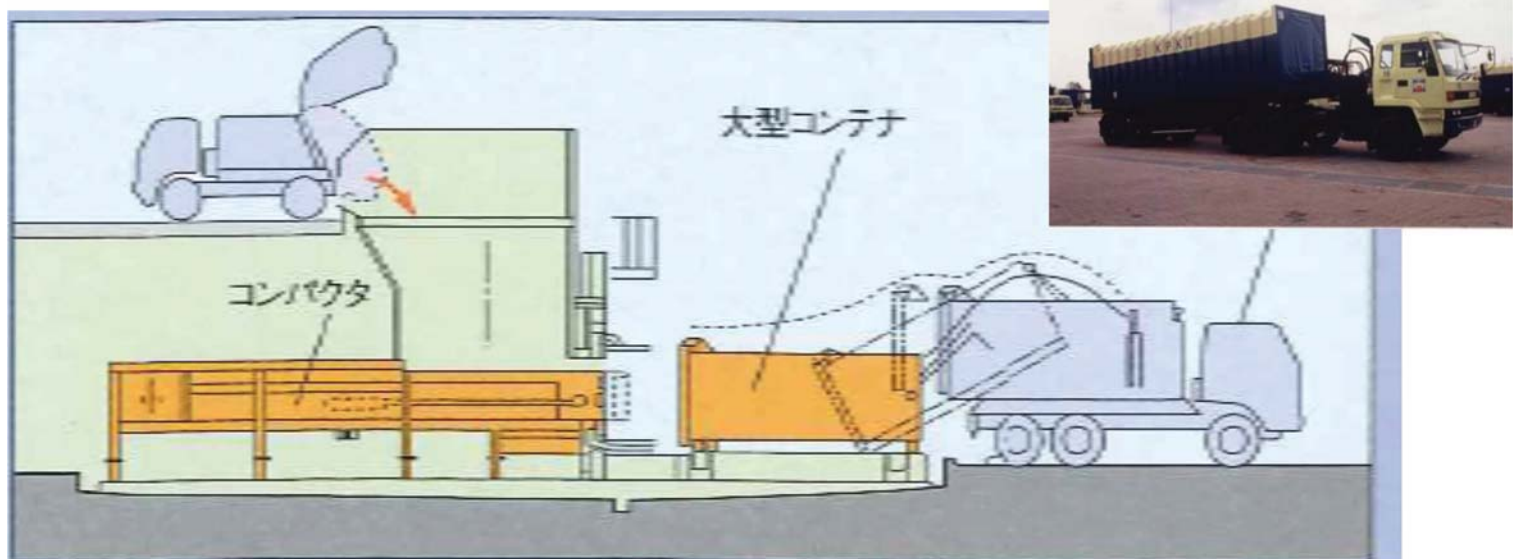


Source : Waste collection – theory and implementation p145, Maruzen (2011)

## Measure of Collection and Transportation (Waste Transfer)

### Compactor-Container Method

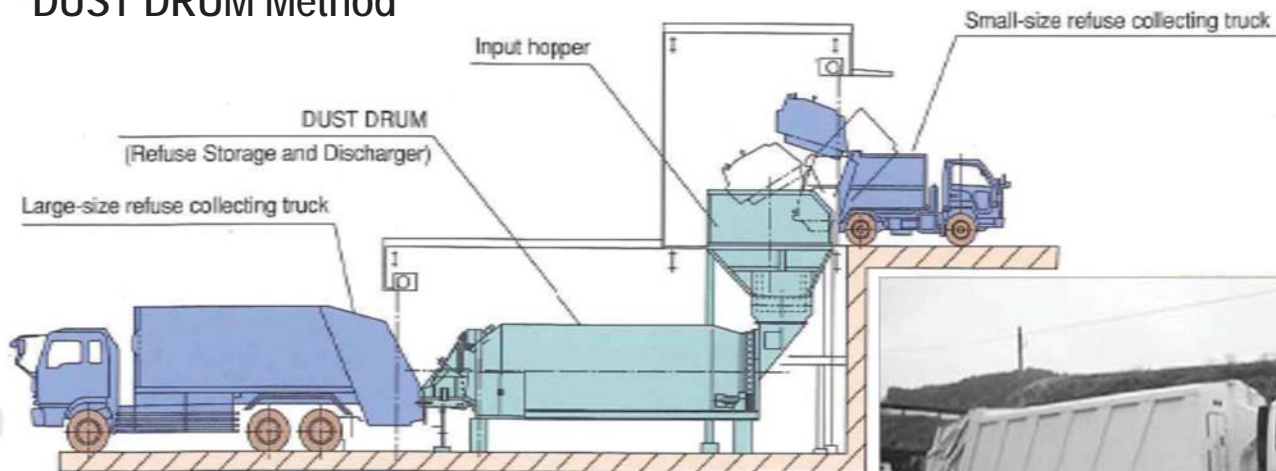
### Semi-compactor 20-40m<sup>3</sup>



Source : Shinmeiwa Kogyo Ltd.

## Measure of Collection and Transportation (Waste Transfer)

### DUST DRUM Method



In this method, the refuse collected by small-size refuse collecting truck is stored in a DUST DRUM and reloaded into a larger refuse collecting truck and then transported. This method, requiring comparatively small investment, is suitable for transportation of refuse 20tons or less per day.

Source : Shinmeiwa Kogyo Ltd.



## Measure of Collection and Transportation (For Collection of Recyclable)

- Group Collection
- Waste Bank ( a kind of group collection)
- Segregated Collection

## Improvement of Waste Collection System for Recyclable Segregation



Station collection of recyclable



Segregated collection



Reuse of PET bottle



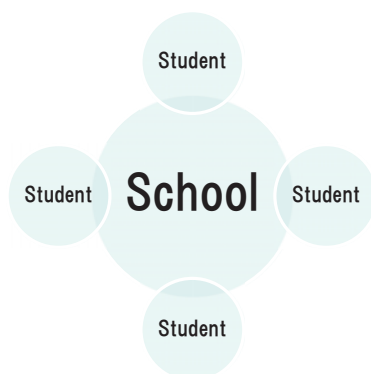
Station collection of recyclable

16

## Measure of Collection and Transportation (For Collection of Recyclable)

- How to set up the group for group collection, collection points, collection area?
- How to raise the awareness with some incentive as well as environmental education?

Option 1  
Collection and segregation of recyclable waste at school



<http://www.dynax-eco.com/repo/report-28.html>



## Measure of Collection and Transportation (For Collection of Recyclable)

- How to set up the group for group collection, collection points, collection area?
- How to raise the awareness with some incentive as well as environmental education?

Option 2  
Collection and segregation by residents at meeting area community



## Measure of Collection and Transportation (For Collection of Recyclable)

- How to set up the group for group collection, collection points, collection area?
- How to raise the awareness with environmental education?

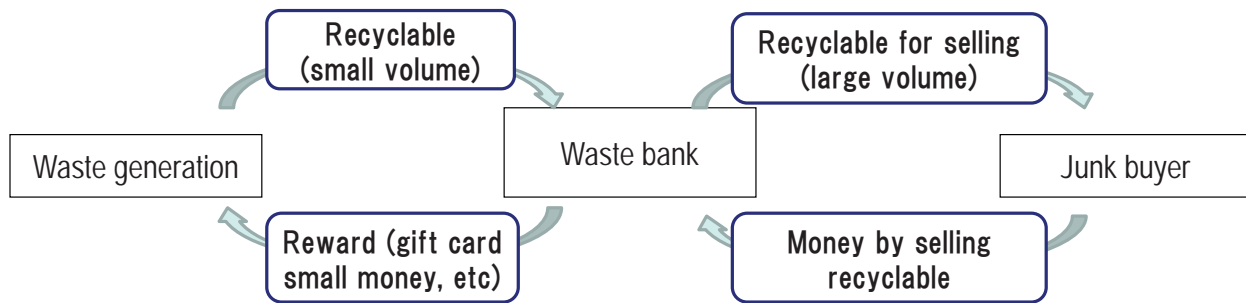
Option 3  
Collection and segregation at shop



Source :  
[http://www.city.niihama.lg.jp/so-shiki/detail.php?lif\\_id=12408](http://www.city.niihama.lg.jp/so-shiki/detail.php?lif_id=12408)

## Measure of Collection and Transportation (For Collection of Recyclable)

### Waste Reduction (Waste Bank)

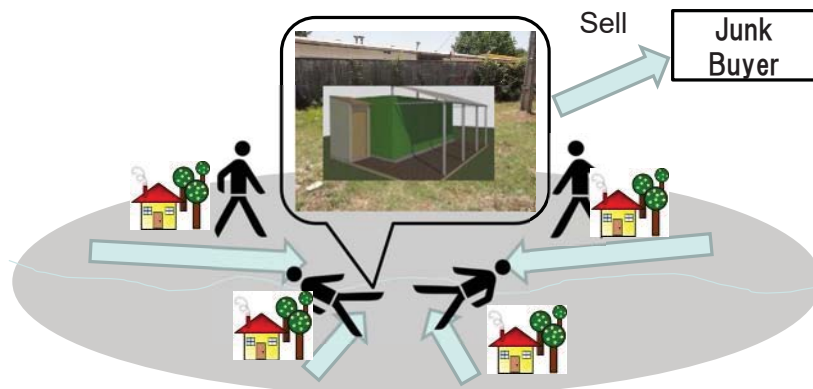


20

## Measure of Collection and Transportation (For Collection of Recyclable)

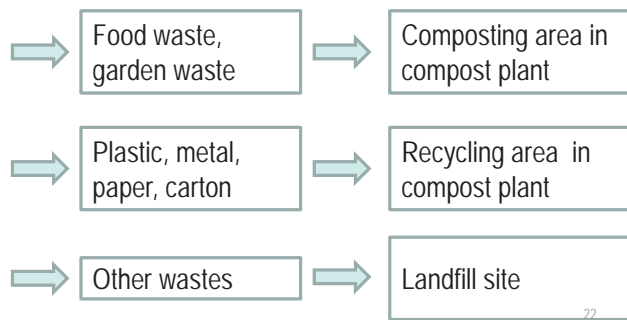
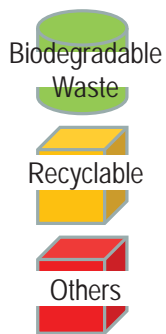
### Collection and Transportation (Waste Bank)

Brought by Residents or Students of Recyclable Waste



21

## Collection and Transportation System (Segregated Collection)



Points to be considered in upper stream

- Necessary of cooperation of waste dischargers
- Clear indication of segregation rule
- Monitoring system of waste segregation

Collection date	Fri	Sat	Sun	Mon	Tue	Wed	Thu
Biodegradable			○		○		○
Recyclable		○				○	
Others	○			○			

Points to be considered in upper stream

- Secure of goal of segregated waste
- Supporting system for market fluctuation

## Collection and Transportation System (Segregated Collection)



Necessary to explain in detail what kind of waste should be put into each dust bin.



There is no detail information what kind of waste should be put into each dust bin.

## Collection and transportation (Segregated Collection)



24

## Measure of Recycling

### Recycling for Organic Waste

- Identification of market of organic waste is very important
- If there is no market for compost or other recycled or reused organic waste, soil conditioner or soil cover material in landfill site will be possible.

### Recycling for Inorganic Waste

- Establishment of Recycling flow is very important.
- Understanding of BASEL convention and situation of recycling market is also important to do so



## Measure of Organic Waste Recycling (home composting)

Preparation of Container which allow to pass through easily from outside

Preparation of sheet on the inner side of container to prevent spillage and cover by cloth or something to prevent insects from outside

Segregate and cut organic waste for suitable size (smaller is better)

Prepare cut organic waste and seed compost (compost product including microorganism)

Keep hot temperature and mix a few times a week to obtain oxygen for decomposition

Finish fermentation process and mature a few weeks for compost or soil conditioner

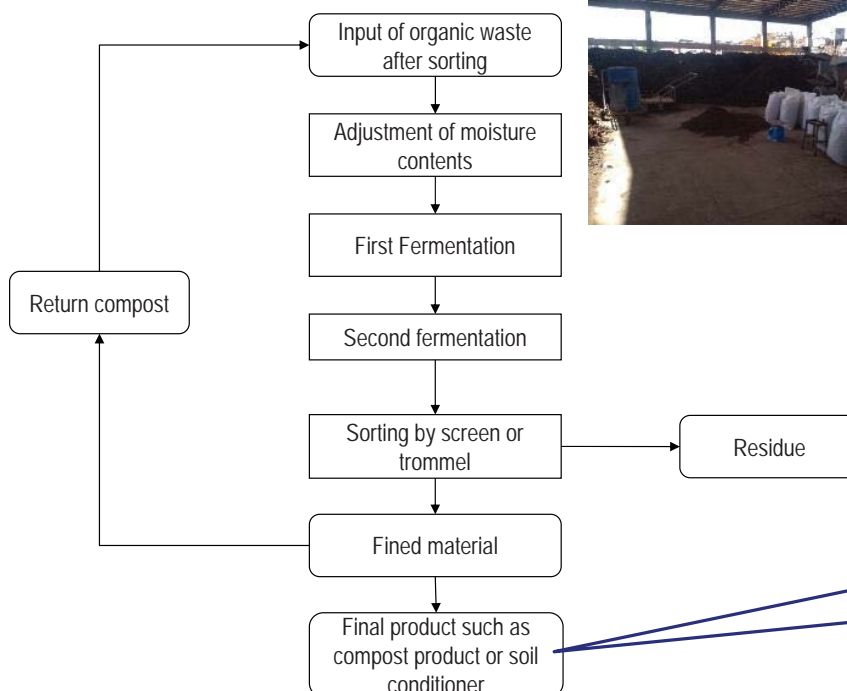


Low temperature : heat moderately and keep temperature around 60 to 70 degree  
High moisture contents : put husk or rice

Second fermentation may be necessary by local authority due to keeping compost quality.

26

## Measure of Organic Waste Recycling (Community Composting)



It is important to secure the utilization method of final product utilization

27

## Basic Understanding of Composting Process

Process		Contents
Pre treatment	Shredding	Crushing to accelerate the decomposition of organic waste, and to accelerate the evaporation of moisture from vegetable waste with high moisture content.
	Auxiliary material mixing	To adjust to reduce moisture content, add fermentation bacteria and improve aeration, auxiliary materials such as return compost, rice husks, sawdust, etc., are mixed into the raw material.
Fermentation	First fermentation	Air ventilation and mixing are used to decompose easily degradable organic matter in the raw material and evaporate moisture. Inactivation of pathogens and other organisms in the compost material is carried out at the same time by mixing the material to a temperature of 70° C or higher.
	Second fermentation	The fermentation is designed to produce good quality compost without impairing the growth of crops. In secondary fermentation, the reaction is smaller than in primary fermentation.
Preparation of product	Sorting	Trommel and vibrating sieves are used to remove foreign substances such as metals and plastics, as well as those that are not sufficiently decomposed.
	Packaging	Packaging for selling product.

## Recycling of inorganic waste (Plastic)



Source : JAT prepares based on the information of Plastic Waste Management Institute in Japan

## Recycling of inorganic waste (Plastic)

### **Trommel screening for sorting:**

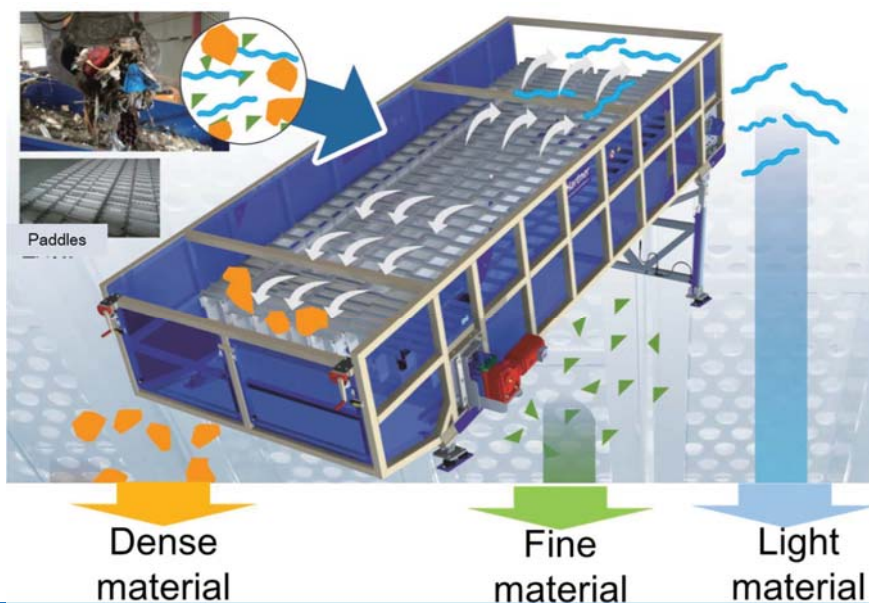
Bulky waste is eliminated and the rest of waste is untangled.



## Recycling of inorganic waste (Plastic)

### **Ballistic separator:**

Plastic bags and papers are sorted by the upflowed wind from fans.



## Recycling of inorganic waste (Plastic)

### Baling:

Sorted materials are packed in this baling process.



32

## Recycling of inorganic waste (Plastic)

### Regulation for export of waste-derived plastics under Barzel convention

- Y48 Plastic waste, including mixtures of such waste, with the exception of the following:
  - Plastic waste that is hazardous waste pursuant to paragraph 1(a) of Article 1
- Plastic waste listed below, provided it is destined for recycling in an environmentally sound manner and almost free from contamination and other types of wastes:
- Plastic waste almost exclusively consisting of one non-halogenated polymer, including but not limited to the following polymers:
  - Polyethylene (PE)
  - Polypropylene (PP)
  - Polystyrene (PS)
  - Acrylonitrile butadiene styrene (ABS)
  - Polyethylene terephthalate (PET)
  - Polycarbonates (PC)
  - Polyethers

33



## Recycling of inorganic waste (Plastic)

### Exemption from the regulation of export in Barzel convention

Pelletized plastics (Pure plastics)



Single-colored plastic flakes (Pure plastics)



>> These kinds of the primary manufactured products need high quality control and cost for manufacturers.



Therefore, it will be necessary to establish the process of flake or pellet production process to satisfy Basel Convention

34

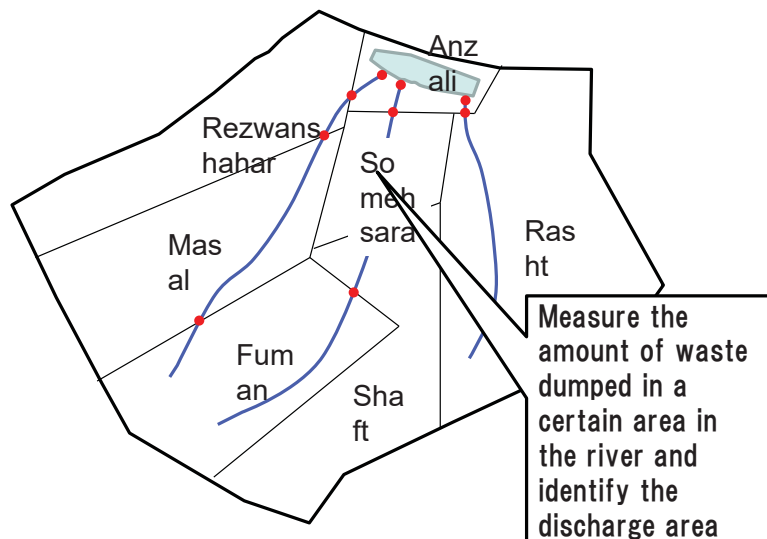
## Countermeasure for prevention of waste scattering and illegal dumping

### Monitoring of illegal Dumping Along River

Trap the illegally dumped waste in the river and monitor the amount and discharge area of waste dumped into river and environmental awareness for waste dischargers



## Example of Monitoring of Illegal Dumping Area Along River



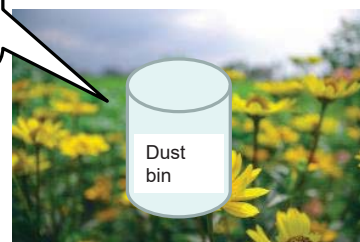
Setting the boundary of each administrative boundaries or wetland zones (refer to mark )

36

## Example of Prevention of Waste scattering along roads



Prepare beautiful attraction to prevent waste discharge around dust bin



<http://www.new-material.com/gomiyoke-tori.htm>

Let's Discuss the Possible Measures to Improve Solid Waste Management  
including Collection and Transportation as well as Recycling.

Thank you so much.



## Overview of actions to prevent marine plastic litter and microplastics in the Caribbean

---

**JICA Workshop - TECHNICAL COOPERATION PROJECT ON ADVISOR FOR  
MARINE PLASTIC LITTER MANAGEMENT  
IN THE CARIBBEAN REGION**

---

# Overview

16<sup>th</sup> March 2022

**1** Regional overview & frameworks on Marine Litter

**2** Marine Litter Regional and National Action Plans

**3** Regulatory action on single-use plastics

**4** Interventions to reduce plastic waste and marine litter

**5** Knowledge, capacity building and awareness raising

**6** Other related on-going and upcoming initiatives

**7** Conclusions and Recommendations

## Waste Management in Latin America and the Caribbean

- Steady waste generation growth (**1 kg/hab/day**)
- Low recycling rates (**< 10%**)
- Inadequate disposal (**~50%**)
- **>10,000** dumpsites

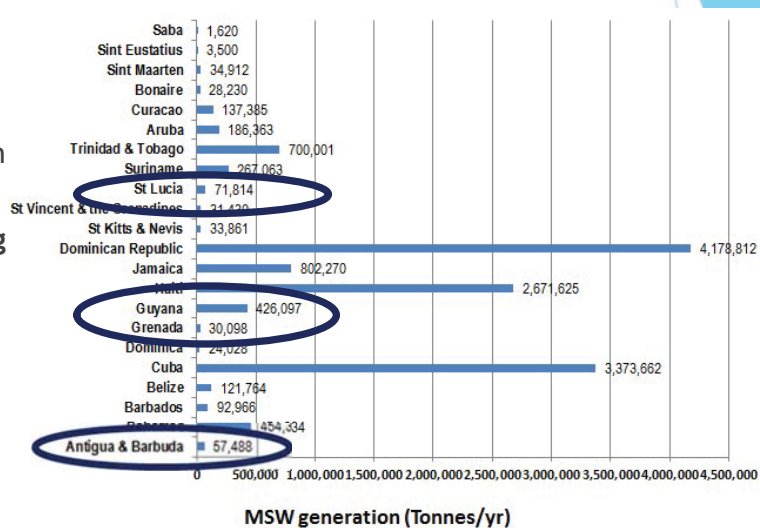




## Waste status and trends in the Caribbean

### Municipal Solid Waste generation - total per country

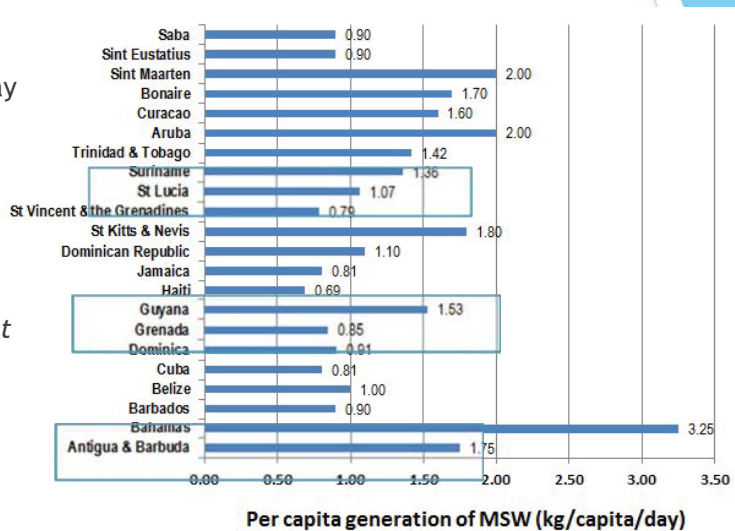
- ▶ **Caribbean: 13.7 million ton/yr**
- ▶ **English/Dutch speaking Caribbean: 3.5 million ton/yr (25%)**



Source of data: RWMO and TNO (2016)

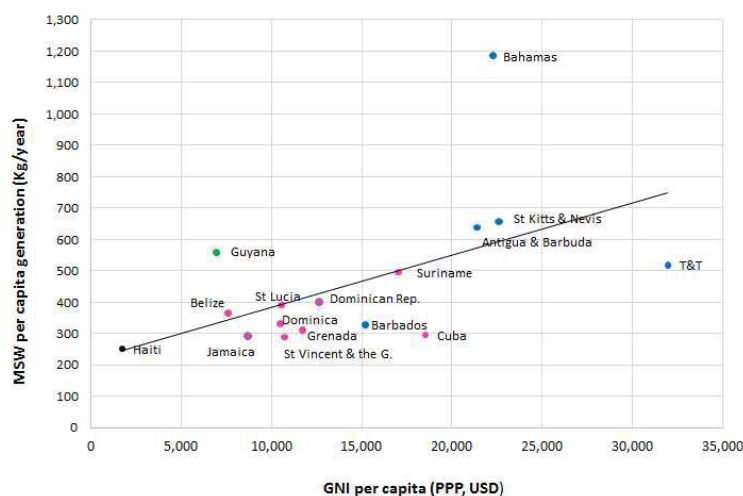
# Municipal Solid Waste generation - per capita

- ▶ **Average LAC:** ~1 kg/cap/day
- ▶ **Average Caribbean:** 1.3 kg/cap/day
- ▶ **English/Dutch speaking Caribbean:** 1.4 kg/cap/day
- ▶ Similar to World Bank *"What a Waste 2.0"* Report: 0.99 kg/capita



Source of data: RWMO and TNO (2016)

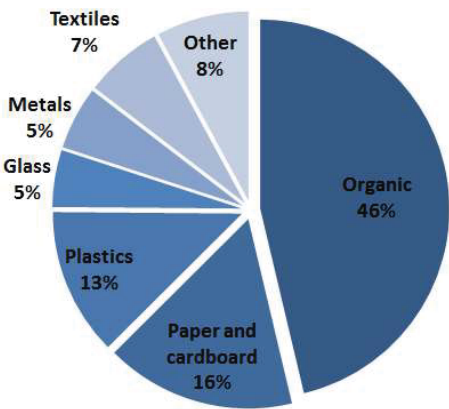
## Waste generation vs Income



Source of data: RWMO

# Waste composition

**MSW average composition**  
(9 Caribbean countries)

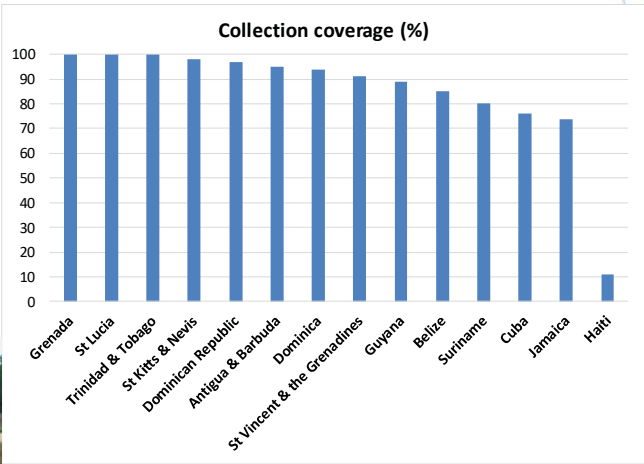


Source of data: RWMO

# Waste collection

**Waste collection (%)**  
(14 Caribbean countries)

- Quantitative and qualitative improvement
- Decreased or lack of coverage in marginal and rural areas



Source of data: RWMO

# 1. Some regional frameworks

## Forum of Ministers of Environment of LAC

The XXI Meeting of the Forum of Ministers of the Environment of Latin America and the Caribbean, adopted **Decision 1: Chemicals, Marine Litter and Waste Management**.

- Encourages countries to develop and implement national and regional plans to reduce marine litter, developing the necessary policies, strategies, and programs (including alternatives to use of plastic and microplastics, restriction of SUP, implementation of EPR, waste management,...).
- To strengthen the existing regional coordination mechanisms (e.g. Regional Seas Programme, Global Partnership for Marine Litter and its Regional nodes, Basel and Stockholm Convention Regional centers,...)
- Invites UNEP in coordination with other relevant organizations to continue to support and promote all actions taken by countries in LAC, and to further strengthen regional collaboration and coordination.

## Conference of Parties to the Cartagena Convention & its Protocols

The XV Meeting of Contracting Parties through multiple Decisions:

- Encourages countries to ratify & implement the **LBS Pollution Protocol** as part of their response to reducing plastic pollution;
- Encourages greater collaboration with Chemical Cluster of MEAs e.g. **BASEL Convention**;
- Supported the development of new projects and activities for improving waste management including circular economy approaches & ship-generated wastes;
- Include **plastics/microplastics** as a parameter to be reported on future State of Convention Area Reports on Marine Pollution;
- Enhance coordination with **UNEP Regional & Sub-Regional Offices** including more coordinated positions during UNEA

## XXII Forum of Ministers of Environment of LAC / Decision 1 - Pollution

Adopts the **Action Plan 2021-2024 on regional cooperation on chemicals and waste** with priority issues for the region.

Intensify **waste prevention and minimization**, promoting responsible consumption and sustainable production practices, such as circular economy; (...) convert **waste into a resource** and increase recycling rates, including gradual reduction and/or substitution of **single-use plastics**, prevention of food loss and the **treatment of organic waste**.

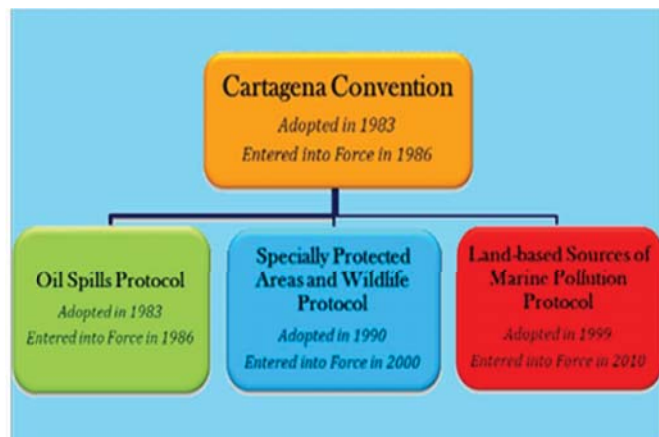
Call upon countries in the region to progressively eradicate inappropriate final waste disposal practices, guided by the **Roadmap for the progressive closure of dumpsites** in Latin America and the Caribbean.

Urgently address the issue of **marine litter and microplastics**, through a preventive and **whole life-cycle approach**; (...), and establish a suitable mechanism to promote **regional cooperation and coordination**





## Policy & Regulatory Frameworks: Cartagena Convention & LBS Protocol



The **LBS Protocol** under the Cartagena Convention focuses on reducing and preventing:

- **Pollution** from land-based sources and activities
- **Pollution** from ships
- **Pollution** caused by dumping



## Goals and Objectives of CWMAP

- ▶ Define regional and island-specific waste management strategies and systems that are environmentally and financially sustainable and supported by civil society
- ▶ Identify priority actions:
  - ▶ Communication and Collaboration
  - ▶ Strategic Planning
  - ▶ Funding (SWM Systems)
  - ▶ Expanding Infrastructure
  - ▶ Managing Disaster Debris
  - ▶ Preventing Waste Pollution
  - ▶ Increasing Landfill Diversion
  - ▶ Fostering Public-Private-Partnerships (PPPs)



## Key Issues and Challenges identified in CWMAP

- Limited availability of suitable land for landfills and poor waste management practices (open dumping, littering)



New Providence, Bahamas, 2017



Riverton Dump, Kingston  
Jamaica, 2015





## Philipsburg, St. Maarten, 2016-17



18

## Philipsburg, St. Maarten 2016-2017



19



Philipsburg, St. Maarten 2016 (Car tires)



20

St. Johns, Antigua, 2014-2015



St. Lucia, May 2016



## Key Issues and Challenges identified in CWMAP

- Remoteness of many islands, resulting in high costs for transportation
- Small and sometimes sparse populations that limit any potential economies of scale for waste treatment and recycling
- Limited institutional and human resources capacity
- Limited financing for solid waste management systems, which has not kept pace with growth in waste quantities



## Waste management in the Caribbean: Impacts

- ▶ Human health risks, e.g. vector-borne diseases
- ▶ Environmental pollution, e.g. marine litter
- ▶ Economic impacts, e.g. loss of amenities
- ▶ Loss of valuable resources



## Waste management in the Caribbean: Opportunities

- ▶ Recovery of valuable resources and energy
- ▶ Health and environmental benefits
- ▶ Clean communities /cities, beautification
- ▶ Economic growth and green jobs
- ▶ Regional cooperation:
  - ▶ Best practices
  - ▶ Economies of scale



# From Waste Management to Material Chain Management

1. Reduction and prevention
2. Re-use systems
3. Recycling systems
4. Beneficial application, including energy recovery
5. Safe removal or disposal
  1. Incineration as method of destruction
  2. Landfilling or discharge

26



From  
here

to there





## CWMAAP Actions

- ▶ 55 Regional and National-level Actions to address the issues identified
- ▶ Examples of Priority Actions:
  - ▶ Create a knowledge platform and inventory of projects
  - ▶ Develop a strategic planning tool box and island-specific comprehensive solid waste strategies
  - ▶ Unified MARPOL Annex 5 policies and fees
  - ▶ Adopt programmes to manage plastics - clearly define recycling
  - ▶ Work as a region (hub and spoke) to optimize recycling
  - ▶ Harmonize national and regional waste management disaster recovery plans
  - ▶ Prohibit children from landfill recycling and treat landfill recyclers with dignity and respect
  - ▶ Create an enabling environment to attract more private investment in waste management systems

## 2. Marine Litter Regional and National Action Plans



### Marine Litter Action Plan for the Northeast Pacific



Promote the implementation of environmental policies, strategies, actions and measures for the sustainable management of marine litter in the ocean of the Northeast Pacific region through the cooperation and coordination of national and regional actors.

#### Lines of action:

1. Alliances and cooperation
2. Education and awareness
3. Monitoring and Research
4. Governance
5. Infrastructure
6. Control and surveillance

**Status:** Under review and development.

### Marine Litter Action Plan for Panama



Guidance tool to reduce and eliminate marine litter that threatens biodiversity and ecosystems on its coasts and seas, involving and joining the efforts of the largest number of national actors.



**National consultation:** 10 provinces, 3 indigenous regions.

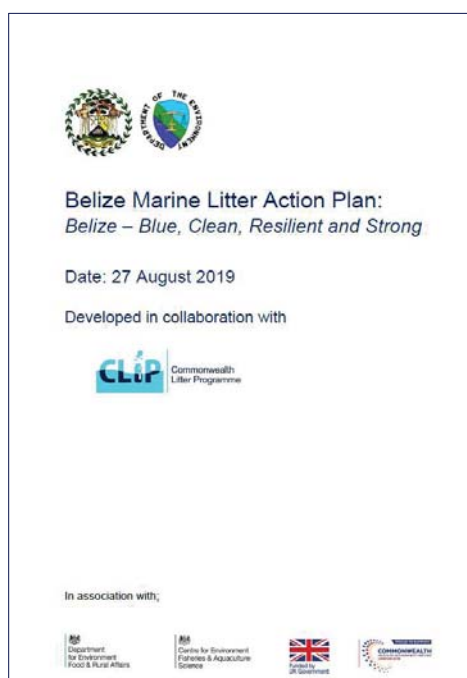
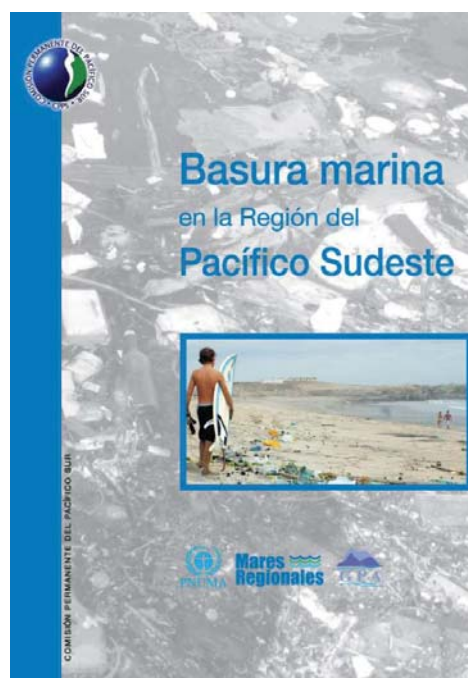
#### Lines of action:

1. Awareness and Education
2. Legislation and Governance
3. Cleaning and Restoration
4. Financing
5. Research, development and innovation.

**Status:** In development, expected launching December 2020.



## 2. Marine Litter Regional and National Action Plans



**Vision:** A healthy Caribbean Sea without risk from marine litter.

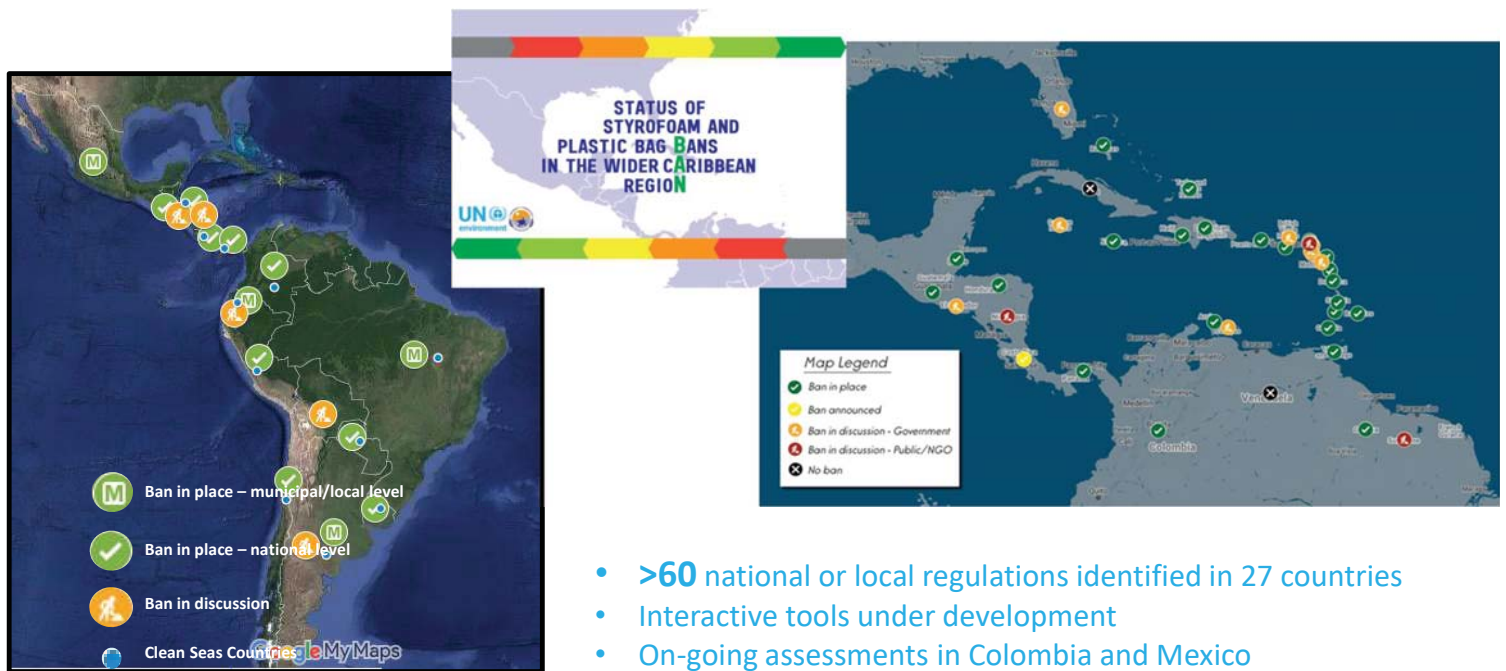
**Mission:** To provide leadership, information, and resources in efforts that have been developed to reduce marine litter in the Caribbean Sea.

**Composition:** National, regional organizations, governments and research individuals working to reduce the impact of marine litter in coastal zones of the Wider Caribbean Region.

**GPML-Caribe** is hosted by the Gulf and Caribbean Fisheries Institute (GCFI), a regional NGO, and the Secretariat of the Cartagena Convention.



### 3. Regulatory action on single-use plastics



<https://www.google.com/maps/d/edit?mid=1YpWrH1gdpXfOEcBH-CjEjUssKcG0Yr&usp=sharing> (work in progress)

### 4. Interventions to reduce plastic waste and marine litter

#### Plastic Waste minimization project in Jamaica

**Objective:** 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.

- ✓ **Regulatory Impact Assessment** to provide recommendations for the best course of action regarding the management of plastic waste, plastic packaging materials inclusive of Polystyrene.
  - Hotspot Analysis
  - Description of policy context and objectives
  - Cost benefit analysis
  - Impact and effectiveness assessments
- ✓ **Policy development**
- ✓ **Advocacy, awareness raising, policy dialogue and knowledge building**
- ✓ **Pilot activities**





## 4. Interventions to reduce plastic waste and marine litter

### Phasing-out single use plastics: Towards Clean Seas and Sustainable Tourism in the Caribbean

**Objective:** Reduce the volume of plastic waste in the Caribbean, more specifically in St. Lucia, by improving the capacity of hotels to phase out SUP and implement sustainable procurement and eco-innovation solutions.

#### Results:

- ✓ Increased knowledge about waste streams generated by hotels – focus in plastic waste.
- ✓ Improved capacity for proper management and reduction of plastic waste.
- ✓ Raised awareness among authorities, hotels and tourists on the impacts of SUP.



- ✓ Partnership between the U.S. EPA, Peace Corps, Cartagena Convention Secretariat, UNEP's Regional Office for Latin America and its Caribbean Sub-Regional Office

**The Trash Free Waters (TFW) Initiative** catalyzes local communities and governments in the Caribbean region to work together to develop marine litter policies and projects that reduce the amount of trash entering the Caribbean Sea.

- ✓ National projects were implemented in **Jamaica** and **Panama** through **partnerships with Governments, NGOs, Civil Society and Private Sector.**

#### PANAMA

Provided training sessions to improve the management of solid waste and encourage responsible consumption and good environmental practices.

#### JAMAICA

- 200 garbage bins distributed across 40 locations.
- 4,500 lbs of plastic bottles were collected for recycling.
- Public awareness campaigns - 3,445 persons
- 2,500 lbs compost
- 20 residents trained in composting and jewellery making





## Completed Projects and Initiatives

- Incidence of microplastics in commercially important fish in Grenada. (St. George's University)
- Link between marine litter and mosquito-borne diseases.
- Solid Waste Reduction Project in the Whitehouse and Bluefields communities in Jamaica (Trash Free Waters Initiative).
- Youth Involvement in the Special Session on Marine Litter held during the 72<sup>nd</sup> Annual Conference of the GCFI, the GPML-Caribe Student Awards and Albatross Film Screening.
- Social media campaigns :#PlasticFreeJuly and #PlasticFreeChristmas.

## Ongoing/Future Projects and Initiatives

- Community Based Projects & National Marine Litter Action Plans (EU ACP MEA)
- Testing harmonized marine litter/plastics monitoring in the Wider Caribbean.
- Reducing Fishing Gear Loss and the impacts of ALDFG (Environment Canada, GGGI, GCFI).
- Development of marine litter reduction strategies for Caribbean cultural events.
- Waste/Plastics Management proposal with Government of Germany (PPG received)



## 5. Knowledge, capacity building and awareness raising



### 20 LAC governments have joined Clean Seas



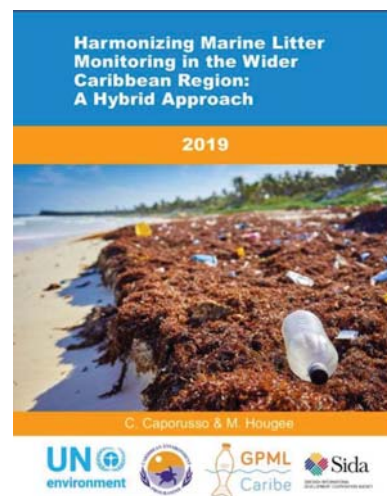
## 6. Other related on-going and upcoming initiatives

- ❑ **High-Level Forum of Caribbean Ministers responsible for Waste Management/Caribbean Waste Management Action Plan (updated)**
- ❑ **GEF - Reduce marine plastic pollution by supporting governments and businesses at the city level to accelerate the transition to a circular economy** (Colombia, Jamaica, Panama).
- ❑ **GEF ISLANDS - Implementing Sustainable Low and Non-Chemical Development in Small Island Developing States** (Antigua & Barbuda, Bahamas, Barbados, Cuba, Dominica, Jamaica, Saint Lucia, Saint Kitts and Nevis, Trinidad and Tobago, Dominican Republic, Suriname and Guyana).
- ❑ **Action Plan 2021-2022 Intergovernmental Network on Chemicals and Waste** (shall include actions on plastics and marine litter)
- ❑ **Coalition for the progressive closure of dumpsites in LAC**

## EU Action Programme: Support to the effective and sustainable management of Solid Waste in the Caribbean

- **Geographic scope:** CARIFORUM Member States (Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago and Cuba).
- **Timeframe:** 2022-2025
- **Budget:** 8M EUR
- **Implementing partners:** UNEP, AFD, GIZ
- **Expected results:**
  1. Robust solid waste management **legal and strategic frameworks** are developed;
  2. **Capacity** for sustainable consumption and sustainable waste management in **targeted areas** is enhanced;
  3. **Investment opportunities** in the solid waste sector are defined and facilitated; and
  4. **Increased awareness** of the EU-CARIFORUM partnership including on waste management and circular economy.

- OSPAR Convention for the North East Atlantic and the Cartagena Convention Secretariat agreed in June 2017 to support the implementation of SDG 14 (#OceanAction17198).
- Funds were mobilised in 2018 from Sweden and Netherlands to support marine litter activities in the WCR.
- In 2019, GCFI and the Cartagena Convention Secretariat completed a report on harmonized monitoring of marine litter and initiated the development of a new Regional Marine Litter and Plastics Reduction Strategy.
- The harmonizing approach:
  - allows for engagement with citizens for marine litter monitoring;
  - ensures good quality data collection;
  - ensures a cost effective and efficient means of harmonizing data collection;
  - ensures that litter removal is maximized at preselected sites.



## 7. Conclusions and recommendations

- Historic resolution at UNEA in March to end plastic pollution and forge an international legally binding agreement by 2024. High political priority!
- Existence of regional and sub-regional mechanisms and frameworks to address plastics and marine litter management; coordination platforms to be strengthened
- Several ongoing projects and activities (UNEP and non-UNEP) that the Caribbean could benefit from – importance of synergies among initiatives and sub-regions
- UNEP is enhancing relationships with Development Banks, other MEAs to support Caribbean countries

# Thank you



---

Presented by Vincent Sweeney, Head, Caribbean Sub-Regional Office

Supported by Christopher Corbin, Cartagena Convention Secretariat  
&  
Jordi Pon, Latin America and the Caribbean Office

---

United Nations Environment Programme (UNEP)

[www.unep.org](http://www.unep.org)



Commencement Workshop  
for

the "Technical Project on Advisor for Marine Plastic Litter Management in  
the Caribbean Region

- **Introduction of Extended Producer Responsibility  
(EPR) System** -

17 March, 2022  
JICA Advisory Team



## 1. Background & Objective



- Because of the rapid increase of waste, involving producer of products is required to cover the life cycle of the product.
- Because the resource (especially finance) of the public sector is limited, involvement of producers and consumers (waste generators) are critical to control waste management issues.
- Especially, for promotion of recycling by introducing new system, EPR can provide effective method.

2

## 1. Background & Objective



Objective:  
Let's discuss the possibility  
and potential of EPR system

Involving  
Stakeholders!

3

## 2. What is EPR?



### 【Definition by OECD】

- The OECD defined EPR as an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle. In practice, EPR involves producers taking responsibility for collecting end-of-life products, and for sorting them before their final treatment, ideally, recycling. EPR schemes can allow producers to exercise their responsibility either by providing the financial resources required and/or by taking over the operational and organizational aspects of the process from municipalities. They can do so individually or collectively.

(source) OECD, EPR Updated Guidance for Efficient Waste Management, 2016

4

## 3. Typical Responsibility in EPR



- Financial responsibility
  - ✓ EPR to pay all or some management fees of end-of-life products (collection/treatment/recycling, etc.)
- Physical responsibility
  - ✓ Direct or indirect responsibility regarding physical management (of collection/treatment/recycling, etc.) for end-of-life products (after the post-use stage)
- Informative responsibility
  - ✓ By fulfilling a producer's obligation to provide information about environmental performance, etc. of products produced by itself, implying various possibilities to expand its responsibility

5

- Please introduce EPR case which you know including voluntary case.
  - ✓ Who pay all or some costs of to manage end-of-life products? (collection/treatment/recycling, etc.)
  - ✓ How and who collects the end-of-life products?
  - ✓ How is the refund system in Antigua & Barbuda?

## 4. Policy Instruments of EPR

No	Instrument	Description
1	Product take-back requirements	Assigning responsibility, for example to producers or retailers, for the end-of-life management of products. This type of requirement is often achieved by establishing recycling and collection targets for a product or material.
2	Deposit-refund	An initial payment (deposit) is made at purchase and is fully or partially refunded when the product is returned to a specified location.
3	Advanced Disposal Fees (ADF)	Fees levied on certain products at purchase based on the estimated costs of collection and treatment. The fees may be collected by public or private entities and used to finance post-consumer treatment of the designated products. Unused fees may be returned to consumers.

#### 4. Policy Instruments of EPR (2)



No	Instrument	Description
4	Material taxes	Involve taxing virgin materials (or materials that are difficult to recycle, contain toxic properties, etc.) so as to create incentives to use secondary (recycled) or less toxic materials. Ideally, the tax should be set at a level where the marginal costs of the tax equal the marginal treatment costs. The tax should be earmarked and used for the collection, sorting, and treatment of post-consumer products.
5	Upstream combination tax/subsidy	A tax paid by producers subsequently used to subsidise waste treatment. It provides producers with incentives to alter their material inputs and product design and provides a financing mechanism to support recycling and treatment.

8

#### 4. Policy Instruments of EPR (3)



No	Instrument	Description
6	Regulations and performance standards	Including minimum recycled content can encourage the take back of end-of-life products. When used in combination with a tax, such standards can strengthen incentives for the redesign of products. Standards can be mandatory or applied by industries themselves through voluntary programmes.
7	Information-based instruments	Aiming to indirectly support EPR programmes by raising public awareness. Measures can include reporting requirements, labelling of products and components, communicating to consumers about producer responsibility and waste separation, and informing recyclers about the materials used in products.

9



#### 4. Policy Instruments of EPR - Issues



No	Instrument	Description
A	Where producer's responsibility applied?	<ul style="list-style-type: none"> <li>- End of life product</li> <li>- Physical and economic aspects of recycling activities</li> <li>- Support government program</li> </ul>
B	Who is the producer?	<ul style="list-style-type: none"> <li>- Brand owner (ex. liquid in the bottle)</li> <li>- Container producer</li> </ul>
C	How to share the responsibility?	(By activity and cost) <ul style="list-style-type: none"> <li>- Producer</li> <li>- Retailer</li> <li>- Consumer</li> <li>- Government</li> </ul>

10

#### 4. Policy Instruments of EPR - Issues



No	Instrument	Description
D	Organizing the producers	- Establishing Producer Responsibility Organizations
E	Voluntary or Compulsory?	- Producers prefer voluntary approach (ex. CSR activities).
F	Free riders	- Stop someone not to bear responsibility
G	Evaluation	- What is the cost benefit?

11

## 5. Case of Deposit-Refund System



- Advantage
- ✓ Effective monitoring because users have incentive to return
- ✓ Increase of recovery rate
- ✓ Increase of reuse and recycle, leading to resource efficiency
- ✓ Decrease of volume of waste and disposal
- ✓ Others (depends on the system)
  - Employment opportunity
  - Less financial resource by the deposit
  - Potential revenue by no refund

12

## 5. Case of Deposit-Refund System



- Issues
- ✓ Burden for retailers
- ✓ Workable system for deposit & refund (both material side and financial side)
- ✓ Use of fund from non-returned materials
- ✓ Establishing recycling system and Fluctuation of market on recycled material
- ✓ Control of boundary

13

## 5. Case of Deposit-Refund System (Germany)



### ➤ How deposit and refund

PANE RUSTICO	EUR	1,19	B
ZWIEBEL LAUCH	EUR	0,59	B
PORREE	EUR	0,79	B
WARSTEINER PILS	EUR	0,79	A
PFAND	EUR	0,25	A *
JA! MIWA CL	EUR	0,19	A *
PFAND	EUR	0,25	A *
SUMME	EUR	5,05	
Geg. BAR	EUR	5,05	
Rückgeld BAR	EUR	1,00	
Steuer %	Netto	Steuer	Brutto
A= 19,0%	1,24	0,24	1,48
B= 7,0%	2,40	0,17	2,57
Gesamtbetrag	3,64	0,41	4,05
11.01.2018	17:34	Bon-Nr.: 8329	
Markt: 0100	Kasse: 2	Bed.: 232323	

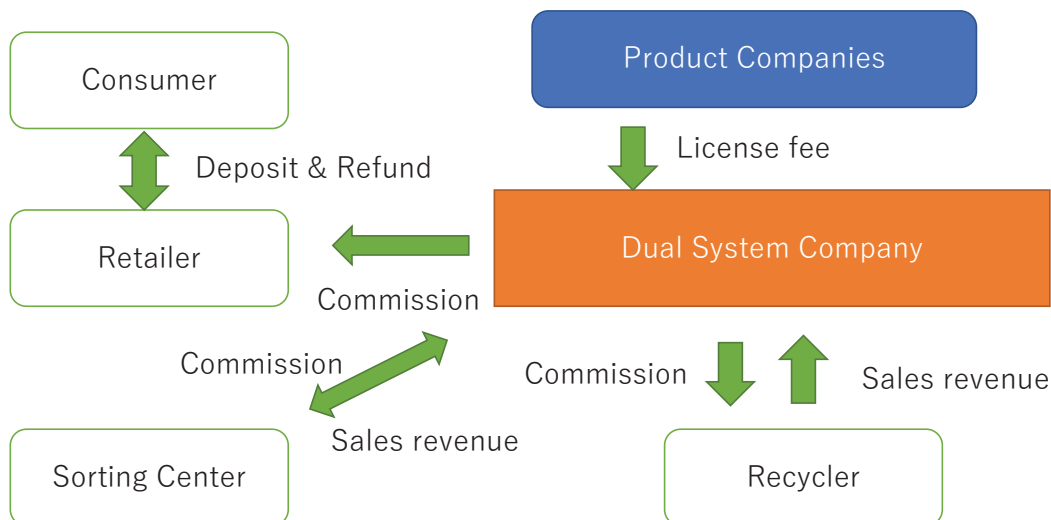


14

## 5. Case of Deposit-Refund System (Germany)



### ➤ Financial flow



15

## 6. Example of EPR in Japan



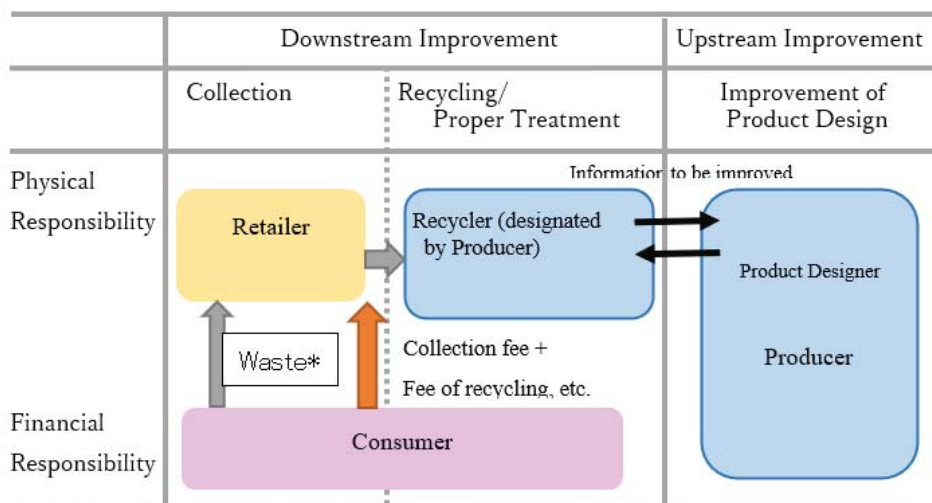
- There are EPR base recycling laws in Japan.
  - ✓ Material-Cycle Society Law (Umbrella Law)
  - ✓ Waste Containers and Packaging
  - ✓ Home Appliances Waste
  - ✓ Electronics Waste
  - ✓ Food Waste (from industry, retailer and restaurants)
  - ✓ Construction & Demolition Waste
  - ✓ End-of-Life Vehicles

16

## 6. Example of EPR in Japan



### 【 The Home Appliance Recycling Law 】



\* waste TV, air conditioner, refrigerator and washer & dryer

17



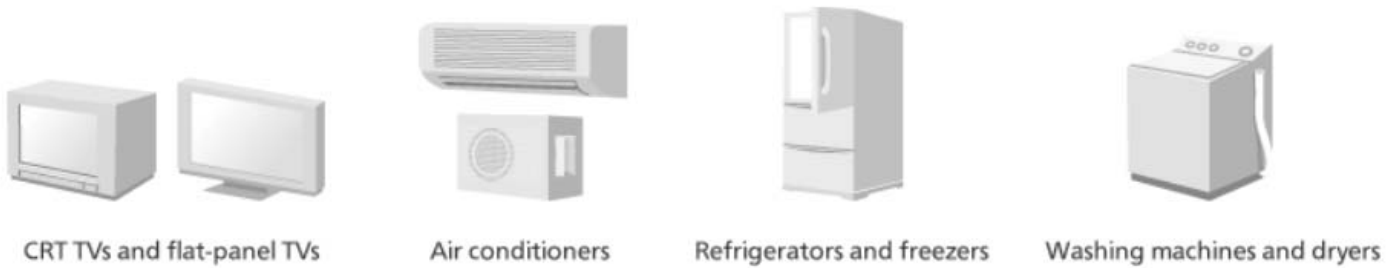
## 6. Example of EPR in Japan



### 【 Products covered by The Home Appliance Recycling Law 】

#### Four Home Appliance Types Under the Home Appliance Recycling Law

These four types cover about 80% of all home appliances in terms of weight



Source: Panasonic

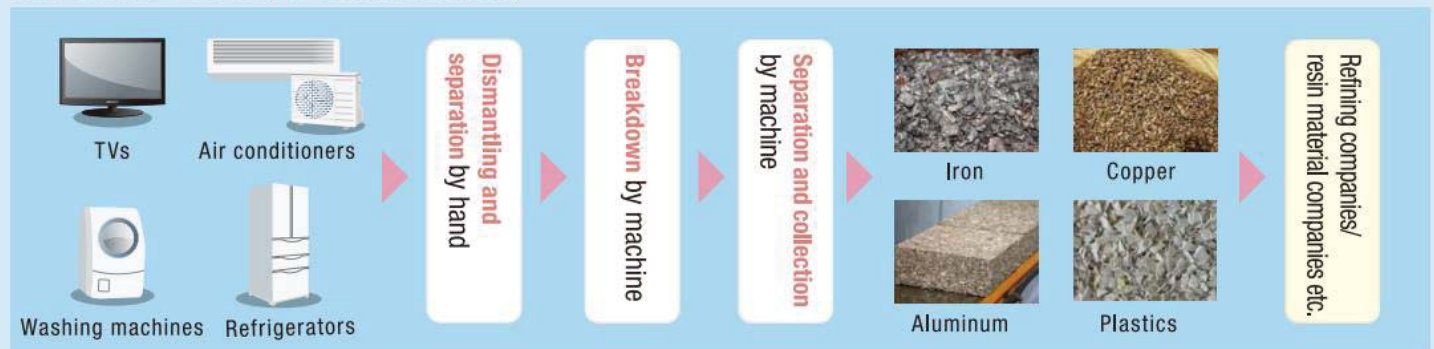
18

## 6. Example of EPR in Japan



### 【 Recycling process of collected Home Appliance 】

Products with different manufacturers, models and composition are first dismantled by human hand. Hazardous substances such as CFC gases and mercury are also disposed of appropriately. Then, following breakdown by machine and automatic separation, the products return to society as recycled resources.



Source: Panasonic

19

## 6. Example of EPR in Japan

【 Recycling Ticket by the Home Appliance Recycling Law 】  
Waste discharger pay for collection fee and recycling ticket.

Track number

0000-00000000-0

Name of discharger  
家電太郎  
(電話番号 012-345-6789)

Name of retailer  
小売業者  
(電話番号)

Type of product  
エアコン  
テレビ  
ブラウン管式  
液晶・プラズマ式  
冷蔵庫・冷凍庫  
洗濯機・衣類乾燥機

Name of manufacturer  
パナソニック (100)  
日立グローバル (300)  
シャープ (310)  
三菱電機 (320)  
ソニー (340)  
富士通ゼネラル (350)  
ダイキン工業 (120)  
三井物産 (130)  
パナソニック (三洋電機) (101)  
三菱重工冷熱 (370)

Name of collector  
引取日 西暦 年 月 日 時 分 秒

Paid amount  
商品回収料  
収集・運搬料  
消費税  
合計

見本

①小売業者控兼受領書

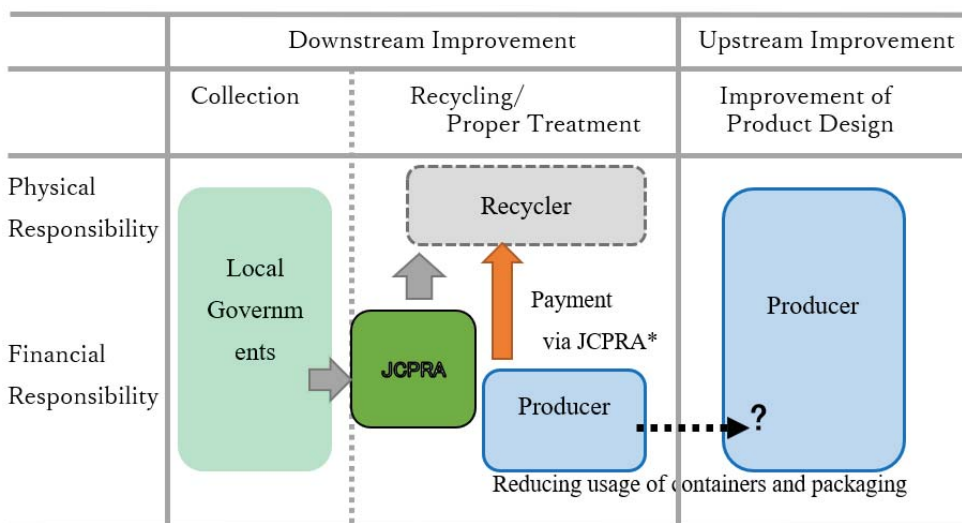
②料金区分  
●ブラウン管式テレビ  
小：15型以下、大：16型以上  
●液晶・プラズマ式テレビ  
小：15V型以下、大：16V型以上  
●冷蔵庫・冷凍庫  
小：全定格内容積170L以下  
大：全定格内容積171L以上

一財団法人家電製品協会 家電リサイクル券センター ©一財団法人 家電製品協会 2019

20

## 6. Example of EPR in Japan

【 The Containers and Packaging Recycling Law 】



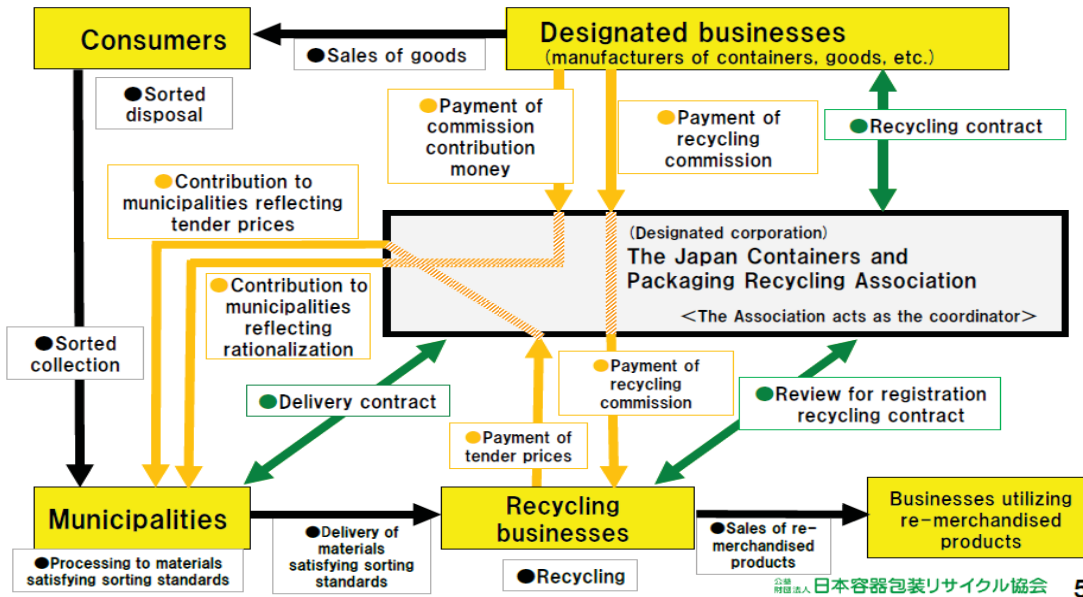
\* Japan Containers and Packaging Recycling Association (JCPRA) designated by the Law Containers and Packaging covers PET bottle, plastic containers, glass bottle and paper containers.

## 6. Example of EPR in Japan



### 【 Business Scheme by The Containers and Packaging Recycling Law 】

#### Recycling Business Scheme



Source:  
JPRCA

## 6. Example of EPR in Japan



### 【 Issues on Recycling Law 】

- Disseminating information for understanding by stakeholders
- Pressurizing producers/retailers by responsibility sharing
- Grasping and inspecting individual producer and product (though retailer association/group and producer association) for charging
- Control of illegal dumping

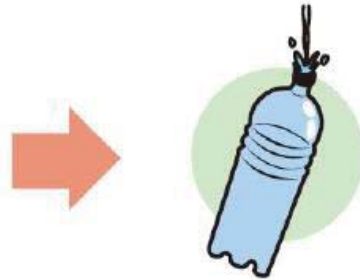
## 6. Example of EPR in Japan



### 【 Request to Citizens for Collection of Containers 】



Separate:  
Bottle bodies  
Caps  
Labels



Lightly rinse the inside



Crush before disposal

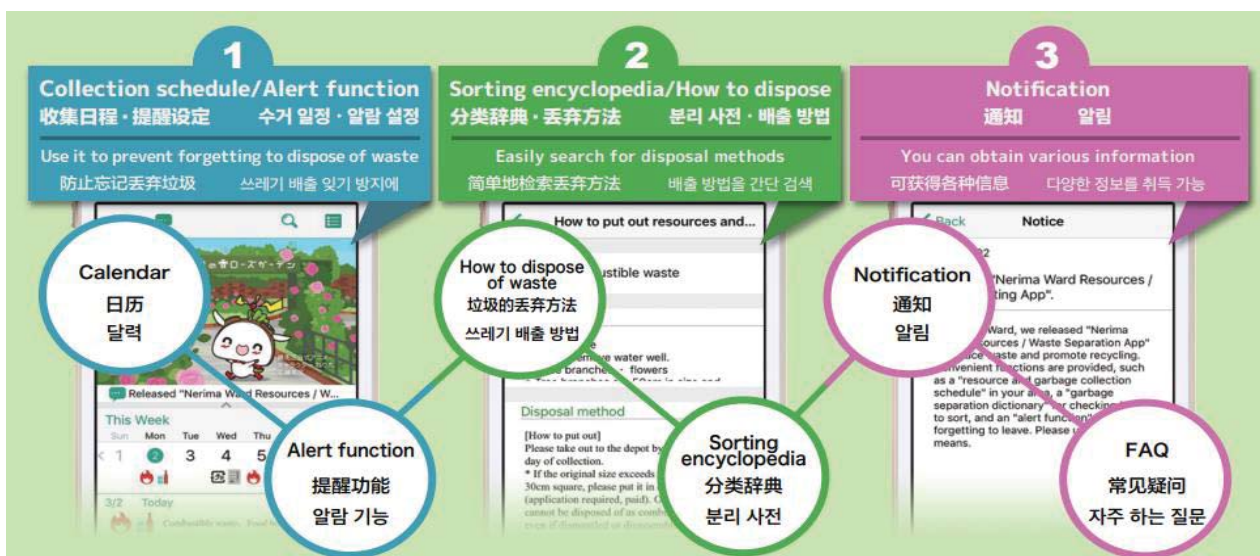
⇒ **Collection of high-quality plastic (PET) bottles** 5

Source: Kawasaki City, Japan

## 6. Example of EPR in Japan



### 【 Example of Mobile App for Segregation and Collection 】



Source: Nerima-ward, Tokyo, Japan



## 6. Example of EPR in Japan



### 【 Example of Resource Collection by Community 】

- A system in which organizations such as residents' associations, neighborhood associations, and the PTA contract with collection companies to have paper and other resources collected to promote reuse and recycling
- The target items are those that the city government does not collect: newspapers, magazines, cardboard, milk cartons, refillable bottles, used clothes and other textiles

Around 1985, when garbage increased rapidly, a government-supported method of collecting resources called "community group collection" spread to municipalities nationwide, and in 1990, Kawasaki also started "community group collection of resources" by making use of the conventional waste collection system.



Source: Kawasaki City, Japan

## 6. Example of EPR in Japan



### 【 Example of Improving the separation rate: garbage school program 】



Lecture



See-through vehicle showing the inside of a garbage truck

Source: Kawasaki City, Japan

## 7. Example of Island Country (Palau)



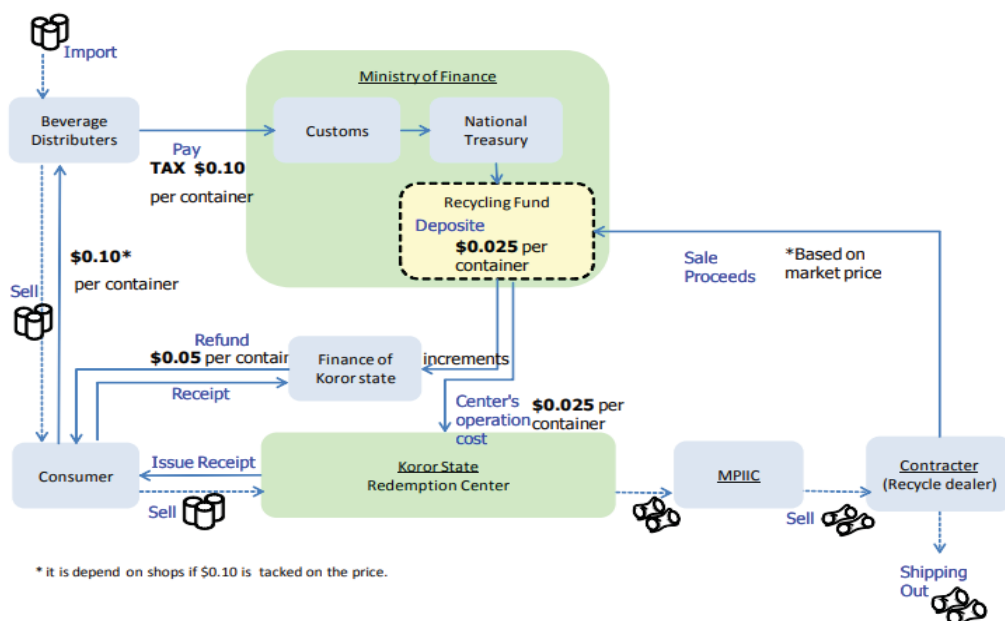
### 【 Beverage Container Recycling Program 】

- Law
  - ✓ The Republic of Palau Public Law (RPPL No. 7-24)
  - ✓ Beverage Container Recycling Regulations
- Agencies involved
  - ✓ Ministry of Public Infrastructure, Industries and Commerce
    - Implementation of the recycling program
    - Approve and monitor redemption center(s)
    - Export or find ways to export redeemed containers
  - ✓ Ministry of Finance
    - Management and maintenance of fund
    - Monitoring of Fund
    - Collection of deposit fee by the Customs Office under MOF
  - ✓ Koror State Government
    - Operation of the Redemption Center

## 7. Example of Island Country (Palau)



### 【 Beverage Container Recycling Program 】



Source:  
SPREP

- What is the advantage and disadvantage of individual instrument?  
For example, the advantage and disadvantage of Deposit-Refund
  - ✓ Advantage
  - ✓ Disadvantage

## 8. Consideration on EPR in Your Countries

- Where recycling industry is limited
  - Material flow
    - ✓ Need to find the recycler outside the country and clarify the requirement of the buyer
    - ✓ Check the present flow from informal recycling
  - Financial flow
    - ✓ Identify who is the stakeholder such as importer
    - ✓ Preventing free-rider, especially when charging
  - Decision-making
    - ✓ Understand it is the political agenda, considering legislative needs and avoiding strong objection from stakeholders
    - ✓ Involving stakeholders such as politician, ex. through providing info to mass media

*Thank you for your attention!*

Questions or comments to Taisuke Watanabe:  
[t-watanabe@exri.co.jp](mailto:t-watanabe@exri.co.jp)



## ANNEX H

Information and Knowledge Sharing Workshop in Jamaica  
(31 Aug. - 2 Sep. 2022)

## Information and Knowledge Sharing Workshop in Jamaica (31 Aug. - 2 Sep. 2022)

### 1. Summary

- A workshop was held in Jamaica for three days from August 31st to September 2nd. The first two days were lectures, and the final day was a site visit to see Kingston's marine plastic situation and a recycling facility. In addition to the five target countries, UNEP and 2 private organization and one academic institution in Jamaica that are implementing activities related to marine plastic pollution also participated. At the beginning of the workshop, speeches were made by the JICA Representative, the Ambassador of Japan, and the Minister of Economic Growth and Job Creation of Jamaica, followed by presentations and lively discussions.
- Regarding the questions raised during the workshop, there were general questions about waste management, such as the shape of the garbage disposal site and the frequency of soil covering at the landfill site. Regarding the plastic waste, single-use plastic regulation, alternatives to single-use plastics, grace period for the existing stocks, and expansion of target items were asked. In addition, the collection method and pelletization of the PET flakes are asked in regard to the PET bottle collection pilot project currently in place.
- As a result of the workshop, a common understanding was shared by all of the participants that regional cooperation across countries is essential to solve the issues with waste management, especially the issues with marine plastic litter since these targeted nations have small populations and small scale of industry.
- Based on the above common understanding, as a next step, a new program will be considered to include a session to discuss what kind of cooperation is possible to improve waste management in the Caribbean region at the next workshop with target countries.

### 2. Workshop participants

#### Participants

Antigua and Barbuda	Mr. F. Daryl Spencer, General Manager, National Solid Waste Management Authority
Grenada	Ms. Myrna Julien, Communications Manager Grenada Solid Waste Management Authority
Guyana _	Mr. Satrohan Nauth, Director of Sanitation Ministry of Local Government & Regional Development
Saint Lucia	Mr. Laurianus Lesfloris, Acting General Manager, Saint Lucia Solid Waste Management Authority
Jamaica	Mr. Richard Nelson – Senior Manager, Environmental Management Ms. Bethune Morgan – Manager, Pollution Prevention Branch Ms. Shannon Douse – Environmental Engineer Mr. Anthony McKenzie – Director, Environmental Management and Conservation National Environment and Planning Agency (NEPA) Mr. Edson Carr , Planning Manager Ms. Jadisha Phipps, Planning Officer National Solid Waste Management Authority (NSWMA)
JICA Jamaica Office	Mr. Mitsuyoshi Kawasaki, Resident Representative Mr. Hiroyuki Okazaki, Project Formulation Advisor Ms. Sauna Maragh , Program Officer
JICA Advisory Team	Mr. Ikuo Mori, Leader Mr. Makoto Yamashita, Sub-leader

	Mr. Satoshi Higashinakagawa, in charge of collection, transport and recycling Mr. Yukihiisa Sakata , in charge of final disposal operation and maintenance Mr. Taisuke Watanabe, in charge of organization and institution analysis Ms. Suzette Grizzle, local assistant
international organizations	Ms. Sarah Wollring , Associate Program Management Officer, Cartagena Convention Secretariat, Ecosystems Division, United Nations Environment Program (UNEP) Ms. Tamoy Singh, Program Management Assistant, UNEP Cartagena Convention Secretariat Ms. Kristeena Monteith, UNV Communications and Advocacy Officer, UNEP Cartagena Convention Secretariat
Private entities	Ms. Jade-Ashley Carberry, PR Community Outreach Officer Mr. Michael McCarthy, Director, Clean Harbors Jamaica Grace Kennedy Foundation (GKF) Mr. Romario Anderson Mr. Darren Fletcher Mona Geoinformatics Institute ( MGI) Ms. Aleatia Willis , Operations Manager Recycling Partners of Jamaica (RPJ)

#### Guests

Jamaica	Senator, The Honorable Matthew Samuda, Minister without Portfolio, Ministry of Economic Growth and Job Creation Mr. Peter Knight , CD, JP, Chief Executive Officer and Government Town Planner, NEPA Ms. Gillian Guthrie , Technical Director, Planning & Environment Management Division, Ministry of Economic Growth and Job Creation
Japan	Mr. Masaya Fujiwara, Ambassador Extraordinary and Plenipotentiary of Japan in Jamaica

### 3. workshop program

date	Time	Activity	Remarks
8/31 Wed	9:00	Opening remarks by Mr. Mitsuyoshi Kawasaki, Resident Representative, JICA Jamaica Office	Venue: Poolside Conference Room, Hotel Four Seasons
		Short speech by Mr. Masaya Fujiwara, Ambassador Extraordinary and Plenipotentiary of Japan in Jamaica	
	9:15	Short speech by Senator, The Honorable Matthew Samuda, Minister without Portfolio, Ministry of Economic Growth and Job Creation (MEGJC)	
	9:30	coffee break	
	9:50	Presentation from National Environment and Planning Agency (NEPA) Jamaica : Status of Single Use Plastic- Jamaica's Initial Response by Mr. Anthony McKenzie, Director, Environmental Management and Conservation, NEPA	
	10:25	Presentation from National Solid Waste Management Authority (NSWMA) Jamaica : An overview of the organization and its activities involving Solid Waste Management in Jamaica by Mr. Edson Carr , Planning Manager , NSWMA	
	11:00	Presentation by Mona GeoInformatics Institute (MGI) : The Impact of Plastic Pollution affecting the Kingston Harbor & Hellshire Bays	

date	Time	Activity	Remarks
	11:30	Presentation on Foundation's project activities by GraceKennedy Foundation (GKF)	
	12:00	Lunch	
	13:30	Presentations of the pilot projects 1. Integrated Marine Plastic Litter Prevention Pilot Project in Jamaica by Mr. Taisuke Watanabe, JAT	
	14:30	coffee break	
	14:50	2. Pilot project for remediation of the Deglos Sanitary Landfill in Saint Lucia by Mr. Yukihiisa Sakata, JAT	
	15:50	Closure	
9/1 _ Thu _	9:30 _	Explanation of Work Plan and Record ver.2 of the Project by Mr. Ikuo Mori, JAT	Venue: Poolside Conference Room, Hotel Four Seasons
	10:00	3. Project to promote waste minimization in Saint Lucia by Mr. Satoshi Higashinakagawa, JAT	
	10:50	coffee break	
	11:00	Presentations on the current efforts to tackle plastic waste in the Solid Waste Management in the region 1. Grenada: Ms. Myrna Julien Communications Manager Grenada Solid Waste Management Authority	
	11:40	Presentation on the current projects related to the Marine Plastic Litter by U NEP	
	12:10	Lunch	
	13:40	Continuation of the presentation 2. Antigua and Barbuda: Mr. F. Daryl Spencer General Manager National Solid Waste Management Authority	
	14:20	coffee break	
	14:30	Continuation of the presentation 3. Guyana: Mr. Satrohan Nauth Director of Sanitation Ministry of Local Government & Regional Development	
	15:10	Continuation of the presentation 4. Saint Lucia Mr. Laurianus Lesfloris, Acting General Manager, Saint Lucia Solid Waste Management Authority (SLSWMA)	
	15:50	Closure of the Workshop (Explanation of the site visit on Friday)	
9/2 _ Fri _	10:00 a ll day	Site visit (Observing plastic wastes dumped into the gulley of the Kingston Metropolitan Area, marine plastic waste in the Kingston Harbour, PET bottle baling facility, etc.)	



# Plastic Pollution: Jamaica's Initial Response

Presentation  
**JICA Information and knowledge Sharing Workshop**  
*Hotel Four Seasons, Kingston Jamaica*  
*31 August – 2 September 2022*

Anthony McKenzie  
NEPA

## Overview of Presentation

- Plastic Policy Framework
- The Ban on Single Use Plastics
- Plastic Action and next steps

# Policy and Legislative Framework

Jamaica is Party to a number of multilateral environmental agreements that address the environmentally sound management of waste, inclusive of plastic waste:

- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their disposal
- The Cartagena Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region, and more specifically its Protocol on Land-based Sources of Pollution to the Marine Environment (RAPMaLi)
- The United Nations Convention on the Law of the Sea
- The International Convention for the Prevention of Pollution from Ships (MARPOL)

*Managing and protecting Jamaica's land, wood, air and water*



# Policy and Legislative Framework

- National Policy - Environmental Management Systems (EMA), *In Pursuit of a Green Economy - March 2019*
- Integrated Waste Management Strategy & Action Plan
- Regulatory Impact Assessment on Plastics including Polystyrene
- The National Green Economy Investment Strategy and Action Plan

*Managing and protecting Jamaica's land, wood, air and water*



# Policy and Legislative Framework

Jamaica introduced legislation to ban the importation, distribution, manufacture and commercial use of certain types of single use plastics beginning 1 January 2019:

- The Trade (Plastic Packaging Materials Prohibition) Order, 2018.
- The Natural Resources Conservation Authority (Plastic Packaging Materials Prohibition) Order, 2018

*Managing and protecting Jamaica's land, wood, air and water*



## Plastic Pollution Problem



Top 10 Items collected in Jamaica 2019 - International Coastal Cleanup Day (Source: JET 2019)

*Managing and protecting Jamaica's land, wood, air and water*



# Plastic Pollution Problem



Relative abundance of debris with/without biotic interaction collected by zones at Half Moon Bay - Hellshire - Marine Debris Assessment: Jamaica 2017

*Managing and protecting Jamaica's land, wood , air and water*

## GoJ Policy Position On Plastics – Overview of the Process

- Senator Samuda's Motion in the Senate
- Cabinet deliberation and Decision
- Establishment of Multi-Stakeholder Task Force
- Consideration of the Task Force recommendations
- Communication of GoJ policy position
- NEPA tasked with oversight of implementation
- Planning and implementation - Technical Working Group
  - Legislation
  - Public awareness

*Managing and protecting Jamaica's land, wood , air and water*



# Ban on Single Use Plastic

**Single-Use Plastic Bags**

**Banned**



**Exempt**




Image credit: [https://www.bagsforchange.org.uk/](#)

As of January 1, 2019 single-use plastic shopping bags ('scandal bags'/'T-Shirt') at and below 24" x 24" will be banned.

Limited exemption allowed until January 2021 for branded single-use shopping bags made of Polyethylene on a case-by-case basis on application to NEPA.

For additional information please contact, email: [policyonplasticban@nepa.gov.in](mailto:policyonplasticban@nepa.gov.in) or hotline 878-285-8531

# Ban on Single Use Plastic

**Polystyrene Foam (Styrofoam)**

**No Importation as of January 1, 2019**



➤ **No importation of Styrofoam food and beverage containers as of January 1, 2019**

➤ **Locally manufactured food and beverage containers will be banned as of January 1, 2020**

Image Credit: [www.livethenow.com](http://www.livethenow.com)

# Ban on Single Use Plastic

**Single-Use Plastic Straws**  
**Banned as of January 1, 2019**



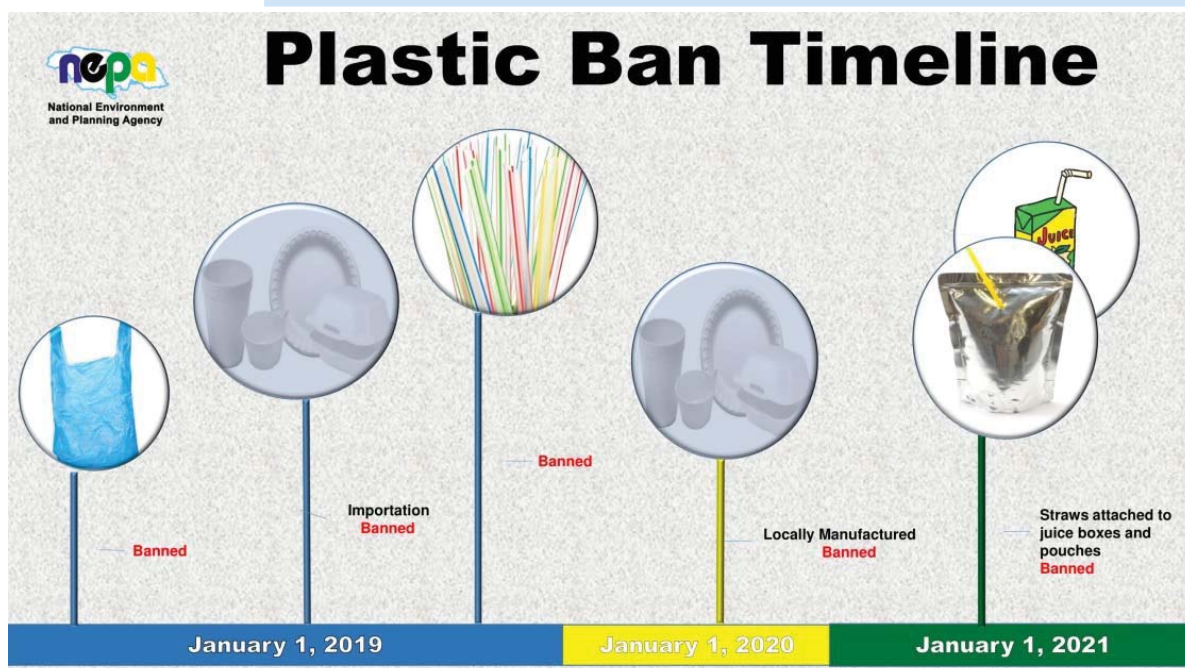
Single use-plastic straws will be banned.

> **Exemptions** will be considered for the medical sector as well as persons with disabilities. Applications for exemptions should be sent to NEPA

> **Not banned** - wax-lined or other non-plastic straws.

Image credit: <https://fr.pinterest.com>  
Image credit: <https://www.amazon.com>

# Ban on Single Use Plastic

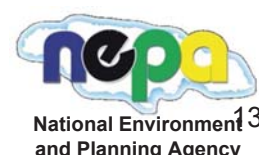




# Impact of the Plastic Ban

- The ban has generally been accepted by manufacturers, retailers and consumers.
- Acknowledgement of the positive environmental impacts from the ban of these single use plastics products
- Ban on polystyrene foam food containers has led to an increase in the use of polypropylene food containers on the market primarily for use for take-away meals

*Managing and protecting Jamaica's land, wood , air and water*



# Impact of the Plastic Ban

- Most shoppers now carry their own reusable bags to the supermarkets and stores,
- International Coastal Cleanup Day (ICCD) - 2019
  - plastic bags collected in 2019 increased by 8.2% when compared to 2018,
  - plastic straws collected in 2019 decrease by 33.4% when compared to 2018 and
  - styrofoam collected in 2019 decreased by 1.6% when compared to 2018.

*Managing and protecting Jamaica's land, wood , air and water*



# NEPA Supported Initiatives related to Plastic Waste Management



# NEPA Supported Initiatives related to Plastic Waste Management



- Ministry of Economic Growth and Job Creation
- Office of the Prime Minister
- Ministry of Finance and the Public Service
- Passport Immigration and Citizenship Agency
- Development Bank of Jamaica





# Opportunities: Value of Recycling

Type of waste	YEAR					
	2020			2021		
	Quantity exported (KG)	Revenue		Quantity exported (KG)	Revenue	
		USD	JMD		USD	JMD
Paper	4,698,470	306,850	43,626,858	4,266,830	424,974	64,678,855
Assorted Scrap Metal	21,032,955	3,992,255	568,515,395	30,638,948	5,686,618	857,877,172
Aluminium waste and Scrap	1,115,900	790,576	112,303,940	1,206,960	770,480	115,833,881
Plastic waste	1,589,523	470,742	66,587,427	2,696,612	751,892	114,513,712

Revenue generation from recycling of plastic, paper and metals 2020-2022, (Jamaica STATIN 2021)

*Managing and protecting Jamaica's land, wood, air and water*



# Opportunities: Value of Recycling

Type of Waste	Export Countries
Plastic waste	Brazil, Canada, Spain, Honduras, Indonesia, India, Korea, Republic of South Korea, Malaysia, Netherlands, Singapore, Turkey, United States of America, Vietnam
Ferrous Waste and Scrap	United Arab Emirates, Canada, Spain, Korea, Republic of South Korea, Panama, Thailand, Taiwan, United States of America, Vietnam
Aluminium waste and Scrap	United Arab Emirates, Panama, Thailand, Taiwan, United States of America
Paper	Canada, Chile, Colombia, Ecuador, Spain, Guatemala, India, Italy, Korea, Republic of South Korea, Mexico, Singapore, El Salvador, Thailand, Turkey, Taiwan, Vietnam

Markets for Jamaica's plastics, metals and paper recyclables (Jamaica STATIN 2021)

*Managing and protecting Jamaica's land, wood, air and water*



# Basel Convention Plastic Waste Amendments – Decision Bc-14/12

- Plastic Waste Amendments to the Basel Convention were adopted at the 14th meeting of the Conference of the Parties (COP) in May 2019, coming into effect on January 1, 2021.
- Amendments were done to Annexes II, VIII and IX to the Basel Convention.
- The entries specify the criteria for plastic wastes that require the 'prior informed consent' (aka PIC procedure) of the import and transit states for transboundary movement.



*Managing and protecting Jamaica's land, wood & water*

**NEPA**  
National Environment &  
Planning Agency

# Basel Convention Plastic Waste Amendments – Decision Bc-14/12

Two (2) sensitization sessions were conducted during 2021-2022 with stakeholders that are critical to the implementation of the Plastic Waste Amendments to the Basel Convention.

Private Sector stakeholders in the plastic waste export market included:

- Recycling Partners of Jamaica
- Jamaica Recycles aka International Recycling & Reclamation Ltd
- Gravita

Public sector stakeholders included:

- MEGJC
- Jamaica Customs Agency (JCA)
- National Solid Waste Management Authority (NSWMA)



*Managing and protecting Jamaica's land, wood & water*

**NEPA**  
National Environment &  
Planning Agency

# Basel Convention Plastic Waste Amendments – Decision Bc-14/12

## Drafting instructions and proposed legislative amendments to Transboundary Regulations

- Review of the Natural Resources (Hazardous Wastes) (Control of Transboundary Movement) Regulations were conducted and Drafting Instructions prepared to facilitate the Plastic Waste Amendment to the Basel Convention.

## Provisional Measures To Guide Plastic Waste Exporters Pending Regulatory Amendment Of The Transboundary Regulations

- In anticipation of the local promulgation of the regulatory requirements for the export of specific plastic wastes in accordance with the ‘prior informed consent’ (PIC) procedures of the Basel Convention, provisional measures to guide plastic waste exporters were prepared

*Managing and protecting Jamaica's land, wood & water*



## Enforcement of the Plastic Ban

- Forty-two businesses/individuals have been prosecuted for breaches under the Natural Resources Conservation Authority (Plastic Packaging Materials Prohibition) Order, 2018, Twenty-seven businesses/individuals have been convicted and fined. Ten matters are currently before the courts for a decision.
- The number of breaches by parish are:
  - St James: 16
  - Kingston and St Andrew: 9
  - Trelawny: 7
  - Manchester: 4
  - St Elizabeth: 3
  - Portland: 2
  - St Thomas: 1
- The penalty for breaches of the ban under the Trade (Plastic Packaging Materials Prohibition) Order, 2018 is \$2 million, while breaches under the Natural Resources Conservation Authority (Plastic Packaging Materials Prohibition) Order, 2018 attract a fine of \$50,000.

*Managing and protecting Jamaica's land, wood & water*



## *Preserve our Land....Support the Plastic Ban*



**R**ethink

**R**efuse

**R**educe

*Managing and protecting Jamaica's land, wood, air and water*



## Single Use Plastics – Next Phase

- UN Environment Assembly (UNEA 5.2) - Intergovernmental Negotiating Committee (INC) :legally binding agreement by 2024
- National Policy on Single Use Plastics
- Strengthened surveillance and enforcement – NEPA, National Compliance and Regulatory Authority, Jamaica Customs Agency
- Further phase – out of other categories of single use plastic.

*Managing and protecting Jamaica's land, wood & water*



# Many Thanks for Your Attention

---

Questions?





# MANAGING JAMAICA'S SOLID WASTE

---



## OVERVIEW OF PRESENTATION

---

- NSWMA
  - What is Separation at Source
  - Overview of Pilot Projects
  - Lesson Learnt

# NATIONAL SOLID WASTE MANAGEMENT AUTHORITY

---

- Effect April 1, 2002
- Creation of the National Solid Waste Management Authority
- Primary Focus – Solid Waste Management at the National Level via its Regions
- Subsumed all previous Parks and Markets Companies

# NATIONAL SOLID WASTE MANAGEMENT AUTHORITY

---

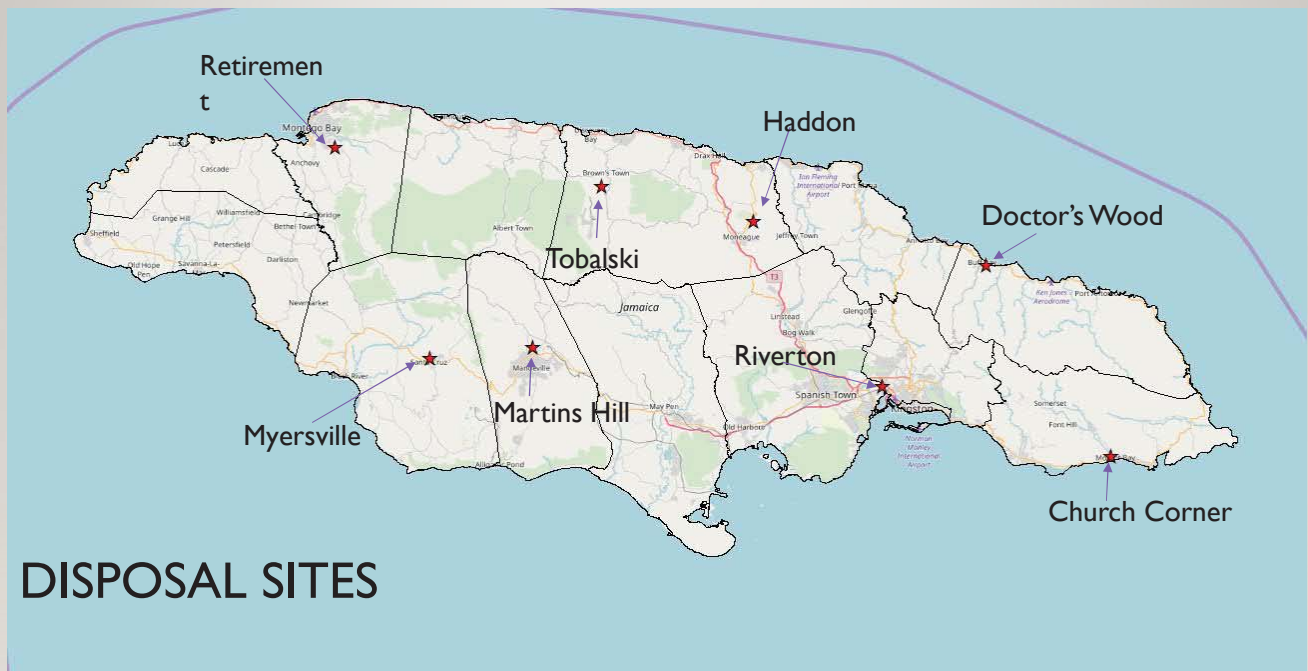
- Functions of the Authority

## Regulatory

Grant, Refusal, Renewal, Modification. Suspension  
and Revocation of Licences

## Operational

Public Cleansing: Street Sweeping, Collection,  
Transportation and Final Disposal of Municipal  
Waste, Operation of Disposal Sites



## National Solid Waste Management Authority



- Riverton City Disposal Facility
- Kingston, St. Andrew & St. Catherine
- Population of 1,183,295

# Separation at Source

---

- What is the current collection regime
- What is Separation at Source
- Benefits of Separation at Source



# Pilot Projects

---

- Integrated Community Development Project (ICDP)
- Rae Town Recycling Pilot Project
- Northern Belt Plastic Recycling Initiative



# ICDP

---

- Construction of approx. 120 concrete enclosures for waste storage
- Construction of 29 composting units for conversion of biodegradable waste into organic fertilizer
- Construction of approx. 120 concrete enclosures for waste storage
- Construction of 29 stations for storage and recycling of plastic bottles

# ICDP

---

- Skip Enclosures



- Recycling Enclosures



- Composting Enclosures

# ICDP

---

- Greenwich Town
- Majesty Gardens
- Tivoli,
- Maxfield Park,
- Passmore Town,
- Jones Town/Craig Town,
- Federal Gardens,
- Whitfield Town
- Central Village
- Shelter Rock
- Lauriston
- March Pen
- Tawes Meadows
- Flankers

## Rae Town Recycling Pilot Project

---

- Reduction of Marine litter along the Rae Town Fishing Village Coastline
- Reduction of the volume of garbage within the gully.
- Creation of a culture of separation at source.

## RAE TOWN'S PROJECT SCOPE

---

- Clean-up



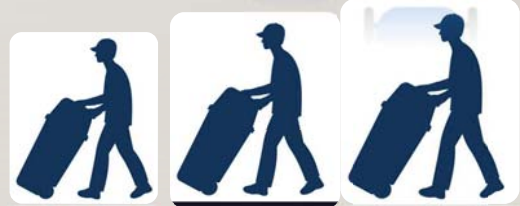
- Garbage Collection



- Separation at Source



- Environmental Wardens



## PET BOTTLES COLLECTED

---

- Between July 2020 and April 2021

**33,580 lb**

# NORTHERN BELT

---

- Hope Pastures
- Barbican
- Liguanea
- Mona Heights
- Havendale
- Cherry Gardens
- Millsborough
- Lower Shortwood
- Beverly Hills
- Belgrade
- Smokey Vale
- Jack's Hill
- Long Mountain
- Norbrook
- Waterworks
- Dillsbury

## NORTHERN BELT'S PROJECT SCOPE

---

- Sensitization



- Separation at Source





## PET BOTTLES COLLECTED

---

- Since January 27, 2020 over  
**200,000 lb**

## LESSONS LEARNT

---

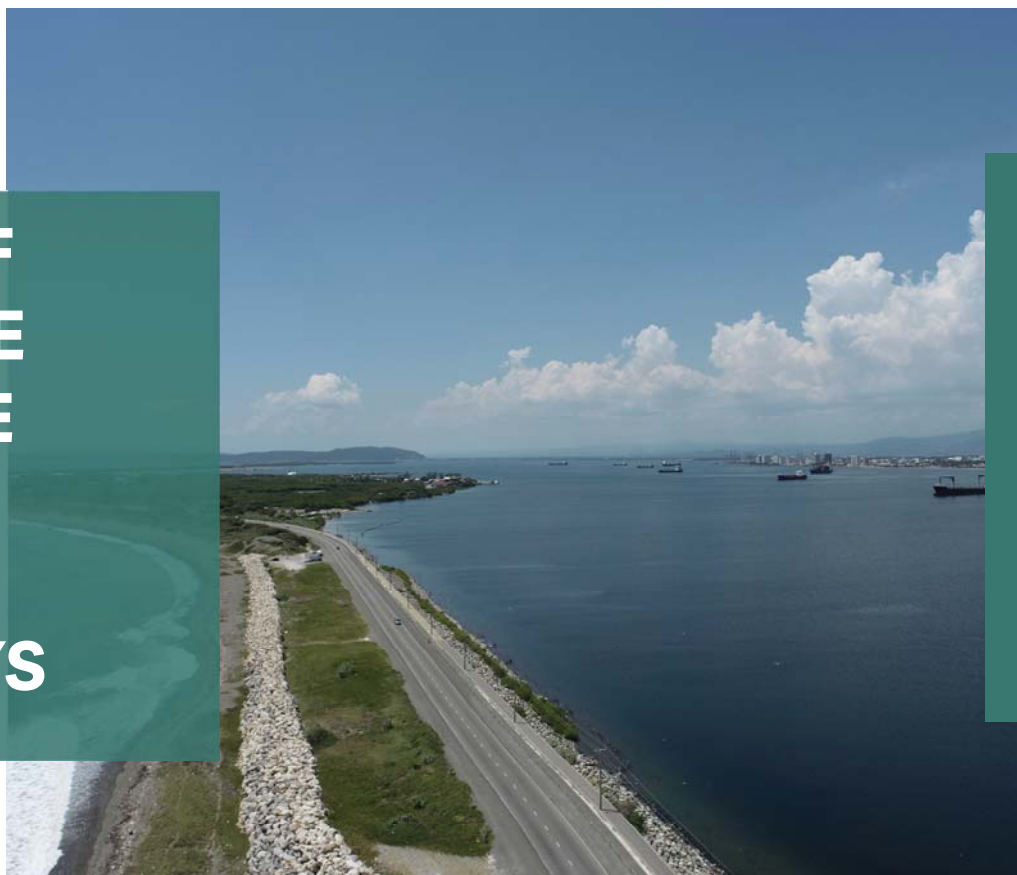
- Proper Sensitization Campaign Needed
- Sensitization of Children is also very important
- Communities needed seeding of garbage bags (Highly unsustainable)
- Trucks spend less times within communities when garbage is separated

*Thank  
you*



# THE IMPACT OF PLASTIC WASTE AFFECTING THE KINGSTON HARBOUR AND HELLSHIRE BAYS

*Prepared by*  
Mona Geoinformatics Institute  
UWI Mona



## About MGI

Mona GeoInformatics Institute:

- Spatial Solutions providers; spatial research and development; advanced GIS and data supply
- Established 2004
- Based at UWI, Mona, Jamaica
- University-owned
- [monagis.com](http://monagis.com); [blue.monagis.com](http://blue.monagis.com)





ID	Name
1	Rio Cobre
2	Sandy Gully
3	Balmagie Gully
4	Jew Gully
5	Shoemaker Gully
6	Tivoli Gully/ Admiral Town Gully
7	Kingston Pen Gully
8	Barnes Gully
9	Franklyn Town Gully
10	Mountain View Gully
11	D'Aguilar Gully



Created by: Mona Geoinformatics Institute  
Datum: JAD 2001

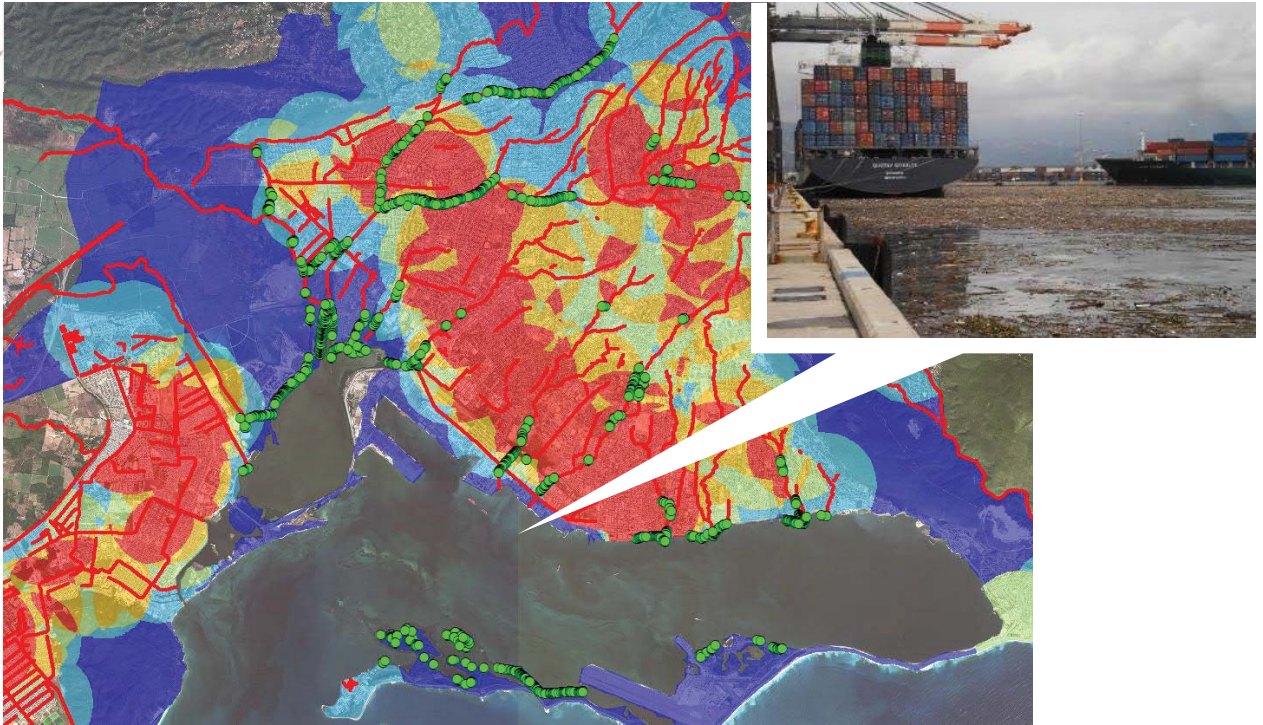
## KINGSTON HARBOUR GULLY OUTFALL POINTS

- Resource in the Kingston Harbour has been under threat from **solid waste pollution** for decades.
- Much of this garbage finds its way into the harbour **through gully and river drainage systems**.

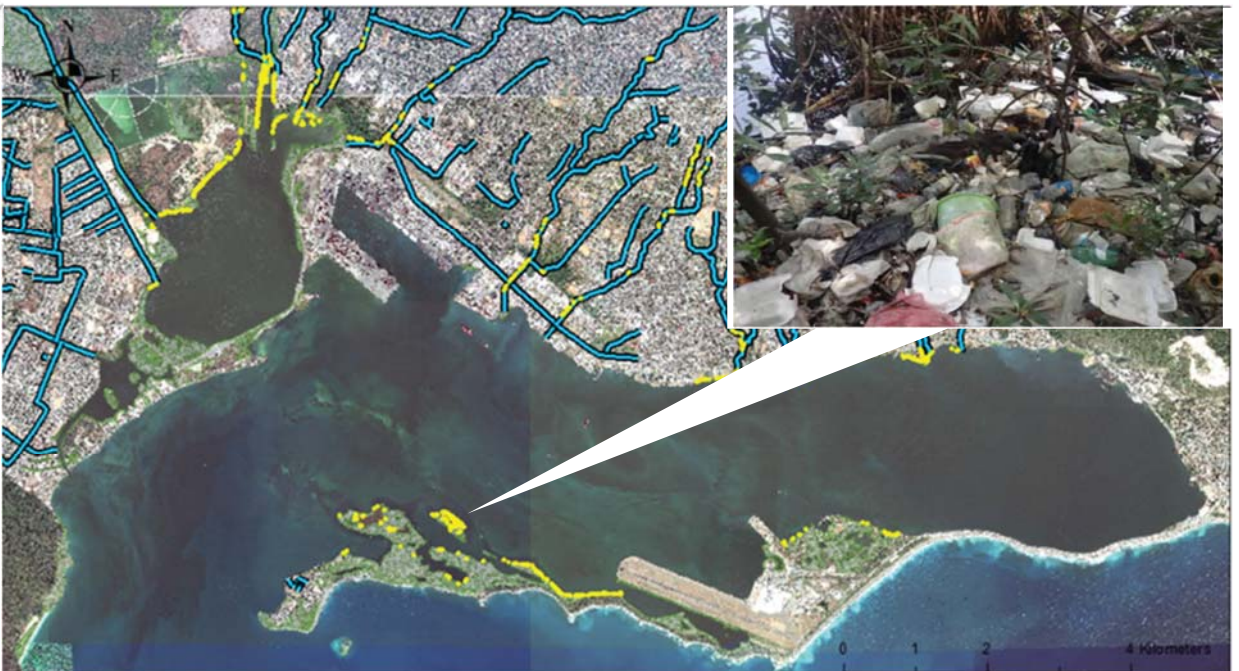




- Solid waste flowing out to the sea ruins the landscape and has the potential to discourage plans for the expansion of cruise shipping to the capital.



- Solid waste washing into mangrove forests have been forming berms high enough to block the flow of seawater exchange in and out of the forest. This has caused hyper-salinity and stagnation, killing plants and animals even into the center of the forest.



# Implementation of Eco-System Adaptation Measures for the Kingston Harbour Communities (KHEAM) Introduction



## Aim of the Project

*To boost the defence of the vulnerable low-lying areas of the city of Kingston against the climate risks of flooding, storm surges, and hurricanes through mangrove restoration, rehabilitation, and conservation*



## Monitoring Sites for Kingston Harbour Eco-system Adaptation Measures



### Legend

- 1km Point From Gully Mouth
- Gully Outflow Monitoring Sites
- Points of Interest
- Gully Networks

- Gallews Point, Refuge Cay & Plumb Point
- Buccaneer Beach
- Gunboat Beach
- Huntsbay
- RefugeCay

0 0.5 1 2 3 4 Kilometers

## Drone Flight Plans for Gullies of Interest



Mountain View Gully



Franklyn Town Gully



Barnes Gully





Remote sensing techniques used to classify beached solid waste at Franklyn Town Gully

## Beached Solid Waste Litter Stockpiles: Barnes Gully, Kingston, Jamaica



0 10 20 40 m

Map Created by: Mona Geoinformatics Institute  
Date: May 2022  
Data Sources: Mona Geoinformatics Institute  
Datum: WGS 1984  
**Based on preliminary analysis.  
Do not reproduce.**

**Beached Solid Waste Litter Density Rank**

1 - Low	4
2	5
3	6 - High

Supported by:



based on a decision of the German Bundestag





*Figure 1: Plastic dump site along Mountain View gully mouth*



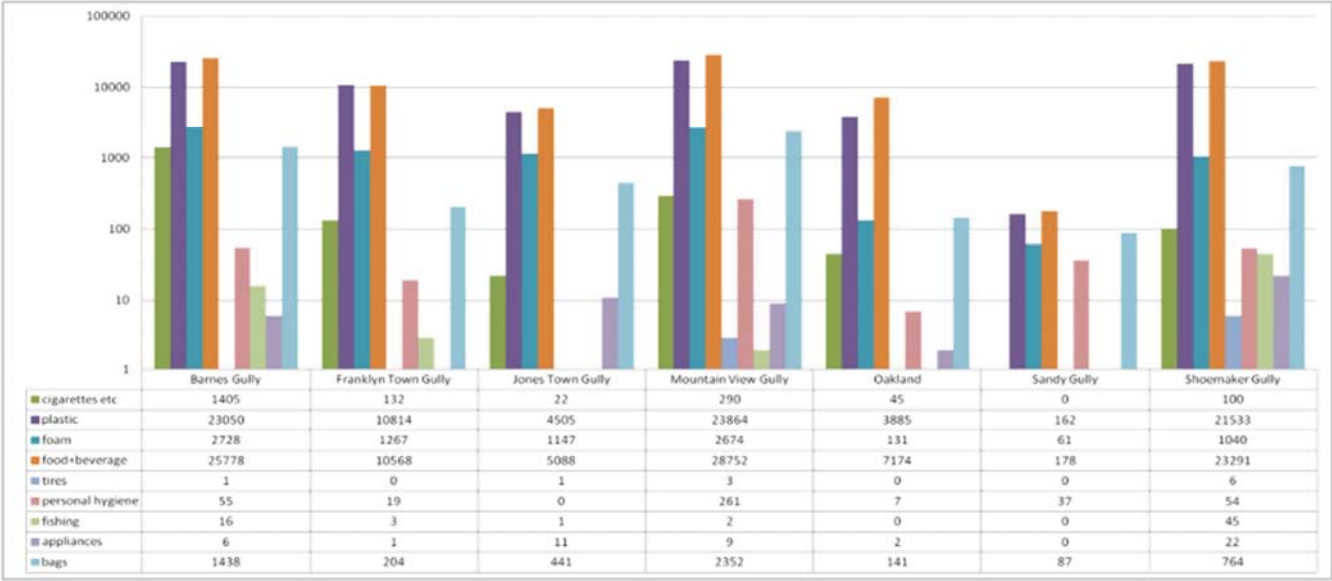
*Figure 2: Plastic dump site along Mountain View gully mouth*



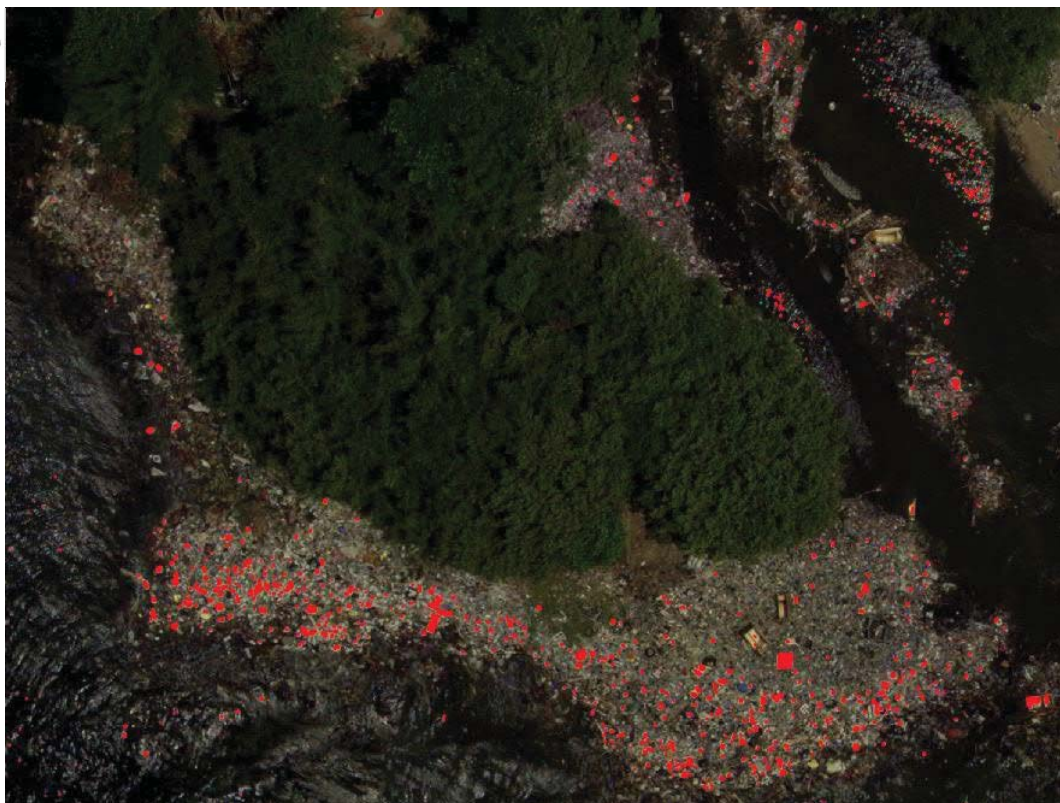


Figure 3: Plastic dump site along Franklyn Town gully mouth

# Solid Waste Profiles







MGI developed plastic-detecting algorithm using drone-captured imagery to quantify floating & beached PET solid waste litter (in red) accumulating on mangroves

## Beached Solid Waste Litter Stockpiles: Gunboat Beach, Kingston, Jamaica



Map Created by: Mona Geoinformatics Institute  
Date: May 2022  
Data Sources: Mona Geoinformatics Institute  
Datum: WGS 1984

Based on preliminary analysis.  
Do not reproduce.

### Beached Solid Waste Litter Density Rank





Figure 4: Tidal Driven Current within the Kingston Harbour

GPS Drifter Path Originating from Gully Mouth to Mangroves of the Kingston Harbour



Legend

- Barnes Gully Drifter: 8:00 PM - Land Breeze, Falling Tide Conditions
- Barnes Gully Drifter: 10: 03 AM (next day) - Sea Breeze, Rising Tide Conditions
- Mountain View Gully Drifter: 9:18 AM - Land Breeze, Falling Tide Conditions
- Mountain View Gully Drifter: 10:00 AM - Sea Breeze, Falling Tide Conditions
- Franklyn Town Gully Drifter: 7:40 PM - Land Breeze, Falling Tide Conditions

- Gully Networks
- Tracker End Point
- Tracker Start Point

Based on preliminary analysis.  
Do Not Reproduce.





*Figure 5: Plastic dump site along Gunboat Beach*



*Figure 6: Plastic dump site along Plumb Point*





*Figure 7: Plastic dump site along Buccaneer Beach*

# The Ocean Cleanup Project Introduction



## Aim of the Project

*To increase insights in the spatial-temporal variations and composition of plastic debris transport into Kingston Harbour, Kingston, Jamaica*

Image Source: CMS, UWI Mona



## KEY MGI OBJECTIVES

### GAIN INSIGHTS

To gain insights on the plastic transport and flash floods in the gullies into Kingston Harbour and Hunts Bay during the wet season, focused on the flash flood events

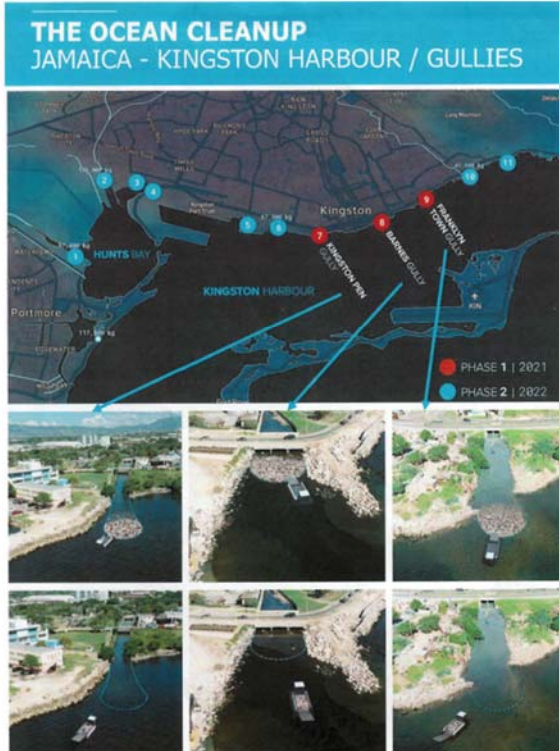
### ESTABLISH CORRELATION

To establish correlation between plastic transport and local environmental conditions (rainfall, flow velocities and wind regime).

### IDENTIFY & QUANTIFY

To identify and quantify garbage stockpiles and capture waste transport flow in the gullies during the wet season of 2021





# Teleconnected SARgassum risks across the Atlantic: building capacity for TRansformational Adaptation in the Caribbean and West Africa (SARTRAC) Project Introduction





## SARGASSUM DETECTION MODEL

Develop a detection model using remote sensing techniques to track the movement of *Sargassum*.  
Determine appropriate drone flight plans for detecting area and species of *Sargassum*

## PHYSICAL CHARACTERISTICS OF SHORELINE

Validation of EWS by understanding the shoreline characteristics which most influence *Sargassum* beaching



## VOLUMETRIC QUANTIFICATION OF SARGASSUM

Development of accurate and feasible field and drone-based methodologies for quantifying various beached *Sargassum* parameters.



KEY OUTPUTS-MGI

## Jamaica

## SARGASSUM MONITORING: COASTAL VALIDATION SITES



Map Created by: Mona GeoInformatics Institute  
Date: September, 2020  
Data Sources: Mona GeoInformatics Institute (MGI)  
Datum: JAD 2001



0 30 60  
Kilometers

### Coastal Validation Sites

- ★ Start Point
- End Point

Selected Shorelines of Study  
Parishes

SELECTED BEACH SITES

Figure 8: Map showing the four selected stretches of coastline for Sargassum Monitoring

## MAIN OUTCOMES

- To provide near real time alerts for the **location of nearshore, offshore and beached Sargassum** for different sectors of the coastline.
- To provide alerts **specific to various communities and sectors** based on their vulnerability and interests in Sargassum.



## MAIN OUTCOMES

- To improve the resiliency and the potential for utilizing the seaweed as a means of transformational adaptation.





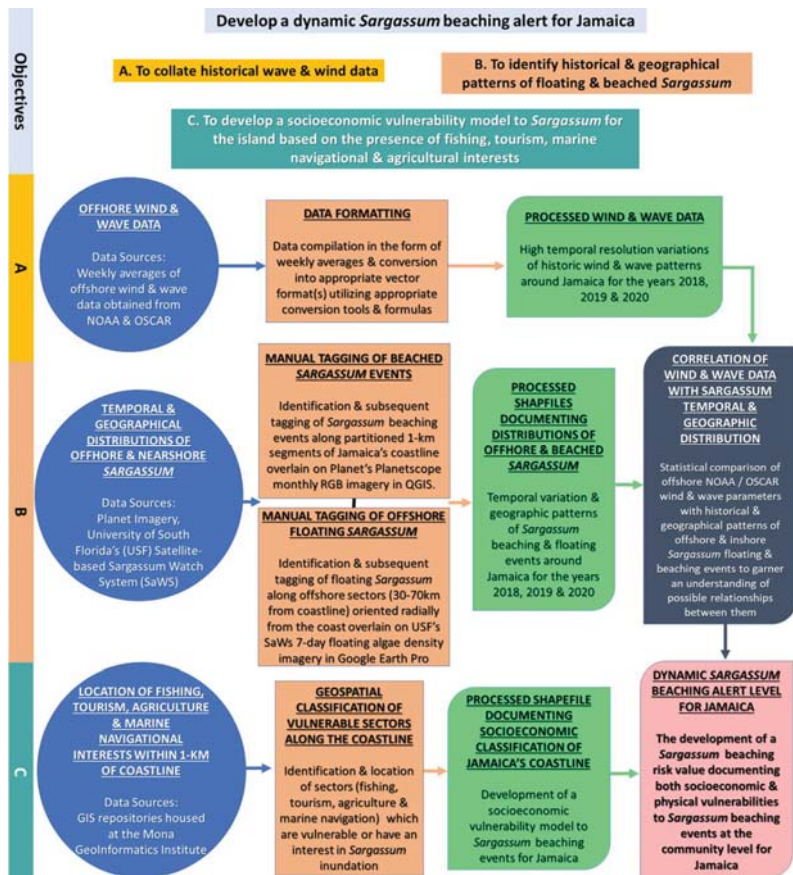


Figure 9: Flow chart documenting methodologies involved in Early Advisory System development

## METHODS: USER SPECIFICATION REQUIREMENTS

- An online semi-structured focus group was organized with a range of in-country stakeholders including representatives from fisheries, tourism, environment, national planning and alternative use interests.

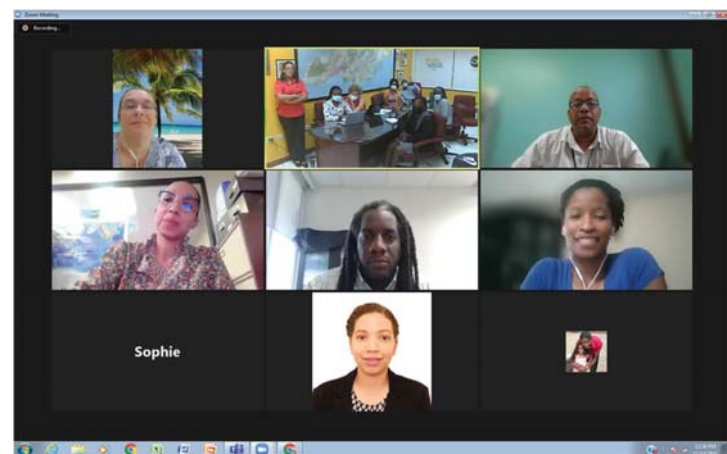


Figure 10: Screenshot from online focus group looking at user specifications for an Early Advisory System

## METHODS: USER SPECIFICATION REQUIREMENTS

- Feedback was garnered on the mockup version of the website to improve interaction with user interface.

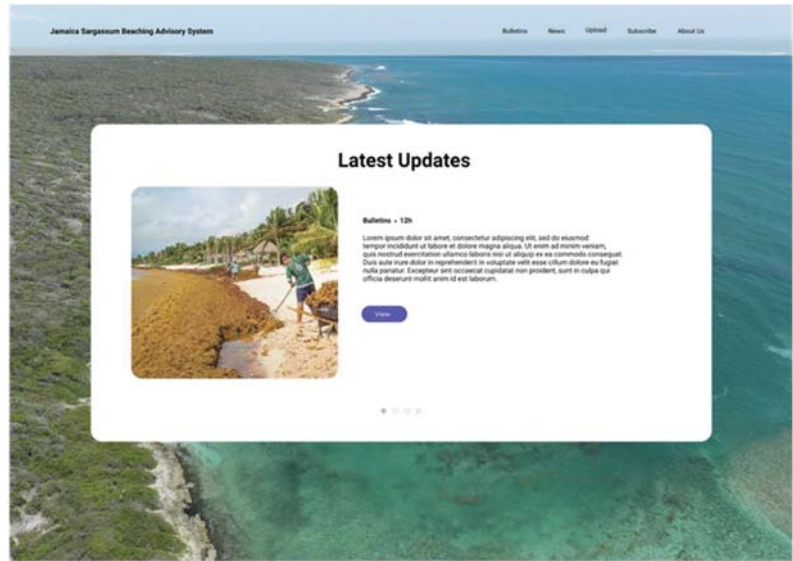


Figure 11: Screenshot from EAS website mockup

## METHODS: DYNAMIC MODEL PREDICTING MOVEMENT OF SARGASSUM BETWEEN OFFSHORE, NEARSHORE AND BEACHED *SARGASSUM*

- Data on offshore currents, wind and wave patterns will be garnered from NOAA/OSCAR platforms ensuring that there is diurnal variability.
- All data will be converted into appropriate formats suitable for statistical analyses.

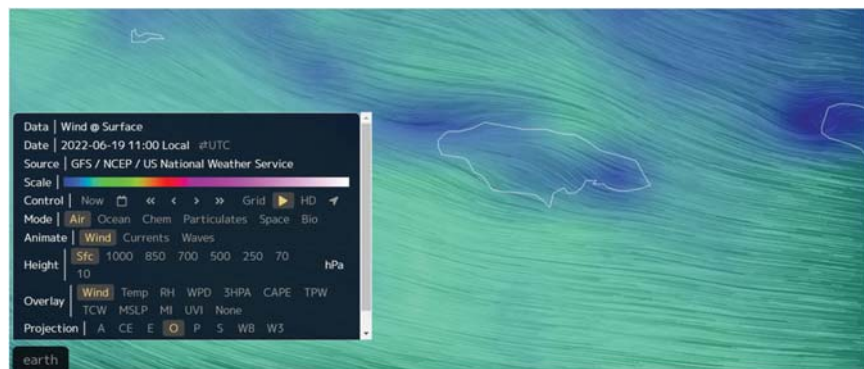


Figure 12: NOAA/OSCAR platform from which data on offshore currents, wind and wave patterns will be garnered



## METHODS: DYNAMIC MODEL PREDICTING MOVEMENT OF SARGASSUM BETWEEN OFFSHORE, NEARSHORE AND BEACHED SARGASSUM

Identification of the temporal and geographical variations of *Sargassum* beaching events for the years 2018, 2019, 2020 and 2021 around the coastline

Deciphered by overlaying 1-km segmented shoreline polyline feature on Planetscope RGB imagery in QGIS 7.8.4

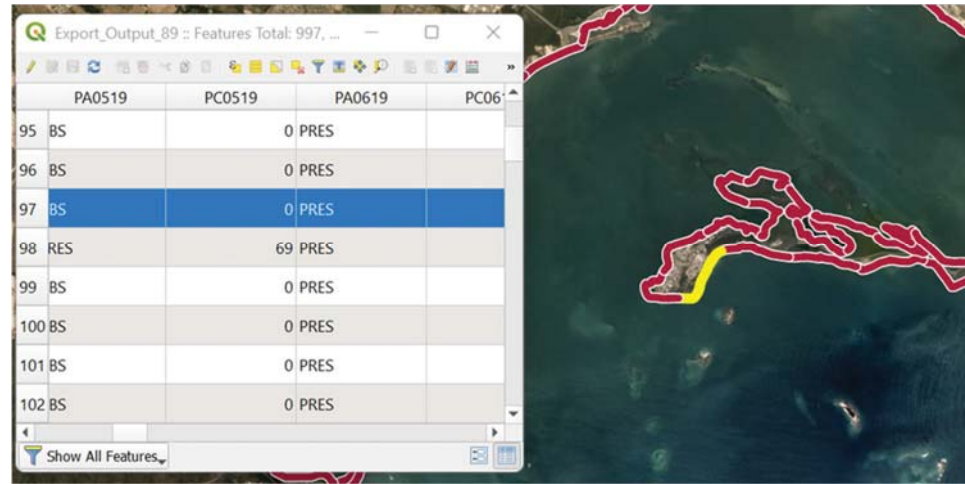


Figure 13: Screenshot documenting the tagging of beached *Sargassum*

## METHODS: DYNAMIC MODEL PREDICTING MOVEMENT OF SARGASSUM BETWEEN OFFSHORE, NEARSHORE AND BEACHED SARGASSUM

Identification of the temporal and geographical variations of offshore *Sargassum* events for the years 2018, 2019, 2020 and 2021 around the coastline of Jamaica.

Done by overlaying offshore (30-75 km from coastline) vector files developed in ArcMap onto USF's seven-day average floating algae density maps.

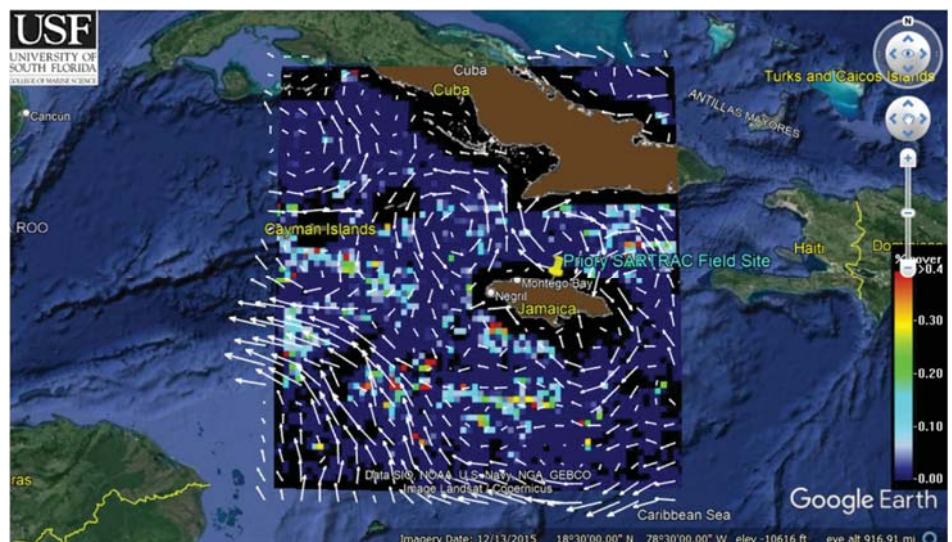


Figure 14: USF's seven-day average floating algae density map with ocean currents

## METHODS: DYNAMIC MODEL PREDICTING MOVEMENT OF SARGASSUM BETWEEN OFFSHORE, NEARSHORE AND BEACHED *SARGASSUM*

After identifying current, wind and wave patterns, they will be statistically compared with offshore and beaching locations across Jamaica to decipher the relationships which exist. Relationships found will be applied to modern conditions to create dynamic EAS predictions.

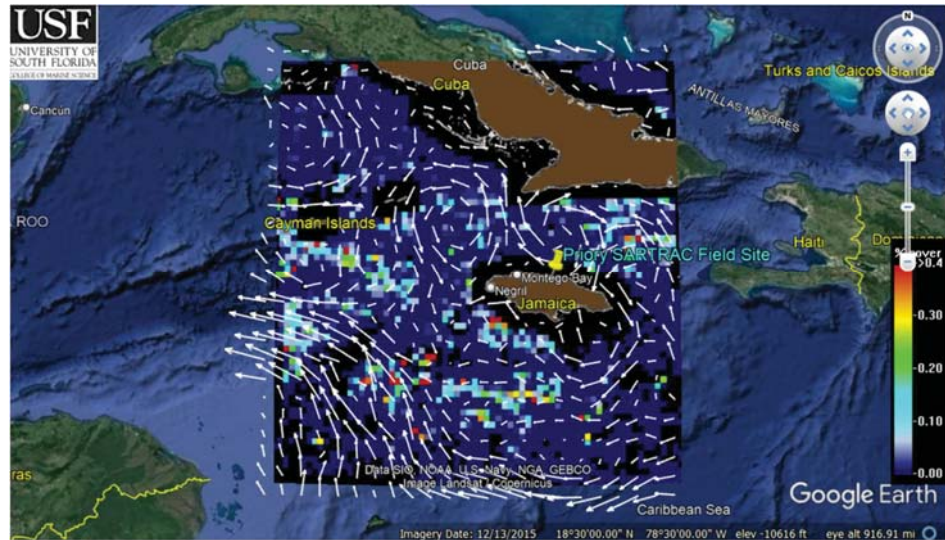


Figure 15: USF's seven-day average floating algae density map with ocean currents

## METHODS: DYNAMIC MODEL PREDICTING MOVEMENT OF SARGASSUM BETWEEN OFFSHORE, NEARSHORE AND BEACHED *SARGASSUM*

- A socioeconomic vulnerability model will be developed based on the presence of various sectors, such as fisheries, agriculture, tourism and marine navigation, within 1 km from the coast around the island. This was garnered from GIS repositories housed at MGI.
- This model will also be supported by quantitative data collection through field work aimed at administering questionnaires to representational heads of fishing and tourism sectors.



Figure 16: *Sargassum* along a fishing beach in Negril, Jamaica



## METHODS: DYNAMIC MODEL PREDICTING MOVEMENT OF SARGASSUM BETWEEN OFFSHORE, NEARSHORE AND BEACHED SARGASSUM

- A socioeconomic vulnerability model will be developed based on the presence of various sectors, such as fisheries, agriculture, tourism and marine navigation, within 1 km from the coast around the island. This was garnered from GIS repositories housed at MGI.
- This model will also be supported by quantitative data collection through field work aimed at administering questionnaires to representational heads of fishing and tourism sectors.



Figure 17: *Sargassum* along a fishing beach in Negril, Jamaica



Figure 18: Plastic dump site along Hellshire Beach



## THANK YOU!

Find us on our website: <https://blue.monagis.com/>

& our social media pages

Instagram & Twitter: @mgi.blue

Linkedin: MGI Blue

### *Contacts:*

Dr. Ava Maxam – Acting Director

Email: [amaxam@monainformatixltd.com](mailto:amaxam@monainformatixltd.com)

Mr. Romario Anderson – Research Officer

Email: [randerson@monainformatixltd.com](mailto:randerson@monainformatixltd.com)

Darren Fletcher – Technical Projects Coordinator

Email: [dfletcher@monainformatixltd.com](mailto:dfletcher@monainformatixltd.com)





# THE KINGSTON HARBOUR CLEANUP PROJECT



# THE KINGSTON HARBOUR CLEANUP PROJECT

## ABOUT THE HARBOUR

The Kingston Harbour boasts immense ecological, economic and social value.



# THE KINGSTON HARBOUR CLEANUP PROJECT

## THE PROBLEM

For decades, Jamaica's vital resource in the Kingston Harbour has been under constant threat from point and nonpoint source pollution.



# THE KINGSTON HARBOUR CLEANUP PROJECT





# THE KINGSTON HARBOUR CLEANUP PROJECT

## PROJECT MISSION

Working together to provide a long-term solution to the pollution of Kingston Harbour.



# THE KINGSTON HARBOUR CLEANUP PROJECT

## THE PILOT

In February 2022, a pilot project was implemented to prevent solid waste from flowing into Kingston Harbour.

Interceptor™ barriers to trap waste will be installed at the mouths of 11 gullies that feed into the Harbour.

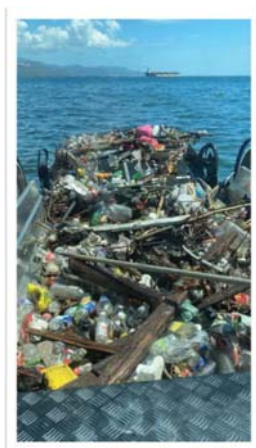


# THE KINGSTON HARBOUR CLEANUP PROJECT



Debris is trapped by the Interceptor™ Barriers

# THE KINGSTON HARBOUR CLEANUP PROJECT



Tender with debris collected from a barrier



Debris that is removed by the Interceptor™ Tender is transported to an offloading site for sorting and disposal.



Offloading Site: Plastic bottles packaged for collection



# THE KINGSTON HARBOUR CLEANUP PROJECT

THE OCEAN  
CLEANUP



## PROJECT PARTNERS

**The Ocean Cleanup** has provided funding, expertise and technology – Interceptor Barriers and Interceptor Tender .

**Clean Harbours Jamaica** are the local operators of the Interceptor™ Tender and are responsible for the maintenance of the barriers and the management of the Offloading Site.

**The GraceKennedy Foundation** provides project facilitation, donor fund management, coordination of beach cleanups, volunteer activities and stakeholder outreach.

# THE KINGSTON HARBOUR CLEANUP PROJECT

## PROJECT SUPPORT

The extensive engagement of the government, private sector agencies and community representatives has been critical to project success thus far.



The Hon. Minister Desmond McKenzie  
visits Kingston Pen Gully

# THE KINGSTON HARBOUR CLEANUP PROJECT

## PILOT GULLIES

### PHASE 1

The Interceptor Barrier locations:

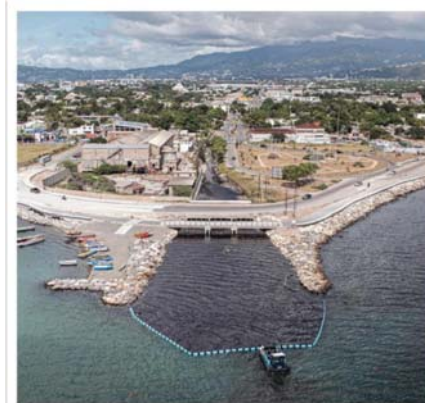
- Rae Town Gully
- Kingston Pen Gully
- Barnes Gully



KINGSTON PEN GULLY



RAE TOWN GULLY



BARNES GULLY

# THE KINGSTON HARBOUR CLEANUP PROJECT

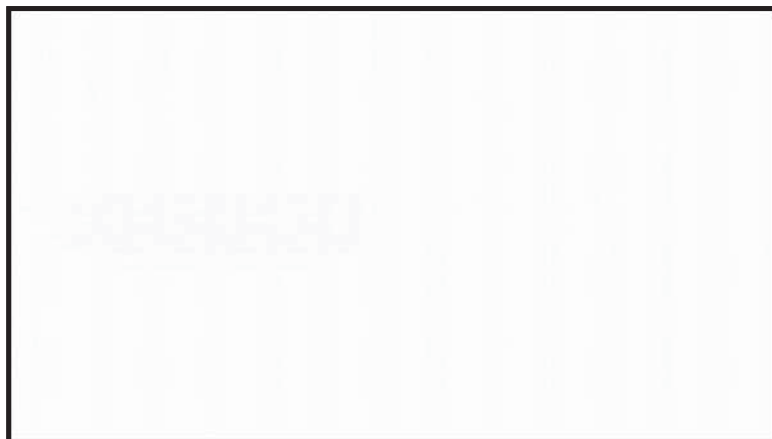
## COMMUNITY OUTREACH

- MONTHLY VOLUNTEER BEACH CLEANUPS
- THE ENVIRONMENTAL WARDEN PROGRAM



# THE KINGSTON HARBOUR CLEANUP PROJECT

## COMMUNITY OUTREACH – BEACH CLEANUPS



COLLECTION DATABASE- SUMMARY				
March - July 31st, 2022				
	Kingston Pen Gully	Rae Town Gully	Barnes Gully	Sirgany Beach
	Total Collected (KG)	Total Collected (KG)	Total Collected (KG)	Total Collected (KG)
<b>Waste collected at Interceptor Barriers™</b>				
Organics	1319.5	490.00	6,127.80	—
PET	588.30	658.89	4,696.13	—
Other Materials	1,348.40	157	3,720.55	—
Other Plastics	—	53.5	87.50	—
Hard Plastics	—	61.00	1,268.55	—
Soft Plastics	—	150.00	292.4	—
Foam Plastics	—	6.00	295.55	—
Clothing	—	64.01	568.6	—
Diapers	—	—	64	—
<b>Waste collected at volunteer cleanups:</b>	1,083.13	380.88	—	978.40
<b>Waste collected from legacy cleanups*</b>	11,339.81	12,700.59	—	—
<b>TOTAL</b>	<b>15,679.14</b>	<b>14,721.87</b>	<b>17,121.08</b>	<b>978.40</b>

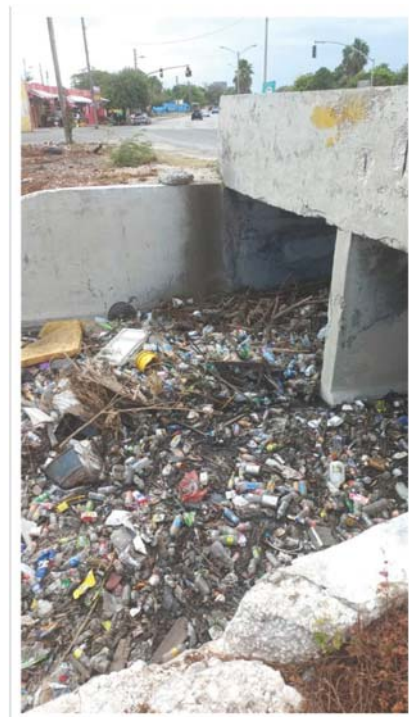
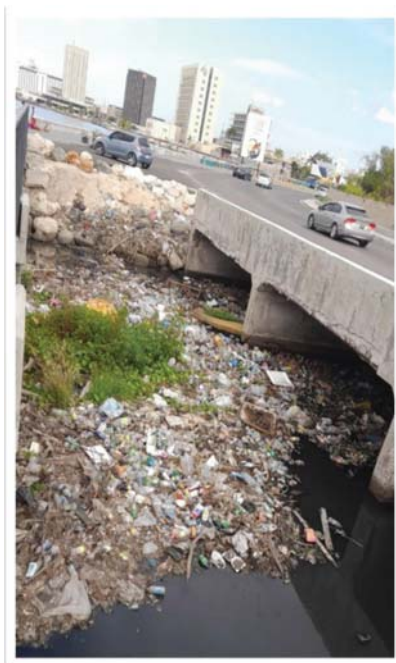
Other collections	5443.11
<b>TOTAL WASTE COLLECTED (KG)</b>	<b>53,943.60</b>



# THE KINGSTON HARBOUR CLEANUP PROJECT

## PROJECT CHALLENGES

- Gully Blockage
- Hazardous Waste
- NSWMA Collection



# THE KINGSTON HARBOUR CLEANUP PROJECT

## PROJECT CHALLENGES

- Waste not flowing down to Barriers





# THE KINGSTON HARBOUR CLEANUP PROJECT

## CLOSING REMARKS





Information and knowledge Sharing Workshop  
for  
the “Technical Cooperation Project on Advisor for Marine Plastic  
Litter Management in the Caribbean Region”

- Pilot project in Jamaica -

31, August 2022  
Taisuke Watanabe  
JICA Advisory Team



**NIPPON KOEI**

## Contents

1. Plastic Pollution in Jamaica
2. Activities on Linkage between SWM and Leakage of Plastic in the Kingston Metropolitan Area
3. Knowledge Transfer for Plastic Policy Development

## 1. Plastic Pollution in Jamaica

### 【Kingston Harbour】

- Kingston Harbour, surrounded by most populated area in Jamaica, is heavily polluted, especially by plastic.



3

## 1. Plastic Pollution in Jamaica

### 【Gullies flows into Kingston Harbour】

- People litter waste to gullies (drains) from Kingston Metropolitan Area, which has biggest population in Jamaica, then rainwater flushes waste including plastic into the Harbour



4

## 1. Plastic Pollution in Jamaica

### 【Clean-up in the gully mouth】

- GraceKennedy Foundation installed a boom (trap) at the mouth of gully and recover waste by boat and by manual.



5

## 1. Plastic Pollution in Jamaica

### 【Plastic Regulation】

- Legal prohibition of import, manufacturing and distribution of:
  - ✓ Plastic bag: made wholly or in part of polyethylene or polypropylene
  - ✓ Plastic Packaging: made wholly or in part of expanded polystyrene foam
  - ✓ Drinking straws: made wholly or in part of polyethylene or polypropylene, manufactured for single use

6



## 1. Plastic Pollution in Jamaica

### 【Plastic Bottle Recycle】

- Recycling Partners of Jamaica (RPJ) conducts plastic bottle recycling, that is, collection from depo point, bale and export. Part of the program is conducted by the deposit-refund scheme, with refund to the large quantity drop-off at the redemption center.
- Some recycling companies working on recycling of valuables including plastics.

7

## 1. Plastic Pollution in Jamaica

### 【 Recycling Partners of Jamaica (RPJ) 】



8

## 2. Proposed Activities on Plastic and Solid Waste Linkage

### 2-1 Survey on gully and maps

- Estimation of linkage between solid waste management (SWM) at land and leakage of plastic waste into the Kingston Bay

Measure the amount of littered waste in some gullies within the budget and estimate the annual per capita plastic discharge amount to be used for the plastic material flow. This activity is combined with the Public opinion survey on littering in the area where the measurement is conducted.

- Showing littering background info by GIS maps

GIS maps with community border show information such as waste amount and waste collection service intensity

9

## 2. Proposed Activities on Plastic and Solid Waste Linkage

### 2-2 Plastic Material Flow

- Plastic Material Flow in the Kingston Metropolitan Area

#### Consumption= Waste generation

(From waste generation per capita and plastic rate in waste)

#### Collection

Collected as waste

Collected as Recyclables (rough estimate)

Uncollected/ Littered\*

#### Destination

Disposed at Landfill

Recycled (domestic)

Recycled (export)

On Land

Flow to Sea\*

\* From measurement

(Note) Focus on single-use plastic (excluding bulky waste)

10

## 2. Proposed Activities on Plastic and Solid Waste Linkage

### 【Note】

Although we do our best, as existing and reliable data is limited, result of these activities are trial base information.

→

Quantification is estimation basis and subject to change by updated data/information.

11

## 3. Proposed Knowledge Transfer for Plastic Policy Development

### 2-3 Support for Policy Proposal

(1) Provide support for the development of a policy proposal by MEGJC and NEPA through transfer of knowledge and experience of JICA Advisory Team.

#### 【Background Situation】

- Existing plastic regulation is enforced by 2 Orders on ban of plastic bag, packaging and drinking straws.
- Intergovernmental negotiating committee (INC) developing an international instrument on plastic pollution is scheduled from November 2022 till December 2024 (From OEWG in June, 2022)

12

### 3. Knowledge Transfer for Plastic Policy Development

#### 【Candidate topic】

- Regulation on single-use plastic product
  - ✓ Points to be considered for regulation
  - ✓ Regulation in Caribbean Island countries
  - ✓ Regulation on microbeads (ban in developed countries)
  - ✓ Potential alternative items

13

### 3. Knowledge Transfer for Plastic Policy Development

#### 【Reference: Examples of regulation in Caribbean Islands】

Country	Target Single-Use Plastic (Ban)
Antigua and Barbuda	- shopping plastic bags and Styrofoam
Bahamas	- plastic bags, plastic straws, plastic utensils, Styrofoam cups and food containers - Permit on release any number of balloons
Barbados	- plastic containers and single-use plastic cutlery
Grenada	- Styrofoam food service containers, plastic bags, plastic food service products and utensils
Haiti	- black plastic polyethylene bags and polystyrene foam containers
St. Lucia	- Styrofoam and plastic food service containers

14



### 3. Knowledge Transfer for Plastic Policy Development

#### 【Issues to be considered in the regulation of single-use plastic】

- Easier enforcement/compliance
  - ✓ Consultation with importer/manufacture/retailer
  - ✓ Lessons from introduction of present regulation
- Alternatives
  - ✓ Cost of alternatives
  - ✓ Support by tax benefits
- Exemptions
  - ✓ Bio-degradable not easy to handle
- Awareness raising
  - ✓ Education/training and promotional activities with private sector
  - ✓ Can be combined with Deposit-Refund Scheme

15

### 3. Proposed Knowledge Transfer for Plastic Policy Development

#### 2-3 Support for Policy Proposal

(2) Provide support for the development of a policy to promote plastic recycling, with focus on Deposit-Refund Scheme (DRS).

#### 【Background Situation】

- Present DRS is in rather small scale and the government want to expand.

16

### 3. Knowledge Transfer for Plastic Policy Development

#### 【Candidate topic】

##### ➤ Deposit-Refund Scheme

- ✓ Plastic bottle refund in Caribbean Island countries
- ✓ Example of legislation on Deposit-Refund Scheme
- ✓ Financing options
- ✓ Awareness raising

17

### 3. Knowledge Transfer for Plastic Policy Development

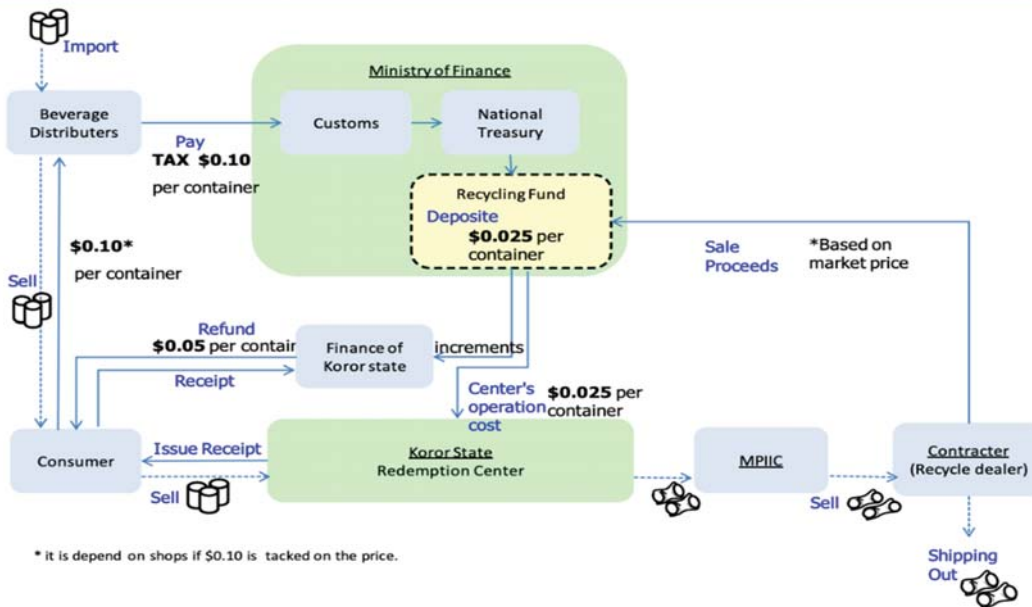
#### 【Reference: Examples of plastic bottle refund in Caribbean Islands】

Country	Refund value per PET bottle (USD)
Antigua and Barbuda	【project base】 - 0.74 cent
Barbados	【legislation】 The Returnable Containers Act (RCA) of 1986 - 5 cent
Trinidad and Tobago	【project base】 - 0.75 cent

18

### 3. Knowledge Transfer for Plastic Policy Development

【Reference: Examples of mandatory Deposit-Refund in Palau】



19

**Thank you!**

**Will keep in touch!**

**Contact:**

**Taisuke Watanabe (Mr.)**

**[t-watanabe@exri.co.jp](mailto:t-watanabe@exri.co.jp)**



Information and knowledge Sharing Workshop  
for  
the "Technical Cooperation Project on Advisor for Marine Plastic Litter  
Management in the Caribbean Region

- Pilot project for remediation of the Deglos Sanitary Landfill in  
Saint Lucia -

31, August 2022  
Yukihisa Sakata  
JICA Advisory Team



**NIPPON KOEI**

## 1. Rationale

- Deglos Sanitary Landfill is the only final disposal site in Saint Lucia.
- The remaining final disposal capacity will be strained.
- Our concern is prolonging the existing landfill site, however,
  - The remaining capacity is not confirmed
  - Possibility of landslides on the existing accumulation
  - Leachate treatment is not performed as designed.
  - Unintentional fire made by retention flammable gases



For the future usage of Deglos Sanitary Landfill, all the issues uneasy shall be cleaned up.



Remediation plan for Deglos Sanitary Landfill will be formulated in the pilot project.



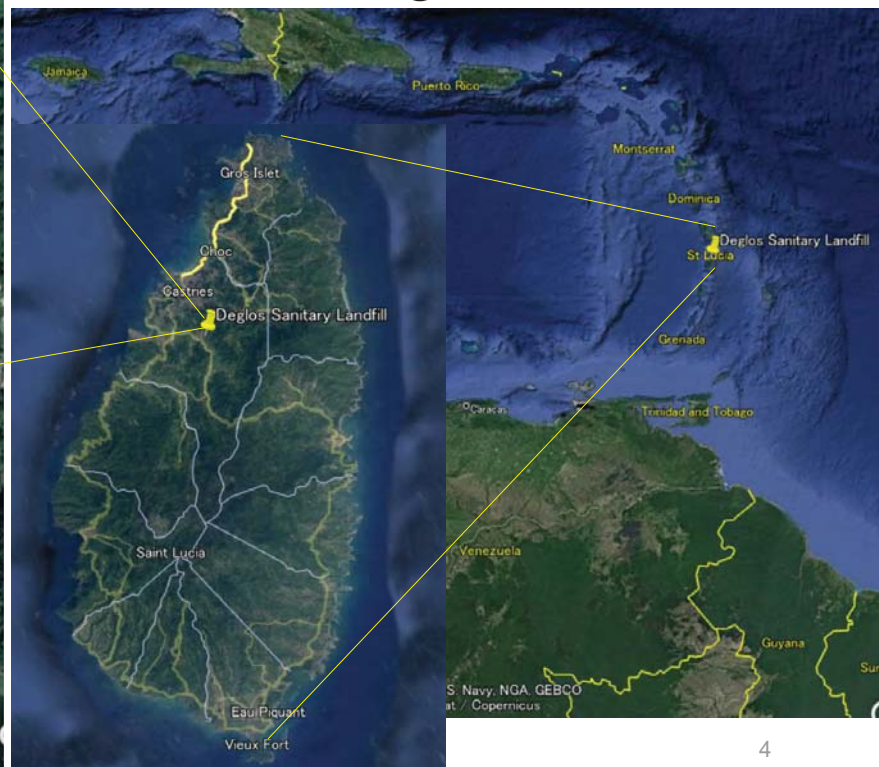
## 2 Outline of the pilot project

- Purpose:
  - To demonstrate how to address the problems currently facing the Deglos Sanitary Landfill
  - To show the way to prolong the life of the landfill in a safe and environmentally responsible manner.
- Each activity undertaken in the pilot project will be documented and a remediation plan will be developed to reflect the results. The activities and planning will be done in collaboration with SLSWMA and JAT. Therefore, the outcome of the Pilot Project will be a remediation plan that SLSWMA is familiar with and can implement.

3



### Target area



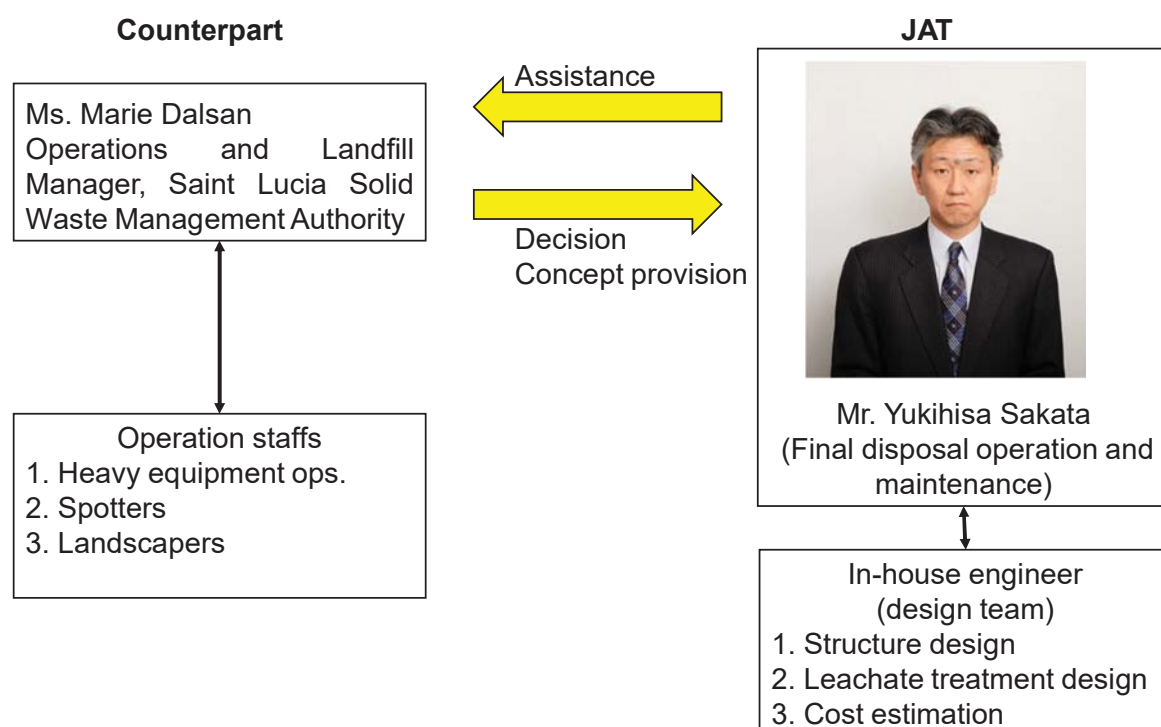
4

## 2 Outline of the pilot project

### CONTENTS

- (1) Development of a pilot project implementation plan
  - i. Remaining capacity in case operated as is
  - ii. Planned remaining capacity in case of improvements
  - iii. Formulation of experiments and construction plans
- (2) Small-scale improvement experiment
  - i. Leachate treatment experiment
  - ii. Gas venting experiments
- (3) Prevention of landslide and improvement of landfilling work
  - i. Installation of an embankment to prevent landslides
  - ii. Improvement of landfilling operation to prevent landslide
- (4) Development of remediation plan
  - i. Expansion and continuation plan for the pilot project based on the results of (1) through (3)
  - ii. Support for placing detailed design orders
- (5) Support for preparation of purchase order documents for construction work, etc.

## 3. Pilot Project Team



## 4. Develop a pilot project implementation plan

- i) Confirmation of remaining capacity of the landfill

Estimate the waste capacity by comparing the survey results and design drawings.

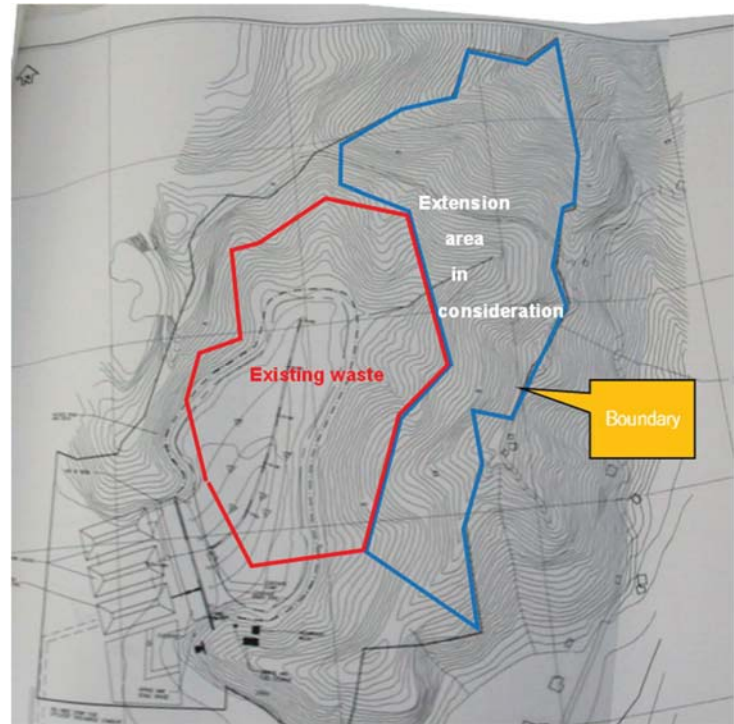
- ii) Calculation of required capacity: future waste volume (setting of population and specific energy consumption), target year of the project

Social frame, target population and waste volume will be estimated.

- iii) Establishment of landfill waste composition

Composition of landfill waste shall be estimated.

- iv) Arrangement of necessary landfill area (determination of boundaries)



Potential extension area (in blue line) 7

## 5. Current state of Deglos Sanitary Landfill



## 5.1 Grand Layout as of April 2022



9

## 5.2 Approach to the dumping area



10



## A photograph of a grassy field with a red dashed line indicating a boundary or path. In the background, there is a body of water, trees, and a small building.



## A wide, muddy road covered in trash and debris, leading towards a hillside under a cloudy sky. The road is filled with plastic waste, paper, and other litter. In the background, there are green hills and a cloudy sky. On the right side, there is a small structure and some vehicles.



## 5.5 Waste compaction practice



13

## 5.6 Waste compaction on gentle gradient area



14



## 5.7 Uncompacted waste on the slope



15

## 5.8 Uncompacted waste on the slope



16



## 5.9 Temporary drainage channel



17

## 6. Consideration of remediation methods

Expansion of area for landfill

Remediation of leachate treatment pond

Desilting and improvement of regulating ponds and concrete drainage channels and installation of perimeter drainage canals.

Repair leachate collection system.

Improve access road and maintain storm water drainage system

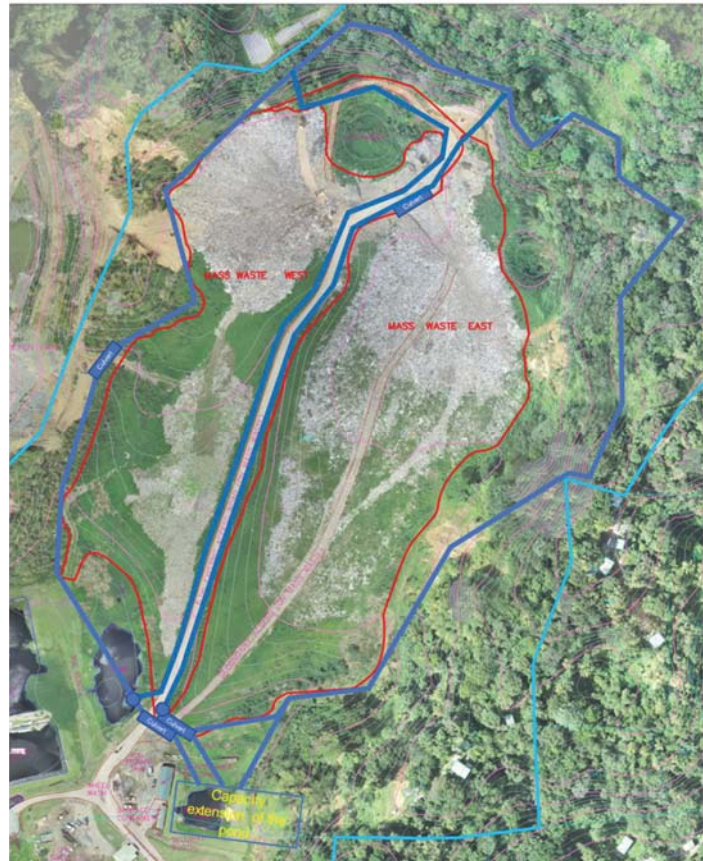
Covering of exposed waste material

18



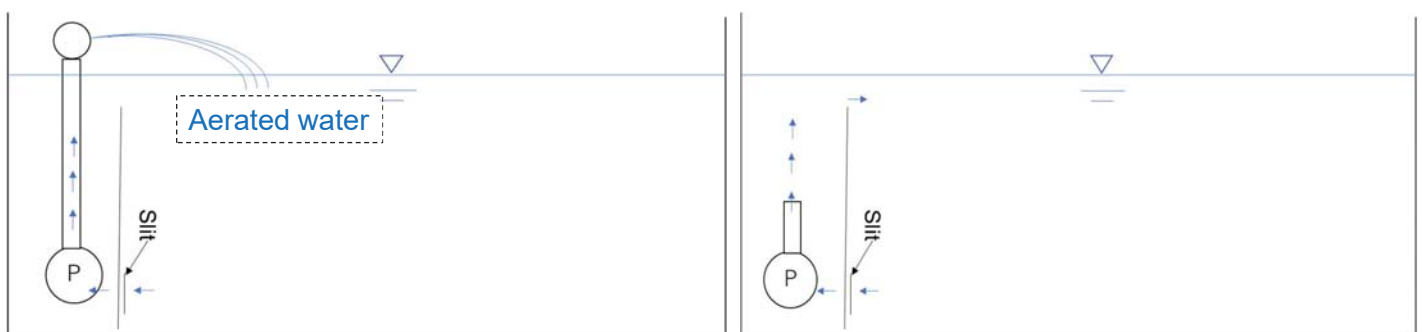
### Example

Illustration of storm water drainage system (in blue line)  
Drainage installed at the height of final shape of the waste  
Capacity of regulating pond will be extended.  
4 culverts installed under the access road for soil excavation and for incoming waste tipping.



## 7. Small-scale improvement experiment project

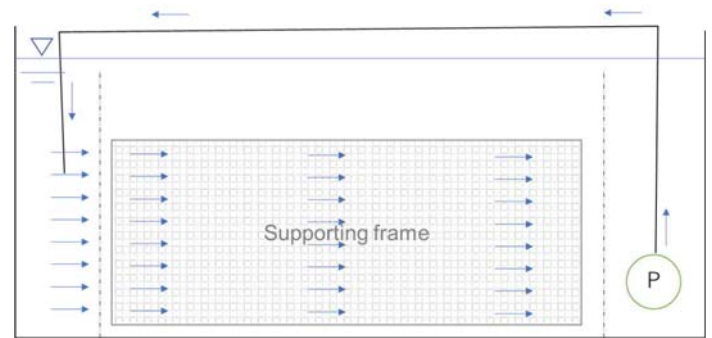
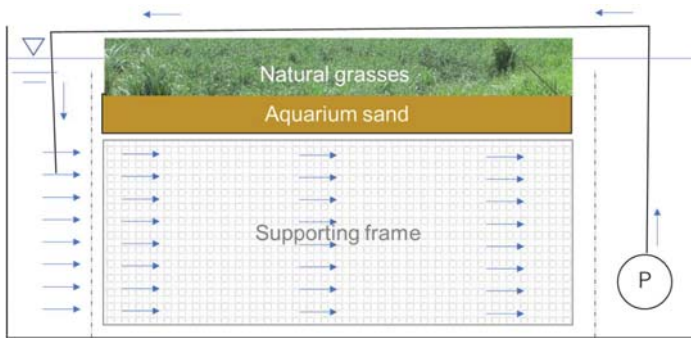
### Trial-1: Aeration effect



Comparative run without aeration at the same flow rate

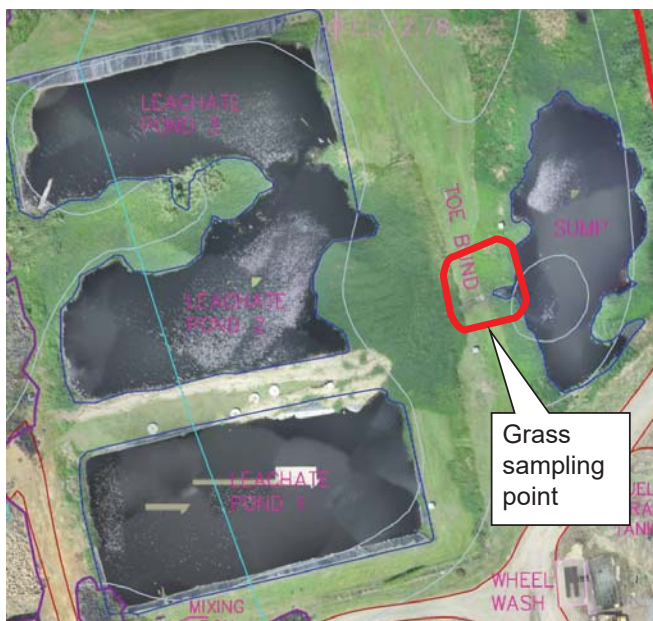
## 7. Small-scale improvement experiment project

### Trial-2: Wetland trial

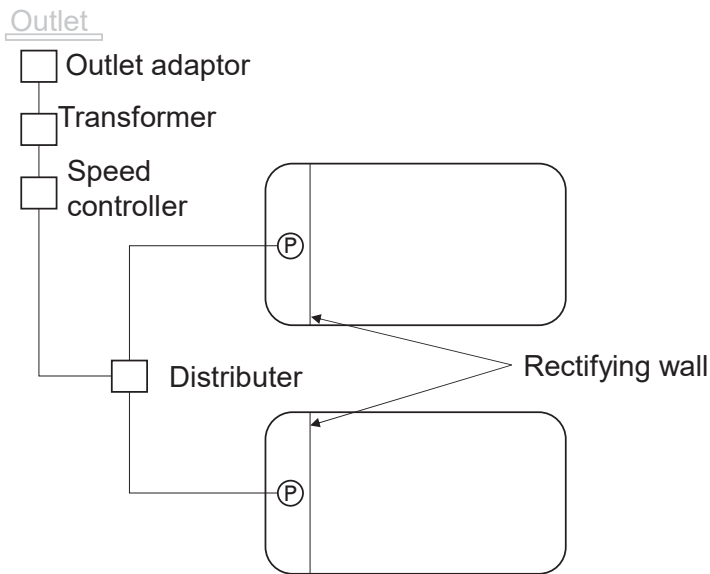


Comparative run without wetland at the same flow rate

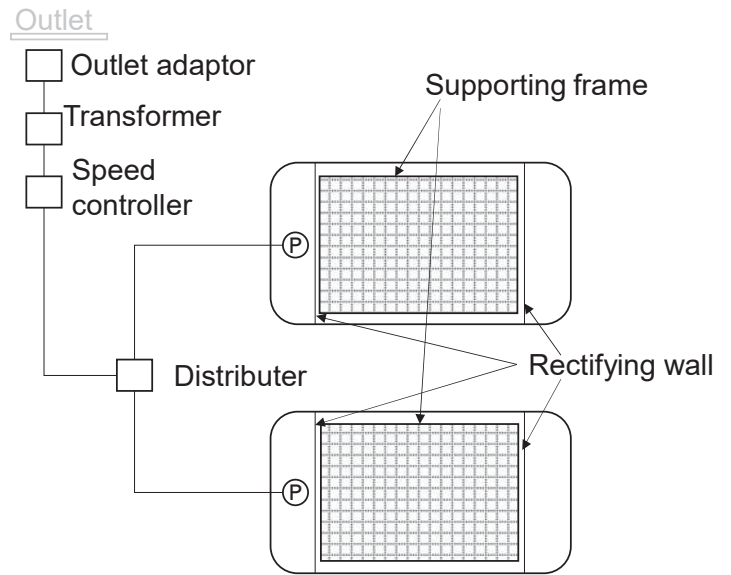
### Grasses to be used in the experiment



## Assembly plan



Aeration effect



Wetland effect

## Tool list

Category	Item	Qty.	Category	Item	Qty.
Apparatus	Plastic box 154L (for water tank)	2	Measuring devices	Graduated cylinder	1
	Plastic plate (for water flow control)	6		Water sampler	1
	AC adapter	2		Water quality analyzer	1
	Speed Controller AC single phase 100V	1		Sampling bottles	1 set
	Submersible pump	2	Tools	Water hoses	1
	Piping	1 set		Box cutter	1
	Valves	1 set		Water bucket with rid	1
	Aquarium sand	1 set		Small shovel	1
	Extension cable (Distributer)	2			
	Transformer (Stepping down 240V to 100V)	1			
Material	Duct tape	1			
	Natural grasses	1 set			
	Sealing material	1			

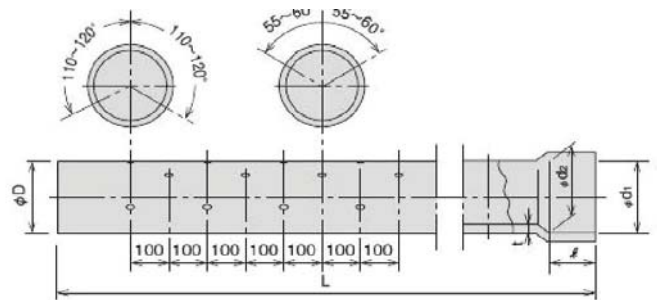
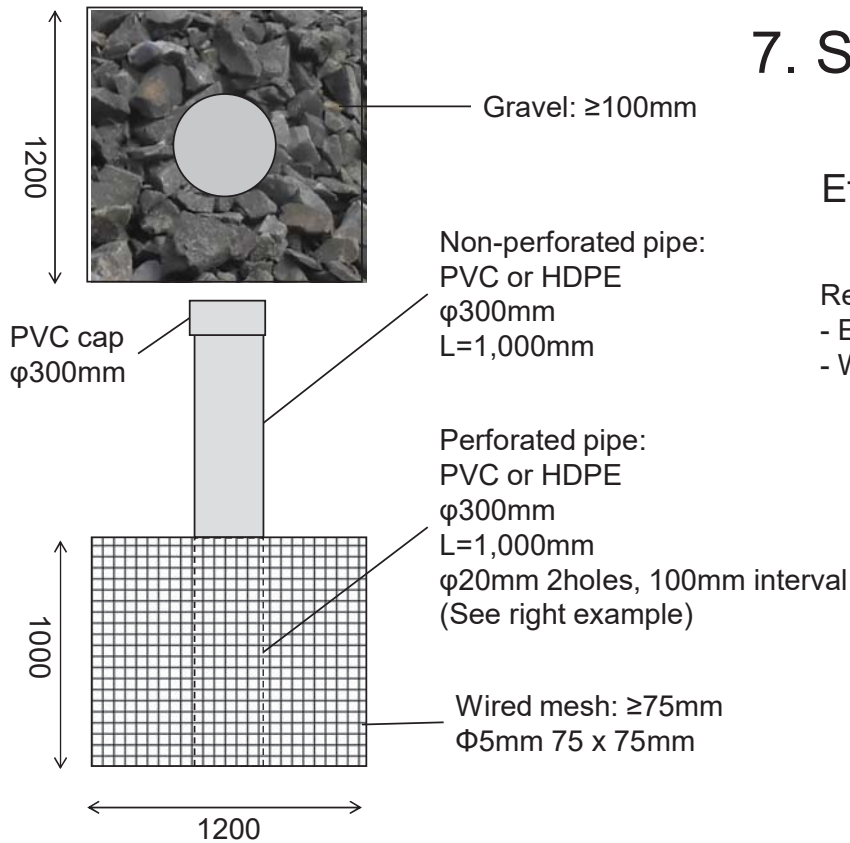


## 7. Small-scale improvement experiment project

### Effect of gas ventilation system Gas ventilation unit

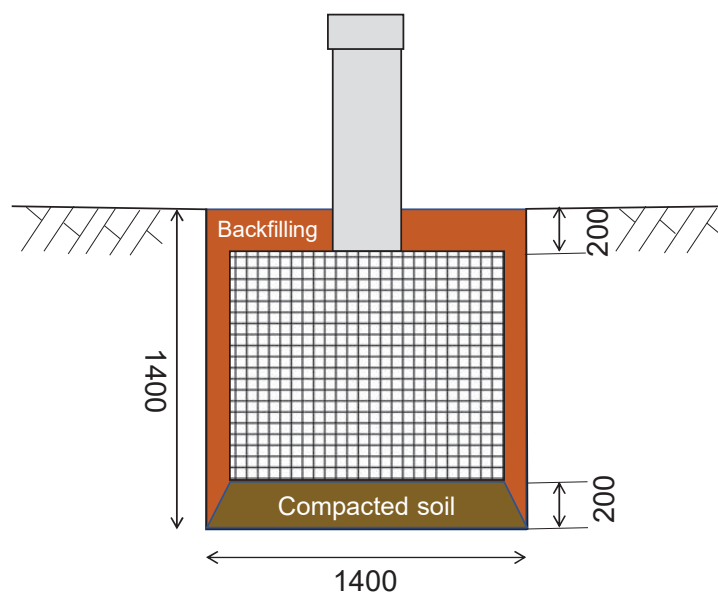
Requirement:

- Each ventilation unit can stand alone.
- Wooden frames can be assembled for the unit.



(Example of perforated pipe)

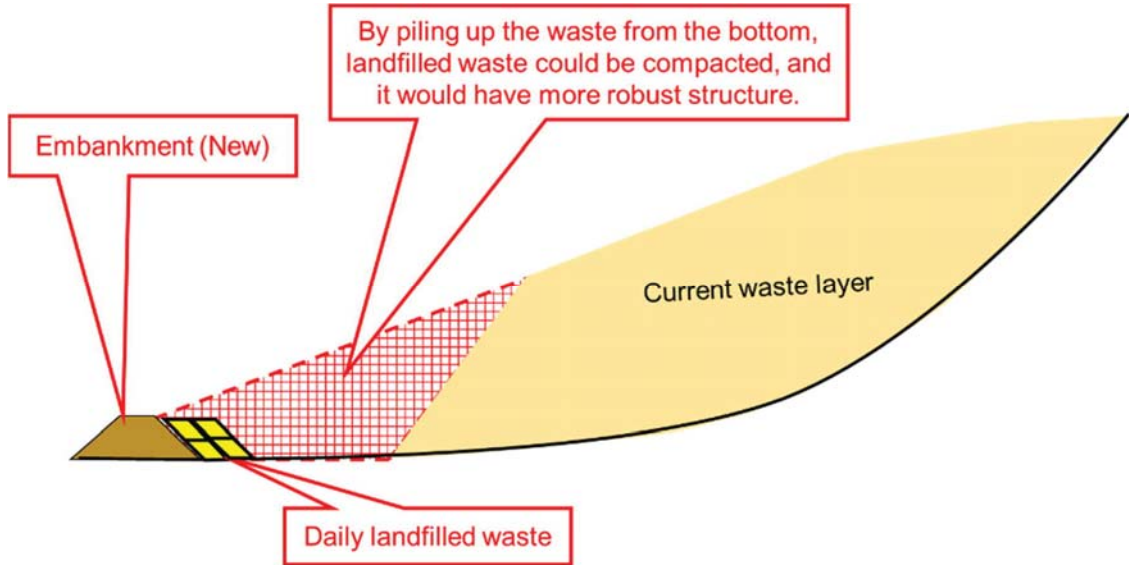
## Installation of gas ventilation units





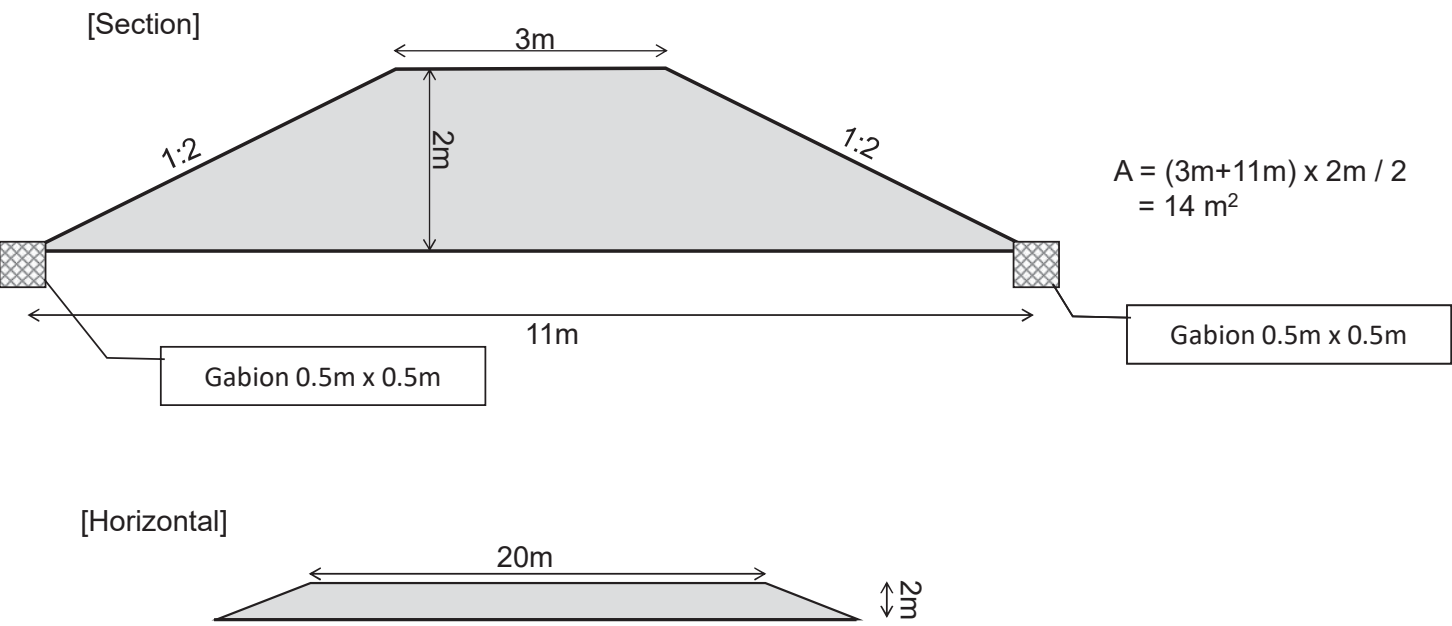
# 8. Collapse prevention and landfill operation improvements

An embankment will be constructed under the slope at the southeast end to practice the method of piling up the waste from the bottom to the top.

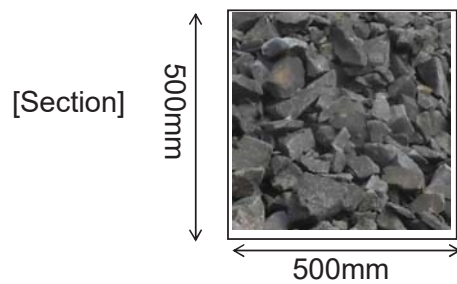


Section drawing of the embankment and piling up the waste from the bottom

## Embankment illustration



# Gabion and Drainage channel and illustration



Excavation

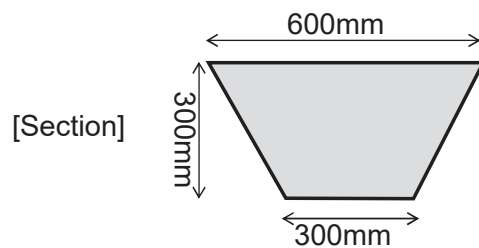
$$A = 0.6\text{m} \times 0.6\text{m} = 0.36 \text{ m}^3 / \text{m}$$

Wire mesh

$$A = 0.5\text{m} \times 4 = 2 \text{ m}^2 / \text{m}$$

Gravel

$$A = 0.5\text{m} \times 0.5\text{m} = 0.25 \text{ m}^3 / \text{m}$$

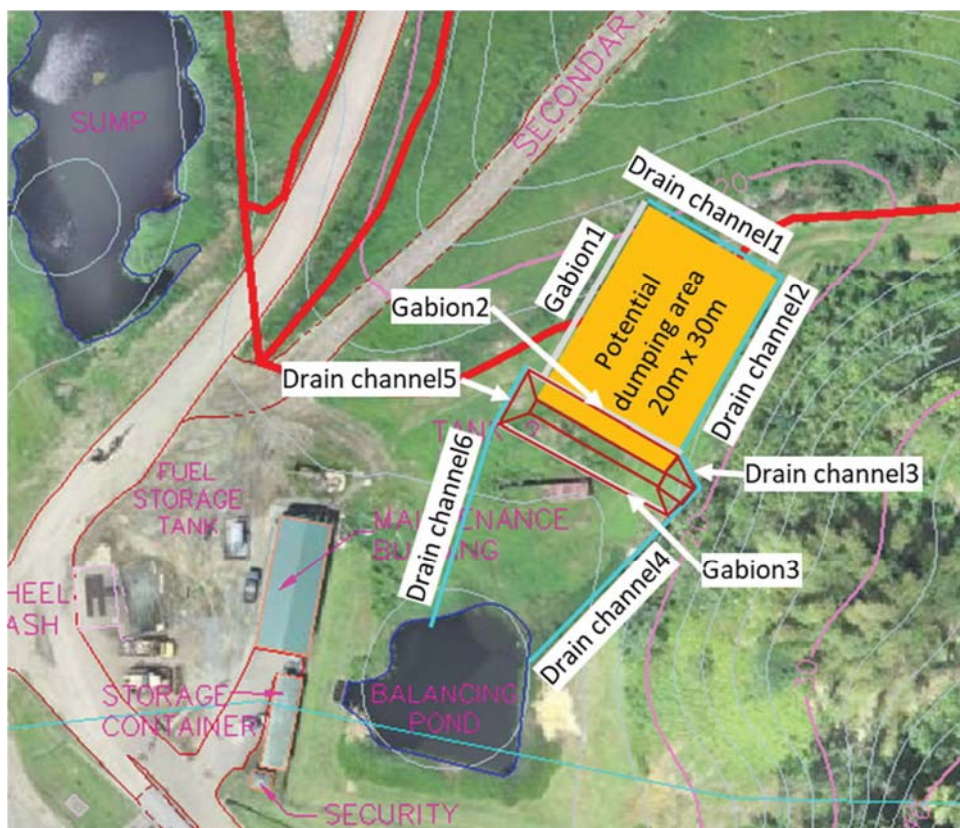


Excavation

$$A = 0.6\text{m} \times 0.3\text{m} = 0.18 \text{ m}^3 / \text{m}$$

Trimming

$$A = (0.3^2 + 0.15^2)^{1/2} \times 2 + 0.3\text{m} = 0.97 \text{ m}^2 / \text{m}$$



N o.	Item	Dimension
1	Embankment	L=20m, F.H= +19.0m
2	Gabion1	L=27m, 500mmH x 500mmD
3	Gabion2	L=24m, 500mmH x 500mmD
4	Gabion3	L=26m, 500mmH x 500mmD
5	Drain channel1	L=21m U-600mmLtop x 300mmLbottom x 300mmD
6	Drain channel2	L=28m U-600mmLtop x 300mmLbottom x 300mmD
7	Drain channel3	L=5m U-600mmLtop x 300mmLbottom x 300mmD
8	Drain channel4	L=33m U-600mmLtop x 300mmLbottom x 300mmD
9	Drain channel5	L=10m U-600mmLtop x 300mmLbottom x 300mmD
10	Drain channel6	L=28m U-600mmLtop x 300mmLbottom x 300mmD

## 9. Frequently easy monitoring



Water analyzer  
(pH, TDS, etc.)



Gas analyzer  
(CH<sub>4</sub>, CO<sub>2</sub>, etc)

31

## 10. Formulation of remediation plan

- i) Organize and analyze the improvement results of (1) to (3)
- ii) Review and organize improvement methods
- iii) Formulation of remediation plan
- iv) Cost estimation
- v) Development of construction schedule

## 11. Conceptual design

The contents of the studies in the pilot project will be illustrated and the design quantities and construction conditions will be compiled.

The work will be completed within 4 months.

32

# 12. Schedule

Year / month		2022												2023											
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Conceptual plan for Deglos Sanitary Landfill Remediation																									
Small experiment for leachate treatment																									
Small experiment for landfill gas emission																									
Embankment installation for stable foundation for remediation area																									
Simple environment monitoring																									
Monitoring plan																									
Monitoring																									
Cost estimation of the conceptual plan																									
Assistance for procurement of detailed design of the remediation																									
Evaluation of the pilot project																									

In Japan

In St. Lucia

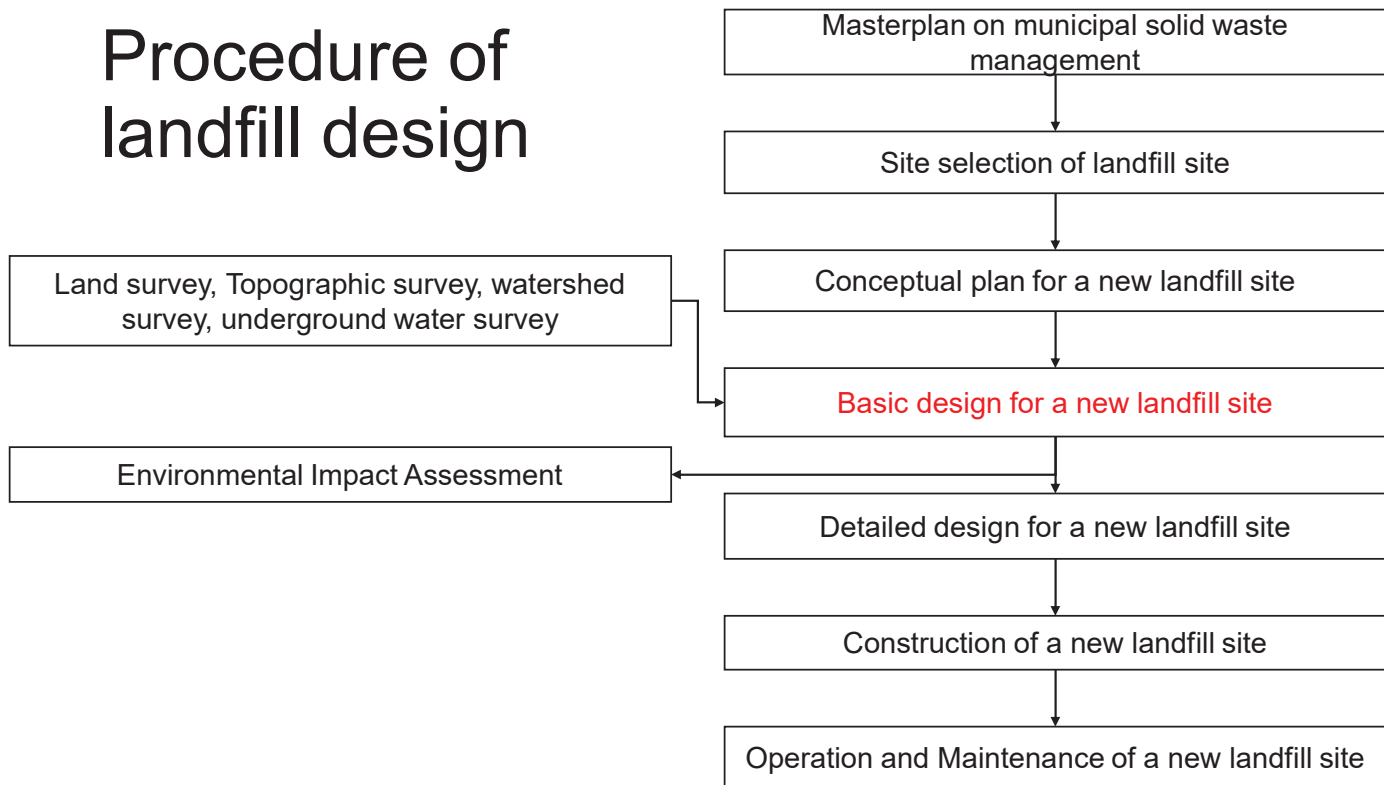
# 13. Cost

USD 90,000 to 100,000

Supplement: Basic item for landfill



# Procedure of landfill design



## Items of the design

Confirmation of solid waste to be landfilled Specific gravity	Leachate collection system
Grand layout plan	Leachate treatment system
Land improvement design	Gas ventilation system
Storage structure	Weighing system
Underground water collection system	Monitoring system
Liner structure	Administration building
Storm water drainage system	Internal roads

# List of basic design documents and drawings

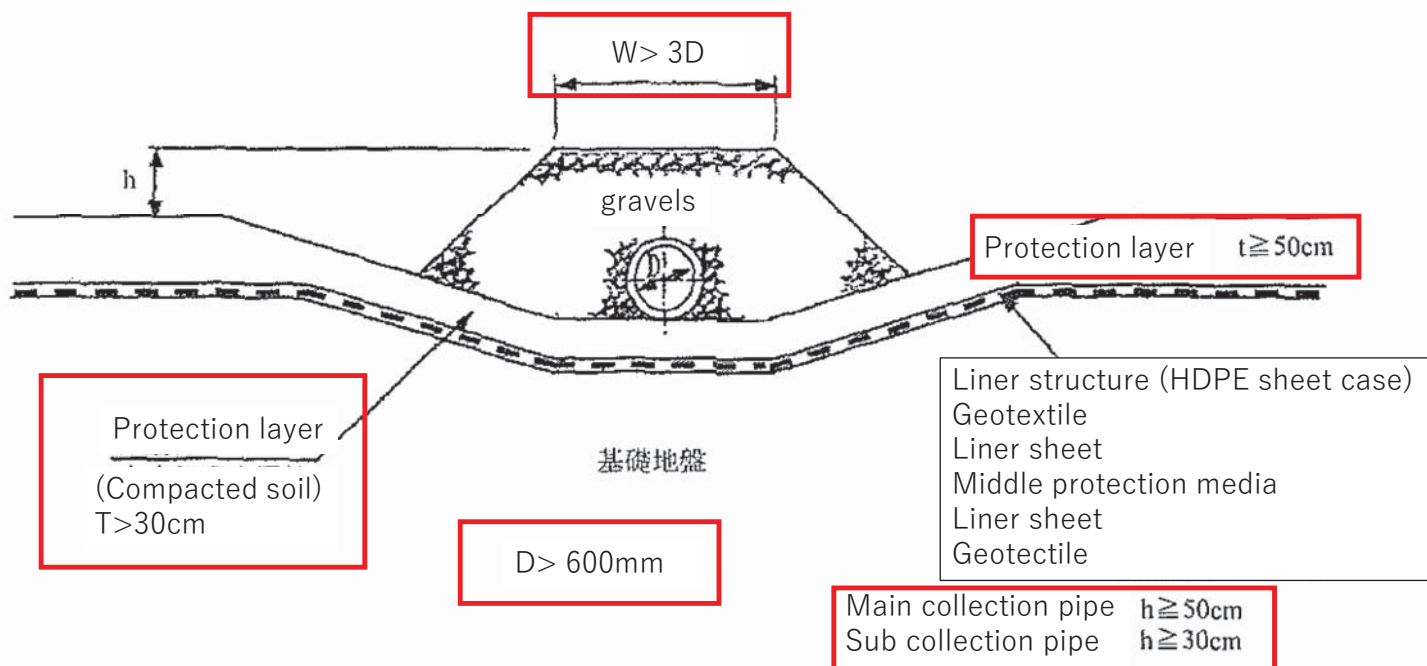
item	name
Basic Design Drawings	Land use plan (after land development)
	Land use plan (after landfilling)
	Main section
	Storm water and drainage layout plan
	Standard section drawings of storm water and drainage
	Leachate collection layout plan
	Leachate collection equipment standard drawing
	Gas ventilation standard structure drawing
	Underground drainage layout plan
	Underground drainage standard section plan
	Drainage basin map
	Balancing reservoir standard structure
	Standard road section drawing
Flow rate calculation report	Discharge flow rate calculation
	Balancing reservoir capacity calculation
	Design of leachate collection pipe diameter
Stability calculation for landslide	Stability calculation for landslide
	Result of the calculation
Quantity calculation report	Quantity calculation report

## Comparison of liner structure to collect leachate

Type of liner structure	Geomembrane liner	Bentonite mixed liner	Clay liner
	<p>Waste</p> <p>Protection layer (compacted soil)</p> <p>Protection layer (compacted soil)</p> <p>Geomembrane liner 1.5-2.5mm</p> <p>Ground</p>	<p>Waste</p> <p>Protection layer (compacted soil)</p> <p>Bentonite-soil mixed layer (1m thick)</p> <p>Protection layer (compacted soil)</p> <p>Ground</p>	<p>Waste</p> <p>Protection layer (compacted soil)</p> <p>Clay (ex. 5m thick)</p>
Construction cost	High (HDPE needs to be imported from Thailand or China. Unit cost is expensive.)	Fair (Bentonite needs to be imported from USA, Canada, Argentina, Uruguay, Chile, Mexico, Brazil or Peru.)	Low (in case of existing natural clay layer)
Workability	Moderate (There are many references in European and Asian Countries)	Moderate (There are many references in Asian Countries such as Japan and Sri Lanka)	It requires highly technical skill of work, especially in moisture control. (Cracks of clay layer must occur.)

**NOT RECOMMENDED  
DUE TO FEW  
EXPERIENCE**

# Structure of leachate collection



Thank you for your attention.

Contact:  
Yukihisa SAKATA (Mr.)  
Email: [sakata@exri.co.jp](mailto:sakata@exri.co.jp)



Information and knowledge Sharing Workshop for  
the “Technical Cooperation Project on Advisor for Marine Plastic Litter  
Management in the Caribbean Region”

- Project to promote waste minimization in Saint Lucia -

2, September, 2022

JICA Advisory Team



**NIPPON KOEI**

## Contents

1. Background and objective
2. Contents of the activity
3. Implementation schedule and structure
4. Current progress



# Background and objective

3

## Background and Objectives

### 1. Background

- Considering marine plastic litter management, the minimization at source and before disposal of not only plastic waste but also the other type of waste is critical.
- In case of Saint Lucia, remaining capacity of existing landfill site which receive plastic waste and the other waste will become tight in the near future.
- In this sense, waste minimization is indispensable for effective utilization of existing landfill site.
- Minimization of disposal amount of organic waste which occupy the large portion of disposed waste is also necessary.
- The reduction of organic waste will be firstly implemented at source



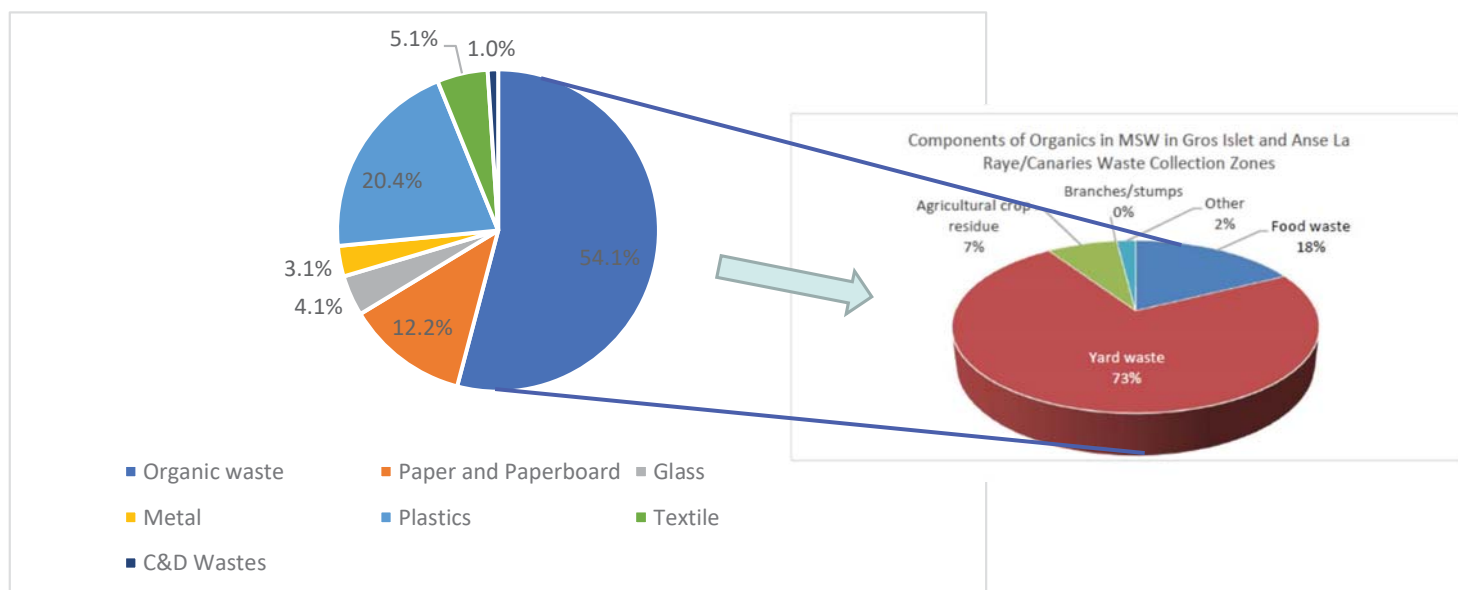
Implementation and promotion of home composting from food waste at home

### 2. Objectives

- The reduction at source of waste generation is main objective
- Through the activity, public awareness raising of waste minimization and separation at source will be promoted

4

## Waste characterization from the waste from household and institution



Source : Waste Characterization Survey Report (2018) , Saint Lucia Solid Waste Management Authority (SLSWMA)

## Contents of the activity

## Contents of the Activity

- Trial Activity by JAT and SLSWMA
  - Preparation of material for Public Awareness Raising Activity
  - Implementation of Public Awareness Raising Activity
  - Implementation of fermentation of food waste in each household
  - Monitoring and suggestion regarding the fermentation in each household by SLSWMA with support of JAT
  - Implementation of Waste Composition Survey to identify the effect of this activity
  - Preparation of the future plan based on the result of this fermentation
- 

7

## Trial Activity by JAT and SLSWMA

- Fermentative microorganism, moisture content and oxygen provision is important for suitable fermentation process.
- Moisture content will be adjusted by dried material such as dry leaves
- Oxygen will be provided by frequently mixing
- Regarding fermentative microorganism, these can be obtained from fermented foods, maturing compost and/or compost product. In Japan, fermented foods include yoghurt, natto, rice malt, pickles, kimuchi, dry yeast, etc.
- Alternatives for aerobic fermentation bacteria that are available in Saint Lucia are considered
- Trial experiments with fermentation liquids and base materials prepared beforehand will be carried out.
- JAT and SLSWMA will also collaborate on finding the conditions including temperature, moisture content, etc



8

## Preparation and Implementation of Public Awareness Raising Activity

- A hearing survey will be conducted on the awareness of some residents in the target area through the staff of SLSWMA in the target area.
- Based on the results of the hearing, we will prepare the material for public awareness, and carry out educational activities to disseminate methods of fermenting food waste at home.
- The method of public awareness raising activity will be face to face education and SNS.
- In the educational activities by utilizing SNS tool used by SLSWMA or face to face promotion activity, we will promote fermentation of organic waste and instruct waste separation at source, etc.



9

## Implementation of fermentation of food waste in each household

- Target area will be selected around 100 to 200 households
- Fermentation of food waste is carried out in each household according to the manual of fermentation method of food waste prepared in advance.
- Temperature, odor, color, etc. are monitored during the fermentation process.
- A weight loss effect can be expected in the fermentation process. Food waste after fermentation is recommended for use in each household as compost or soil conditioner.



10



## Implementation of Waste Composition Survey to identify the effect of this activity

Before and after small-scale experiments, waste composition survey for waste generated in the target area is implemented in Degros landfill site to investigate the effect of small-scale experiment.

Sampling the waste from each household for identifying physical composition of food waste and yard waste in total waste

Collected waste samples are spread out and sorted into food waste and yard waste and the other waste to measure the weight to identify the rate.



11

## Preparation of Future Plan of Food Waste in household

- Based on the implementation of food waste fermentation and composting in each household, the level of cooperation, weight reduction during fermentation and use after fermentation in each household will be monitored with some instructions
- A future plan for weight reduction at the source of food waste will be developed.
- In the future plan, the contents could include the follows;
  - Waste generation, stream of organic waste
  - Result of this Pilot Activity
  - Plan of source separation and reduction of organic waste
  - Public awareness raising activity for source separation and reduction organic waste
  - Implementation structure and cost estimation
  - Issues and recommendation to expand the other areas

12

# Implementation schedule and structure

13

## Implementation Schedule

Item		2022			2023			
		Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
Preparation	Information collection for Activity	↔						
	Preparation of activity plan	↔						
	Discussion about the activity	↔						
Small scale pilot activity	Trial activity		↔					
	Preparation of explanation material for public		↔					
	Explanation and awareness raising for public			↔	↔			
	Procurement of equipment and material, preparation and trial			↔	↔			
	Waste composition survey			↔	↔	↔		
	Implementation of small scale pilot activity				↔	↔		
	Preparation of future plan					↔	↔	
	Continuous public awareness raising and monitoring						↔	↔

## Implementation Structure and Responsibility

### Counterpart Personnel

- Emilyn Jean, Information and Communication Manager, Saint Lucia Solid Waste Management Authority (SLSWMA)
- Ms. Marie Dalsan, Operations and Landfill Manager, Saint Lucia Solid Waste Management Authority (SLSWMA)

### JICA Advisory Team

- Satoshi Higashinakagawa (collection and transportation)

	item	CP	JAT
Creation of a waste minimization promotion plan	Draft plan		X
	Finalization of draft plan	X	
Waste amount survey	Procurement of materials and equipment		X
	implementation	X	X
	Data analysis and summary	X	X
Creation of public awareness leaflets	Creation of leaflet (draft) for public awareness		X
	Finalization of public awareness leaflet	X	
Implementation of fermentation of organic waste at home	Procurement of materials and equipment		X
	Guidance and dissemination of implementation methods	X	X
	Implementation status monitoring	X	X

## Current Progress

## Current Waste Generation and Source in Saint Lucia (2020/21)

Unit [ton/year]

Waste generation source	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Residential/Institutional	32,492	33,279	32,349	30,328	33,971	32,791
Commercial (including bulky waste from residential)	16,324	18,172	15,985	17,943	19,131	14,061
Hotel	6,028	7,775	5,527	6,415	5,996	1,932
Ship/Aircraft	1,755	1,708	1,556	2,036	2,732	84
Industrial	1,078	1,108	1,079	1,171	1,213	776
Construction and demolition	4,354	7,873	5,827	8,159	5,683	5,505
Gardening company	6,291	6,340	6,245	6,736	6,392	6,556
Farm	699	1,088	1,124	1,188	1,328	1,114
Medical	49	87	61	73	135	73
Cleansing (Beach/street)	4,466	5,058	4,903	3,783	3,344	2,816
Others	667	176	649	630	140	38
Total	74,202	82,664	75,304	78,460	80,064	65,746

17

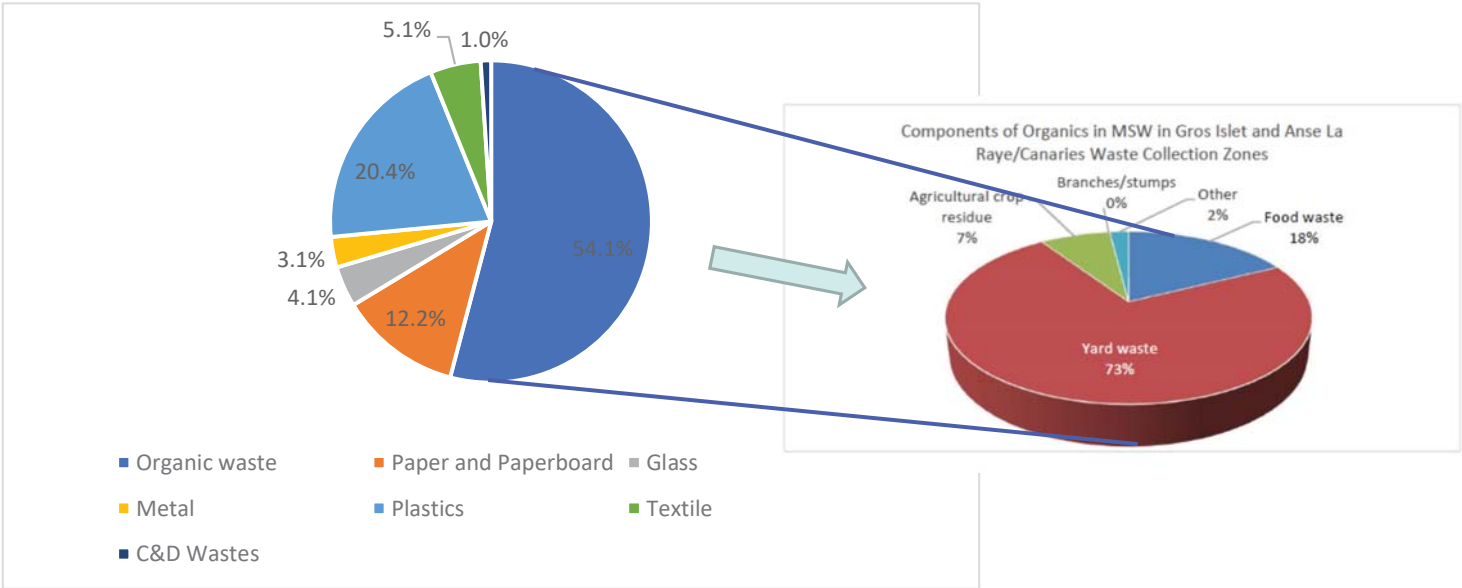
## Current Waste Generation and Source in Saint Lucia (2020/21)

Waste generation source	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Residential/Institutional	44%	40%	43%	39%	42%	50%
Commercial (including bulky waste from residential)	22%	22%	21%	23%	24%	21%
Hotel	8%	9%	7%	8%	7%	3%
Ship/Aircraft	2%	2%	2%	3%	3%	0%
Industrial	1%	1%	1%	1%	2%	1%
Construction and demolition	6%	10%	8%	10%	7%	8%
Gardening company	8%	8%	8%	9%	8%	10%
Farm	1%	1%	1%	2%	2%	2%
Medical	0%	0%	0%	0%	0%	0%
Cleansing (Beach/street)	6%	6%	7%	5%	4%	4%
Others	1%	0%	1%	1%	0%	0%

18

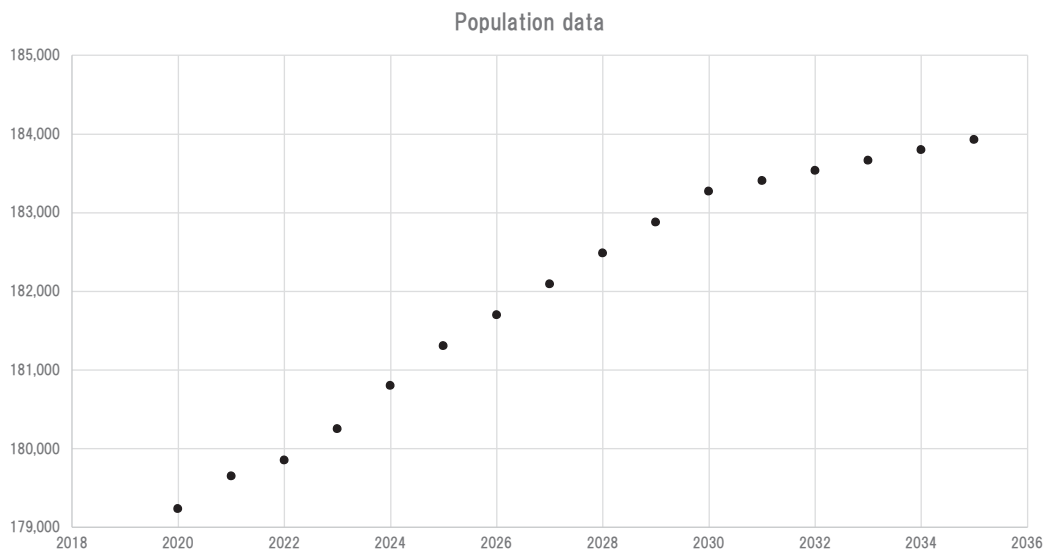


# Possibility of Waste Diversion of Organic Waste by Home Composting



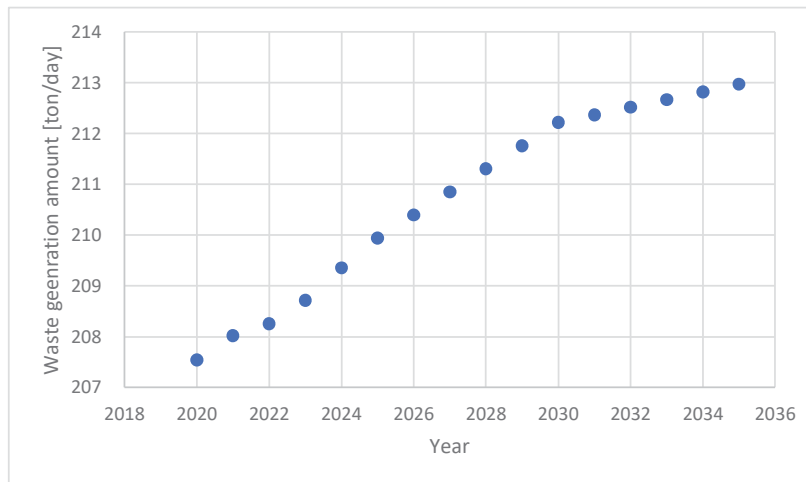
Source : Waste Characterization Survey Report (2018) , Saint Lucia Solid Waste Management Authority (SLSWMA)

# Population projection in Saint Lucia



Source : [Saint Lucia Population 2022 \(Demographics, Maps, Graphs\) \(worldpopulationreview.com\)](https://worldpopulationreview.com/saint-lucia-population/)

## Tentative Future Waste Generation Amount in Saint Lucia



Waste generation of food waste in 2035: 213 [ton/day] x 54% x 18% x 43%  $\div$  8.9 [ton/day]  $\Rightarrow$  3,250 [ton/year]

How much can the generated amount of food waste be reduced

Enhanced into the future plan based on the result of this activity

21

## Concept of Implementation of Home Composting

### Step 1: Making fermenting liquid

Some fermentative microorganisms are required in order to ferment organic waste. These can be obtained from fermented foods.

### Step 2: Make fermenting bed

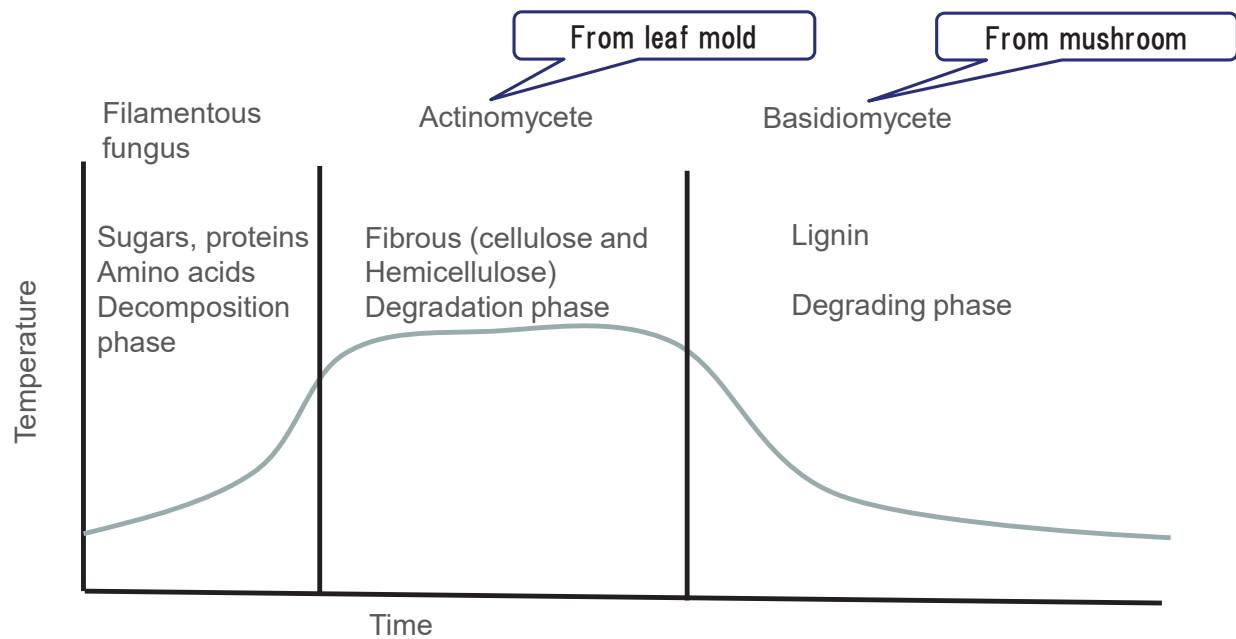
Fermenting bed can be prepared from rice straw, fallen leaves, wheat bran, leaf mold, hay, etc.

### Step 3: Fermentation process

After the preparation of fermentation bed and mixing fermenting liquid, food waste is inputted and they are mixed to promote fermentation process with inflow of oxygen and homogeneous moisture contents.

22

# Composting Process and Decomposition by Microorganism



23

## Preparation of fermentation process

### Composting of green waste in Deglos Landfill Site



Temperature is 30 to 35 degrees celsius

Use as bed material with microorganism for fermentation

Food waste, mainly vegetable peels, some remaining foods

Home composting



24

## Current Progress (Food waste collection at source)

Trial experiment in our house in Saint Lucia has been being implemented.



- It take a week to decompose vegetable peel but still remains
- The temperature is around 30 to 35 degrees in 25 to 30 degrees of surrounding temperature



Necessary to improve

25

## Next Step

### **Improvement of composting process at the trial activity**

- Inputting carbohydrate and/or used oil and/or inputting leaf mold to increase the temperature
- Dry fermented waste and/or add dried material to adjust the moisture contents

### **Consider the public awareness raising procedure**

- A hearing survey will be conducted on the awareness of some residents in the target area through the staff of SLSWMA in the target area
- After the survey, material for public awareness raising will be prepared based on the result of the trial activity

26



Thank you so much.

If you have some questions and/or clarifications, please let me know during 2<sup>nd</sup> workshop

If you have questions or clarification after 2<sup>nd</sup> workshop, please send the e-mail.

E-mail: [higashinakagawa-st@n-koei.jp](mailto:higashinakagawa-st@n-koei.jp)

# Current Efforts to Tackle Plastic Waste in Grenada.

Information and Knowledge Sharing Workshop for the

“Technical Cooperation Project on Advisor for Marine Plastic Litter Management in the Caribbean Region.

JICA/Advisory Team

Thursday 1<sup>st</sup> September 2022

Presented by: Myrna Julien

Communications Manager

Grenada Solid Waste Management Authority



## In this presentation

- The Grenada Solid Waste Management Authority.
- Legislation specific to plastics waste management.
- Grenada's waste Streams...
- Organizational Structure Review to address increasing and diverse waste streams
- Waste Diversion/Integrated resource Recovery.
- Partnerships for Businesses out of plastic waste
- Public Education



## Statutory Body Established by an Act of Parliament in 1995

- Grenada Solid Waste Management Authority Act

Act No. 11 of 1995 amended  
by  
Act No. 30 of 1995,  
Act No. 8 of 2008.



## Other supporting Legislation

- The Environmental Levy Act.1997
- The Waste Management Act. 16 of 2001
- Abatement of Litter Act. #24 of 2015
- Environmental Management Act of 2005
- National Parks & Protected Areas Act 1991
- Non Biodegradable Waste Control Act of 2018
- Procurement and Disposal of Public Property Act #1 of 2018
- Public Finance Management Act # 17 of 2015



# Non Biodegradable Waste Control Act 2018

- Phased Ban on the Import and Manufacture of Styrofoam Food Service Containers.

## Feb 2018. six month phases

- Ban on the Offer for sale of Styrofoam Food Service Containers.
- Ban on the distribution for use of Styrofoam Food Service Containers.
- Plates, cups, food containers,

- Phased Ban on the import & local Manufacture of plastic shopping bags.

- Ban on the offer for sale of single use plastic shopping Bags.
- Ban on the distribution for use of single use plastic shopping bags. T-Shirt Bags.

## NBDG

- Ban on the import and Local Manufacture of plastic food service cutlery.
  - Ban on the offer for sale of plastic Food Service cutlery.
  - Ban on the distribution for use of plastic food service cutlery.
- Forks, sporks, knives, drinking straws.

- Cabinet Appointed Steering Committee to guide the phased process and to identify the products subject to this legislation.
- Consultation with Major Importers.
- Development and implementation of a Public Education Strategy.



## Support for the process

- Enforcement
- Information desk
- Workshops for Customs and excise staff- Grenada & Carriacou.
- Guidance manual for effective import of alternatives.

### Five Steps to Enjoying Hassle Free Importation of Approved Alternatives to Non-Biodegradable Products



a1

## Response to Legislation

### Challenges

- Importing before obtaining a license.
- Importing products of a similar nature as Petroleum plastics made of corn starch.
- Customs officers unsure of labeling- early stages. Oxo-bio, 100% degradable, Green,

### Solutions

- Refresher workshops.
- Development of Memorandum by GSWMA directed to Department of Trade re non compostable items being imported.
- CROSQ standard for labeling of Biodegradable products.

# An urgent need for waste diversion


Increasing waste stream

Running out of space for landfilling .

Cannot find a new location on island for landfill development.

Valuable waste types are being locked away in landfill cells.  
Many businesses to be born out of waste.

Quite a lot of waste not making its way to the landfill but ending up in illegal dumpsites, coastal areas and the marine environment.

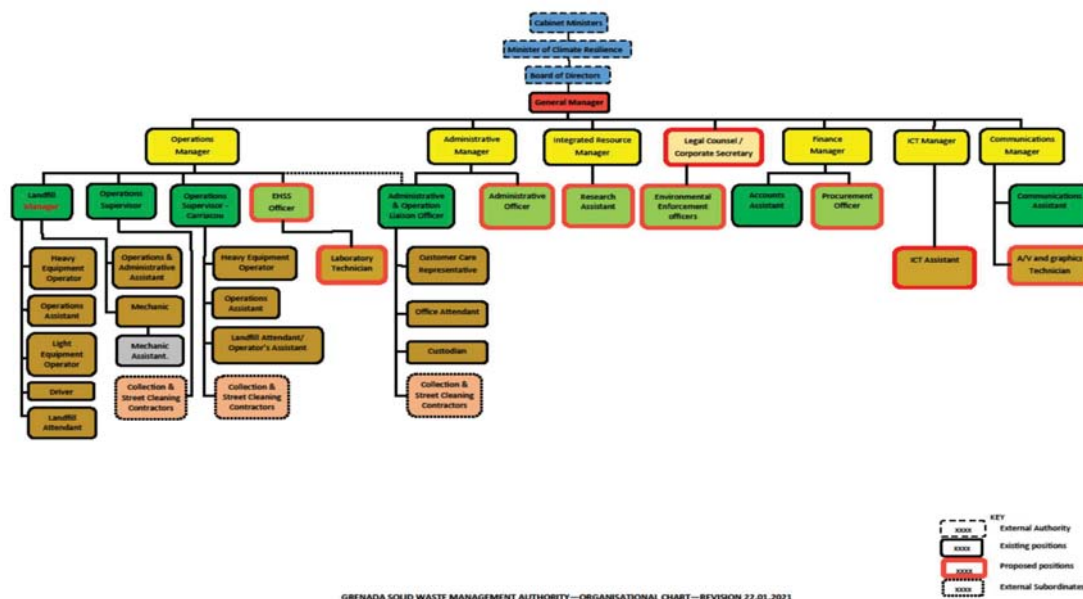


Creating the enabling environment to encourage waste diversion in Grenada required addressing Our Organizational and Governance Structure Structure.

---

2020- Establishment of the Integrated Resource Recovery Unit

# GSWMA Revised Organisational Structure



## Integrated Resource Recovery Unit

Establishment of this new department within the GSWMA is intended to transition waste disposal to resource recovery

Basic functions being to forecast and have a clear understanding of Grenada's waste stream, offer directions for sustainable waste diversion initiatives and plan in consultation with stakeholder institutions including private partners, government ministries & institutions, projects aimed at waste reduction in conformity with the best practices and sound environmental principles .

GRENADA SOLID WASTE MANAGEMENT AUTHORITY



# Establishment of an Integrated Resource Recovery Unit within the GSWMA



INTEGRATED  
RESOURCES MANAGER



RESEARCH ASSISTANT

## Formalize Waste Pickers

- Offer training on waste separation and understanding what is in the waste stream.
- Expose them to OHS training.
- Provide protective gear for operations
- Issue ID cards and protocols for operating at the landfill.
- Align them with waste recyclers





**Operating within the Law's of Grenada.**  
**Conflict management**



**Establishment of cooperative.**  
**Not receptive at this stage.**

- Lack of knowledge of Co-Ops. Not at the level to understand the benefits.
- Still divisive.
- Traders engage them individually.
- Instant gratification. Have no interests in savings and business interests.

---

## New Positions Under the Revised Organisational Structure:

---

Environmental Health &  
Safety Officer- *in the  
process of filling*

AV and Graphics  
Technician-  
*Communications  
Department*

Research Assistant-  
*Integrated Resource  
Department*

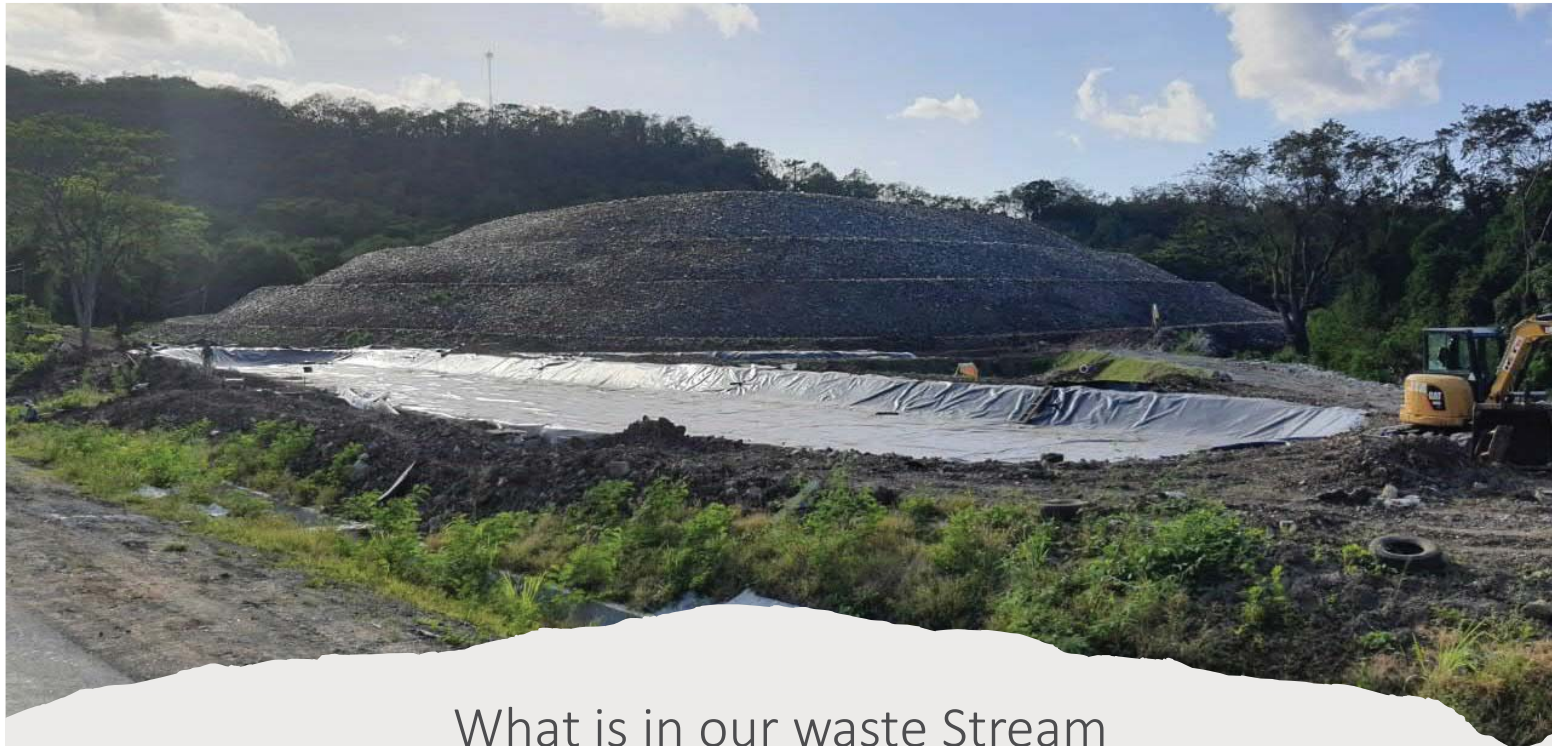
Administrative Officer-  
*Administrative Department*

Procurement Officer-  
*Finance Department*

**Proposed New Unit-  
GSWMA Enforcement Unit**

- Legal Counsel
- Environmental Enforcement Officers

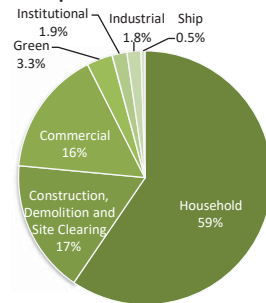
# The Plastic Picture Grenada



What is in our waste Stream

# Our waste generation Trends

**Solid Waste Deposited at Perseverance Landfill**



46,106.72 Tonnes per year.

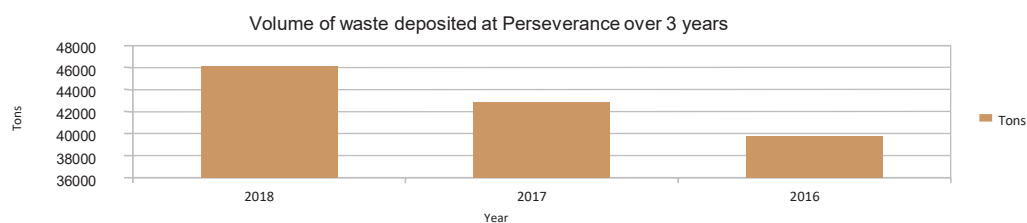
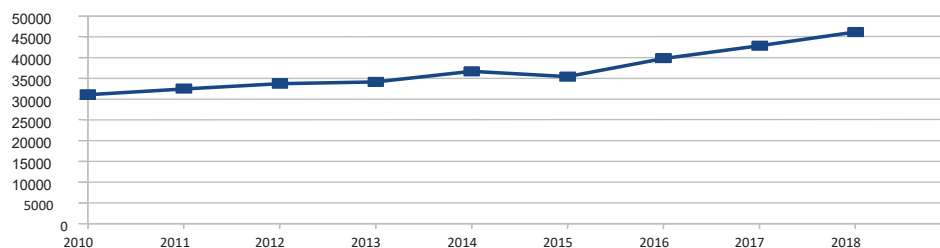


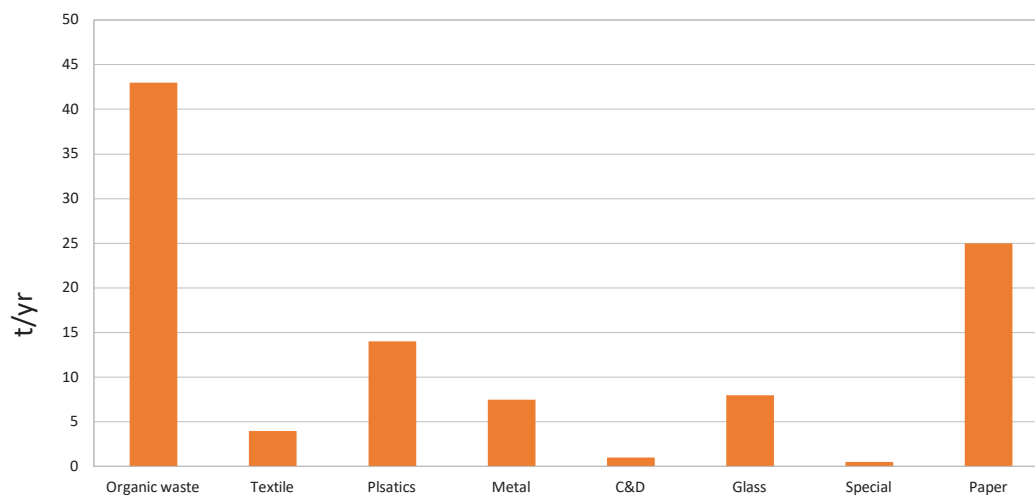
Chart shows the volume of waste in tons deposited at the Perseverance Dumpsite over a 3 year period  
**2018 – 46,106.72 short tons, 2017 – 42,868.06 short tons 2016- 39,789.83 short tons**

The Chart below shows a record of waste arrivals at the Perseverance for 2010 to 2018



## What is in our Waste Stream

Approximately 29,000 in 2001 to 40,000 tonnes 2019



14% of waste arriving at the landfill consists of Plastics.

- 29% consists of PET
- 25% consists of HDPE
- Plastic waste diversion initiatives are primarily focused on the PET and HDPE at this time which is approx 2625 tonnes of waste arriving annually at the landfills







## Businesses Out of Plastic Waste

Role of the GSWMA is to establish the enabling environment to encourage recycling.

- Facilitate and promote waste separation.
- Allow Access to waste disposal facilities – (regularization of waste pickers)
- Establish PPP's or MOU's in consultation with Line Ministry
- Seek support for private partners requiring specialized equipment.
- Make recommendations for tax concessions where needed.
- Promote small businesses born out of waste recycling



# Recycling Businesses targeting plastics

Eco Blocks – NSU

Re-Create

Out of the Box  
development

Re-Plast OECS



## NSU Manufacture of Construction Hollow Blocks

From Granulated PET Plastics

# NSU. No to Single Use



## PLASTIC POLLUTION CARRIACOU SOLUTION

### ECO-PLANTERS

- > 40% plastic forever trapped
- > Do not end in landfill or ocean
- > Plastic not exported to other countries
- > No transport, No sorting, No melting
- > 90% energy saving VS sort/melt recycling
- > Home plastic selective collect
- > Well paid local employment to granulate and build
- > Get granulated plastic for \$10/Kg for selfmade

### ECO-BLOCKS

- > 10% granulated plastic forever trapped
- > Partially replace gravel/sand
- > Greater than 100 years before degrade
- > Local block built by existing local supplier
- > No landfill, No discard in ocean
- > Sold locally in every countries/regions
- > No transport, No sorting, No melting
- > 90% energy saving
- > Home plastic selective collect

**BUY ME:**

The GEF Small Grants Programme

**BUY FROM LOCAL SUPPLIER**

BY BUYING OR BUILDING IT YOU CONTRIBUTE TO  
STOP PLASTIC WASTE IN LANDFILL AND OCEAN

"PLASTIC IS NOT THE PROBLEM. PLASTIC DISPOSAL WAS UNTIL TODAY"

ORDER FROM: WA: 1-473-456-3474 - FB Messenger: [climatesaveactionist](#)



Ref No. \_\_\_\_\_  
In replying the above  
Number and date of this  
letter should be quoted.



MINISTRY OF TOURISM,  
CIVIL AVIATION, CLIMATE  
RESILIENCE, AND THE  
ENVIRONMENT  
MINISTERIAL COMPLEX  
BOTANICAL GARDENS  
ST. GEORGE'S  
GRENADA, W.I.

25<sup>th</sup> January, 2022

Mr. Lydon Robertson  
General Manager  
Grenada Solid Waste Management Authority  
P.O. Box 1194  
Building #9  
Frequente Industrial Park  
Grand Anse  
ST. GEORGE

Dear Mr. Robertson,

CONTRACTUAL AGREEMENT BETWEEN GRENADA SOLID WASTE  
MANAGEMENT AUTHORITY, PADDY'S ENTERPRISES AND NO-TO-SINGLE-USE  
ASSOCIATION

Please be advised that Cabinet at its meeting on the 17<sup>th</sup> January, 2022, approved the following:

- The Grenada Solid Waste Management Authority to enter into a Contractual Agreement with Paddy's Enterprises and no-to-single-use association for the recycling of plastics; and
- Approval for the use of the blocks for minor construction works in the first instance as a precautionary measure.

Please note that once the contract agreement is drafted, it should be forwarded to the Ministry for review prior to signing.

Please be guided accordingly.

Yours sincerely,

Desiree Stephen (Ms.)  
PERMANENT SECRETARY

**PERMANENT SECRETARY**  
Ministry of Tourism,  
Civil Aviation, Climate Resilience  
and the Environment

## GSWMA/NSU establishment of a PPP was authorized in August 2022.

- Will allow the project to move from pilot phase to Business.
- Allow for investment in industrial shredder to cater for larger quantities of plastics and higher grades of plastics.
- Allow NSU to diversify its operations. Manufacture of other formed products e.g. garden steppers, planters,



# Re-Create- Local Manufacturing

## Targeting PET & HDPE plastics for recycling.



## Reasons for Targeting grades 1 & 2 plastics.



Available in large quantities  
2625 tonnes per year.



Easiest grades to  
manipulate and therefore  
easy to recycle.



Products to be  
manufactured can find  
ready market on island.



Does not intend to export  
and therefore would no  
have to store recyclables for  
long periods in warehouses.

## Re-Create Projections and milestones

- Purchase machinery for the plant and have on island by October 2022.
- Collaborate with local institutions to establish plastic collection stations.
- Acquire vehicles for waste transportation
- Process 4,409 lbs of plastic per month or 52,908lbs per year
- Increase plastics processes by 25% each year

Re-Create is investing USD80,000.00 in the purchase of equipment to process PET and HDPE plastics as follows:

- PET: fiber in the manufacture of Stuffed toys, Pillows, cushions, and craft.
- HDPE: Plastic flakes in the manufacture of beams, craft and sheet press for making tabletops and park benches.



Involves  
Purchase  
and logistics  
for 7 key  
processing  
machines

Plastic shredder

Flakes washing machine

Flakes Dryer

PET Polyester to fibre

Extruder

Injector and

Sheet Pressers

---

## Out of the Box Development

---

The focus of this company is the recycling of Tyres, plastics and all oils found on island.

The tyre and plastic products emerging out of investment in a pyrolysis plant will include Birthing cushions for marinas and docks, rubber mats , molder form products and rubber crumbs for sale to manufacturers of other products.

## Out of the Box Investment

- 1.4 Million USD for the recycling plant and infra structure.
- Plant equipment is comprised of 3 separate processing lines:  
Mechanical Tyre & plastic shredding equipment  
Pyrolysis Batch run plant  
Rubber crumb mold making equipment.

# Limitations to waste diversion/ Challenges

- High Start Up capital
- Lack of sufficient financial resources
- Lack of suitable lands
- Insufficient examples to prove viability ( seen as a risk venture)
- Slow approval time from relevant authorities

## Solutions

- GSWMA will provide its available equipment to facilitate businesses.
- GSWMA will seek funding to purchase equipment required equipment to assist businesses – enter into lease agreement with businesses.
- Equipment needs list inc: Grid-tied Solar PVC System for oil refinery.
- Computers, Wood Chipper, Commercial vehicles, Used Oil storage tanks, Skid Steer Loaders, plastic bailer, plastic granulator, metal baler



# Other Collaborations

## Other ongoing projects engagements

### ReMlit –OECS Project

- **ReMlit –OECS project.**
- Pilot waste separation to retrieve plastics and recycle in some form.
- *Colour coded litter bins*
- *Training workshops for sanitation staff.*
- *Equipment support.*

### ReMlit ctd

- Public Awareness education- Promotions locally and across the region. Inc competitions
- Clean-up initiatives- addressing Marine litter.
- Promotional material
- Consultancy for Legislative review to effect the Waste Management Act. Absence of Regulations to go with the Act.

# RePlast Project 2022

## Introduction to waste separation

- Introduced in June 2022.
- Driven by Unite Caribbean
- Collaboration between GSWMA, Coca Cola, Bottled water producers, Tourism stakeholders.

## Waste handlers workshop



Two-month pilot project to determine Grenada's readiness to get into waste separation & return plastic bottles for rewards project.

## Collection drives island wide



## Coastal clean-up initiatives



## 7 weeks into the project



**7000 lbs of plastic PET bottles were collected.**

• Sources:

- Coastal collection drives,
- Establishment of special collection system for Carnival celebrations.
- Deposits from major hotels
- Deposits from the SGU
- Citizen drop offs
- Commercial establishments

## Expected outcomes of the RePlast 2month pilot project.

- Grenadians would have a better appreciation of how plastics have impacted the marine environment.
- They will see the need to recycle plastics.
- One business entity will take up the project –Rainbow Janitorial company.
- Government, GSWMA and stakeholder entities will lend support to a sustainable like initiative.

# General Public Relations

- Daily Radio productions
- Radio and Tv Promos
- EFSI- School project for student awareness.
- Production and broadcast of documentaries
- PR in support of the NBDWCA.
- Production and distribution of relevant promotional material.

## PR.ctd

- Community engagements-
- Householders
- Businesses
- Street Vendors
- Surveys for Bin removal- Process





# International Sector Day Observances

Anti Litter Awareness Week.

**World Water Day- TV Appearances  
partnership with NAWASA to address  
ground water contamination**



**Stop Marine Plastic Pollution... Be the  
Solution**



## Public Education /promotion

**GSWMA in Carnival**



Thank You







## UNEP's Marine Litter Projects in the Wider Caribbean Region

*Presented by: Sarah Wollring*

*Associate Programme Officer, UNEP Cartagena Convention Secretariat, [sarah.wollring@un.org](mailto:sarah.wollring@un.org)*



The Caribbean is the biggest plastic polluter per capita in the world





Supported by Jamaica and  
other Caribbean countries

Partnerships towards regional & global  
transboundary cooperation –  
**UNEP/EA.5/Res.14**

**End plastic pollution: towards an  
international legally binding instrument**



3

Eliminating pollution is one of the three pillars of UNEP's  
work, with **plastic pollution** being very high priority

UNEP's medium-term strategy outlines  
a set of transformative shifts that  
target the drivers of climate change,  
biodiversity loss and pollution, and  
looks at their impacts.



*Towards the Sustainable  
Development Goals*

## Global Partnership on Marine Litter (GPML)



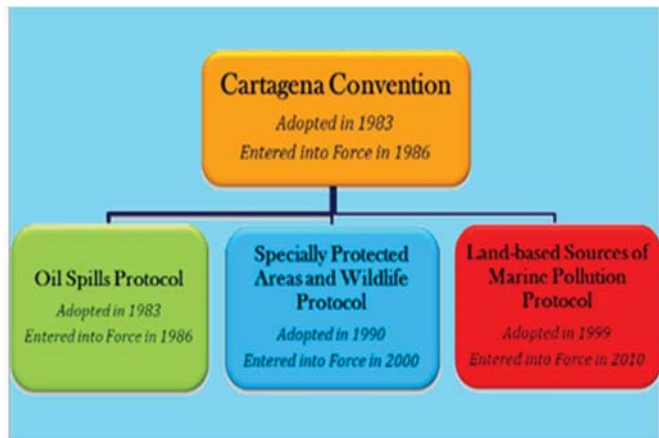
Global Partnership  
on Marine Litter

A multi-stakeholder partnership that  
brings together all actors working to  
prevent marine litter and plastic  
pollution.

Led by a Steering Committee and the  
United Nations Environment  
Programme (UNEP)



# Cartagena Convention & LBS Protocol



The LBS Protocol under the Cartagena Convention focuses on:

- **Pollution** from land-based sources and activities
- **Pollution** from ships
- **Pollution** caused by dumping



## RATIFICATION OF THE LBS PROTOCOL



\* Caribbean Netherlands: Special public bodies of the Netherlands. Alternatively known as Bonaire, St. Eustatius and Saba, BES Islands



# About GPML-Caribe

- A partnership for national and regional organizations, governments, research/technical agencies and individuals, that are focused on reducing the quantity and impact of marine litter in the WCR.
- The work of the Node directly supports Governments in meeting national, regional and global agendas.
- The Gulf and Caribbean Fisheries Institute (GCFI) and the Secretariat for the Cartagena Convention are the co-hosts of the GPML-Caribe.



## Regional Marine Litter Action Plan



CEP Technical Report: 72

### REGIONAL ACTION PLAN ON MARINE LITTER MANAGEMENT (RAPMaLi) FOR THE WIDER CARIBBEAN REGION 2014



**Vision:** A healthy Caribbean Sea without risks from marine litter

**Mission:** To provide leadership, information and resources in efforts that have been developed to reduce marine litter in the Caribbean Sea

**Composition:** National, regional organizations, governments and research individuals working to reduce the impact of marine litter in coastal zones of the Wider Caribbean Region



### Regional Strategies and Action Plans



### Reports, Factsheets, Project Outputs



## ACP MEA III - AFRICAN, CARIBBEAN AND PACIFIC MULTILATERAL ENVIRONMENTAL AGREEMENT III

- **Geographic scope:** Antigua and Barbuda, Saint Kitts and Nevis, Dominica, St. Lucia, Barbados, Saint Vincent and the Grenadines, Grenada, Trinidad and Tobago, Suriname, Guyana, Bahamas, Dominican Republic, Jamaica, Cuba, Belize
- **Timeframe:** 2019-2023
- **Budget:** 2M EUR under Component/Objective 2
- **Expected results:**
  1. Reinforcement of Regional Seas Conventions Governance Frameworks and associated protocols
  2. Development of regionally representative networks of Marine Protected Areas
  3. **Reduction of the influx of waste** (plastics and other forms of human and industrial liquid and solid waste) **entering the marine environment of the four regions**
  4. **Document best practices and lessons learnt in marine litter management** at the community level

# EU Action Programme: Support to the effective and sustainable management of Solid Waste in the Caribbean



- **Geographic scope:** CARIFORUM Member States (Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago and Cuba).
- **Timeframe:** 2022-2025
- **Budget:** 8M EUR
- **Implementing partners:** UNEP, AFD, GIZ, supported by OECS Commission
- **Expected results:**
  1. Robust solid waste management **legal and strategic frameworks** are developed;
  2. **Capacity** for sustainable consumption and sustainable waste management in **targeted areas** is enhanced;
  3. **Investment opportunities** in the solid waste sector are defined and facilitated; and
  4. **Increased awareness** of the EU-CARIFORUM partnership including on waste management and circular economy.



## GEF LAC CITIES - Reduce marine plastics and plastic pollution in Latin American and Caribbean cities through a circular economy approach (2022-2026)

- ✓ Partnership between GEF, UNEP through the Cartagena Convention Secretariat and local governments (city administration)

**Objective:** Reducing regional marine plastics and plastic pollution by facilitating governments and businesses at the city-level, to accelerate the transition to a circular economy thereby responding to national, regional and global marine litter and plastics-related action plans, resolutions and commitments Latin American and the Caribbean (LAC).

- ✓ Geographical scope: **Colombia, Jamaica and Panama**



**Component 1:** Municipalities led governance and policy development  
**Component 2:** Private sector led interventions, waste management and recycling  
**Component 3:** Intercity marine plastics and plastics circular economy engagement Network  
**Component 4:** Capacity development, visibility improvement, knowledge management and dissemination, and communications.



## PREVENTION OF MARINE LITTER IN THE CARIBBEAN SEA –

### Promoting Circular Economy Solutions

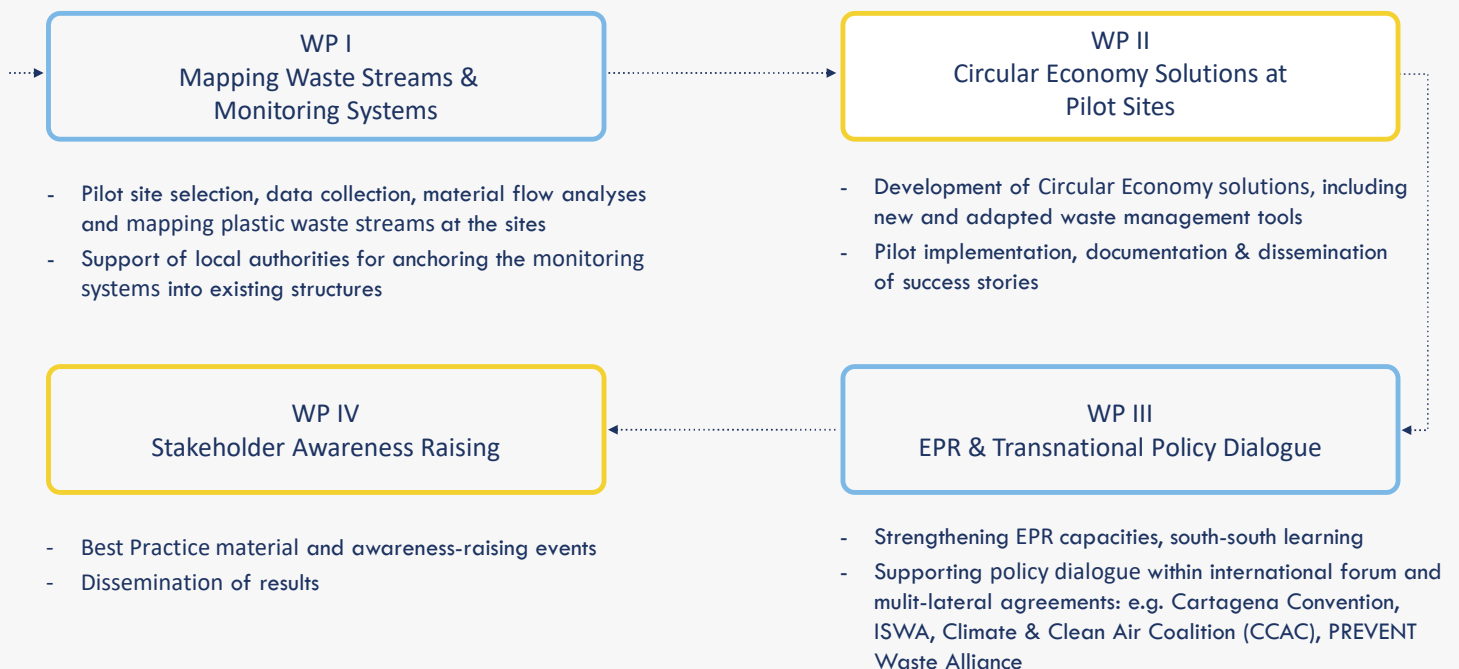


Federal Ministry  
for the Environment, Nature Conservation,  
Nuclear Safety and Consumer Protection

Time frame	10/2022 – 10/2025
Donor	German Federal Ministry for the Environment and Nuclear Safety and Consumer Protection (BMUV), coordinated by ZUG as programme manager
Funding	4.9 million EUR
Target countries	Dominican Republic, Costa Rica, Colombia, the <b>British Virgin Islands, Guyana, Suriname, Saint Kitts &amp; Nevis, and Trinidad &amp; Tobago</b>
Lead implementer (proposal submitter)	Adelphi (Germany)



## PROMAR | WORK PACKAGES





## Trash Free Waters International Initiative (2016-2019)

- ✓ Partnership between the U.S. EPA, Peace Corps, Cartagena Convention Secretariat, UNEP's Regional Office for Latin America and its Caribbean Sub-Regional Office

**The Trash Free Waters (TFW) Initiative** catalyzes local communities and governments in the Caribbean region to work together to develop marine litter policies and projects that reduce the amount of trash entering the Caribbean Sea.

- ✓ National projects were implemented in **Jamaica** and **Panama** through partnerships with Governments, NGOs, Civil Society and Private Sector.



### JAMAICA

(Bluefields and Whitehouse communities)

- 200 garbage bins distributed across 40 locations.
- 4,500 lbs of plastic bottles were collected for recycling.
- Public awareness campaigns -3,445 persons
- 2,500 lbs compost
- 20 residents trained in composting and jewellery making



## Protecting Our Caribbean Sea, Sustaining Our Future

# THANK YOU

United Nations Environment Programme Caribbean Environment Programme  
and Cartagena Convention Secretariat

14-20 Port Royal Street  
Kingston, Jamaica, W.I.

<https://www.unep.org/cep/>

[unep-cartagenaconvention@un.org](mailto:unep-cartagenaconvention@un.org)



UNEPCartagenaConvention



UNEP\_CEP



YouTube: CEPUNEP



LinkedIn: UNEP-Caribbean Environment Programme

# ANTIGUA AND BARBUDA

## Journey to ending Plastic Pollution



Prepared by:

Indira James-Henry  
F. Daryl Spencer

## Significant Achievements to date

- 1995: National Solid Waste Management Authority Act 1995
- 1999: The establishment of the NSWMA and the Environmental Services Department signaled a public awareness and attitudinal and behavioural change regarding Solid Waste Management. In excess of 5000 school children educated on the principle of recycling
- 2005: Amendment to the National Solid Waste Management Authority Act 1995
- 2005 to present: Antigua and Barbuda Waste Recycling Corporation (ABREC) have processed approximately 1.4 million lbs of plastics (693 tonnes/ 33 40ft containers)
- 2015: Environmental Protection and Management Act ( amended in 2019, repealing the 2015 legislation)
- 2016: Antigua and Barbuda became the first country within the Americas to ban Single-use-Plastics
- Amendment of the Litter Prevention and Control Act

## Significant Achievement cont.

- 2020: Beneficiary country of the regional project GEF 5558; Development and Implementation of a Sustainable Management Mechanism for Persistent Organic Pollutants in Eight (8) Caribbean Countries. Implemented by Basel Convention Regional Training Centre for Training and technology Transfer for the Caribbean (BCRC- Caribbean)
- 2020: Plastic Waste Free Island Project , Searious Business consultants collaborated with IUCN and Asia Pacific Waste Consultants (APWC) to determine the plastic waste pathways across the life cycle of different plastic types.. Antigua Grenada and St. Lucia



### THE MINISTRY OF HEALTH AND THE ENVIRONMENT **ANTIGUA & BARBUDA**

#### REUSABLE BAGS



MAKING A DIFFERENCE  
ONE BAG AT A TIME



<https://www.facebook.com/investingforwellness>  
<https://www.facebook.com/aandbenviron>  
<https://www.facebook.com/nationalsolidwaste>

#### BIODEGRADABLE CONTAINERS



MAKING ANTIGUA AND BARBUDA  
STYROFOAM FREE





# Meaning of the Ban

- “Expanded polystyrene “Styrofoam” : is defined as food service products” to include food containers including bowls, plates, hot and cold beverages cups and cup lids, clamshell, hinge lids and all other containers made of polystyrene for food services, meat, vegetable, and fruit trays, egg cartons, coolers, and any other products made of Expanded Polystyrene and used for selling or providing food for consumption on or off the premises.
- “Shopping plastic bag” means plastic bags that are polyethylene or petroleum-based used as shopping bags. These are sometimes called single-use bags for carrying items from a store to home or off premises these bags ranges from High Density Polyethylene (HDPE), Low Density Polyethylene (LDPE), Linear Lowdensity Polyethylene (LLDPE), Medium Density Polyethylene (MDPE), and Polypropylene (PP).

# Meaning of the Ban

- The External Trade (Shopping Plastic Bags Production) Order, 2017, bans the import, distribution, sale, and use of plastic bags. Art. 3.
- The law exempts a list of plastic bags including bread wrapping, wrap for fresh meat and fish, primary packaging, medicine, laundry dry cleaning, waste disposal, etc. Schedule.
- The External Trade (Expanded Polystyrene) (Prohibition) Order, 2018, bans the use of styrofoam and promoting the use of biodegradable and reusable materials

# Measured Impact of Plastic Pollution

- **Human Health Concerns** – Leaching of styrene and ethylbenzene from food service containers
  - Department of Health and Human Services indicates that styrene “Reasonably anticipated to be a human carcinogen”
  - International Agency for Research on Cancer labels styrene a possible carcinogen;
- **Environmental Concerns-** Littering and improper waste management can increase exposure to chemical contamination
  - Animal health
  - Marine plastic litter and micro plastics contamination
  - Ingestion by wildlife
  - Environmental persistence (littering)
  - Burning leads to POPs and UOPs generation and ozone depleting substances
- **Economic Burden-** Over 2 Million lbs net weight polymers of single use plastics imported between 2015-2019

## Waste Generation

Waste generation amounts in tonnes (2020)	101, 968.14
Waste generation rate (kg/person/day)	3.54
Plastic waste generation amounts pre plastic ban (ton/day)	18.68
Waste collection coverage	97%
Recycling rate	Not determined
Recycling rates for Plastics	Not determined

Commonly recycled materials: glass, aluminium cans, steel cans, PET, tyres and metal

Annual Waste Receipt 2020													
Technician:													
Month	Waste Type												Total
	House hold	Indus	Com	Instit	Medical	C & D	Clean Bulk	Bulk Waste	Cruise Ship	Street Sweep	Sewage	Tyres	
January	2,143.67	33.64	850.18	17.87	6.53	348.10	137.78	4,575.40	130.67	80.24	1,615.92	117.30	10,057.30
February	2,370.17	58.20	1,042.90	25.35	0.88	703.37	487.67	5,684.04	190.90	86.85	1,617.64	81.3	12,349.27
March	2,212.00	17.08	942.89	164.21	0.70	571.91	86.71	5,622.63	68.34	78.83	1,686.16	78.17	11,529.63
April	1,884.43	74.66	301.77	174.44	0.51	103.67	8.34	2,858.27	0.27	77.47	868.11	24.89	6,376.83
May	1,904.52	74.32	433.41	60.13	1.78	343.54	560.03	5,722.53	-	242.31	955.88	38.09	10,336.54
June	2,123.86	33.72	552.23	65.69	0.65	352.26	33.81	4,954.62	-	220.57	1,168.32	47.69	9,553.42
July	2,212.93	23.58	581.07	84.42	1.35	454.63	70.13	7,209.66	-	196.58	1,076.17	47.58	11,958.10
August	1,978.69	24.15	577.00	42.30	3.16	584.77	115.86	10,751.97	-	56.35	1,164.09	45.49	15,343.83
September	2,062.45	107.66	568.06	19.47	1.10	900.87	383.84	9,180.17	-	37.66	1,126.02	75.94	14,463.24
October													-
November													-
December													-
Total	18,892.72	447.01	5,849.51	653.88	16.66	4,363.12	1,884.17	56,559.29	390.18	1,076.86	11,278.31	556.45	101,968.16



## Cooks Sanitary Landfill

Prior 2016

# Ongoing Initiatives

- THE EXTERNAL TRADE (EXPANDED POLYSTYRENE) (PROHIBITION) ORDER, 2018, No.44
- THE EXTERNAL TRADE (SHOPPING PLASTIC BAGS PROHIBITION) ORDER, 2017, No. 83
- LITTER CONTROL AND PREVENTION ACT, 2019 No. 3 of 2019
- PLASTIC WASTE FREE ISLAND (IUCN AND GOVERNMENT )
- ESTABLISHMENT OF A PLASTIC BOTTLE CONTAINER DEPOSIT LEGISLATIONS (CDLS)- effective recovery of recyclable and non-recyclable plastic material
- UPGRADE OF THE SOLID WASTE MANAGEMENT ACT TO INCLUDE HAZARDOUS WASTE TYPES, AND RECYCLABLE MATERIALS
- ESTABLISHMENT OF AT LEAST 4 COMMUNITY RECYCLING COLLECTION POINTS ACROSS THE ISLAND.

## Plastic Waste Free Antigua Barbuda



Every bottle you return is recycled into a new bottle



Contribute to a Cleaner Environment

OUR ENVIRONMENT AND LANDFILL DEPENDS ON YOU!



**For more information contact:**  
The Ministry of Health, Wellness and the Environment  
462—5522  
Department of Environment  
562—2568  
Will's Recycling  
Willsrecycling@gmail.com

 <https://facebook.com/investingforwellness>  
 ABWREC-Antigua-Barbuda-Waste-Recycling-Corporation  
 <https://www.facebook.com/AandBEnviron>



**JULY 5 2021**  
**STARTING: 9:00 AM TO 3:00 PM**  
**(MONDAYS, WEDNESDAYS, SATURDAYS)**





**THE MANADATE FOR  
THE MINISTRY OF  
HEALTH,  
WELLNESS AND  
THE ENVIRONMENT**



The policies and programs mandated by Ministry of Health, wellness and the Environment seeks to encourage preventative health care while increasing more environmentally friendly practices aimed at an overall holistic healthy lifestyle.

Antigua and Barbuda has been selected by the International Union for Conservation of Nature, Regional Office for Mexico, Central America and the Caribbean (IUCN-ORMACC), with support from the Norwegian Agency for Development Cooperation (NORAD) and Searious Business for a Plastic Free Waste Island Project.

**What is Plastic Waste Free Islands In a nutshell...?**

A project working towards driving Antigua and Barbuda circular economy to eliminate plastic leakage.



**HOW BOTTLE DEPOSIT WORKS !!!**

**Step 1:** Collect your transparent Soda and Water Bottles with the code (1) PET

**Step 2:** Drop-off at any of the following locations between 9: 00 am -3:00 pm on (Mondays, Wednesdays, Saturdays)

**Step 3:** Get \$0.20 cents back for every soda and water bottle code (1) PET

**ISLAND WIDE DEPOSIT LOCATIONS !!!**

**PHASE I**

- 📍 Epicurean Fine Foods & Pharmacy Supermarket on Epicurean Drive
- 📍 Ebenezer Plaza South Mall
- 📍 Crab Hole Liquors Cobb's Cross

**PHASE II**

**COMING SOON!!!!!!**

**BENEFITS OF RECYCLING PLASTIC**

- ⇒ Helps to protect the Environment
- ⇒ Provides financial incentives for recycling
- ⇒ Assist in the prevention of Littering
- ⇒ Job Creation
- ⇒ Creation of more opportunities to recycle other waste
- ⇒ Production of high-quality recyclable materials (chairs, tables, souvenir's, etc.)
- ⇒ Encouragement and promotion of producer and consumer responsibility



**REDEEM THROUGH**



# Plastic Waste Collection under IUCN project


Over 1 million bottles collected



## Ongoing initiatives cont.

- In collaboration with OECS ReMLit: Sound Land Based Waste Management Technologies towards a pollution free marine environment in Antigua and Barbuda

BUILDING RESILIENCE IN THE EASTERN CARIBBEAN THROUGH A REDUCTION IN MARINE LITTER (REMLIT)



**OECS Journalist Challenge:**  
**CLEAN OCEANS**  
#oecsoceanaction #bigocceanstates

**The Challenge**  
Produce journalistic work focusing attention on:  
• Ocean pollution and ocean governance in the OECS today  
• The Circular Economy model and its implications for Waste Management in the OECS  
• ReMLit Project interventions as catalysts for change and enablers of the transition to a Blue Economy

**Who Qualifies?**  
Practicing Journalists/ Reporters/Bloggers based in the Member States of the Eastern Caribbean, in any one or a combination of Print, Broadcast and Online media.

**What Qualifies?**  
Entries must be published work these formats:  
• Broadcast / Print News Reports  
• Special Investigative print, audio or video feature stories  
• Published limited short series for print, audio or video pieces  
• Blog series  
• Podcast series

Through the use of research, journalists should make the connection between the problem of ocean pollution in the OECS, Circular Economy and the Blue Economy showing how different stakeholders are taking action / or must act to prevent and fight the problems of Ocean Pollution as well as advance the OECS sustainable development agenda.


Share work on the Facebook page: Media for Climate Change Education Action  
<https://www.facebook.com/groups/1438731043102963>  
with the hashtag: #oecsoceanaction #bigocceanstates

**Competition Timeline**  
Work published between June 8th 2021 (World Oceans Day), and September 26th, 2021 (World Environmental Health Day).

**PRIZES XCD**  
1st **5500**  
2nd **4500**  
3rd **3500**

Submissions must be in English and must be available online during that period  
Download the complete competition information kit at:  
<https://cutt.ly/OECS-Journalist-Challenge>  
**Deadline: September 26th, 2021 at 11:59 p.m. AST**

Organisation of Eastern Caribbean States



Norwegian Ministry of Foreign Affairs



## Resources and Funding

- Financial resources for start –up companies to promote the plastic markets
- Institutional support for government and private sectors
- Establishment of small markets export facilities
- Producer responsibility extended to SIDS



## Technical/Human Capacity

- Knowledge transfer with SIDs for new and innovative pathways in recycling technology
- Knowledge transfer with profitable upcycle products such as furniture, shoes and clothing establish within SIDs
- Technical training in creating shipping routes that small scale island states can boost the circular economy to deal with the plastic generated within the various islands.
- Educational promotion campaigns funded by producers in small scale economies being as robust as first world states

## Antigua and Barbuda Vision

- Unified regulation among CARICOM
- Implementation of a legally binding treaty for all countries
- Inclusion of technical and financial assistance for the transition away from plastics. To include educational promotion for the reduction of plastics.
- Promotion and implementation of the full lifecycle of plastics
- Research and testing for suitable alternative materials





**THANK YOU!**





# MARINE PLASTIC WASTE IN GUYANA

Satrohan Nauth

Director of Sanitation

Minister of Local Government & Regional Development

1<sup>st</sup> September, 2022

## AGENDA

- Background
- Ministry of Local Government & Regional Development
- Our structure
- Roles & responsibilities
- Area of focus
- Strategic direction
- Efforts to tackle marine plastic litter
- Challenges
- Opportunities



# BACKGROUND

- On the north Atlantic coast of South America lies the land of many waters.
- 214,970 km<sup>2</sup> in area
- Bounded by: - Venezuela to the west,  
- Suriname to the east,  
- Brazil to the west & south  
- Atlantic Ocean to the north
- 90% of the population lives on the low coastal plain.
- 80% tropical rainforest
- Population of 747,884



3

## MINISTRY OF LOCAL GOVERNMENT & REGIONAL DEVELOPMENT

### Vision

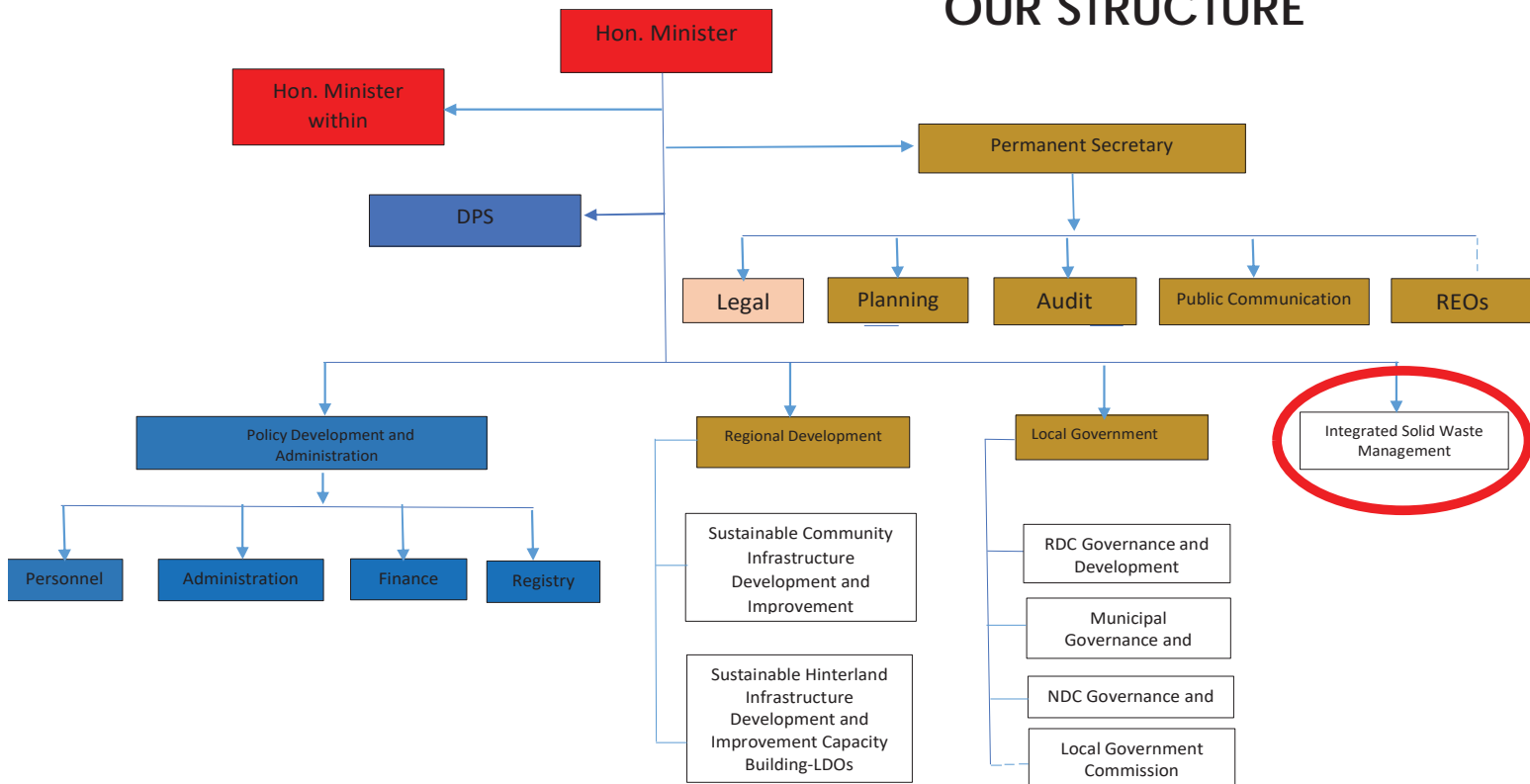
"To collaborate and transform communities across Guyana"

### Mission

"To supervise and maintain the legal and regulatory framework of the system of local and regional administration; to encourage and facilitate the development of the regions and local organs; and to support the continued integration and development of the hinterland communities."



## OUR STRUCTURE



## SWM AGENCIES

“To strengthen the solid waste management programme at the local level to deliver timely collection, appropriate treatment and disposal of waste”

Ministry of Local Government & Regional Development

10 Regional  
Democratic Councils

10 Municipalities

70 Neighborhood  
Democratic Councils

1800 Community  
Development  
Councils



## LEGAL FRAMEWORK

- Municipal and District Councils Act, Chapter 28:01
- Environmental Protection Act, Chapter 20:05
- Public Health Ordinance, Chapter 145
- Draft Solid Waste Management Bill



7



## STRATEGIC DIRECTION

### Objectives

- A cleaner environment
- Better public health protection
- Contribute to economic prosperity

### Goals

- Less litter & illegal dumping
- Less waste generated
- Better resource recovery
- Efficient and cost-effective waste collection
- Better waste infrastructure
- Strengthen human & institutional capacity

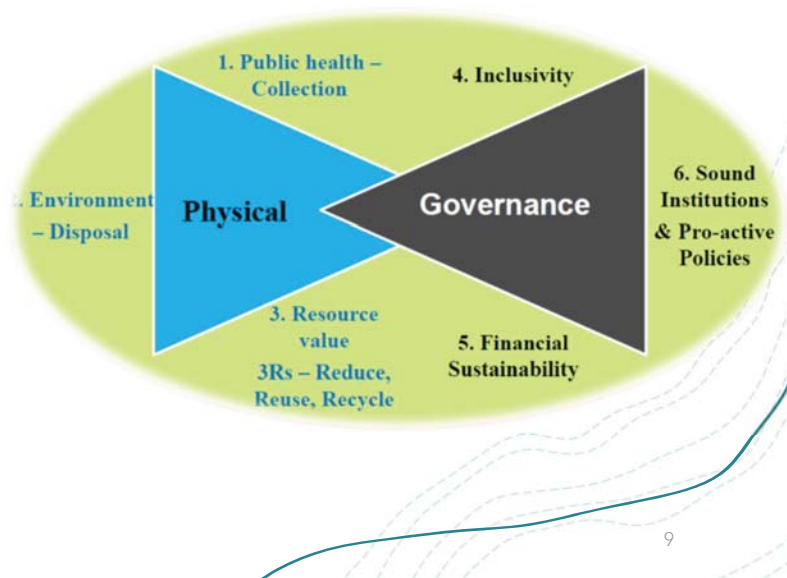


8

## AREAS OF FOCUS



## Integrated sustainable waste management



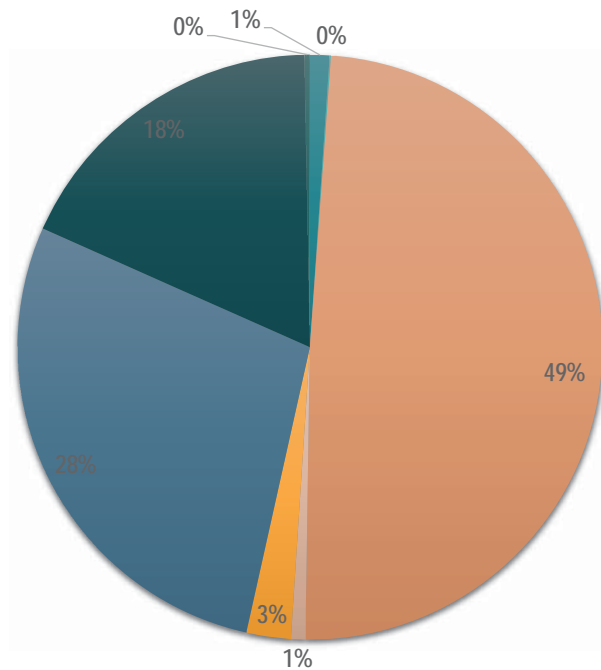
9

## PRESENT SITUATION



- Waste increased exponentially due to the rapidly growing oil & gas sector
- Collection is done by local authorities and private service providers
- 95% of the waste is landfilled
- No hazardous and industrial waste landfill
- Abundance of agriculture (sugarcane, rice, etc.) and forestry (sawmill & harvest residue) wastes.
- Minimal recycling and recovery – metals, glass bottles, wood, inert waste and C&D waste

## WASTE LANDFILLED



Year: 2021

- Institutional
- Industrial
- Commerical
- Medical
- Construction/ Demolition
- Domestic
- Soil
- Tyres

Total – 442,787 tons

11

## EFFORTS TO TACKLE PLASTIC WASTE



- National Enhancement Committee – Monthly Cleanup Exercise
- Developing 2 new regional landfill facilities & upgrading of other controlled landfill sites.
- Closure and restoration of illegal dumpsites
- Public awareness campaign for littering
- Collaboration with UNEP to modernize the draft SWM bill
- Removal of waste from pump stations before entering the Atlantic Ocean
- Beach cleanup exercises
- Providing resources to Local Authorities e.g. equipment, bins, etc.

12



## NATIONAL ENHANCEMENT COMMITTEE



- Monthly Cleanup Exercise in the 10 Administrative Regions
- A collaborative effort between the Government, Municipalities, Private Sector, NGOs, Civil Societies and Residents
- Works include cleaning and removal of waste from public spaces, drainage network and removal of derelict vehicles.

13

## NATIONAL CLEANUP EXERCISE



14



## PLASTIC WASTE CLOG DRAINAGE NETWORK



15

## BEACH CLEANUP EXERCISE & MANGROVE RESTORATION PROJECT



16



## TRASH RACK TO CAPTURE WASTE



17

## UPCYCLED PLASTIC HOUSE



18



## CHALLENGES

- Growing waste streams
- Collection coverage
- Finance and cost recovery mechanism
- Industrial and hazardous waste treatment facilities
- Material recovery/recycling facilities
- Institutional capacity and resources
- Behavioural change
- Enforcement of supporting legislations

19

## OPPORTUNITIES



### Materials Recovery

Tyre  
Metals  
Derelict Vehicles



### Recycling

Composting  
Plastics  
E-waste



### Waste to Resource

Pyrolysis  
Gasification  
Anaerobic Digestion



### Waste Oil Recycling

Motor oil  
Cooking oil



### Waste treatment facilities

Oil & Gas waste  
Hazardous waste  
Biomedical waste



20

# CONCLUSION

- Primarily focusing on infrastructure development across all 10 administrative regions to increase collection and disposal of waste.
- Public education and awareness campaigns to change behaviour.
- Create an enabling environment for private sector to be involved in waste recovery and recycling.
- Remove waste from waterways before entering the Atlantic Ocean

21

# THANK YOU



***“Solid Waste Management: a good choice today for a healthier tomorrow”***

Satrohan Nauth

Director of Sanitation

Satrohan.nauth@mlgrd.gov.gy



# **Technical Cooperation Project on Advisor for Marine Plastic Litter Management in the Caribbean Region**

## **INFORMATION & KNOWLEDGE SHARING WORKSHOP**

**August 31 – September 2, 2022, Jamaica**

### **EFFORTS AT TACKLING PLASTIC WASTE IN SAINT LUCIA**

*Laurianus Lesfloris*

*General Manager (Ag.)*



**Saint Lucia Solid Waste  
Management Authority**

## **THE PROBLEM**

- Based on a WCS in 2002, plastics made up 15% of waste stream
- Based on a 2008 WCS plastics makes up 22% of the household waste stream
- In 2018 a WCS of the most populous district indicated that plastics made up 25% of the waste stream with PET and HDPE accounting for 42%.
- The percentage of plastics in the waste stream continues to increase.
- Plastics enters the environment mainly through littering followed by indiscriminate disposal of waste



# **THE PROBLEM –**

## **Plastics in the marine environment**



## **Efforts at Addressing the Problem – Private Sector Action**

- Private sector -
  - Massy Supermarket –
    - Ban on single use plastic shopping bags
    - Established collection points at supermarkets for PET/HDPE
    - Provide support to the RePLAST Project
  - Windward & Leeward Brewery Limited
    - Provided facility for a recycler to operate
    - Provides support to the RePLAST Project
  - CHEMICO – Deposit refund for HDPE
  - Hotel/Hospitality Sector – Ban on SUP
  - Recyclers – collection of plastics for export



# **Efforts at Addressing the Problem – Unleashing the Blue Economy in the Caribbean (UBEC) Project**

- World Bank-Finance Project
- Strengthen the enabling environment for the blue economy and to enhance resilience of selected coastal infrastructure
  - 5-year project - SLU, GRE, SVG
  - Fisheries & Agriculture – US\$3.4M
  - Tourism - US\$6M
  - Waste Management – US\$6.32M
    - Development of a NWMS
    - Design & Development of a PA & E Program
    - Implement a Source Separation Pilot Program
    - Develop a Composting Facility
    - Undertake the ES Closure of Vieux Fort Waste Disposal Site
    - Feasibility Study for Development of Landfill in Southern part of Island



# **Efforts at Addressing the Problem – RePLAST Project**

## **OBJECTIVES**

- Collect, sorting and manage PET
- Export PET to Caribbean
- Public awareness and education
- Replication in other OECS countries



# **Efforts at Addressing the Problem –**

## **RePLAST Project**

- Part-Funded by the Republic of France
  - Incentivized and volunteer model - recyclers collect, bale and ship plastics
  - Participation by communities, schools, hotels
  - Private sector provides incentives in the form of reward points for products & services
  - Volunteers set up pop-up depots on weekends
  - Extended by OECS through funding by the Norwegian Government
  - US\$10K monthly to operate – PR, Depots ops, Consultant fees
  - Ended 26 August 2022.
  - 150K pounds of plastic waste collected and shipped (20 mths)
  - Next step - ????????



# **Efforts at Addressing the Problem –**

## **Marine Litter-Management Action Plan**

- Funded by UNEP – Completed by November 2022
- Develop a Marine Litter Strategy and Action Plan to reduce the impacts of plastic pollution
- Determine the current state of knowledge on marine litter and plastic pollution in Saint Lucia (including sources, pathways, and impacts of plastic in the environment, as well as data gaps)
- Recommend actionable steps and interventions that can be implemented (including monitoring, policy, infrastructure, etc.) to reduce the impacts of plastic pollution





# **Efforts at Addressing the Problem – Building Resilience in the Eastern Caribbean Through Reduction of Marine Litter (ReMLit)**

- Implemented by OECS Secretariat – Funded by Gov't of Norway - US\$3M - Began in 2019 - 2022
- Follow up to the OECS Solid & Ship Generated Waste Management Project (2003) – SLU, SVG, GRE, ANB, DOM, MON
- To contribute to building resilience in marine ecosystems through a reduction in marine litter

## **OBJECTIVES**

- Enhance policy and legislation for effective reduction and management of waste
- Increase awareness of issues relating to marine litter
- Undertake concrete interventions to reduce and control litter in the marine environment



# **Efforts at Addressing the Problem – Building Resilience in the Eastern Caribbean Through Reduction of Marine Litter (ReMLit)**

- Enhance the enabling environment and coordinate mechanisms for waste management,
- Facilitate new business opportunities or stimulate existing initiatives for material recycling, reuse or/and substitution,
- Develop fiscal and other incentive programs to reduce plastics and Styrofoam use, and encourage sustainable production, recycling and reuse where appropriate,
- Develop a strategy to improve the transboundary/transnational movement of plastics and other waste within the OECS to enhance economies of scale and provide affordable secondary raw materials for waste recycling enterprises.
- Support enhancement of national policy, legislation and fiscal incentive frameworks.
- Develop and implement community-based interventions that contribute to reducing marine litter.



# **Efforts at Addressing the Problem – Building Resilience in the Eastern Caribbean Through Reduction of Marine Litter (ReMLit)**

## **Outputs to date**

- Draft Model Sustainable Waste Management Policy - waste management and resource recovery challenges
- Draft National Sustainable Waste Management policy
  - Focus on waste prevention, improved material recovery, addressing challenges of plastic pollution
- Draft New Legislation –
  - Waste Management Regulations
  - Hazardous Waste Regulations
  - Hazardous Waste (Control of Transboundary Movements) Regulations
  - Litter (Control and Prevention) Act



# **Efforts at Addressing the Problem – Plastic Waste-Free Islands (PWFI)**

- Financed by the Norwegian Agency for Development Cooperation (NORAD)
- Antigua, Saint Lucia and Grenada – (SIDS)
- Hosted by International Union for Conservation of Nature (IUCN) and the OECS
- 3-year program began in 2019
- The project seeks to drive the circular economy agenda forward and to reduce plastic waste generation and leakage from the islands.
- Three plastic waste-related sectors of tourism, fisheries and waste management.



# **Efforts at Addressing the Problem – Plastic Waste-Free Islands (PWFI)**

## **Demonstrate how to reduce plastic waste generation and leakage**

- Measure and Classify the amount and type of plastic waste in each island
- Identify economically viable products that can be developed with recyclable polymers as alternative to existing products.
- Support knowledge uptake and capacity building among target public and private stakeholders



# **Efforts at Addressing the Problem – Legislation**

- Draft Beverage Containers Bill (2008) - MBCB
- Enactment of the Styrofoam and Plastic Food Service Containers (Prohibition) Act of 2019 prohibits the manufacture, sale, use, distribution and importation of Styrofoam and single use plastic food service containers and items such as spoons, forks, knives, etc.
- Application of a zero percent (0%) import duty on all bio-degradable and compostable alternatives
- Education and awareness campaign to promote the transition away from Styrofoam and single use plastic food service items





# Efforts at Addressing the Problem – Public Information & Awareness



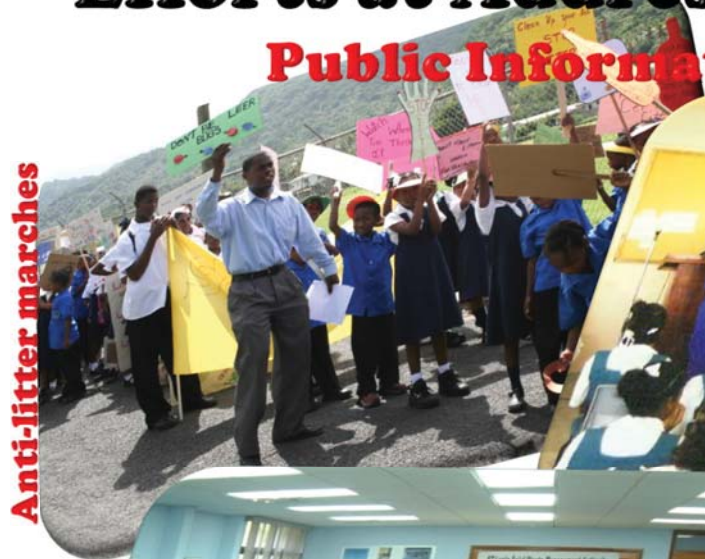
# Efforts at Addressing the Problem – Public Information & Awareness





# Efforts at Addressing the Problem – Public Information & Awareness

Anti-litter marches



Schools' presentations



Workshops/training



Landfill tours



Saint Lucia Solid Waste Management Authority. Website: [www.sluswma.org](http://www.sluswma.org)



# Efforts at Addressing the Problem – Public Information & Awareness

- Production of PSA – radio & TV
- Participation in radio and TV talk shows
- Creation of website
- Meetings in communities
- Staging of summer workshops for children

Saint Lucia Solid Waste Management Authority. Website: [www.sluswma.org](http://www.sluswma.org)



# THANK YOU!

