

THE DEMOCRATIC REPUBLIC OF TIMOR-LESTE

**DATA COLLECTION SURVEY
ON
SOLID WASTE MANAGEMENT
IN DILI MUNICIPALITY
FOR
REDUCING MARINE PLASTIC WASTE
IN TIMOR-LESTE**

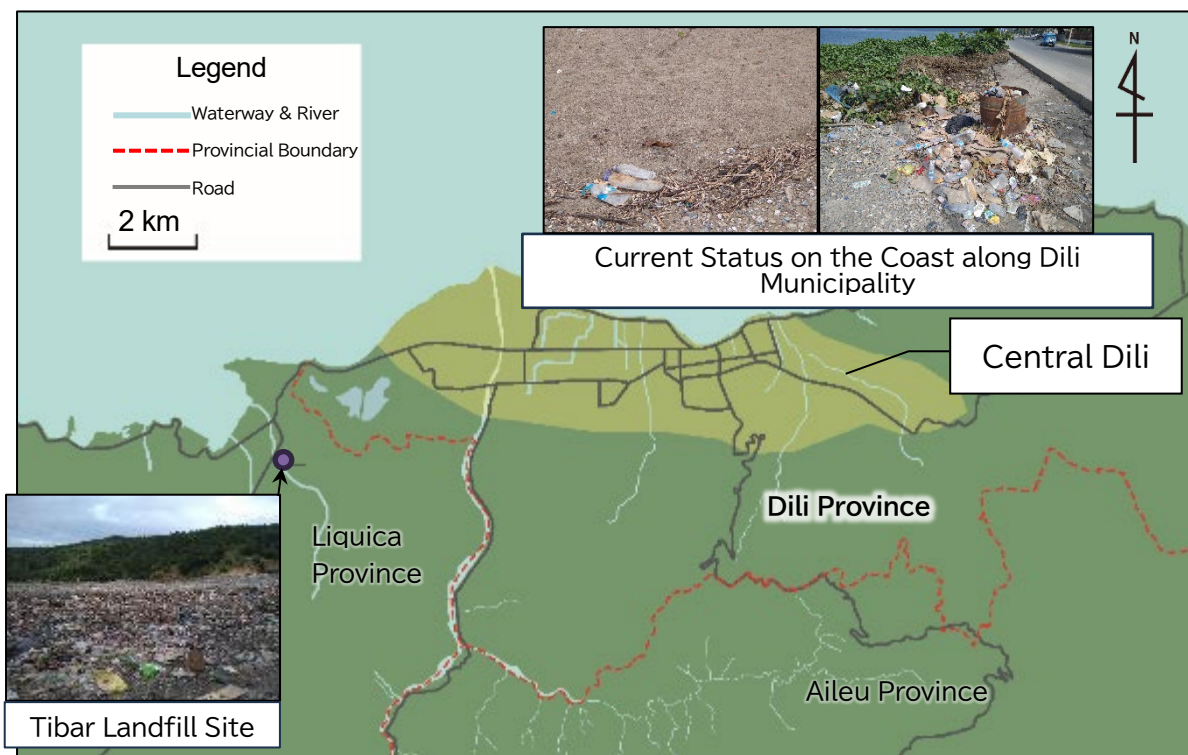
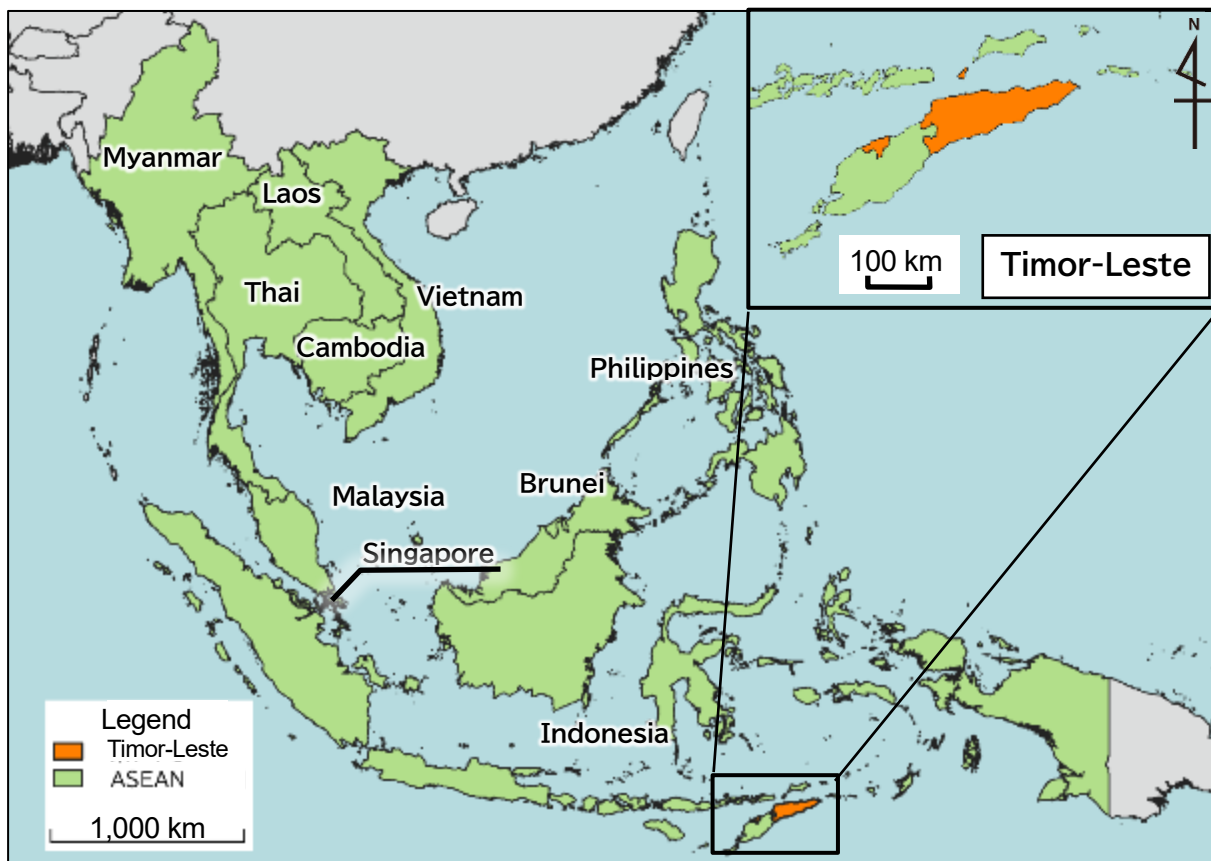
FINAL REPORT

OCTOBER 2024

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NIPPON KOEI CO., LTD.

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Survey Site Map

Data Collection Survey on Solid Waste Management in Dili Municipality
for
Reducing Marine Plastic Waste in Timor-Leste
Final Report

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Abbreviations

3R	Reduce, Reuse, Recycle
ACCPP	ASEAN Conference on Combatting Plastic Pollution
ADB	Asian Development Bank
AMS	ASEAN Member States
ASCC	ASEAN Socio-cultural Community
ASEAN	Association of Southeast Asian Nations
ATSEA	Arafura and Timor Seas Ecosystem Approach
CEIA	Centro Edukasaun no Informasaun Ambiental
COBSEA	Coordinating Body on the Seas of East Asia
COVID-19	Coronavirus Disease 2019
DBO	Design-Build-Operate
DNA	Designated National Authority
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPR	Extended Producer Responsibility
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
HASATIL	Hametin Agriculture Sustainable Timor Lorosa'e
ICT	Information and Communication Technology
IEE	Initial Environmental Examination
INC	Intergovernmental Negotiating Committee
INFPM	National Institute of Pharmacy and Medical Product
INSPTL	National Institute of Public Health in Timor-Leste
JICA	Japan International Cooperation Agency
KOICA	Korea International Cooperation Agency
MSA	Ministry of State Administration
MTE	Ministry of Tourism and Environment
NDUOS	National Directorate of Urban Organization Services
NGO	Non-governmental Organization
NHSSP	National Health Sector Strategic Plan
PET	Polyethylene Terephthalate
PMU	Project Management Unit

PPP	Polluters Pay Principle
PSA	Plastics Solutions Alliance
PVC	Polyvinyl Chloride
RDF	Refuse Derived Fuel
RPF	Refuse Paper & Plastic Fuel
RPP	Recycling Pilot Promotion
SEA	Strategic Environmental Assessment
SMASA	Municipal Environmental and Sanitation Services Authority
SOP	Standard Operating Procedure
SPACE	Strategic Program for ASEAN Climate and Environment
SPREP	Secretariat of Pacific Regional Environment Program
SWM	Solid Waste Management
TDRUP	Tibar Dumpsite Rehabilitation and Upgrading Project
UN	United Nations
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VSA	Volunteer Service Abroad
WACS	Waste Amount and Composition Survey
WHO	World Health Organization

1 Overview of the Survey

1.1 Background and Objective

According to the solid waste survey conducted by the Asian Development Bank (ADB) in 2015, the estimated daily waste generation amount in Dili Municipality was 190 tons/day, and plastic comprised 18% of the total waste generated. Census data showed that the population of Dili Municipality has increased from 268,000 in 2015 to 325,000 in 2022, and this trend is prospected to continue. As a result, the daily waste generation amount is estimated at 300 t/day in 2024 and will increase to 720 t/day by 2040 with further population growth.

The lack of understanding on solid waste management among general citizens has caused environmental impacts due to the improper disposal of plastic waste and other types of waste. Heavy rainfall causes rivers and drainage overflow, bringing a massive inflow of plastic waste that clog of the drainage systems, and often lead to littering in the coastal areas. Therefore, waste collection status in Dili Municipality likewise needs to be improved. The recycling activities by non-governmental organizations (NGOs) or private companies in Dili Municipality are limited.

To address these issues, the government prepared “Zero Plastic Policy”, that bans single-use plastics such as shopping bags and straws to reduce plastic consumption. Some donors have provided support for waste separation and recycling. Although NGOs and community groups have conducted awareness programs and cleanup campaigns, these efforts have had only temporary effects. Furthermore, relevant ministries and agencies lack sufficient understanding of the current situation, and there are ambiguities in their respective roles and responsibilities are ambiguous.

The ninth administration of Timor-Leste, inaugurated in July 2023, aims at early accession to the Association of Southeast Asian Nations (ASEAN). The report of the fact-finding mission prepared by the ASEAN Secretariat in 2022 highlighted the needs of capacity building in environmental management and governance under the ASEAN Socio-cultural Community (ASCC) pillar. In response, the government has officially announced to implement a marine plastic reduction strategy as part of its "Five-Year Program".

Furthermore, at the Japan-ASEAN Ministerial Dialogue on Environment and Climate Change held in Laos, in August 2023, Japan proposed the Japan-ASEAN Climate Environment Strategy Program (SPACE) and pledged to promote cooperation in addressing plastic pollution.

As Timor-Leste seeks to join ASEAN, it is essential for the country to align its efforts with those existing ASEAN Member-States and implement appropriate measures to address these issues.

The objective of the Data Collection Survey on Solid Waste Management (SWM) in Dili Municipality toward Reducing Marine Plastic in Timor-Leste (hereafter, referred to as “the Survey”) is to identify issues and provide recommendations for marine plastic waste management in line with the country’s geographical and social environment by collecting existing information on i) relevant laws, regulations and policies, ii) current status of SWM at and around Dili Municipality, iii) assistances by other donors on SWM and marine plastic countermeasures, and iv) measures adopted in the ASEAN region.

1.2 Approach to the Survey

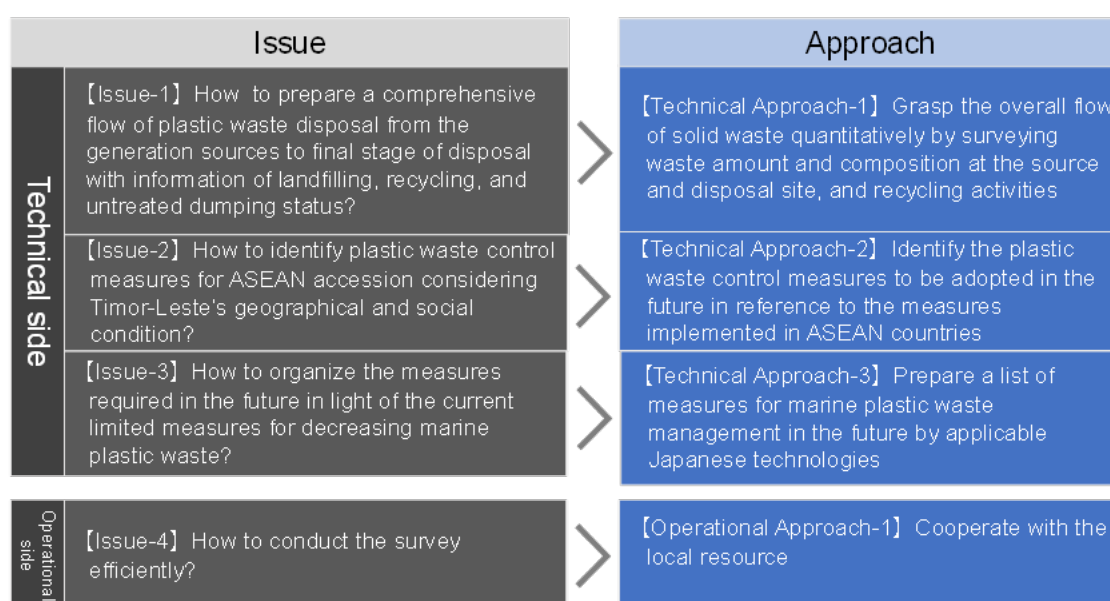
In Dili Municipality, waste generation and composition has changed due to urbanization trends and lifestyle

changes spurred by the coronavirus disease 2019 (COVID-19) pandemic. To consider future marine plastic waste management, it is necessary to understand the current waste volume and composition. Moreover, Timor-Leste is currently aiming at joining ASEAN as early as possible. To achieve this aiming, it is required to implement marine waste reduction strategies in line with ASEAN policies. The ASEAN countries have adopted measures to address marine plastics, however, in Timor-Leste, except for the "Zero Plastic Strategy," related regulations have not yet been established. Given the current situation, it is required to examine applicable measures among the ones implemented in the ASEAN countries and other nations with experience in marine plastic waste management, taking Timor-Leste's unique geographical and social environment into account.

Currently, systematic treatment and recycling activities are not conducted by administrative organizations, and only simple recycling activities by a few private recycling operators are being carried out. Going forward for achieving the "Zero Plastic Strategy" with the implementation of the "Decree No. 37/2020 Banning Plastic Bottled Beverages", it is necessary to adopt feasible plastic management measures in Dili Municipality.

Considering the situation mentioned above, the following points have been identified as the issues:

1. How to comprehensively understand the flow of plastic waste from the source to final disposal.
2. How to address plastic waste management measures for ASEAN accession, considering Timor-Leste's geographical and social conditions.
3. How to organize necessary future measures, considering the current limited marine plastic waste reduction measures.



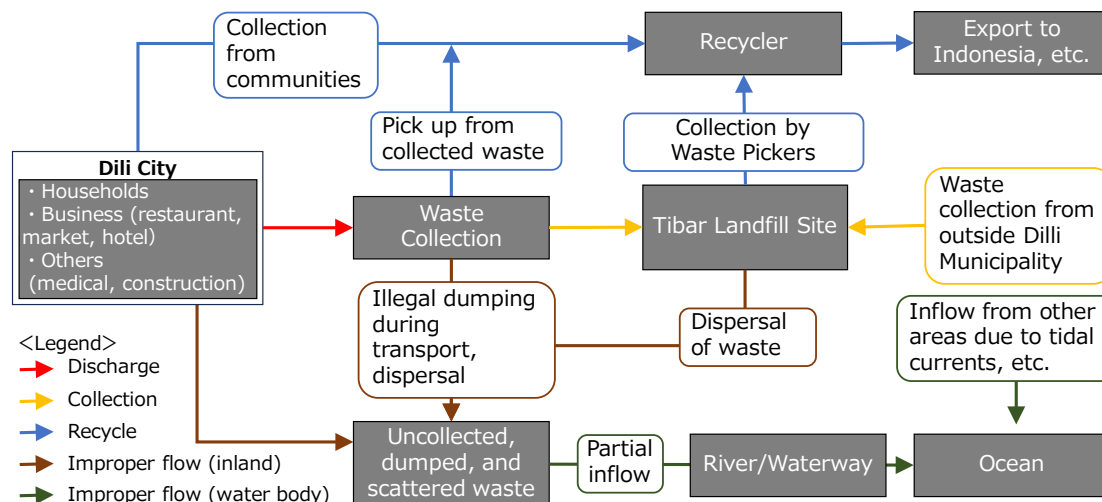
Source: JICA Survey Team

Figure 1-1 Basic Approach for the Implementation of the Survey

Technical Approach-1	Grasp the overall quantitative flow of solid waste by waste amount and composition survey at the waste generation sources and disposal site and recycling activities survey
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Marine plastic waste mainly originates from improper inland SWM. Especially in developing countries, where there are many challenges in inland SWM, it is considered that increasing the land-based waste

collection rate with conducting appropriate treatment and disposal would contribute to significant decreasing the discharged amount of plastic waste into the ocean. To collect data on current waste treatment and disposal through the Survey, an waste amount and composition survey was conducted in Dili Municipality to obtain an overview of the waste flow and generated status of marine plastic waste, as shown in Figure 1-2.



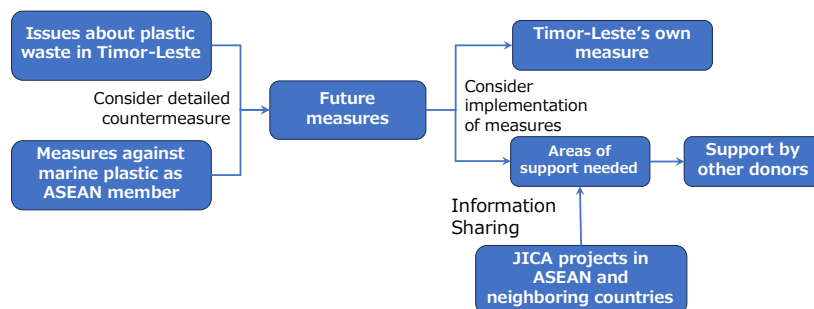
Source: JICA Survey Team

Figure 1-2 Waste Flow Diagram

In quantifying waste flow, it is important to conduct waste amount surveys at the sources, disposal sites, and recyclers to obtain a quantitative overview of generated solid waste. To grasp the discharged status of plastic waste into the ocean, the rate of plastics contained in waste needs to be identified by surveying waste amount and composition at the generation sources and disposal site. The amounts of plastic waste generated and disposed were measured in the survey. Regarding the amount of plastic handled by recyclers, in the collection stage, the collected amounts by communities at the generation sources and by private collectors were measured. In addition, transported amount and collected amount by waste pickers in the disposal stage were also measured. Having information on generated waste and measured data in the aforementioned survey, the amount of uncollected, dumped, and scattered plastic, including plastics waste runoff to the ocean, were examined.

Technical Approach-2	Identify the plastic waste control measures to be adopted in future in reference to the measures implemented in experienced countries.
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To identify measures for improving plastic waste control in future, the JICA Survey Team identified applicable measures by referencing with countries who have implemented suitable plastic waste management including some ASEAN countries. It also took into consideration the geographical and social conditions in Timor-Leste, based on the issues identified by assessing the current situation. The Survey proposed the measures that Timor-Leste could implement through discussions with the Ministry of State Administration (MSA), the Dili Municipality, and other concerned stakeholders. The Survey also examine the support that the international donors are currently implementing or planning in future and identified required support for Timor-Leste and Dili Municipality. Figure 1-3 shows a flow for examination of the required measures and support in reference to the ones implemented in the ASEAN countries.



Source: JICA Survey Team

Figure 1-3 Flow of Consideration of Measures for Future Support

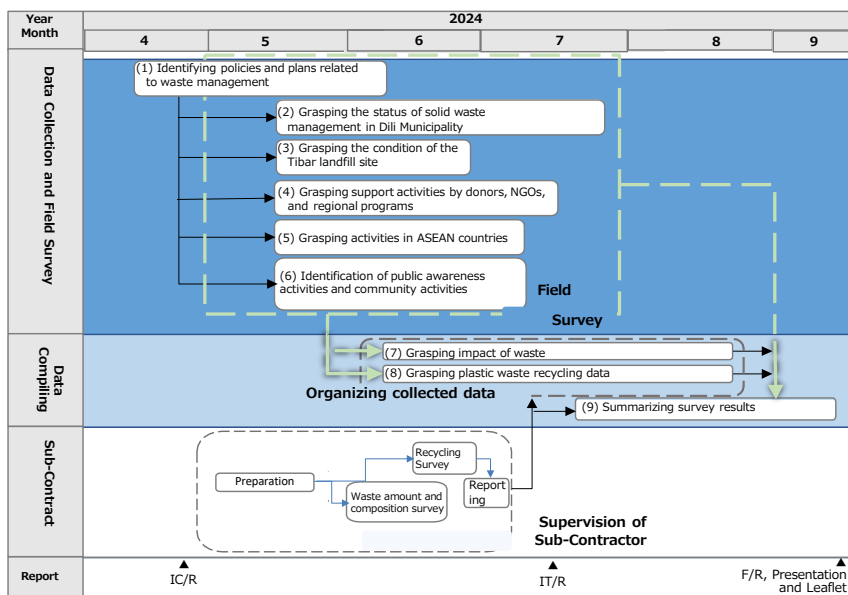
Technical Approach-3	Prepare a list of measures for marine plastic waste management in future by applicable and suitable technologies.
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To identify the measures to be adopted for marine plastic waste management, various aspects need to be examined, such as effective approaches for waste reduction, ways for sufficient collection and proper disposal, prevention of illegal dumping, collecting onshore and offshore scattered waste, developing and using alternative materials to plastics, and awareness-raising activities.

In order to implement effective measures for marine plastic waste control in future, a list of applicable measures covering the aspects mentioned above was prepared. Marine plastic waste reduction measures for each stage of SWM were identified based on the findings from the overall flow of waste prepared as described Technical Approach-1 and other confirmed information. The identified measures will be grouped depending on the expected timing of their implementation as short-, medium- and long-term measures.

1.3 Survey Contents and Schedule

The Survey was conducted in line with the following workflow.



※ IC/R: Inception Report, IT/R: Interim Report, F/R: Final Report

Source: JICA Survey Team

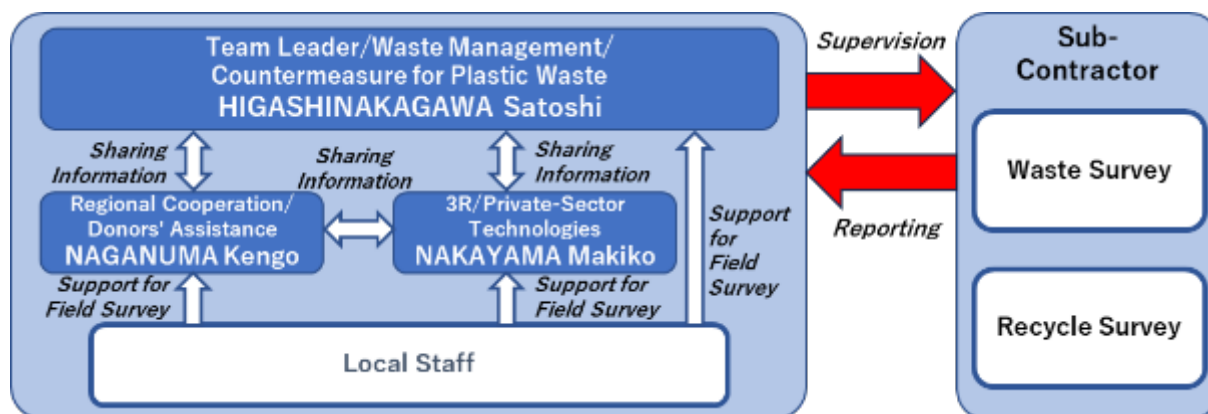
Figure 1-4 Workflow of the Survey

The information on the existing policies and laws regarding waste management, plastic waste reduction, and public awareness were collected from websites in home work in Japan, and the meetings with the relevant organizations in Timor-Leste. The information on future policies and investment plans were likewise collected in the meetings with relevant organizations, such as the MSA, the Ministry of Tourism and Environment (MTE), and Dili Municipality in Timor-Leste. Meanwhile, the information on the status of SWM in Dili Municipality was collected through interviews with the Sanitation Department of Dili Municipality and on-site surveys. The activities of donors, NGOs, and other ASEAN countries were grasped through meetings with each organization as well as from the websites.

The Waste Amount and Composition Survey (WACS) and Recycling Survey were conducted by the local consultant as subcontracting work.

1.4 Survey Team

The implementation structure of the Survey is shown in Figure 1-5. The JICA Survey Team consists of three experts. A local staff was hired for the field survey to support the Japanese experts. The WACS and Recycling Survey were conducted by the local consultant as subcontracting work.



Source: JICA Survey Team

Figure 1-5 Implementation Structure of the Survey

2 Policies, Plans, and Measures Related to Waste Management by the Government of Timor-Leste

2.1 Existing Laws and Regulations of SWM

The Basic Environmental Law, named “Decree Law for Environmental Basic Law: Number 26/2012”, is positioned as fundamental law concerning environmental management. Additionally, the “Decree Law for Solid Waste Management”, formulated in 2017, is operated as a fundamental law for waste management. There is no basic law regarding a recycling-oriented society and the 3R (Reduce, Reuse, Recycle), nor industrial waste. The main laws and regulations related to environment and waste management with their summaries are as follows.

2.1.1 Decree-Law for Environmental Basic Law: Number 26/2012

This Decree-Law for Environmental Basic Law was enacted on July 4th in 2012. Its purpose is to regulate principles and regulations for environmental protection, sustainable use of natural resources, and environmental management. The outlines of the law are described as follows.

1. **Objective (Article 2):** The decree-law aims to establish the bases for environmental policy, guiding principles for the conservation and protection of the environment, and the sustainable use of natural resources to enhance the quality of life of its citizens.
 2. **Scope (Article 3):** The decree-law and related environmental legislation apply to the entire national territory, including land, internal waters, territorial sea, airspace, and the exclusive economic zone. It applies to individuals and entities, both national and international, within Timor-Leste.
 3. **Goals (Article 4):** The state is responsible for encouraging a healthy and ecologically balanced environment contributing to health and well-being with defining and implementing environmental policy, legislation, programs, plans, and projects. The goals described in the decree-law are:
 - To reduce environmental pressures throughout the life cycle of natural resources usage,
 - Not to subordinate natural resource usage to economic growth, and
 - To ensure sustainable natural resource usage without compromising the environmental balance and securing environmental capacity to meet future generations' needs.
 4. **Responsibilities (Articles 61 and 139):** The state must encourage environmental protection activities, recognizing every citizen's right for receiving a healthy and ecologically balanced environment. Citizens have a duty to preserve and protect the environment for future generations. Natural resource should be used with maintaining ecological balance and preventing ecosystem destruction.
 5. **International Obligations:** Timor-Leste has ratified several international conventions, such as the UN Framework Convention on Climate Change with the Kyoto Protocol, the Convention to Combat Desertification, and the Convention on Biological Diversity. It recognizes its responsibility to implement obligations of these international instruments.
 6. **Environmental Licensing and Permitting System:** This decree-law stipulates environmental licensing and permitting systems such as Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA). The decree-law also regulates requirements on social considerations for vulnerable groups such as people with disabilities, migrants, ethnic and religious minorities, and
-

formulation of public consensus.

2.1.2 Decree-Law for SWM: Number 2/2017

This fundamental Decree-Law for waste management, enacted on March 2nd in 2017, establishes the standards for waste management in Timor-Leste and aims to proceed environmental protection and sustainable development. The Decree-Law stipulates regulations for the collection, transportation, treatment, and disposal of waste, and designates municipalities as the responsible entities for implementation. It also highlights the necessity of educational campaigns to raise public awareness about the environment, particularly concerning waste disposal and reduction.

This Decree-Law aims to establish clear rules for the management of urban solid waste across Timor-Leste. The municipal administrations and municipal authorities have a mandate to manage urban solid waste within their jurisdictions. The key regulations of the Decree-Law are as follows:

(1) Management Entities

- Municipal administrations and municipal authorities are responsible for providing urban SWM services.
- These entities can apply for concessions for waste management, including collection, treatment, and final disposal of waste.

(2) Waste Definitions

- The Decree-Law defines various types of waste, including domestic waste, green waste, public cleaning waste, animal waste, demolition and construction waste, hazardous waste, and hospital waste.

(3) Setting Collection Service Fee

- Urban waste management services are funded through fees charged to users, that are indexed to electricity consumption. Domestic users are charged USD 0.01 per kWh and non-domestic users USD 0.02 per kWh.
- Fees cover service availability, operation, and maintenance, including the installation and replacement of waste collection equipment, waste transport, and landfill management.

(4) Billing

- The waste management fee is billed alongside electricity consumption and follows the same billing frequency.

(5) Penalties

- The Decree-Law outlines fines for various offenses related to waste management, including improper use of waste containers, interference with waste systems, and lack of hygiene in public places.
- Fines are doubled for repeat offenses within three months.

Overall, this decree law is a significant step towards promoting urban hygiene and ensuring sustainable waste management in Timor-Leste, aligning with the Strategic Development Plan 2011-2030 and the Constitution's mandate for a healthy and balanced environment.

2.1.3 Decree-Law for Sale, Import, and Production of Plastic Bags, Packaging, and Other Plastic Items No. 37/2020 of September

This Decree-Law establishes requirements for the sale, import, and manufacture of plastic products in Timor-Leste, aiming to restrict the use of single-use plastics and promote environmental protection. Many single-

use plastic products are prohibited, and the use of biodegradable or compostable materials is encouraged as alternatives, with the goal of reducing waste and minimizing environmental impact.

(1) Prohibition and Prevention of Use of Single-use Plastic for Packaging:

The following single-use plastic for packaging is mainly prohibited in this law.

- Prohibition of packaging and other single-use plastic objects that do not comply with general safety requirements and compliance with good manufacturing practice, labeling, traceability, and composition.
- Prohibition of release for consumption of any packaging or object made of non-recyclable, non-biodegradable, or non-degradable single-use plastic.
- The following single-use plastic objects are prohibited in case of both their being free of charge or for a fee, unless they are compostable and biodegradable.
- Prohibition of plastic bags as fruit and vegetable transport packaging, unless they are compostable and biodegradable.

(2) The Polluter Pays Principle and Extended Producer Responsibility:

The polluter pays principle and extended producer responsibility are mentioned.

- Any operator developing, manufacturing, or processing plastic products shall be subject to the principle of extended producer responsibility.
- Any operator covered by the preceding paragraph may be required to make changes to the design of the plastic object to ensure compliance with the general safety requirements.
- The operator must accept the return of the plastic product after it has been used and be responsible for the subsequent waste management.
- For the effective application of these principles, an environmental tax is created, instilling the costs of waste management on the initial producer of the waste or on the current or previous holders of the waste.
- The environmental tax aims to reinforce the reuse, prevention, recycling, and other recovery of single-use plastic bags, packaging, and objects.

(3) Promotion of Reduce, Reuse, and Recycle and Labelling:

- Plastic bags and packaging are designed in such a way that they can be reused for the same or different purposes.
- For the purposes of the preceding paragraph, the principle of recycling includes organic recycling, where: a) organic recycling is the aerobic (composting) or anaerobic treatment, through microorganisms and under controlled conditions, of the biodegradable parts of packaging waste, with the production of stabilized organic waste or methane; and b) landfilling is not a form of organic recycling.
- Where plastic objects do not meet the requirements to be reused and/or recycled, they should be capable of being used to produce energy, through direct incineration, with or without other types of waste, and with heat recovery.

2.2 Organizational Structure and Roles of Relevant Ministries

In the national government, the relevant ministries related to SWM are the Ministry of State Administration,

the Ministry of Tourism and Environment, and the Ministry of Health. The organizational structure and the roles of the ministries are described as follows:

(1) Ministry of State Administration

The Ministry of State Administration (MSA) is responsible for providing domestic public services, formulating and implementing infrastructure development plans, and overseeing the national waste management, including providing technical assistance and budgetary measures for infrastructure development related to waste management carried out by local governments. The National Directorate of Urban Organization Services (NDUOS) is responsible for SWM. The directorate provides technical support for each local authority, such as Dili Municipality. The organizational structure of the Ministry of State Administration is shown in Figure 2-1.

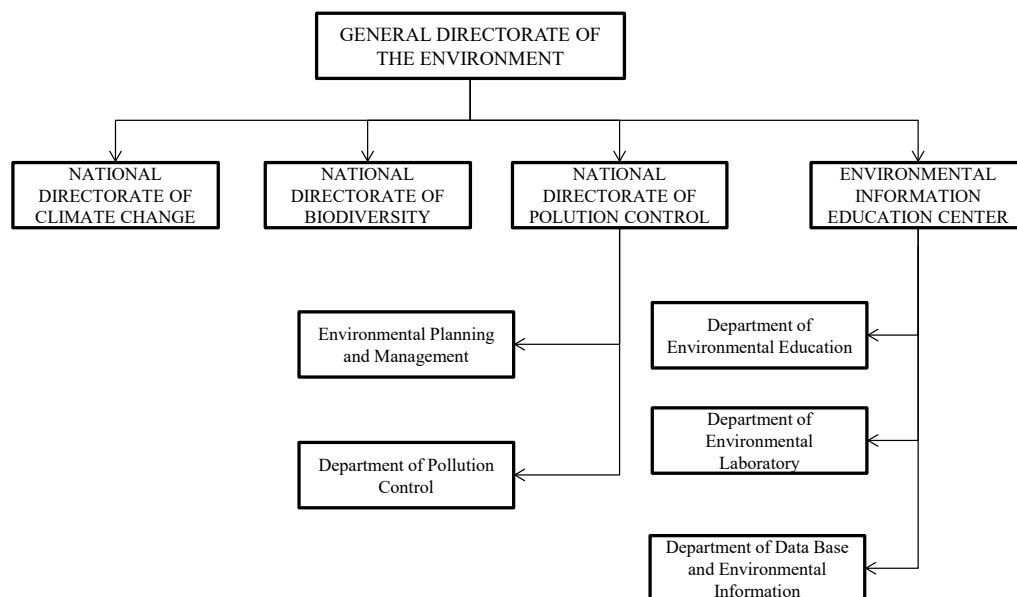


Source: Ministry of State Administration

Figure 2-1 Organization Structure of the Ministry of State Administration

(2) Directorate General for Environment under the Ministry of Tourism and Environment

The responsible organizations for environmental pollution control and environmental education have been transferred from the Secretary of State for the Environment to the Ministry of Tourism and Environment. The General Directorate of the Environment is the responsible organization for environmental management, which includes climate change, biodiversity, pollution control, and environmental education. The organizational structure of the General Directorate of the Environment is shown in Figure 2-2.

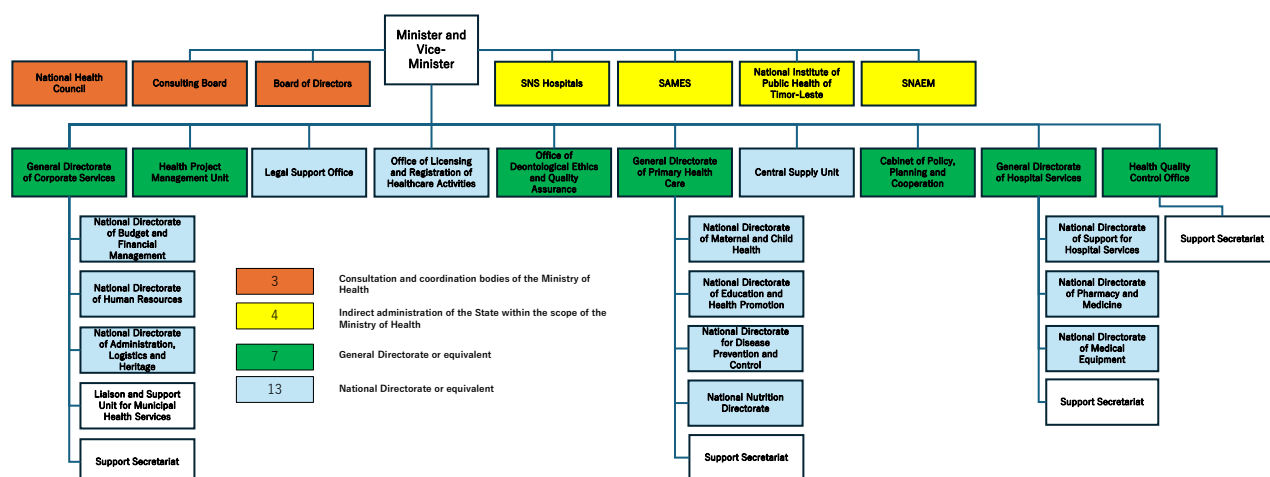


Source: Ministry of Tourism and Environment

Figure 2-2 Organization Structure of the General Directorate of the Environment in the Ministry of Tourism and Environment

(3) Ministry of Health

The Ministry of Health is the governmental organization responsible for the formulation, implementation, coordination, and evaluation of policies related to health and pharmaceutical activities. The main roles include establishing the necessary guidelines related to medical policies, ensuring that all citizens have access to healthcare services, and providing technical support to municipal and regional healthcare services, as well as providing technical support for medical waste management.



Source: Ministry of Health

Figure 2-3 Organization Structure of the Ministry of Health

3 Current Condition of SWM in Dili Municipality

3.1 Outline of Dili Municipality

Dili Municipality is the capital city of Timor-Leste and is located on the northwest coast, which faces the Ombai Strait and is bounded by the mountains to the south side. It has limited flatlands, and the longest distance from the coast to the foot of the mountains is about four kilometres.

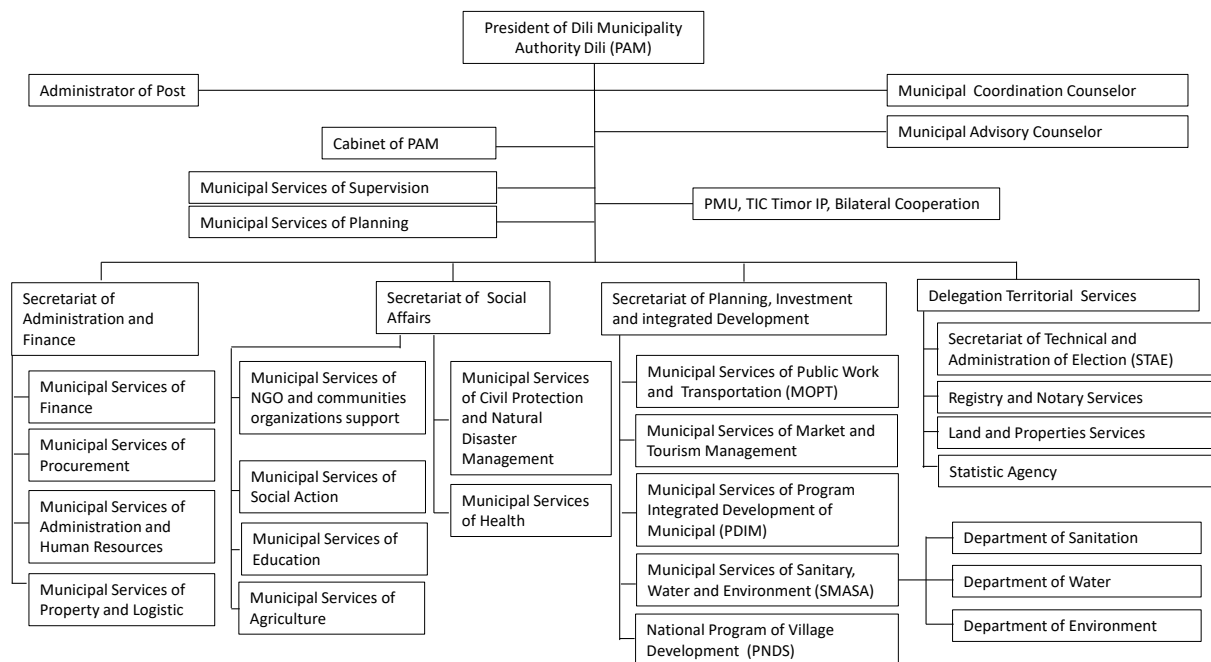
Dili Municipality comprises six administrative posts and 31 *sukus*, it accommodates a population of 324,738 (2022 Census) with an annual population growth rate of 2.7%, which is far above the national average growth rate of 1.8%. The climate is a tropical savanna climate, and the rainy season lasts from November to April, while the dry season is from May to October. The overall average rainfall is around 900 mm/year. The mean temperatures average around 26°C to 28°C and range from 10°C to 35°C.

In the case of Dili, the urban areas are Dom Aleixo, Vera Cruz, Nain Feto, and Cristo Rei (except Hera), while the rural areas are Metinaro and Hera. In the urban area, tertiary industries including various services such as wholesale, retail, hotel, restaurant, and transportation are the main industries. In addition, government employment and employment from the service industry dominate more than half of the labour distribution. On the other hand, in the rural area, the main industry is agriculture, with products such as coffee and rice. There are some protected areas in Dili Municipality, such as the Cristo Rei Protected Area and Tasitolu but there is no designated cultural heritage in the area.

3.2 Organization of SWM in Dili Municipality

Under the MSA, each municipality is responsible for practical tasks such as waste collection, transportation, and landfill management in their respective regions.

In the case of Dili Municipality, the responsible organization for collection and transportation is the Department of Sanitation under the Municipal Service of Sanitary, Water, and Environment. Currently, the Dili Municipality is trying to introduce the establishment of a new collection and transportation system through one private contractor from China. The responsible organization for contract management of the new collection, transportation system, and landfill management is the Project Management Unit (PMU), which has been newly established. The organizational structure of Dili Municipality is shown in Figure 3-1.



Source: Dili Municipality

Figure 3-1 Organizational Structure of Dili Municipality

3.3 Financial Condition of the Department of Sanitation

The Department of Sanitation manage the budget for public cleansing, collection and transportation, and final disposal. Currently, public cleansing is directly operated by the Department of Sanitation, while the collection and transportation, and final disposal is contracted out to contractors. All these activities are covered by the tax revenue. There is no waste collection service charge from business establishments and households, even though the collection service charge is set in the Decree Law for Solid Waste Management: Number 2/2017. There is no collection of tipping fees in the Tibar Landfill site. The SWM budget and expenditure for 2023, based on the Department of Sanitation, are shown in Table 3-1.

Table 3-1 Budget and Expenditure Regarding SWM in Dili Municipality

Item	Current Budget [USD]	Expenditure [USD]
Management and treatment of municipal solid waste	896,236.00	574,487.24
Cleaning public spaces including beaches and open space	2,850,044.00	766,629.09
Total	3,746,280.00	1,341,116.33

Source: Dili Municipality

3.4 Current Waste Flow

Waste amount and composition surveys at the generation source and Tibar landfill site, and a recycling survey have been conducted to grasp the current waste flow in Dili Municipality.

3.4.1 Waste Amount and Composition Survey at the Generation Source

A Waste Amount and Composition Survey (WACS) has been conducted in Dili Municipality. Previously, ADB conducted the WACS in 2014 and 2015. The methodology in this survey utilizes a similar approach but the number of samplings and categories of physical composition are a little bit more than those in the ADB survey, which will collect more detailed information in order to consider countermeasures for future

improvement concretely. Each sampling point for waste generation at the source has been selected in consideration for household income level of the household and the type of business establishments as shown in in Table 3-2.

Table 3-2 Survey Target of Waste Amount and Composition Survey

Generation Source		Number of Samples
Household (High income)	Motael, Bebonuk	33
Household (Middle income)	Comoro, Manleuana	33
Household (low income)	Madoni, Becora	34
Restaurant	International-style restaurants, cafes, warungs	10
Hotel	High-end, med-range budget hotels	10
Shop	Small shops, supermarkets	10
Office, School	Government Offices, NGO Offices, Schools	10
Hospital, Clinic	Health center, Private clinic	10

Source: JICA Survey Team

1) Waste Amount Survey

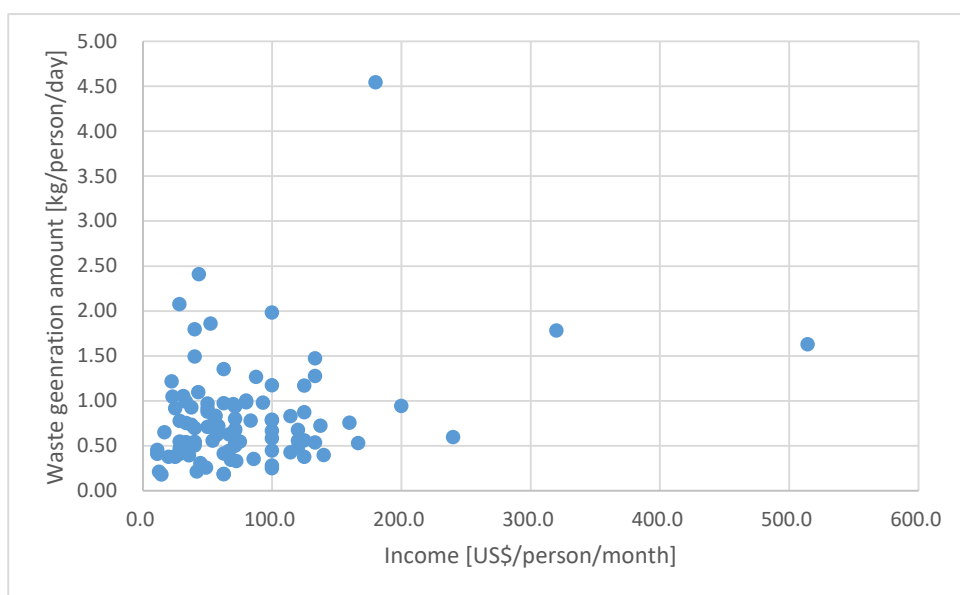
After setting the sampling points, basic information of households and business establishments were collected, including the number of the family and its income level of each household and the number of staff in the business establishments. In the waste amount survey, all waste were collected from the sampling points (households and business establishments). The collected waste were measured per sampled day and this survey continue daily for seven days. The photos of the status are shown in Figure 3-2.



Source: JICA Survey Team

Figure 3-2 Collection of Waste sample and its Measurement

Waste samples were taken from each household, and the measured weights were used to calculate the per capita waste generation rate based on the number of household members and the data was organized by income level. The dispersion figure of the relationship between income level and per capita waste generation rate is shown in Figure 3-3.



Source: JICA Survey Team

Figure 3-3 Dispersion Figure of Relationship Between Income Level and Per Capita Waste Generation Rate

The surveyors instruct each household to bring the daily generated waste into the collectors, but some households did not follow the suggestion such as discharge into waste collection points designated by the municipality or mixing from the other sources. Therefore some data show some extraordinary value. After a review and evaluation of the original data, the per capita unit generation rate ranged from 0.3 kg/person/day to 1.5 kg/person/day. In each category of income level. The average per capita waste generation rate is shown in Table 3-3.

Table 3-3 Per Capita Waste Generation Rate in Each Income Level

Income	Total Monthly Household Income / Person [USD/month]	Waste Generation [kg/person/day]
High income	More than 80	0.75
Middle income	40 to 80	0.73
Low income	Less than 40	0.66
Total		0.71

Source: JICA Survey Team

The average per capita waste generation rate in the urban area of Dili Municipality is 0.71 [kg/person/day]. The value is a little bit smaller than the estimated per capita waste generation rate, 0.75 [kg/person/day], in 2024 in the ADB report, “Preparing the Urban Services Improvement Sector Project (2015)” In the rural areas such as Hera or Metinaro, it is estimated at 0.57 kg/person/day, which is around 80% of the urban rate in Dili Municipality based on the field survey and hearing in the field. Based on the waste amount survey for each business establishment, the per capita unit generation rate for each business establishment is estimated as follows:

Table 3-4 Per Unit Waste Generation Rate for Each Business Establishment

Generation Source	Per Capita Unit Generation Rate [kg/unit/day]
Hotel	18.40
Restaurant	7.90

Generation Source	Per Capita Unit Generation Rate [kg/unit/day]
Shop	10.8
School/institution	10.8
Hospital/clinic	9.6

Source: JICA Survey Team

In consideration of the per unit waste generation in household and business establishments, the total waste amount generation in Dili Municipality is shown in Table 3-5.

Table 3-5 Estimated Waste Generation Amount in Dili Municipality

Generation Source		Number of Persons / Establishments	Per Unit Generation Rate [kg/person/day]	Waste Amount [ton/day]	
Household	Crist Rei	Rural	80,976	0.57	46.0
	Dom Aleixo	Urban	175,800	0.71	124.8
	Metinaro	Rural	7,601	0.57	4.3
	Nain Feto	Urban	35,550	0.71	25.2
	Vera Cruz	Urban	44,399	0.71	31.5
	Total		344,327	0.67	231.9
Generation Source		Number of Persons / Establishments	Per Unit Generation Rate [kg/person/day]	Waste Amount [ton/day]	
Hotel		61	18.40	1.1	
Restaurant		3,058	7.90	24.2	
Shop		3,044	10.8	32.9	
School/institution		1,143	10.8	12.3	
Hospital/clinic		63	9.6	0.6	
Total Waste Amount				303.0	

Source: JICA Survey Team

3.4.2 Waste Composition Survey

(1) Survey Method

The solid waste composition survey was implemented during 3 days from the end of June to the beginning of July, respectively. The collected solid waste was spread on dried plastic sheets and mixed well at first. After mixing, the sample reduction by quartering method was conducted until the amount of the sample was about 10 to 15 kg.

After that, each sample was manually separated into 13 items as described in Table 3-6 below, and the weight for each item was also measured.

Table 3-6 Methods and Sampling Number of Waste Composition Survey

Item	Description
Duration	Three (3) days including Saturday and Sunday
Number of Samples	Six (6) samples of waste discharged from households to be selected for city center and suburban areas
	One (1) sample of waste discharged from restaurants
	One (1) sample of waste discharged from hotels
	One (1) sample of waste discharged from shops or markets
	One (1) sample of waste discharged from institutions (offices or schools)
	One (1) sample of waste discharged from hospital
Measurement Items for Physical Composition Survey	1) Paper/cardboard, 2) Glass, 3) Plastic (hard), 4) Plastic (laminated), 5) Plastic (non-recyclable such as PVC, etc.), 6) Aluminum, 7) Other metal, 8) Food waste, 9) Green/Garden waste 10) Builders waste, 11) Soil and dirt, 12) Hazardous waste, 13) Miscellaneous

Source: JICA Survey Team

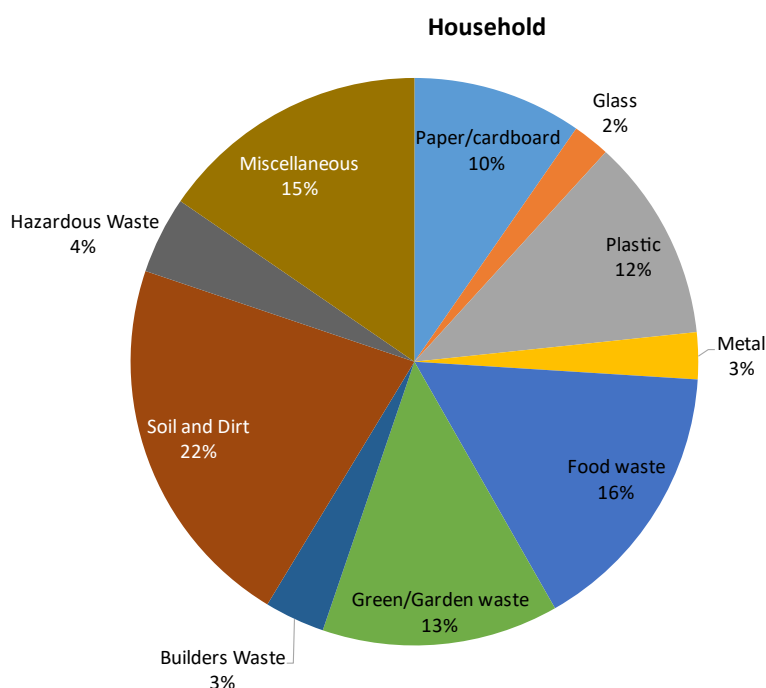


Source: JICA Survey Team

Figure 3-4 Mixing and Quartering of Sampled Waste and Sorting for Measurement of Each Item for Physical Composition Survey

(2) Results of Physical Composition

In the households, soil and dirt (22%), food waste (16%), and green/garden (14%) comprised a significantly larger portion of the waste compared with the other types. Plastic waste (hard) and plastic waste (laminated), which could be recycled in Timor-Leste, accounted 8%. On the other hand, non-recyclable plastic (such as PVC, etc.) occupied 3%. The results of the wet-based physical composition of household waste are shown in Figure 3-5.

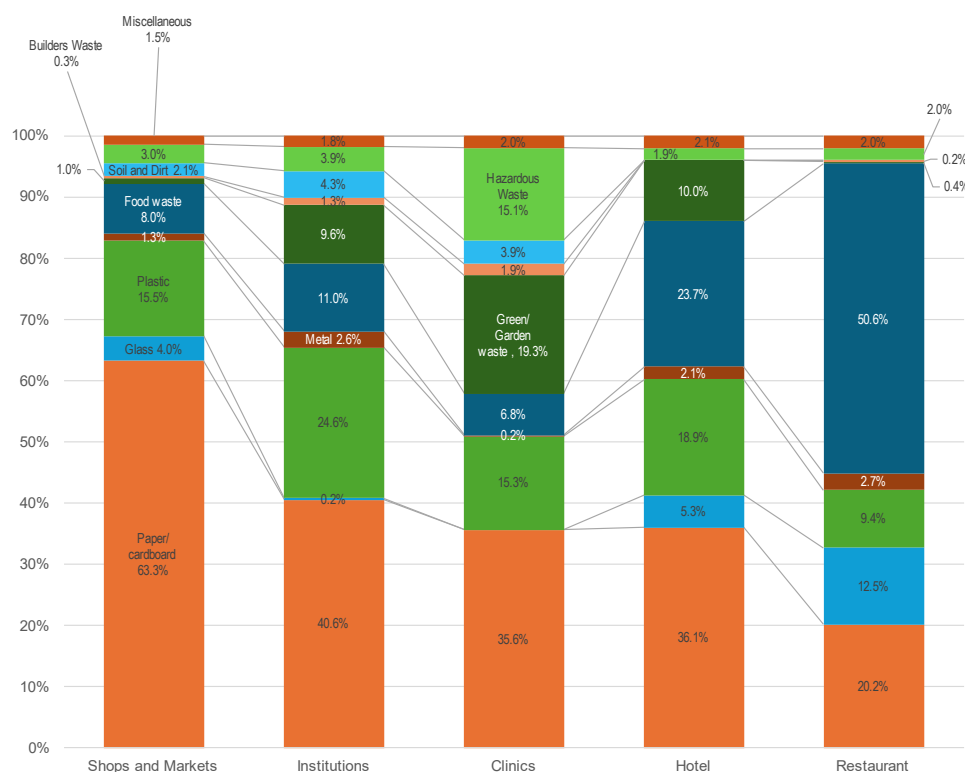


Source: JICA Survey Team

Figure 3-5 Physical Composition of Sample from Households

The waste composition of business establishments is shown in Figure 3-6 and Table 3-7. According to the results, paper/cardboard occupy the largest portions of the waste collected from business establishments,

especially from shops (63.3%). In the restaurants and hotels, food waste constitutes majority of the waste (50.6% and 23.7%, respectively). The waste from the clinic includes some hazardous waste, such as infectious waste (15.1%).



Source: JICA Survey Team

Figure 3-6 Physical Composition of Samples from Shops, Institutions, Clinics, Hotels, and Restaurants

Table 3-7 Physical Composition of Samples from Households, Shops, Institutions, Clinics, Hotels, and Restaurants

Item of Physical Composition	Household	Shops and Markets	Institutions	Clinics	Hotels	Restaurants
Paper/cardboard	9.7%	63.3%	40.6%	35.6%	36.1%	20.2%
Glass	2.1%	4.0%	0.2%	0.0%	5.3%	12.5%
Plastic (hard)	3.4%	7.5%	16.2%	4.3%	10.8%	4.2%
Plastic (laminate)	5.4%	2.2%	4.0%	1.5%	2.8%	2.8%
Plastic (non-recyclable such as PVC, etc.)	2.7%	5.9%	4.4%	9.5%	5.3%	2.4%
Aluminum	0.7%	0.8%	1.8%	0.2%	0.4%	0.5%
Other metal	1.9%	0.4%	0.8%	0.0%	1.7%	2.2%
Food waste	15.8%	8.0%	11.0%	6.8%	23.7%	50.6%
Green/garden waste	13.5%	1.0%	9.6%	19.3%	10.0%	0.4%
Builders waste	3.4%	0.3%	1.3%	1.9%	0.0%	0.2%
Soil and dirt	21.5%	2.1%	4.3%	3.9%	0.0%	0.0%
Hazardous waste	4.4%	3.0%	3.9%	15.1%	1.9%	2.0%
Miscellaneous	15.4%	1.5%	1.8%	2.0%	2.1%	2.0%

Note: Data of more than 10% is shown as bold face.

Source: JICA Survey Team

The comparison between the physical composition obtained in this survey and past ADB surveys is shown in the table below. Compared with the results of the survey in 2014, the current survey showed similar results though food waste in this Survey is slightly more than in the ADB survey. However, compared with the survey conducted by ADB in 2015, the proportion of green/garden waste was lower, while the proportion of soil and dirt was higher. According to the ADB survey in 2015, it was noted that other types of waste were included in the green/garden waste. It is possible that soil and dirt from road cleaning, were not adequately classified and were included in the green/garden waste. The higher amount of soil and dirty is likely due to the need for cleaning surrounding roads, which resulted in the collection of more soil than usual, thus being reflected in the sampling. Furthermore, the waste data from 2015 showed higher values for paper/cardboard and plastic compared with this Survey, while the waste data from 2014 showed similar to this Survey. Considering these circumstances such as higher fluctuation, it is necessary to conduct the survey continuously in the future.

Table 3-8 Comparison between JICA Survey (2024) and Past ADB Surveys

Physical Composition	This Survey (2024)	ADB Survey (2015)	ADB Survey (2014)
Food Waste	15.8	12	16 - 38
Green Waste	13.5	33	11 - 28
Paper and Cardboard	9.7	22	8 - 12
Plastic	11.6	18	12 - 24
Textiles	-	2	4 - 9
Glass	2.1	2	1 - 4
Metal	2.7	1	2 - 3
Wood	-	0	1 - 5
Soil and Dirt	21.5	12	5 - 11
Miscellaneous	23.3	3	4 - 12

Source: JICA Survey Team

(3) Result of Bulk Density

Regarding bulk density from each generation source, household waste is normally $0.2 \sim 0.3 \text{ t/m}^3$ but the measured value is less than normal, such as $0.16 \text{ [t/m}^3\text{]}$ due to less of food waste comparatively because of less food waste in this Survey. On the other hand, the waste from shops includes lower-density waste such as cardboard. Therefore, the bulk density of the waste from shops is lower than the others. Similarly, because food waste in institutions and clinic is less and paper or cardboard and plastic is much, it is considered that the bulk density in shops, institutions and clinics are lower. On the other hand, the bulk density of waste from restaurants is significantly higher than the others because the waste from restaurants includes mostly food waste.

Table 3-9 Bulk Density of the Waste from Each Generation Source

Item	Households	Hotels	Shops	Restaurants	Institutions	Clinics
Bulk Density[kg/L]	0.16	0.09	0.06	0.24	0.07	0.08

Source: JICA Survey Team

3.4.4 Recycling Survey

(1) Survey Method

The Recycling Survey was conducted to grasp the current recycling market and its future potential. Recyclables are collected by private recycling businesses from the communities and waste pickers at the Tibar landfill site. As for the target of the survey, sub-contractor conducted interview with Dili Municipality about the currently operating recyclers and communities and made the list of them, and conducted the survey for the targets as shown in Table 3-10. Several recyclers, as well as the communities and waste pickers were interviewed using questionnaires to determine the collection source, collected amount, sales target and sales amount of each type of recyclables. The survey method is shown in Table 3-10.

Table 3-10 Implementation Method of Recycling Survey

Survey Item	Private Recycling Business	Community Group	Waste Picker
Number of Surveys	Six private recycling businesses	Nine community groups	30 waste pickers
Method of Investigation	Questionnaire survey	Questionnaire survey	Questionnaire survey
Questionnaire Survey Items	* Amount and price of each item collected * Amount and price of each item sold	* Target population of the community * Amount collected and sale price per item	* Amount collected and sale price per item * Awareness related to the activities

Source: JICA Survey Team

(2) Overall Result

Waste pickers basically sell all the recyclable materials they collect to private recycling businesses. Within the community, some groups sell their collected items to Caltech, while others create original products from plastics and glass bottles and sell them locally. Recycling businesses source materials from communities, waste pickers, other contracted clients (such as Caltech), and maintenance businesses like auto repair shops (in the case of metal scrap dealers). Caltech recycles paper, plastic, and glass at its facility. Metals are exported through dealers to Singapore, Malaysia, and Indonesia. The table below shows the amount of recyclable waste collected by the surveyed recycling businesses, communities, and waste pickers.

Table 3-11 Amount of Collected Recyclables

(ton/month)

Recyclable Item	Recycling Dealer	Community Group	Waste Picker
Paper	0.26	0.00	0.00
Plastic	26.50	0.43	1.97
Glass	9.50	0.15	0.03
Metal (non-aluminum)	665.89	0.00	4.07
Aluminum	26.63	0.00	1.98
Other	10.25	0.04	0.00
Total	739.03	0.62	8.05

Note: According to the hearing from recycling dealers and field survey, around 90% of metal is industrial waste

Source: JICA Survey Team

(3) Data of Each Recyclable Item

(i) Paper

Paper is collected by Caltech only in the targeted recycling businesses. No community groups or waste pickers reported that they collect paper, although Caltech answered that they buy paper from waste pickers, as well as from their clients of their waste collection service. The clients include mini marts, cafes, and school. Most of the paper is white paper and cardboard. A school collects milk cartons for Caltech to recycle. In any case, the amount of paper to be recycled is small. It was only 255 kg in June 2024 and this amount remains fairly consistent every month.

(ii) Plastic

Two private recycling dealers collect plastic. Caltech collects 25.5 t/month of plastic on average from community groups, waste pickers and clients. The types of the plastic are mainly PET bottles. They are treated in the factory to produce recycled products. There is another recycling dealer who buys 700 kg to 1 ton of plastic bottles per month from waste pickers, but sell them to Caltech. The buying price of plastic is around 2 cents per kg, and the selling price is 10 cents per kg.

(iii) Glass

Among the recycling dealers, glass is collected by Caltech only. Caltech also organizes a pilot project in which their employees collect waste in communities outside of their ordinary work so that Caltech can collect recyclables more meticulously. One of Caltech’s pilot teams collects approximately 140 kg of glass bottles per month. Apart from the recycling flow of Caltech, a community group has a technology to remake glass bottles into glass cups. They collect approximately ten glass bottles per month.



Source: JICA Survey Team

Figure 3-7 Inspection of Status of Glass Recycling

(iv) Iron

All the six dealers interviewed are working on iron business. They collect iron from waste pickers, construction company and vehicle scrappers. Twenty-eight out of the thirty interviewed waste pickers collect iron. In community groups, iron is not collected. The buying price of iron is from 3 to 10 cents/kg. As there is no metal recycling facility in Dili, the dealers sell it to other dealers in Dili or overseas such as Indonesia, Malaysia, and Singapore.



Scrapped and compiled metal compiled

Metal Stored at the recycler's warehouse

Source: JICA Survey Team

Figure 3-8 Collected Metal within the premises of a Recycling Dealer

(v) Aluminum

Aluminium is also procured by all interviewed recycling dealers. It is procured from waste pickers and is traded among dealers. One dealer reported that community members sell aluminium. The buying price of aluminium ranges from 25 to 80 cents per kg. Aluminium as well as iron is also sold to Indonesia, Malaysia, and Singapore as its final destination.

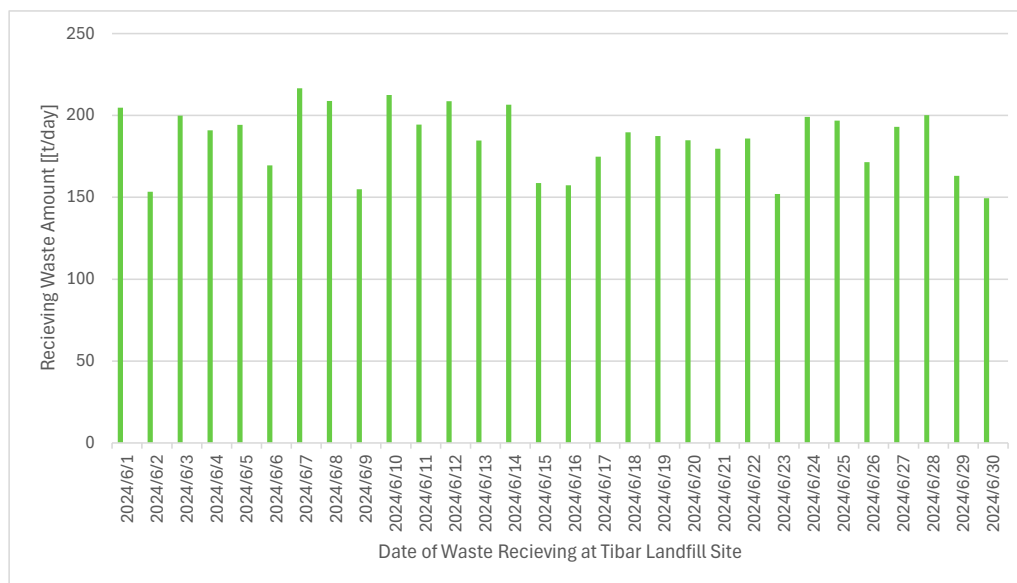
(vi) Other

“Other” recyclable includes batteries and electronic waste (E-waste). Two dealers collect batteries of car and motorbikes. They buy the old items from maintenance factories and residents in communities. The buying price ranges from 40 to 50 cents per kg, and the final destination is overseas markets in Indonesia, Malaysia or Singapore. Caltech is the only organization that collects e-waste. Current collected amount is not weighed. When a container is full, they will ship it to a private firm in New Zealand. A Korean electronics firm is expected to buy it for USD 3/kg. On community basis, there is one group that creates bags made of used banners (plastic-coated textiles).

3.4.5 Waste Amount and Composition Survey (at the Landfill Site)

(1) Waste Amount Survey

At the Tibar landfill site, there is a weighing bridge. Figure 3-9 shows the daily data in May. The amount of waste fluctuated daily from minimum 150 t/day to maximum 220 t/day was fluctuated. The average daily waste hauled into the Tibar Landfill site is 185 t/day.



Source: JICA Survey Team

Figure 3-9 Waste Amount Measured in the Weighing Bridge at the Tibar Landfill Site in May

(2) Waste Composition Survey

(i) Survey Method

A waste composition survey of the samples of Tibar Landfill site was conducted. The sample was collected after unloading the collection vehicles and waste picking activities taking into account of the collecting activity by waste pickers. The six collection areas were selected in different places near the unloading area in the Tibar Landfill site before spreading by heavy equipment. The sampling situation is shown in Figure 3-10.



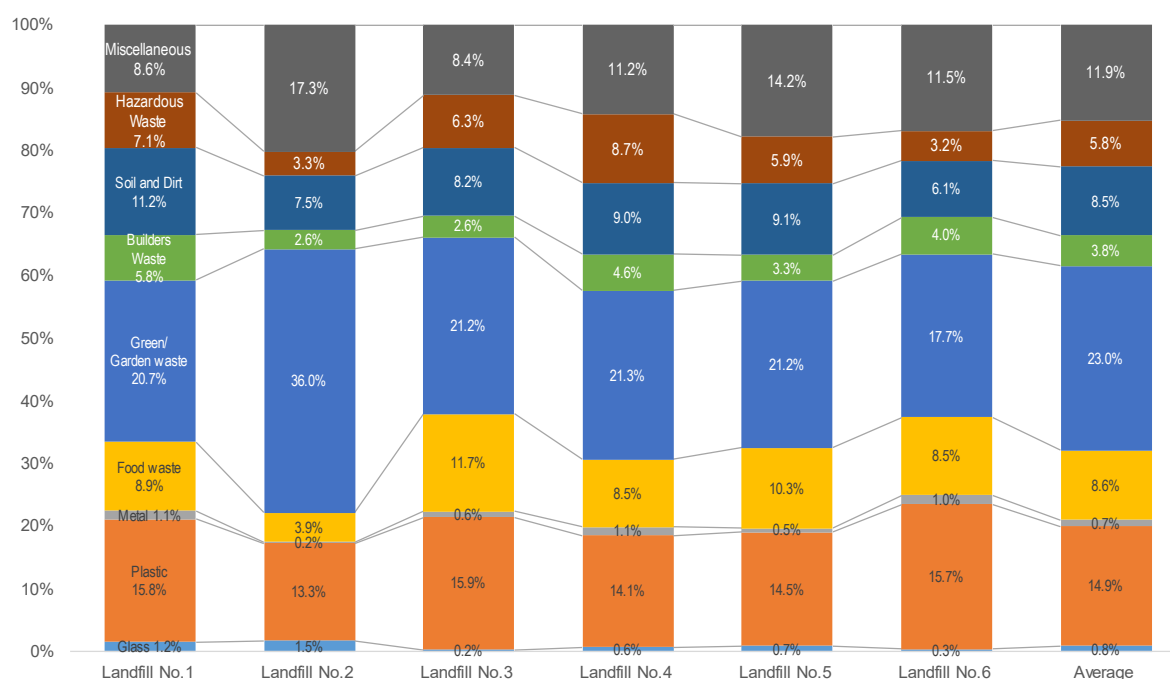
Source: JICA Survey Team

Figure 3-10 Sampling of Waste at the Tibar Landfill Site

(ii) Physical Composition

The composition of waste at the landfill site, as shown in the following figure and table. Portions of paper/cardboard (14.5% to 32.1%), and green/garden waste (17.7% to 36.0%) are much more than the others. The reason for the low rate of food waste could be partly on its decomposition after discharge and could be classified as soil and dirt due to difficulty of separation of food waste from soil and dirt. The portion of

recyclable waste such as plastic, glass and metal are small because it seems that the waste pickers collect the recyclable immediately after unloading.



Source: JICA Survey Team

Figure 3-11 Physical Composition of Samples at the Tibar Landfill Site

Table 3-12 Physical Composition of Samples at the Tibar Landfill Site

Type of Waste	Landfill No.1	Landfill No.2	Landfill No.3	Landfill No.4	Landfill No.5	Landfill No.6
Paper/cardboard	19.5%	14.5%	24.8%	20.9%	20.3%	32.1%
Glass	1.2%	1.5%	0.2%	0.6%	0.7%	0.3%
Plastic	5.5%	4.1%	6.2%	3.6%	5.2%	3.8%
PVC plastic	3.3%	3.2%	2.7%	4.1%	3.7%	3.6%
Other plastics	7.1%	6.0%	7.0%	6.5%	5.6%	8.3%
Aluminum	0.1%	0.1%	0.2%	0.0%	0.5%	0.4%
Other metals	0.9%	0.1%	0.4%	1.1%	0.0%	0.6%
Food waste	8.9%	3.9%	11.7%	8.5%	10.3%	8.5%
Green/garden waste	20.7%	36.0%	21.2%	21.3%	21.2%	17.7%
Builders waste	5.8%	2.6%	2.6%	4.6%	3.3%	4.0%
Soil and dirt	11.2%	7.5%	8.2%	9.0%	9.1%	6.1%
Hazardous waste	7.1%	3.3%	6.3%	8.7%	5.9%	3.2%
Miscellaneous	8.6%	17.3%	8.4%	11.2%	14.2%	11.5%

Note: The data more than 10% is shown as bold face.

Source: JICA Survey Team

(iii) Bulk Density

The bulk density of the waste disposed at the Tibar Landfill site ranges from 0.15 t/m³ to 0.2 t/m³. This similarity is due to the value at the generation source. This is because there is no compaction of waste in the dump truck and the sampled waste was not compacted by a bulldozer in the landfill area. The bulk density of the waste sampled at the Tibar landfill site is shown in Table 3-13.

Table 3-13 Bulk Density of Waste Sampled in the Tibar Landfill Site

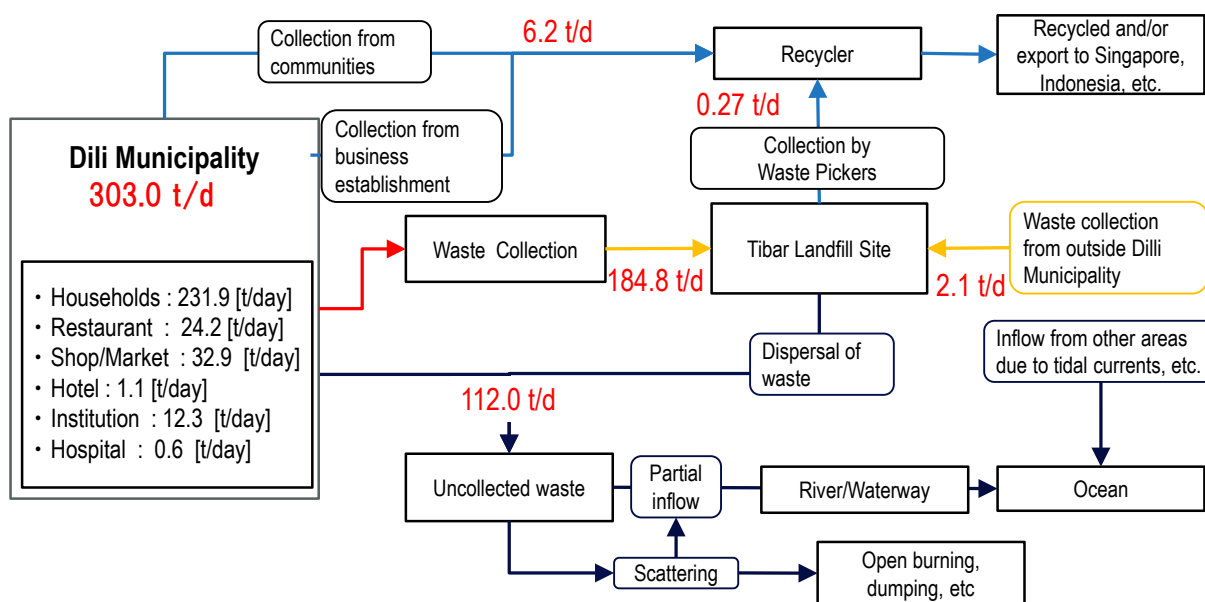
Item	Landfill No.1	Landfill No.2	Landfill No.3	Landfill No.4	Landfill No. 5	Landfill No.6	Average
Bulk Density[kg/L]	0.17	0.14	0.13	0.16	0.14	0.14	0.15

Source: JICA Survey Team

3.4.6 Understanding Waste Flow

(1) Overall Current Waste Flow

According to the waste amount data from Subsection 3.4.1, waste amount generated in Dili Municipality is around 303.0 t/day. According to Dili Municipality, all the collected waste is transported into the Tibar Landfill site. Therefore, waste collection amount and disposed amount is 184.8 t/day, which is measured in the weighing bridge at the Tibar Landfill site. On the other hand, the total amount of recyclable is 6.2 t/day and waste amount collected by waste pickers is 0.27 t/day. Based on this information, the waste flow of municipal solid waste in Dili Municipality is estimated as shown in the following figure.



Source: JICA Survey Team

Figure 3-12 Waste Flow in Dili Municipality

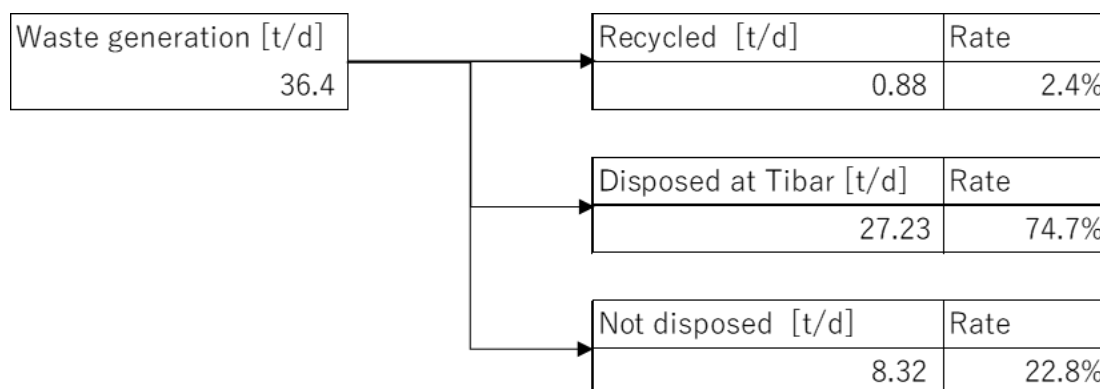
The amount of uncollected waste was estimated at 112.0 t/day. A part of such waste is either burned in open spaces or illegally dumped, while the rest of such waste flows into the ocean through rivers and other waterways. In Dili Municipality, coastal cleanups are conducted weekly. Although litter is observed on the coast, no significant increase of litter has been observed. Therefore, it is assumed that the amount of waste collected during these cleanups is almost equal to the amount of waste flowing into the ocean. The amount of waste collected during coastal cleanups is estimated at approximately 30 t/week by calculation as 10 trips collection by 3 tons truck in a week, based on the information obtained by interview. Based on the estimation, the waste flowing into the ocean is estimated at around 4.3 t/day. If it is assumed that approximately 20% of the waste flowing into the ocean accumulates in rivers and drainage separately, its amount is around 0.9 t/day.

As a result, it is estimated that around 5.2 tons of waste flows into rivers and oceans each day, while the remaining 106.8 t/day out of the 112 t/day is assumed to be either dumped or burned. However, this estimation includes several assumptions, and in order to better understanding on the flow of uncollected waste, it will be recommended to utilize digital technologies for monitoring, as mentioned in the section on Japanese technologies in future.

(2) Waste Flow of Each Recyclable Waste

Plastic

According to the WACS at the generation source and Tibar Landfill site and recycling survey, the flow of plastic waste is estimated in Figure 3-13. The generation and disposed amount of plastic waste was calculated based on the waste amount at the generation source and at the landfill site as well as the physical composition data at each source. Recycle amount utilize the result of recycling survey. Around 75% of plastic waste is disposed of at the Tibar Landfill site. According to Caltech, the receiving capacity of plastic waste is approximately 2 t/day. However, current recycled plastic is approximately estimated at 26.5 t/month or 0.88 t/day according to the hearing. The recycling process to transfer the plastics currently disposed of is necessary by increasing processing capacity of Caltech, which is main plastic recycling company, and by the participation of other plastic recycling companies.



Source: JICA Survey Team

Figure 3-13 Plastic Waste Flow

In the WACS, plastics were classified into: a) recyclable plastics such as plastic (hard) and plastic (lamine) and non-recyclable plastics for the composition analysis. As a result, only 0.88 t/day out of the 26.7 t/day of recyclable plastics generated are being recovered for resource utilization, which accounts for only about 3.3% of the recyclable plastics. Therefore, it is necessary to promote the recycling of these recyclable plastics.

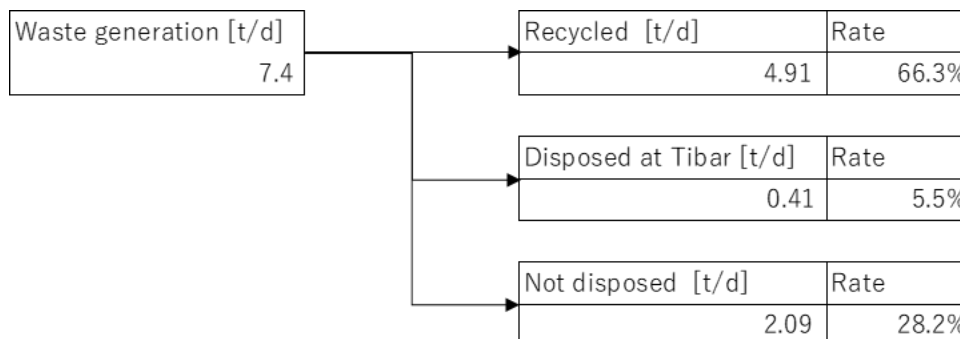
Table 3-14 Flow of each Waste Plastic

Item	Generation amount	Recycling amount	Disposal amount
Plastic (Hard)	12.5	0.88	27.23
Plastic (Lamine)	14.2		
Plastic (Non-recyclable such as PVC)	9.7	0	

Source: JICA Survey Team

Metal (Iron, Aluminum)

According to the WACS at the generation source and Tibar landfill site and recycling survey, the flow of metal waste is estimated in Figure 3-14. About 66% of metal waste is recycled. However, 28.2% of the metal waste is not properly disposed because there is no suitable collection system of scrap metal.

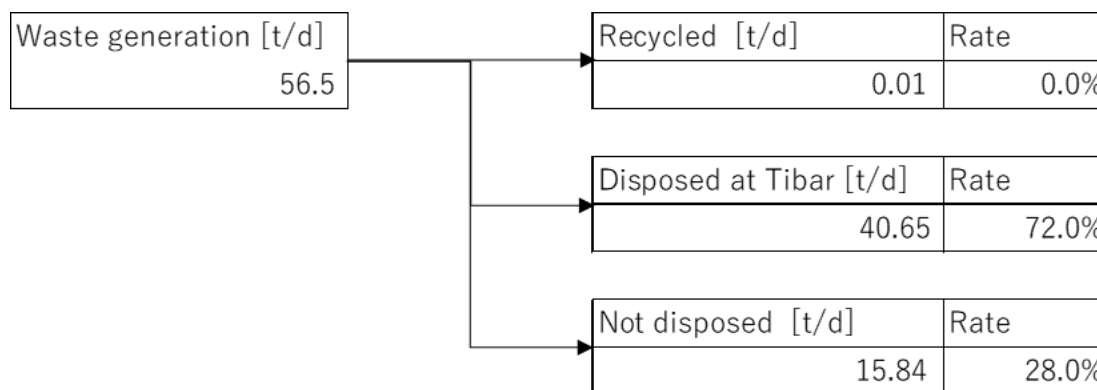


Source: JICA Survey Team

Figure 3-14 Metal Waste Flow

Paper and/or cardboard

According to the WACS at the generation source and Tibar landfill site and recycling survey, the flow of paper and/or cardboard waste is estimated in Figure 3-15. Most of paper and/or cardboard waste is not recycled. As described in the section of recycled waste, there is no suitable recycling factory for cardboards and/or paper recycling.

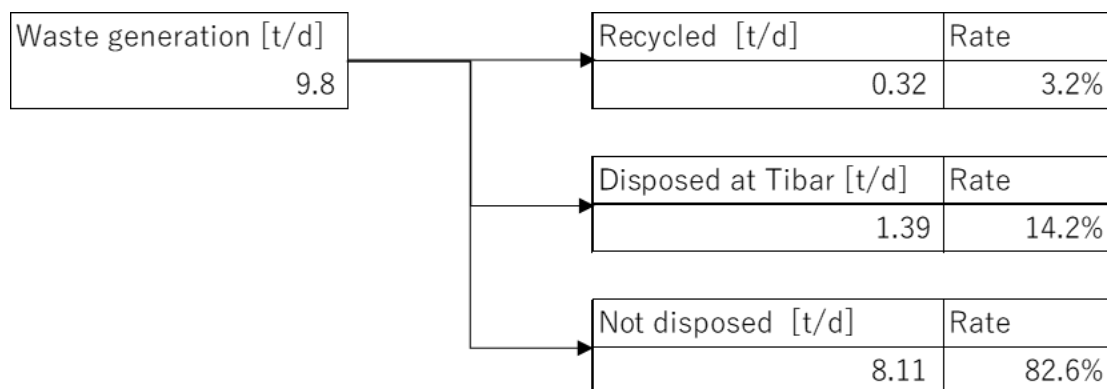


Source: JICA Survey Team

Figure 3-15 Paper and/or Cardboard Waste Flow

Glass

According to the WACS at the generation source and Tibar landfill site and recycling survey, the flow of glass waste is estimated as shown in Figure 3-16. Most of glass waste is not recycled and more than 82.6% of glass waste is not disposed properly.



Source: JICA Survey Team

Figure 3-16 Glass Waste Flow

3.5 Condition of Waste Discharge, Collection, and Transportation

3.5.1 Current Condition of Waste Discharge

In July, waste was discharged in concrete blocks or containers designated as collection points. The designated disposal times are from around 4:00 AM to 7:00 AM, but this information is not sufficiently disseminated and is often not followed. Below are the conditions of waste disposal in the drainage canals and at the collection points.



Source: JICA Survey Team

Figure 3-17 Waste Scattered in the Drainage and Current Condition of Waste Discharge

Regarding waste on the coast, it includes various items such as plastics, glass, cigarette butts, seaweed, and driftwood. The sources are considered to be driftage, inflow from the rivers, and littering by tourists and residents. Figure 3-18 below shows the photos of the scattered in the beach and the waste collected during a coastal clean-up activities.



Source: JICA Survey Team

Figure 3-18 Waste Scattered in the Beach and Waste Collected during a Clean-up Campaign

3.5.2 Current Operation of Sweeping, Collection, and Transportation

Road sweeping is directly carried out by the Department of Sanitation under the Directorate of Municipal Services for Water, Sanitation, and Environment of Dili Municipality.

After sweeping on the roads and/or public spaces like parks, they discharge the waste into the collection points, and the collection vehicle collects the waste to transport it to the Tibar Landfill site.

The Department of Sanitation has contracts with five private companies for the collection and transportation of waste. The collection starts from around 5:00 AM to 6:00 AM every day, and depending on the amount of waste, it continues until noon. The collection vehicles are dump trucks with a loading capacity of approximately 3 m³, and there are about 100 trucks, each staffed with one driver and four collectors. The number and roles of the personnel of the Department of Sanitation are shown in Table 3-15.

Table 3-15 Number and Role of Personnel of the Department of Municipal Services for Water, Sanitation, and Environment

No.	Position of Personnel	Number of Persons
1	SMASA Director	1
2	Chief of the Department of Sanitation	1
3	Chief of the Department of Water	1
4	Administrative Officer	2
5	Supervisor	4
6	Public Roads Sweeping Team (place not mentioned)	116
7	Park and garden cleaner	6
8	Registration and dispatch officer of car	8
9	Garden Watering Team	4
10	Grass Cleaning Team on Public Roads and Garden around the City	21
11	Driver	6
12	Waste Collection Team	15
13	Office Cleaner Team	10

Source: Dili Municipality

The collection service is provided in the central part of the Dili Municipality, excluding rural areas such as Metinaro and Hera. Since there are no waste bins or containers at the collection points, it is necessary to gather the scattered waste discharged at these locations and load it onto the dump trucks, which requires a

considerable amount of time. It is estimated that it takes several minutes to collect waste from a single collection point.

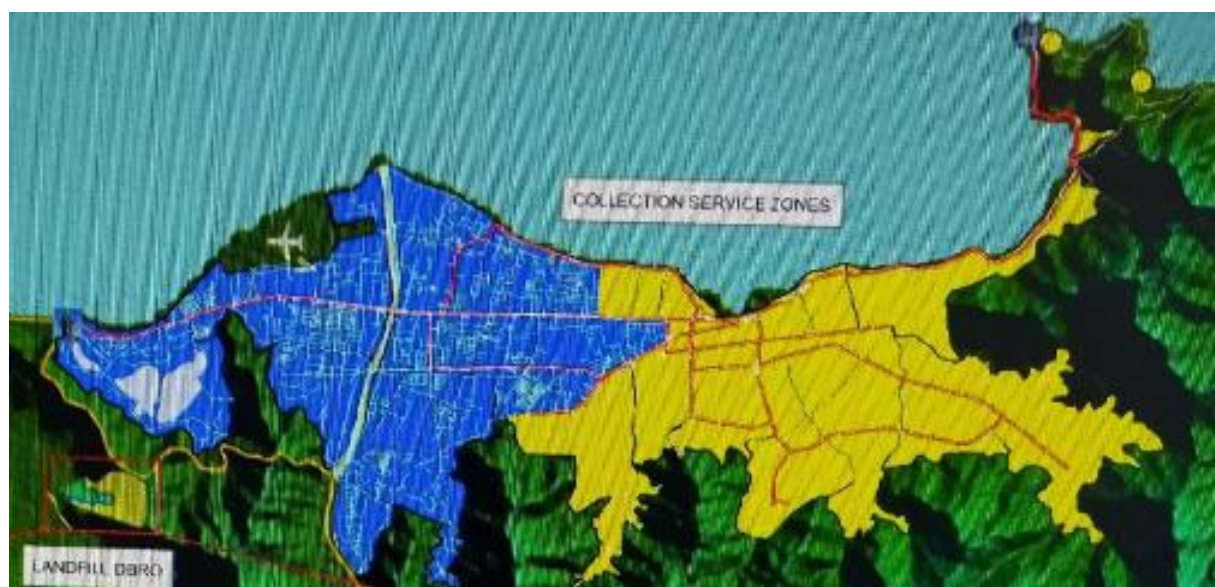


Source: JICA Survey Team

Figure 3-19 Discharged Waste at the Waste Collection Points

3.5.3 Future Plans Regarding Collection and Transportation

Dili Municipality is establishing a new collection and transportation system by contracting with a Chinese private company for seven years. Collection areas are divided into 18 areas on the east side and 22 areas on the west side, as shown in Figure 3-20. According to Dili Municipality, the transition period of the establishment of the new system is from July to December 2024. In the new system, they will introduce compactor vehicles and skip loaders (container carrier) for waste collection and transportation, and will set the waste bins and containers at the collection points. In the new system, there will be only one driver and one collector for one compactor and/or container carrier. By this system, the number of staff for the collection and transportation service will be significantly reduced.



Source: Dili Municipality

Figure 3-20 Collection Service Area for the New Collection and Transportation System



Source: Dili Municipality

Figure 3-21 Collection Points in a Part of the Area for the New Collection and Transportation System

Table 3-16 List of Equipment for the New Collection and Transportation System

Equipment	Capacity	Number
Waste Plastic Bin	120 L	1,000
Waste Plastic Bin	240 L	5,000
Waste Plastic Bin	1,100 L	1,820
Waste Metallic Bin	1,100 L	200
Metal Container for Skip	8 m ³	131
Metal Container for Skip	20 m ³	14
Motor Tricycle	-	10
Compactor	8 m ³	4
Compactor	13 m ³	6
Compactor	20 m ³	6
Hook Lift Truck	-	10
Dump Truck	-	3
Container Washing Truck	-	2
Mobile Workshop	-	2
Truck Mounted Vacuum Road Sweeper	-	2

Source: Dili Municipality



Source: JICA Survey Team

Figure 3-22 Newly Procured Collection and Transportation Equipment

A new collection and transportation system has been in operation since late August. The photos below in Figure 3-23 reflect the current situation.



Source: JICA Survey Team

Figure 3-23 Operational Condition of New Collection and Transportation System

3.6 Intermediate Treatment and Recycling

3.6.1 Condition of Private Company

Some private companies and small businesses for recycling which were interviewed to grasp the recycling status are shown in Table 3-17.

Table 3-17 Recyclers in Dili Municipality

No.	Name of the Company	Dealing Item
1	Caltech	Plastic, glass, paper, metal
2	Besi Tua, Unipessoal Lda.	Metal (focusing on aluminum)
3	HPC Scrap Metal Unipessoal Lda.	Metal
4	Mr. Miggy (individual dealer)	Metal
5	Reloka	Glass, paper, other waste (tires)
6	ENVAC	Plastic
7	Conservation International Timor-Leste	Plastic
8	Tiwomen Ecojewelry	Plastic

Source: JICA Survey Team

Caltech is the biggest recycling private company in Dili Municipality. It collects plastic, glass, paper, and metal. Plastic and glass are recycled in its factory to utilize road paving tiles and wall boards. In the facility for plastic recycling, there are intermediate treatment facilities for flaking, molding, and cooling. Cardboard paper is composted with other organic waste. Metal is not recycled in the factory and handed over to other dealers, named as Besi Tua, Unipessoal Lda., HPC Scrap Metal Unipessoal Lda., and Mr. Miggy.



Facility of Caltech Factory



Compost in Caltech Factory

Source: JICA Survey Team

Figure 3-24 Caltech Factory

3.6.2 Current Plan for Intermediate Treatment and Recycling

There is no plan for intermediate treatment and recycling by the Dili Municipality or the Government of Timor-Leste.

3.7 Final Disposal

3.7.1 Condition of Operation and Maintenance at the Tibar Landfill Site

Waste collected from Dili Municipality is disposed of at the Tibar Landfill site. The Tibar Landfill has been operational since 1987, for a total of 37 years until now. There are some issues with regard to air pollution like fires, notably in 2001, that occurred periodically at the site, highlighting concerns about atmospheric contamination. There is no stormwater drainage, and rainwater flows into the landfill area, which increases leachate. There is no liner and leachate collection system, which will infiltrate into the groundwater and there is the risk of groundwater contamination.

The total area of the landfill site is approximately 22 hectares, with the current landfill area covering 11 hectares (including Cells 1, 2, and 3). Of these 11 hectares, Cells 1, 2, and 3 are segregated from the entrance side of the landfill. As for Cells 1 and 2, 50% of their space has been filled, with plans to excavate them, installing waterproof barriers, and to continue landfilling operations there.

Until 2023, the landfill was operated directly by the municipality but has since been managed by a joint venture with a Chinese company and others. Currently, it operates as an open dumping site without facilities such as stormwater drainage, leachate collection and treatment, or gas ventilation pipe. There is no soil cover and adequate operational management in the unloading area. More than 30 waste pickers operate in the landfill area and near there. Dili Municipality permits the activity of waste pickers with official registration as a means to reduce landfill amounts.

The following figures and tables show the summary of the Tibar Landfill site, pictures of the operational condition, the list of equipment, and number of staff.

Table 3-18 Operational Condition of the Tibar Landfill Site

Item	Description
Commencement of Service	Year 1987
Municipalities	Five subdistricts
Operating Entity	Chinese company contracted by Dili Municipality
Incoming Waste	General waste (industrial and medical wastes are not accepted)
Amount of Incoming Waste	Approx. 200 - 250 t/day
Acceptance Time	6:00 – 18:00
Tipping Fee	No tipping fee

Source: Dili Municipality

The unloading area from collection vehicle in Tibar Landfill site and the weighing bridge in the site are shown in the Figure 3-25.



Weighing Bridge to Measure the Hauled Waste to the Tibar Landfill Site

Unloading the Waste from the Dump Truck in the Unloading Area

Source: JICA Survey Team

Figure 3-25 Operational Situation of the Tibar Landfill Site

Table 3-19 List of Landfill Equipment

Equipment	Number of Equipment	Role
Landfill Compactor	1	Spreading and compaction of disposed waste
Bulldozer	1	Spreading of disposed waste
Excavator	1	Excavation and spreading of waste, excavation of stored cover materials
Dump Truck	1	Transportation of soil cover materials

Source: Dili Municipality

Based on hearings at the disposal site, the main staff of the disposal site are shown in Table 3-20. These staff members are employees of the private company, which is contracted by Dili Municipality.

Table 3-20 Staff in Tibar Landfill Site

Position	Number of Persons	Role
Manager	1	To supervise all personnel and manage the entire operation as the chief executive of the disposal site.
Guard	2	To carry out safety management of the disposal site, including checking the visitors at the site entrance.
Landfill Operator	4	To provide instructions for landfill locations, supervise waste pickers, and monitor various facilities.
Heavy Equipment Operator	4	To operate and conduct daily inspections of bulldozers, excavators, landfill compactors, and trucks.
Weighing Bridge Recorder	1	To carry out weighing operations and data management at the truck scale.

Source: Dili Municipality

3.7.2 Existing Plan of the Final Disposal

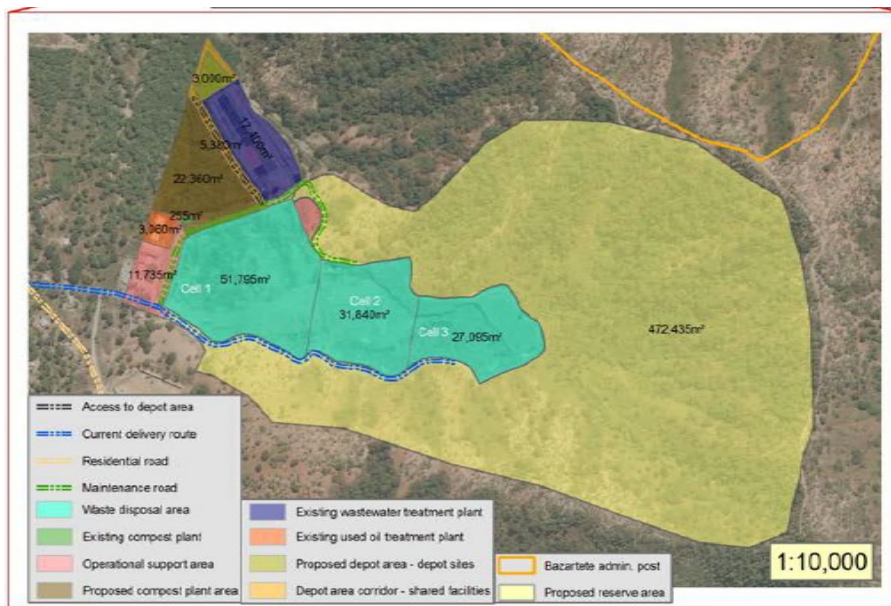
Existing plans involve temporarily relocating waste from Cells 1 and 2 to Cell 3 to establish a sanitary landfill site. Subsequently, waste from Cell 3 will be transferred to Cell 1, with Cells 1 and 2 designated for municipal solid waste and Cell 3 for hazardous waste disposal. The construction of Cell 1 at the Tibar Landfill is scheduled within the next 18 months, followed by the relocation of waste from Cells 2 and 3. Cell 1 is expected to be used for five years, and Cell 2 for ten years, while Cell 3 for 15 years.

The landfill system is a sanitary landfill, utilizing a geomembrane as a liner and two layers of geotextile above and below the geomembrane for protection. Additionally, a clay soil layer containing bentonite is used as a protective layer in case of potential damage to the geomembrane. In the future, the Dili Municipality plans to develop composting and sorting facilities outside the landfill area. Below are the main facilities of the Tibar Landfill, the site plan of the landfill improvement project, a cross-section of the landfill in progress, and cross-sections of the liner system and the leachate collection and drainage pipes.

Table 3-21 Main Facilities at the Tibar Landfill Site

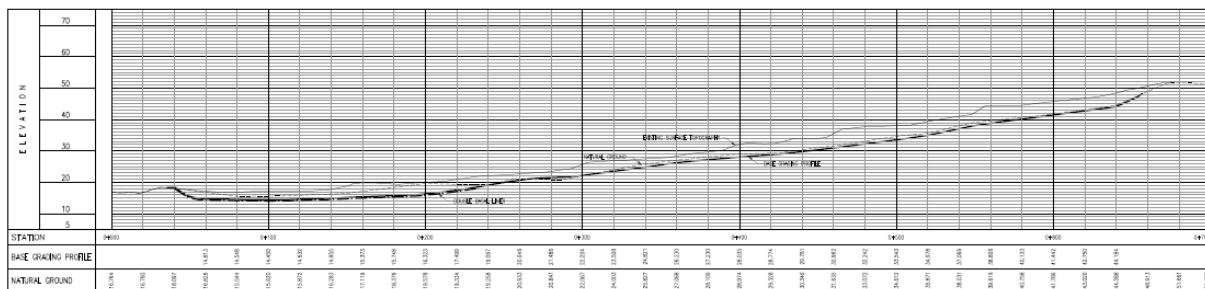
Item	Contents
Remediation of the Waste Disposal Area	Development of embankment for each cell.
Development of Liner	Development of liner to prevent infiltration of leachate and prevention of infiltration of each cell to surface water from outside.
Leachate Collection and Management	Collection of the leachate in the landfill areas and treat the leachate to discharge it to the watercourse.
Landfill Gas Collection and Management	Collect landfill gas in anaerobic landfill site and consider the utilization of landfill gas.
Internal Roads	Development of internal road for smooth implementation of access to unloading area from gate and monitoring in the landfill sites.
Stormwater Drainage	Development of stormwater drainage to prevent infiltrate surface water flow from the surrounding area to the landfill area.
Other Supporting Facilities	Weighing bridge, administration office, gate fence, and environmental monitoring system are developed.

Source: JICA Survey Team



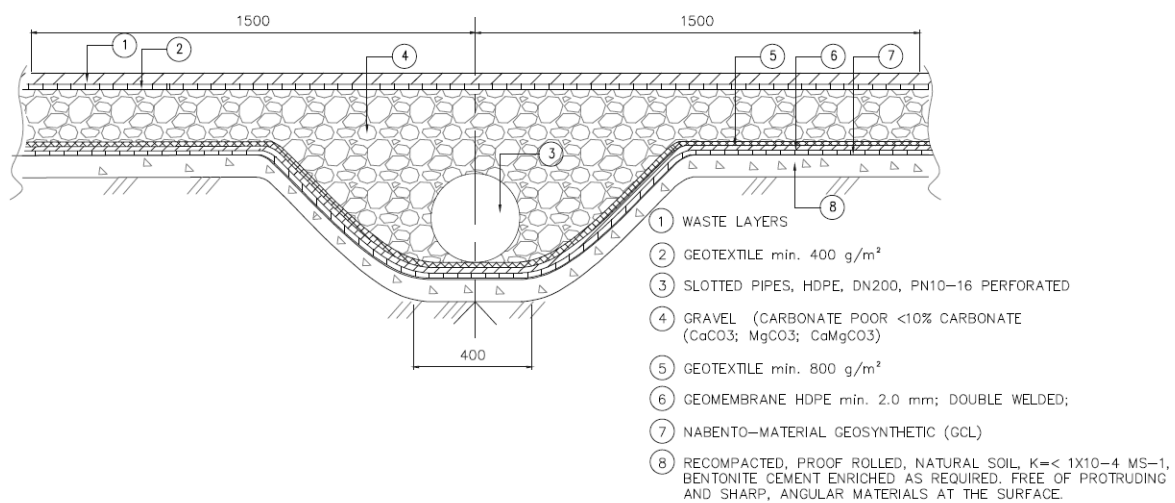
Source: Dili Municipality

Figure 3-26 Layout Drawing of Rehabilitation Plan of the Existing Tibar Landfill Site



Source: Dili Municipality

Figure 3-27 Cross-section Drawing of Rehabilitation Plan of the Existing Tibar Landfill Site



Source: Dili Municipality

Figure 3-28 Liner Structure and Leachate Collection Pipe in the Rehabilitation Plan

3.8 Environmental and Social Considerations

3.8.1 Environmental Impact

The Decree Law No. 5/2011, amended as Decree Law No. 39/2022, on environmental licensing outlines the criteria of each development project with classification of the following categories:

- Category A: Projects that can potentially cause significant environmental impacts and are subject to the Environmental Impact Assessment (EIA) procedure, which is based on the Impact Analysis and the Environmental Management Plan (EMP), in accordance with the provisions of the law.
- Category B: Projects that may cause environmental impacts and which are subject to the Initial Environmental Examination (IEE) procedure: this is based on the Environmental Management Plan, in accordance with the provisions of the law.
- Category C: Projects in which environmental impacts are negligible or non-existent and which are not subject to any Environmental Assessment procedure, in accordance with the provisions of the law.

Annex 1, Annex 2 and Annex 3 of the Decree-Law No. 5/2011 show the criterion of projects in the sanitation sector for Category A, Category B, and Category C as follows:

- Category A: Elimination of hazardous waste (All)
 - Landfill and municipal solid waste deposit (≥ 100 t/day, ≥ 100 m³/day, ≥ 10 Ha)
 - Wastewater treatment stations ($\geq 10,000$ families / eq.)
 - Facilities for recycling hazardous materials (All)
 - Facilities for recycling non-hazardous materials (≥ 2 Ha)
 - Hospitals (≥ 100 rooms)
- Category B: Landfill and municipal solid waste deposit (<100 t/day, 1-100 m³/day, 0.5 to 10 Ha)
 - Wastewater treatment stations ($<10,000$ families / eq.)
 - Facilities for recycling non-hazardous materials (<2 Ha)
 - Hospitals (<100 rooms)

On the other hand, there are no specific statements regarding environmental standards in any decree laws. Currently, there has been no serious impact from waste in Dili Municipality. However, if the amount of waste generation increases, it will cause negative impacts on the environment such as odour, public health, and natural disasters such as flooding caused by clogged drains due to waste. Figure 3-29 shows the current situation, which is likely to cause a negative impact on the environment, public health, and disaster prevention aspects.



Waste Scattered near the Residences

Source: JICA Survey Team



Status that Waste is clogged in the Gutter

Figure 3-29 Environmental Issue Related to Waste Management

3.8.2 Social Impact (Waste Pickers, Communities, etc.)

Currently, Dili Municipality allows 30-40 waste pickers access to the Tibar Landfill site. The waste pickers collect recyclables such as plastic bottles, iron, and aluminium and sell them to buyers or recycling companies. The JICA Survey Team conducted questionnaire survey about the types, amounts, and dealing prices of the waste collected, along with other issues encountered by waste pickers (e.g., fluctuating price of waste, health concerns, working conditions, etc.) to address in the Recycling Survey.

As shown in the national tourism policy “Growing Tourism to 2030,” the Government of Timor-Leste is focusing on tourism as part of its development policy. The policy mentions the environmental sustainability of tourism. Waste management approaches in the country are still weak, thus, improving their capacity to absorb the additional demand that may be placed on them by the expansion of tourism is needed. Waste management in the main tourist spots, such as beaches or Cristo Rei, and source separation at sightseeing spots and hotels shall be the solutions to make these areas more appealing to inbound visitors. Figure 3-30 shows the related pictures in tourist areas..



Park Where Waste Is Scattered

Source: JICA Survey Team



Waste Collection at a Hotel during WACS

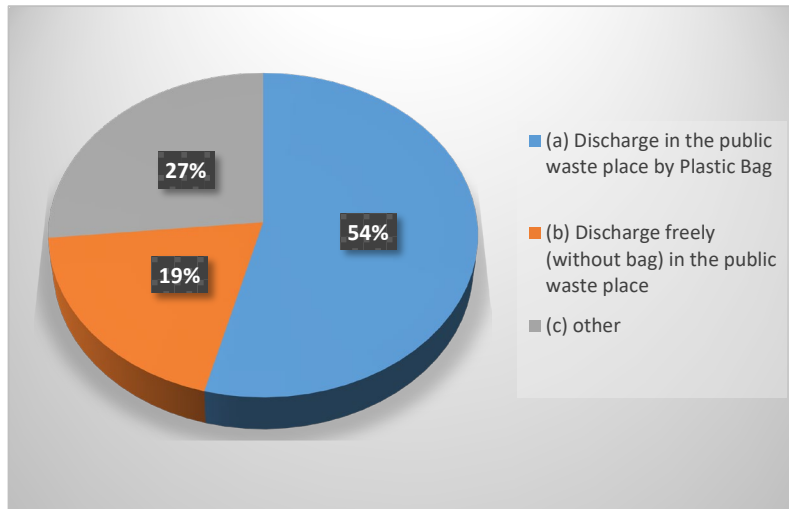
Figure 3-30 Waste Conditions at the Tourism Spots

3.9 Current Public Awareness on SWM

The current public awareness on SWM is important to consider the collection and transportation system in addition to the waste collection service charging system. Therefore, during WACS, the public awareness in the sampling targets of each household has been surveyed based on the questionnaire sheet.

(1) Waste Discharge

The survey has been surveyed to grasp the current situation of waste discharge and their awareness. According to the survey, more than 50% of the respondents utilize plastic bags for waste discharge in the collection points. However, 19% of the respondents answered that they discharged waste at the collection points without utilizing any bags.

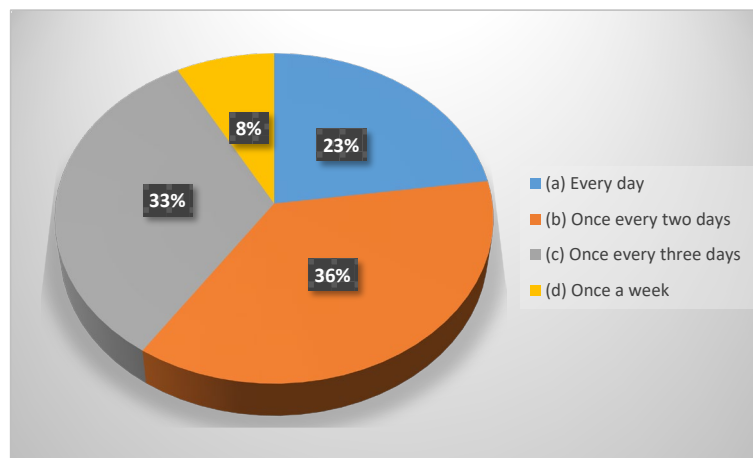


Source: JICA Survey Team

Figure 3-31 Discharge Methods at the Collection Points

(2) Waste Collection Service

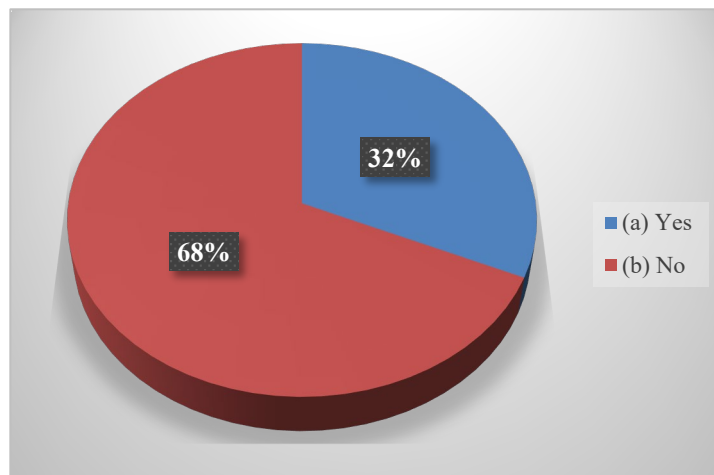
The collection frequency and the quality of service regarding current waste collection service have been surveyed. The frequency of waste discharge is answered as shown in the following figure. More than 70% of the respondents answered that there was non-collection service every day.



Source: JICA Survey Team

Figure 3-32 Collection Frequency

Regarding collection service, 68% of the respondents answered that the current frequency of collection service is not enough, but 32% agreed that it is enough. They required an increase of collection frequency due to some scattering situation at the collection points.

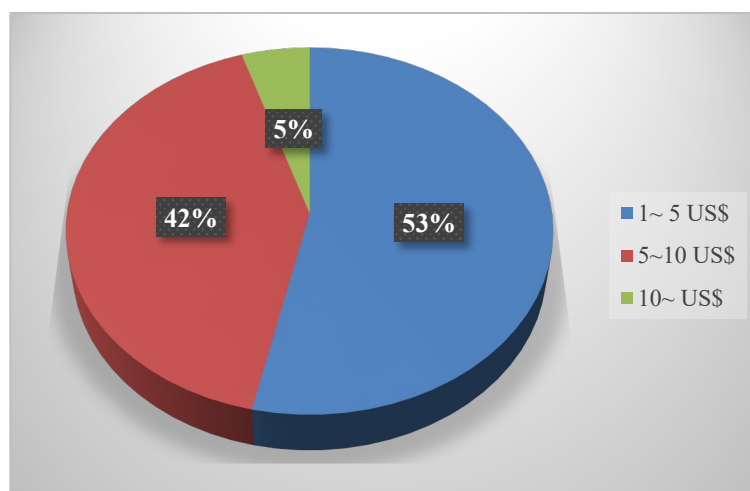


Source: JICA Survey Team

Figure 3-33 Quality of Collection Service

(3) Waste Collection Service Charge

Currently, there is no collection of waste collection service fees from residents as well as business establishments. In this survey, a questionnaire was distributed to the residents to determine future possibility of introducing waste collection service fee. In the questionnaire, it was asked, “How much can you pay on waste collection per month, if waste collection system is improved?” Respondents answered, if Dili Municipality improves the quality of collection service, the residents will pay the waste collection service fee. Around 42% of the respondents are willing to pay USD 5 to USD 10, while 53% can pay USD 1 to USD 5, on the other hand, only 5% can pay more than USD 10 as shown in the following figure:

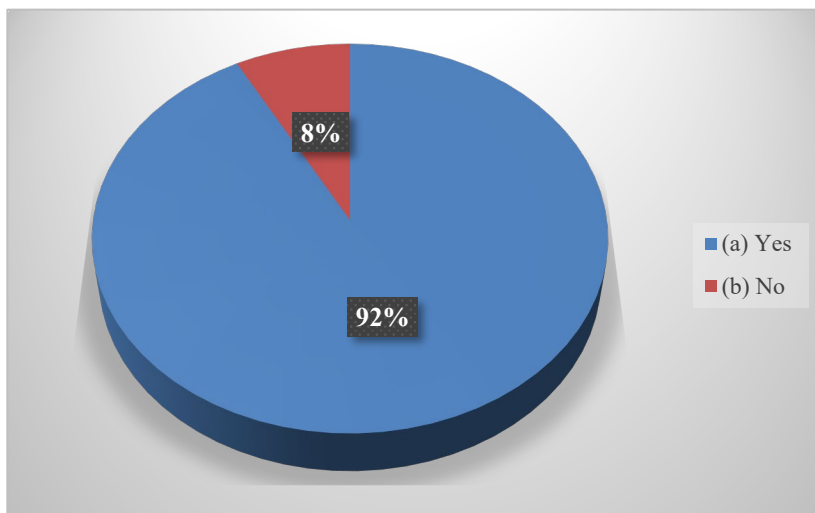


Source: JICA Survey Team

Figure 3-34 Willingness to Pay for Waste Collection Service

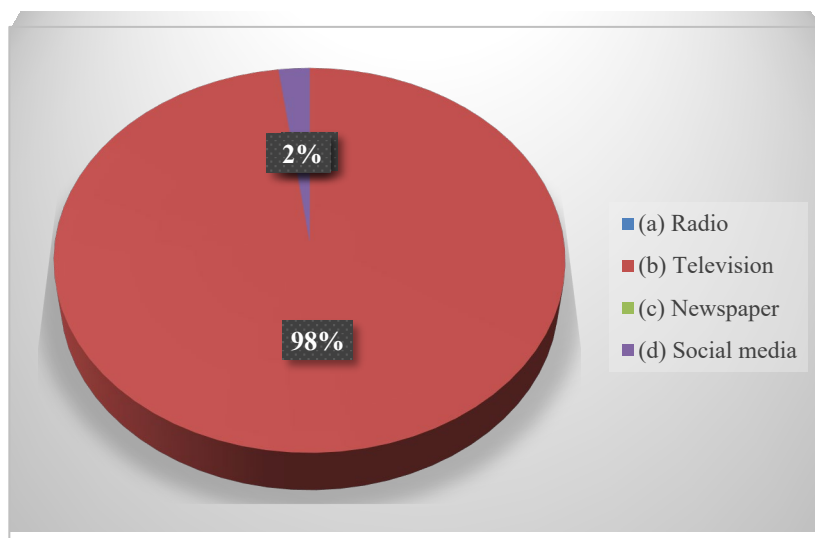
(4) Public Awareness Method

In order to consider a effective public awareness method, the questions regarding effective public awareness method was provided. Firstly, the necessity of public awareness has been questioned. As a result, more than 90% of the respondents answered that the media will raise public awareness for SWM.



Source: JICA Survey Team

Figure 3-35 Necessity of Media to Raise Public Awareness



Source: JICA Survey Team

Figure 3-36 Effective Media to Raise Public Awareness

Based on the survey, 98% of respondents answered that television is more effective method for public awareness. In addition, there are some answers that social media would be effective. There is no answer that public campaign or leaflet would be effective to raise awareness of the residents.

3.10 Public Awareness Raising / Condition of Community Activities

The central government and international donors are leading the public awareness raising activities in Dili Municipality. Through interviews and site visits to each entity, related information has been collected about

the content of activities, strengths, and challenges. The interview targets are shown in Table 3-22.

Table 3-22 Interview Targets

Category	Interviewee
Central Government	CEIA (Ministry of Tourism and Environment)
International Donors	UNDP, FAO

Source: JICA Survey Team

Current activities of each entity are described below.

3.10.1 Center for Environmental Education and Information

The Center for Environmental Education and Information (Centro Edukasaun no Informasaun Ambiental - CEIA) is one of the four departments of the General Directorate of Environment in the Ministry of Tourism and Environment. It is in charge of the environmental education and sharing environmental information with citizens. They have three main activities, namely: Eskola Verde (Green School), Suku Verde (Green Village), and Brigada Ambiental (Environmental Volunteer).

Escola Verde is a project jointly established about ten years ago by the former director of CEIA and the first JICA Environmental Education Volunteer. CEIA provides guidance and support to schools that have pledged to comply with the program, which includes environmental education, tree planting, recycling workshops, regular cleanups, and other activities. Elementary school up to high schools are eligible for this program. CEIA provides tree seedling support and recycling classes to participating schools. As of March 2024, 12 schools have registered, of which four schools are under review for compliance. When a school is registered as Escola Verde, it is given a signboard as an accredited school (see Figure 3-37). The new director, who has been in office since February 2024, has a high awareness of waste issues and has been reorganizing the Escola Verde to focus on lessons about waste and environmental issues (see Figure 3-37). CEIA also hopes to accelerate Escola Verde registration in rate of about 12 schools in ten years.



Signboard of Escola Verde



A class of Escola Verde

Source: JICA Survey Team

Figure 3-37 Environmental Education Activities

Suku Verde is a derivative version of Eskola Verde. Instead of schools, Suku Verde targets communities in *suku* (village) and conducts workshops on environmental education, tree planting, and recycling. As Escola Verde, the change of director has led to a shift in focus to waste issues (e.g., 3R education, the impact of pollution on biodiversity and climate change, cleaning activities, etc.).

Brigada Ambiental is a CEIA-led environmental education and tree-planting program that recruits volunteers interested in environmental issues in their communities. It is also changing its focus to waste issues, and the content of activities is almost the same as that Eskola Verde and Suku Verde. In the long run, CEIA hopes to establish a small-scale waste recycling facility in each *suku*, based on the idea that waste generated in the community in *suku* should be disposed of with responsibility of the waste discharger.

3.10.2 United Nations Development Program (UNDP)

The United Nations Development Program (UNDP) has conducted several projects related to SWM, marine plastic waste, and related public awareness raising. For instance, it conducted a community-based upcycling and recycling project entitled “Recycling Pilot Promotion (RPP)” in four villages: Motael, Colmera, Caicoli, and Campo Alor. The RPP was implemented in cooperation with Hametin Agriculture Sustainable Timor Lorosa’e (HASATIL) and MSA from May 2019 to December 2021. It aimed to create recycling-based jobs and livelihoods through sustainable SWM and integrated recycling facilities.

3.10.3 Food and Agriculture Organization (FAO)



The Food and Agriculture Organization (FAO) has been implementing “Green Jobs Project” in Timor-Leste in cooperation with CEIA. It has been implementing the “Green Jobs for Rural Youth Employment” in collaboration with CEIA. The project aims to provide green job opportunities to younger generation and establish the enforcement of poverty reduction in rural area as well as enforcement of food provision system. Many younger persons took green job training and obtained opportunities of employment and training about farm ownership. The project sites are the municipalities of Dili, Ermera,, Manufahi and Baucau. Younger persons support small scale agriculture and become farm owner wherein they shared their experiences on livestock and crop production.

3.11 Medical Waste

Decree-Law 51/2023 stipulates the responsibilities of the Ministry of Health for healthcare and medical matters. Although there are no laws and regulations specifically related to medical waste, there is a possibility that it will be developed with the support of the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) in the future, according to the Ministry of Health. There is no data on medical waste managed by the Ministry of Health. Several organizations operate under the umbrella of the Ministry of Health related to medical institutions, such as the National Institute of Public Health in Timor-Leste (INSPTL, which has environmental testing equipment), National Institute of Pharmacy and Medical Product (INFPM), emergency centers, and the national hospitals. The national hospital has an incinerator with a capacity of 60 kg. Both the national hospital and four community health centers have incinerators. In the future, they are considering introducing autoclaves with the support of UNICEF, rather than incinerators.

The national hospital has a standard operating procedure (SOP) for handling medical waste. According to the SOP, non-infectious waste: blue; infectious waste: yellow; and sharp materials: put in a red sorting bin. In the national hospital, the amount of medical waste generated is measured and recorded daily. There are two incinerators, i.e., large and small, under operation. However, one is broken, so only one incinerator is currently operational. After the incineration, incinerated the ash is transported to the Tibar Landfill site. The operation of the incinerator requires 600 to 700 liters of fuel every three months.

The other hospitals and clinics should also follow the procedure for separation of hazardous waste such as infectious waste or sharp waste. However, infectious waste observed at the Tibar Landfill site is transported with the non-infectious waste. This is a concern due to the possible damage to health.

	
<p>Incinerator in the national hospital to incinerate infectious waste</p>	<p>Storage of not used or expired pharmaceutical products for suitable treatment and disposal</p>

Source: JICA Survey Team

Figure 3-38 Situation of Medical Waste Management

Healthcare facilities are the main sources of health care risk waste. According to the National Health Sector Strategic Plan (NHSSP) by 2030, 442 health posts with comprehensive health services packages are expected to be established at the *suku* level, 13 district hospitals at the district level, five regional hospitals at the regional level and one national hospital, in Timor-Leste. However, investment plans on responsive and sustainable Healthcare Waste Management appear to be lacking from the strategy. Waste in the hospital is separated into infectious municipal solid waste, infectious waste, and sharp material (needles, ampoules, etc.). Regarding medical waste, the national hospital has formulated a manual and it is shared to other medical facilities.

3.12 Impact by Plastic Waste

The Decree-Law 2/2017 Urban SWM System addresses the protection of human health by noting the need for clear rules in securing waste management to ensure the well-being of its citizens. On the other hand, there are no documents mentioning and chemical harms that plastics and associated toxicants pose to human health in Timor-Leste. Generally, it is said that human exposure to plastics and related toxicants can subsequently lead to, inter alia, reproductive disorders, increased mortality, hypertension, increased cancer risk, and increased birth defects. The waste pickers and their families living at Tibar landfill site are particularly vulnerable. The results of recycling survey showed that 8 out of the 30 waste pickers interviewed stated that health problems due to the working environment are one of the challenges they faced at work. However, there is no specific article or policy that protects the health of the waste pickers from the contaminants.

The Decree-Law 37/2020 for the Disposal, Import, and Production of Bags, Packaging and Other Plastics mentions that plastic bag and package and ineffective utilization of natural resources causes waste scattering in the watercourse and increasing flooding by clogging and disruption of biodiversity.

Timor-Leste Tourism Agency (Organization under the Ministry of Tourism and Environment) is promoting the production and sale of plastic recycled products through collaboration with the communities, Caltech, Mercy Corps, and other donors. Plastic is recycled or upcycled to earrings, bags, baskets, hats, art objects, and various products. They are sold at the souvenir shops located in the hotels and at the airport. “Product

Catalogue” was created, and exhibitions are held.

Timor-Leste Tourism Agency also works with the Department of Environment on clean campaigns based on the current situation, as tourists and residents throw waste on the beach. Regarding waste in the ocean, Dili Port, Marine Police, Quarantine and Clue Ship are monitoring it three or four times a year. Timor-Leste does not impose environmental tax and just finances from visas.



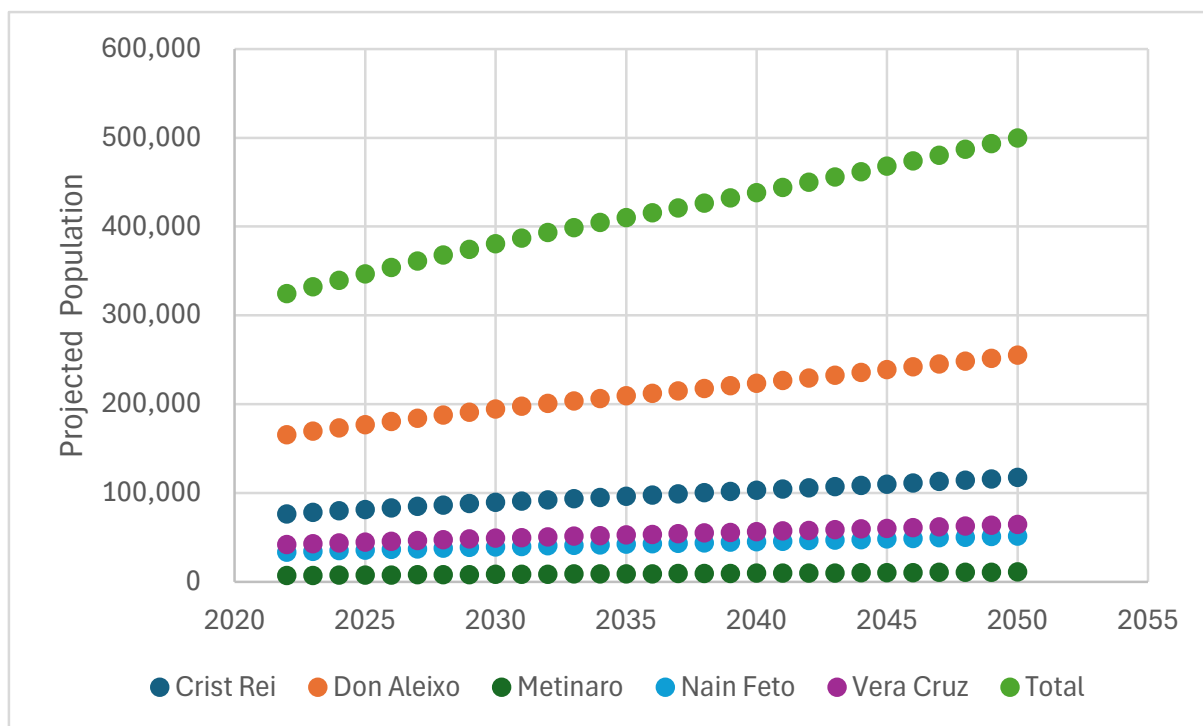
Source: JICA Survey Team

Figure 3-39 Photos of Related Sectors

4 Future Projection of Solid Waste Generation Amount Based on the Population Projection

4.1 Population Projection

The population projection up to 2050 was based on the current census data and population projection data. The population forecast for the municipality includes the five sub-districts, namely: Crist Rei, Don Aleixo, Metinaro, Nain Feto, and Vera Cruz.



Source: National Institute of Statistics Timor-Leste

Figure 4-1 Population Projection in Dili Municipality

4.2 Future Estimation of Waste Generation

The future estimation of household waste generation was calculated based on the following formula:

$$\text{Waste Generation [t/day]} = \text{Waste Generation Rate [kg/person/day]} \times \text{Population [persons]} / 1000 \text{ [kg/t]}$$

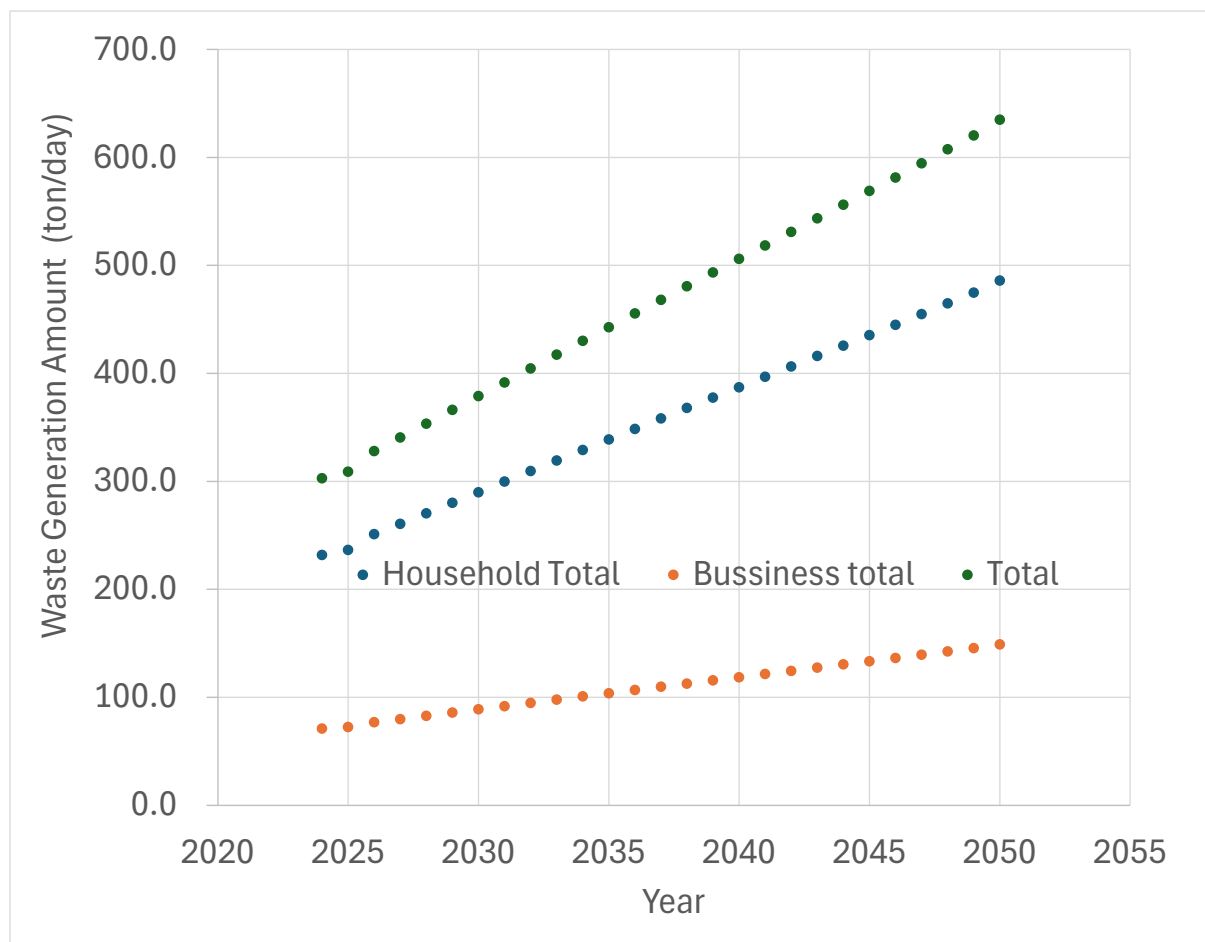
Since there is no gross domestic product (GDP) data available for 2050 for the central and suburban areas of Dili Municipality, the waste generation rates were determined based on the following scenarios:

- It was assumed that the central area of the Dili Municipality would develop by 2050 similar to Thailand or Malaysia as advanced countries in the ASEAN countries.
- It was assumed that the suburban area would be urbanized by 2050 similar to the central area of the Dili Municipality.

According to the report prepared by UNEP in 2017, 1.05 kg/person/day and 1.17 kg/person/day, respectively, are the waste generation rates in Thailand and Malaysia, for an average of 1.11 kg/person/day. In addition, the current household waste generation rate for the central area is 0.71 kg/person/day.

Based on the above discussion, the waste generation rate in 2050 became 1.11 [kg/person/day] for the central area and 0.71 kg/person/day for the suburban area. Regarding commercial waste, it is assumed that there will

be no significant increase in commercial waste due to substantial industrial development. Therefore, the increase rate is set to be the same as that of household waste.



Source: JICA Survey Team

Figure 4-2 Future Estimation of Waste Generation in Dili Municipality

4.3 Future Estimation of Waste Generation for Each Type

The waste generation for each type is shown in Table 4-1. As estimation measure, The waste generation amount of each composition is estimated by multiplying the waste amount from each generation source with the physical composition from each generation.

Table 4-1 Estimation of Waste Generation for Each Type

Year	[t/day]					
	2024	2030	2035	2040	2045	2050
Paper/cardboard	53.7	67.2	78.5	89.7	100.9	112.6
Glass	9.3	11.7	13.7	15.6	17.6	19.6
Plastic (hard)	13.6	17.0	19.9	22.7	25.5	28.5
Plastic (laminated)	14.4	18.0	21.1	24.1	27.1	30.2
Plastic (non-recyclable such as PVC, etc.)	9.5	11.9	13.9	15.9	17.9	20.0
Aluminum	2.3	2.9	3.4	3.9	4.4	4.9
Other metals	5.2	6.6	7.7	8.7	9.8	11.0

Year	2024	2030	2035	2040	2045	2050
Food waste	53.1	66.4	77.6	88.6	99.7	111.2
Green/garden waste	33.1	41.4	48.4	55.3	62.2	69.4
Builders waste	8.3	10.4	12.1	13.8	15.5	17.3
Soil and dirt	51.1	64.0	74.7	85.4	96.1	107.2
Hazardous waste	12.2	15.3	17.9	20.5	23.0	25.7
Miscellaneous	37.0	46.3	54.1	61.8	69.5	77.6
Total	303.0	379.0	442.9	506.1	569.2	635.1

Source: JICA Survey Team

5 Condition of Activities and Assistance of Donors and NGOs in Timor-Leste

5.1 Donors Activities

There are some donors that support the conduct of solid waste management (SWM) including marine plastic waste and environmental management for Timor-Leste.

5.1.1 Asian Development Bank (ADB)

ADB has supported the SWM sector since 2015 as part of the “Urban Services Improvement Sector Project” in Dili Municipality. Targeting the waste and water sectors in Dili, this project was implemented in 2015. It supported the formulation of the "Dili Urban Solid Waste Management Investment Strategy," which looks ahead to 2030. The strategy, which proposes private sector involvement in waste collection, transportation, and landfill site improvement and operation, was approved by the Cabinet in December 2016.

After that the Dili Solid Waste Management Improvement Program initiated in July 2018 has been implemented to carry out the Dili Solid Waste Management Project. To actualize the private sector involvement proposed in the above strategy, tender documents were prepared for the "Equipment Procurement and Service Provision for Waste Collection and Transportation" and the “Tibar Dumpsite Rehabilitation and Upgrading Project (TDRUP)”, along with the draft contracts with respective contractors. The TDRUP project packages are as follows:

- Package 1: Collection and Transportation Project
 - Contract Period: Seven years
 - Contracting Entity: Ministry of State Administration (MSA)
 - Budget: Entirely funded from the general budget of the Dili Municipality
 - Contract Type: "Performance-based service contract," with payments made monthly based on the amount of waste delivered to the landfill
 - Includes maintenance of collection vehicles and skip bins in addition to collection and transportation operations
 - The MSA will procure collection equipment and hand it over to the private contractors.
 - The Dili Municipality will be divided into two zones (east and west), each zone is outsourced to private a contractor.
- Package 2: Landfill Site Improvement and Operation Project
 - Design-Build-Operate (DBO)contract with a contract period of ten years
 - Contracting Entity: Ministry of State Administration (MSA)
 - Budget for Improvement Work: Lump-sum from the government's infrastructure fund; budget for post-improvement operation and maintenance: funded from the general budget of the Dili Municipality
 - The project involves the improvement and maintenance (for ten years) of the Tibar Landfill site.
 - Improvement works aim to convert the current open dumping site into a sanitary landfill site.

- The operation and maintenance (O&M) works may include:
 - The MSA will procure landfill-related equipment and hand it over to the private contractors.
 - Currently, the contract has been completed, with one contractor for each package.
 - ADB support after the commencement of private sector involvement is currently undecided.

5.1.2 United Nations Development Program (UNDP)

The UNDP has conducted some projects related to SWM including marine plastic waste. For example, UNDP conducted community-based upcycling and recycling projects in four *suku* namely Motael, Colmera, Caicoli, and Campo Alor, entitled the “Recycling Pilot Promotion (RPP) Project”. UNDP supported the youth group and Hasatil in cooperation of MSA in the project. The RPP has been implemented between May 2019 and December 2021. The project aims to create recycling-based jobs and livelihood through sustainable SWM and integrated recycling facility. At the inter-country level, there is the Arafura and Timor Seas Ecosystem Approach (ATSEA) Program. ATSEA Program is a regional partnership involving four countries including Indonesia, Timor-Leste, and Papua New Guinea with the support of the Australian government in order to collectively manage high marine and fisheries resources in the Arafura and Timor Seas. Currently, there are no other projects related to SWM and marine plastic waste in Timor-Leste conducted by UNDP.

5.1.3 United States Agency for International Development (USAID)

The USAID supports the Plastics Solutions Alliance (PSA) that is an innovative three-year partnership among Caltech Ltd (Caltech), the European Union (EU), Heineken Timor-Leste (Heineken), the Korea International Cooperation Agency (KOICA), and Mercy Corps Timor-Leste (Mercy Corps).

Under the PSA, plastics are collected from businesses, households, and community bins, and then processed by Caltech before being upcycled or recycled into valuable products like tiles and blocks. USAID funded the investment including the procurement of equipment for recycling.

5.1.4 Korean International Cooperation Agency (KOICA)

The Korean International Cooperation Agency (KOICA) considered the landfill development at the Tibar Landfill site two years ago. At that time, experts from Korea came for the survey. The experts proposed a sorting facility and composting plants near the Tibar Landfill site. However, ADB supported the development of a sanitary landfill site and the improvement of the collection and transportation system. Consequently, KOICA did not consider the infrastructure development regarding SWM, such as the construction of landfill site and procurement of equipment for landfill operation, collection, and transportation.

Previously, there was a recycling dealer that handled used iron, prepared it for sale in the recycling market for export. KOICA also cooperated with PSA and provided some containers for collection of recyclable waste from business establishments.

5.1.5 European Union (EU)

European Union (EU) funded PacWaste, which is a four-year project (2014–2017), is implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to improve regional hazardous waste management across the Pacific in the priority areas of healthcare waste, asbestos waste, and E-waste.

5.2 NGOs

There are some NGOs that support the SWM including marine plastic waste and environmental management for Timor-Leste.

5.2.1 Mercy Corps

Mercy Corps is a global non-governmental organization that operates in transitional contexts experiencing various forms of economic, environmental, social, and political instability.

In Timor-Leste, Mercy Corps initiated an upcycling project for plastic waste. Effective upstream collection is crucial for improving plastic waste management. Consequently, Mercy Corps has launched a pilot project for a private sector-driven collection service to test its feasibility and economic viability. The collection is carried out by Verde Recycle Ltd (Verde), a designated service provider selected by Mercy Corps. Given that plastic recycling is still new to communities in Timor-Leste, Mercy Corps is providing trainings for plastic recycling to local community leaders.

5.2.2 Volunteer Service Abroad

Since 1962, Volunteer Service Abroad (VSA) has been one of the international volunteer organizations that strive to solve waste management problems through upcycling activities to engage the youth in the conversation about managing waste sustainably.

The VSA is sharing the good practices of upcycled products, such as making flowerpots and woven baskets out of plastic waste.

6 Condition of Activities in the ASEAN Countries and Supporting Activities by Donors

6.1 Condition of Activities in the ASEAN Countries

(1) Regional Action Plans and Meetings

- The ASEAN Member States (AMS) are strengthening their efforts to combat plastic pollution through initiatives such as the 2019 "Bangkok Declaration" on Marine Litter and the 2021 "Regional Action Plan." These frameworks aim to address marine plastic pollution through policy interventions and innovative projects that promote sustainable plastic use.
- At the "ASEAN Conference on Plastic Pollution (ACPP)" held in 2023, stakeholders from various countries gathered to share progress, challenges, and opportunities related to pollution reduction. The conference highlighted the importance of coordinated action among governments, the private sector, and civil society.

(2) Technical Strategies and Stakeholder Engagement

- The ASEAN Member States (AMS) are promoting circular economy principles, such as recycling and reuse, to manage the entire lifecycle of plastics. Specific initiatives include the installation of refill water stations and the use of recycled plastics in packaging materials.
- Engagement of stakeholders from both public and private sectors is crucial, and several knowledge-sharing platforms like the ASEAN Circular Economy Stakeholder Platform and the COBSEA Regional Node Platform provide resources and networking opportunities to foster collaborative action.

(3) International Cooperation

- ASEAN actively participates in international negotiations on plastic pollution, such as the Intergovernmental Negotiating Committee (INC) on Plastic Pollution, advocating for approaches that address the entire lifecycle of plastics and emphasizing the needs of developing countries.

6.2 Direction of Timor-Leste Based on the Trends in the ASEAN and Surrounding Countries

As described in Section 6.1, the ASEAN Conference on Plastic Pollution was held in Jakarta on October 17, 2023. During this conference, participants discussed challenges and measures to overcome the impact of pollution caused by plastic waste. Four key pillars of recommendations were recommended during the discussions:

- Technical strategies covering the entire lifecycle of plastics
- Stakeholder engagement for plastic circularity
- Financing and investment for a circular economy
- ASEAN's role in the Intergovernmental Negotiating Committee (INC)

Based on the recommendations described above, the activities listed in Table 6-1 were proposed for implementation by the ASEAN Member States. While the status of planned and ongoing administrative measures to combat plastic waste pollution varies among ASEAN Member States and Timor-Leste, it is recommended that some of the proposed activities be implemented by the Government of Timor-Leste and the Dili Municipality. Considering the current situation in Dili, the activities proposed at the ASEAN conference that are recommended for implementation by the Government of Timor-Leste and Dili

Municipality are outlined below.

Table 6-1 Recommendation 1: Technical Strategies Across the Plastic Life Cycle

Recommended Actions by ASEAN	Current Status in Timor-Leste	Expected Action
Promote the Use of Recycled Plastic Pellets		
1-1: To create regulatory and economic interventions to boost the use of recycled plastics	Although “Zero Plastic Policy” has been enforced, a road map for actualizing requirements regulated in the policy has not been prepared.	To be expected as an action under middle or long-term through a road map which should be prepared.
1-2: To keep up to date and comply with the latest regulations on minimum recycled content as well as increase the usage of recycled pellets.	There are neither regulations nor technologies in place to minimize the use of virgin materials and increase the use of recycled pellets.	The commercialization of recycled pellets is a technically and financially time-consuming process, and it is expected to be an action as part of a long-term plan."
Establish Product and Packaging Standards for Plastics Reuse and Recycling		
1-3: To work together with the scientists and researchers to study and set standards supported by scientific data to ensure consumer safety, especially in reuse systems	In Timor-Leste, it is more important to develop proper waste disposal and recycling system needs to be developed at this moment.	To be expected as an action under middle or long-term.
1-4: To collaborate with the private sector to establish product design standards supported by scientific data to support recycling and reuse	In Timor-Leste, where manufacturing is not prevalent and the country relies on imports, it is necessary to establish standards for imported products along with product design standards and strengthen the recycling promotion system through a collaborative effort between the public and private sectors.	As short-term measures, it is recommended to set standards and recommended criteria for imported products. As for a long-term measure, it will be required to develop design standards as recyclable products when manufacturing industrial sector is developed.
1-5: To incorporate the standards into the products and operations of the private sector.	Manufacturing is not prevalent in Timor-Leste.	This activity will be conducted, followed by Action 1-4.
Build Systems and Infrastructure to Phase Out Single-Use Plastics		
1-6: To create interventions to phase out single-use plastics, especially low-value and hard-to-recycle plastics, and promote sustainable alternatives such as reuse.	Although “Zero Plastic Policy” has been enforced, a road map for actualizing requirements regulated in the policy has not been prepared.	Priority: High To actualize “Zero Plastic Policy”, a road map to phase out single-use plastics needs to be prepared by Timor-Leste government.
1-7: To support the transition to more sustainable alternatives by building an enabling ecosystem and infrastructure that allow cost-effectiveness and large-scale implementation.	Currently, Dili Municipality needs to enhance the capacity for conducting proper plastic waste collection and disposal system by accelerating recycling activities, in cooperation with leading companies and organizations in the private sector.	To be expected as an action under medium or long term for design standard issue.
1-8: To explore sustainable production and packaging options	Although “Zero Plastic Policy” has been enforced, reusable	Priority: High It is necessary to develop a

Recommended Actions by ASEAN	Current Status in Timor-Leste	Expected Action
and transition to reuse systems to phase out single-use plastics and consider strategies to implement these effectively without creating excessive burden to the consumers.	packaging has not been provided.	roadmap for phasing out single-use plastics while highlighting reusable packaging options.
Enhance Waste Collection for Recycling		
1-9: To collaborate to increase the collection of plastic waste for recycling through practical and policy interventions, with clear task distributions based on the circumstances and capabilities.	Dili Municipality is expected to examine the administrative measure for increasing collection of plastic waste for recycling.	Priority: High It is necessary to enhance the capacity for collecting plastic waste for recycling in Dili Municipality with the relevant private companies and organizations collecting and disposing plastic waste.
Strengthen Support for the Informal Sector of Waste Management		
1-10: To provide financial and technical support to the informal waste collection system and must ensure that informal waste collection processes comply with human rights, safety standards, and labour regulations.	In Timor-Leste, as in other developing countries, the activities of the informal sector at the landfills and within urban collection areas have issues in terms of safety, health, and working conditions.	It is necessary to promote the registration of the informal sector and work towards improving their working conditions.
1-11: To provide financial and technical support as part of the extended producer responsibility (EPR).	Timor-Leste does not have regulations related to EPR.	Regulations related to EPR need to be developed considering the industrial structure of Timor-Leste/
1-12: To develop regulations for equitable trade in recyclable waste and recycled materials among ASEAN Member States, e.g., by establishing regional standards and enforcing compliance with the Basel Convention.	Timor-Leste has not been ratified to the Basel Convention.	In order to facilitate the future export and import of recyclable waste and prevent the transboundary movement of hazardous waste, it is necessary for the government to ratify to the Basel Convention.

Source: JICA Survey Team

Table 6-2 Recommendation 2: Stakeholder Engagement for Plastics Circularity

Recommended Actions by ASEAN	Current Status in Timor-Leste	Expected Action
Promote Evidence-based Awareness Raising		
2-1: To raise awareness using existing data for building capacity, and improve understanding on benefits and urgency of participating in the activities to combat plastic pollution.	MTE is implemented awareness-raising activities for waste management. On the other hand, latest data and information that can be used for awareness-raising activities are not so large.	Priority: high Dili Municipality needs to develop capacity for collecting and analyzing existing data and information related to waste collection, transportation, disposal and recycling.
Enhance Multi-stakeholder Knowledge Sharing and Collaboration		
2-2: To create opportunities and actively participate in knowledge sharing and idea exchange	Currently, Timor-Leste is a member of SPREP, allowing it to access information related to	Priority: High The Government of Timor-Leste actively engages in discussions

Recommended Actions by ASEAN	Current Status in Timor-Leste	Expected Action
	waste management in the Pacific region. However, since it is not a member of ASEAN, it is likely challenging to obtain the latest information on waste management.	with SPREP members and exchanges information with various donors to share knowledge and exchange ideas.

Source: JICA Survey Team

Table 6-3 Recommendation 3: Finance and Investments for a Circular Economy

Recommended Actions by ASEAN	Current Status in Timor-Leste	Expected Action
Apply Policy De-risking Measures to Reduce Political and Regulatory Risks		
3-1: To establish national action plans with clearly defined targets	Although “Zero Plastic Policy” has been enforced, a road map for actualizing requirements regulated in the policy has not been prepared.	Priority: high To actualize “Zero Plastic Policy”, it is required to prepare clear targets to phase out single-use plastics with a road map for their achievement by Timor-Leste government.
3-2: To strengthen legal and policy frameworks on the circular economy	Ditto	Ditto
3-3: To strengthen law enforcement and monitoring	Currently, latest monitoring data and information on waste collection, transportation, disposal and recycling are not enough for examining way of acceleration of plastic waste recycling.	Priority: high Following the tightening of regulations on SWM by Timor-Leste government, Dili Municipality needs to enhance monitoring capacity for waste collection, disposal and recycling.
Apply Financial De-risking Measures to Reduce Financial Risks		
3-4: To apply financial de-risking instruments to alleviate risks for private investors	Regarding financial matter, the most urgent task for Timor-Leste government and Dili Municipality is to develop a fee collection system for operating waste collection and disposal.	It is necessary to develop fee collection system for operating waste collection and disposal.
3-5: To disseminate information on investment opportunities	Currently, investment opportunities for plastic waste recycling in Timor-Leste and Dili Municipality seems not to be attractive.	Information on existing recycling business activities and operators needs to be collected for examining how to promote business opportunities for recycling in Dili Municipality.
3-6: To collaborate an effective information disclosure on investment opportunities	Ditto.	Ditto

Source: JICA Survey Team

Table 6-4 Recommendation 4: ASEAN's Role in the INC

Recommended Actions by ASEAN	Current Status in Timor-Leste	Expected Action
Support Active Participation in International Negotiation Committee (INC) Processes		
4-1: To conduct capacity building activities for supporting representatives to participate effectively in the international negotiation processes.	Timor-Leste government needs to develop capacity for participating in the international negotiation processes.	Timor-Leste government needs to collect information on policies, planned and on-going actions by ASEAN, continuously.
4-2: To encourage representatives in the international negotiation committee to participate actively in the negotiation processes.	Ditto	Ditto
Ensure Alignment of International Legally Binding Instrument with Existing Regulations		
4-3: To encourage representatives in the international negotiation committee to participate actively in the negotiation processes.	Timor-Leste is expected to examine inter-regional cooperation for waste management.	For joining ASEAN, information on trend on waste collection, disposal and recycling needs to be updated continuously, and a road map to enhance those activities needs to be developed and implemented to catch up latest movement.
4-4: To participate in ASEAN-level meetings for discussing similarities and differences in stance with regard to the components of the draft text amongst ASEAN members states.	Ditto	Ditto

Source: JICA Survey Team

7 Preliminarily Identified Issues Based on the Current Situation of SWM

Based on the current situation, the following issues have been identified.

7.1.1 Issues Related to Waste Law, Strategy, and Planning

- Although basic laws and regulations on solid waste management (SWM) and on plastics waste exist, there is no fundamental law aimed at achieving a circular society and laws regarding specific types of waste generated from particular sources such as container and packaging waste, construction waste, food waste and e-waste.
- While a feasibility study (F/S) was conducted by the ADB for waste management in Dili, there is currently neither strategy for waste management nor a master plan for the next 10 to 20 years.

7.1.2 Institutional Issues in Waste Management

- All costs related to waste management are covered by taxes. While some cases are funded by tax revenues, it is desirable to collect fees based on the polluter pays principle, especially for commercial waste from business establishments.
- Although 3R initiatives (Reduce, Reuse, Recycle) are being implemented, the availability of recyclable materials is influenced by market prices and financial support is needed to carry out 3R activities. In the future, institutional improvements, including the introduction of Extended Producer Responsibility (EPR), will be necessary.

7.1.3 Issues Related to Waste Generation, Collection, and Transportation

- Currently, there are issues with both the waste disposal methods and collection methods. However, the new collection and transportation system commenced at the end of August. Installing waste bins and containers at the collection points has been implemented and it is expected that improvements in both collection points and collection vehicle such as compactor vehicle and skip loader instead of dump trucks will greatly improve the waste scattering and collection efficiency. It is necessary to monitor the improvements.
- Since all collection and transportation services are outsourced to private companies, it is necessary to conduct contract management properly and to enforce monitoring and supervision of private companies' performance.
- In rural areas of the Dili Municipality such as Hera and Metinaro, there is no collection and transportation system and waste is dumped near the generation sources or in open spaces.
- Additionally, the new collection method still involves mixed collection, and recyclable waste is not separated for collection, which deviates from the 3R initiatives.

7.1.4 Issues Related to Waste Reduction, Minimization, and Recycling

- Public awareness regarding waste management and/or keeping clean environment is not sufficient for suitable waste discharge toward recycling and promotion of waste minimization
- Although there are domestic recycling industries, including Caltech, their scale is small, and items like scrap metal are exported outside the island. To reduce the amount of waste for final disposal and

scattered waste, promoting the recycling industry within the island is necessary. For example, paper has limited recycling target such as composting. PET bottle is recycled but the other type of recyclable plastic has not been collected sufficiently and the recycled material is a part of them.

- Given the small market size in Timor-Leste and necessity of finding overseas market, effective collection of recyclable waste and utilization of current recycling technology are necessary to secure the market of recycled product.

7.1.5 Issues Related to Waste Treatment and Disposal

- While the current open dumping method at the Tibar Landfill site is set to be improved to a sanitary landfill method, methane gas recovery and leachate treatment will be provided and the treated wastewater satisfies the discharged water standard will become issues.
- The landfill site design and construction will be carried out by the private contractors. However, management of these contractors is entrusted to the PMU, and without external consultants such as those from ADB, there are concerns about the PMU's ability to adequately monitor and supervise.
- According to PMU staff, the challenge is how to promote the reuse and recycling of waste to extend the lifespan of the landfill site.

7.1.6 Issues Related to Waste Scattering in Public Spaces, Drainage Channel, River and Beach

- Solid waste is scattered in public spaces such as waste collection points, roads and waterbodies such as drainage channels, rivers, and coastal waterways. Although the introduction of a new collection and transportation system is expected to reduce littering at the waste collection points and on the roads, it is difficult to address littering in the drainage channels, rivers, and coastal areas. Therefore, monitoring is necessary to improve the littering situation.
- Considering Timor-Leste's current technology, collecting waste that flows out from the drainage channel and the river into the sea is challenging, and it is necessary to create preventive measures for waterways and rivers.

8 Consideration of Countermeasure to Solve the Issues

Based on the identified issues, the approach to solve the issues are showed as follows.

8.1 Waste Management Law, Strategy, and Planning:

There are some issues regarding law and regulations toward circular economy and the strategy and planning of SWM. Therefore, the following countermeasures to solve the issues are recommended.

Table 8-1 Issues and Countermeasures regarding Waste Management Law, Strategy and Planning

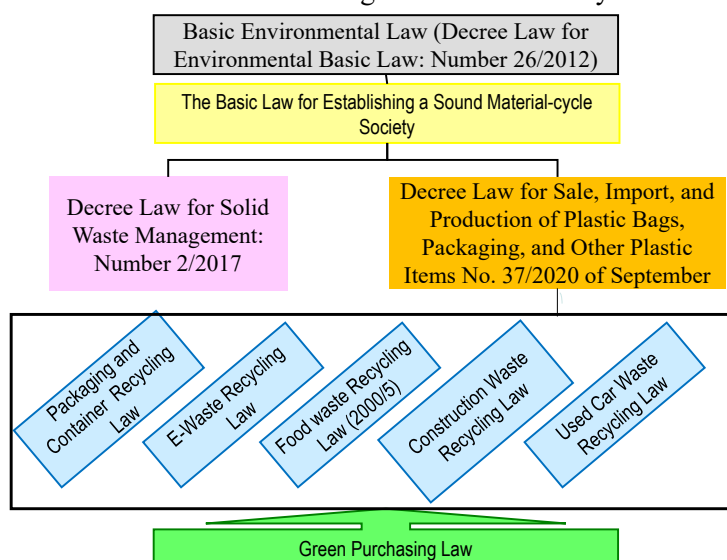
Itemized Issues	Recommended Countermeasure
No existing fundamental law for a circular economy	Preparation of fundamental law regarding circular economy
	Preparation of by-law and/or regulations for each type of waste such as construction waste, E-waste, medical waste, hazardous waste, etc.
No waste management strategy and master plan for the future	Formulation of waste management strategy and master plan regarding SWM
	Preparation of guidelines for the preparation of SWM plan in each local authority

Source: JICA Survey Team

(1) Establishment of Fundamental Law and By-laws Regarding Circular Economy

The Basic Law for Establishing a Circular Society is a fundamental legal framework aimed at promoting the formation of a circular society in Timor-Leste. By enacting this Basic Law, it is expected that a foundation for waste and recycling policies will be established. While it is believed that the Basic Law will address waste and recycling measures, the amount of waste generation is increasing, making it ever more difficult to secure final disposal sites in the coming years, leading to a rise in illegal dumping and littering. To solve these waste and recycling problems, it is essential to move away from a waste disposal without Reduce, Reuse and Recycle (3R), and consideration of return and shift towards creating a "circular society" with less environmental impact. A new legal framework is needed to promote the formation of a circular society. Furthermore, based on the Basic Law, it is necessary to establish legal systems that include measures for each type of waste, considering the 3Rs (reduce, reuse, recycle) and extended producer responsibility.

Figure 8-1 is a proposal for the legal system related to the circular society based on Japanese legal system of circular society and solid waste management. The formulation of unique legal system by referring the proposal is necessary in Timor-Leste.



Source: JICA Survey Team

Figure 8-1 Proposed Legal System for Timor-Leste, based on Japanese Legal System of Circular Society and Solid Waste Management

8.2 Institutional Arrangement:

There are some issues regarding institutional arrangement such as fee collection and EPR. Recommended countermeasures are shown as follows.

Table 8-2 Issues and Countermeasures Regarding Institutional Arrangement

Issues	Recommended Countermeasure
No collection service fee nor tipping fee collection	<p>Consideration of introduction of collection service fee and tipping fee at the landfill site, especially for business establishment in consideration of Polluters Pay Principle (PPP)</p> <p>Consideration of implementing mechanisms, regarding household waste, that can maintain a high collection rate, such as simultaneous collection of fees when collecting electricity charges from sectors where collection is relatively easy, or a designated waste bag system.</p>
Necessity of institutional improvement for promoting 3R for the future development	Establishment of a system that includes collection, reuse, and recycling, based on the concept of the Extended Producer Responsibility (EPR) system,

Source: JICA Survey Team

(1) Introduction of Collection System of Solid Waste Management Service Fee

In the implementation of SWM, securing financial resources is crucial. In addition to tax revenue, it is necessary to collect waste collection service fees and waste disposal fees. These should be implemented based on the Beneficiary Pay Principle, and it is desirable that the amount of fees collected varies depending on the service requests made by the waste generators. For the collection of waste disposal fees, it is possible to charge fees based on the amount of waste measured at the Tibar Landfill site using the weighing bridge. On the other hand, regarding the collection of waste collection service fees, it is difficult to collect fees from beneficiaries, except for large waste-generating businesses that have contracts. Possible collection methods include charging the fees together with electricity or water bills, or selling specially designated garbage bags for waste collection with an additional fee, which would include the waste collection service fee."

Table 8-3 Issues and Countermeasures Regarding Institutional Arrangement

Item	Objectives and Benefits of the Introduction	Brief Introduction of the Method
Collection and Transportation Service Fee	<ul style="list-style-type: none"> ● All the beneficiaries pay the waste collection service fee ● Incentives toward waste reduction 	<ul style="list-style-type: none"> ● Use of designated garbage bag for the collection of waste collection service fee ● Collection with electricity bill or others ● Collection from business establishment which discharge large amount of waste as contract fee
Waste Disposal Fee	<ul style="list-style-type: none"> ● Collection through waste collection company ● Incentive toward waste reduction and recycling 	<ul style="list-style-type: none"> ● Collection of tipping fee through the monitoring record at the weighing bridge of Tibar Landfill site

Source: JICA Survey Team

Designated garbage bag for the collection of waste collection service fee is a specific collection method of waste collection service fee in Japan. An example is shown as follows.

1. **Purchasing Designated Garbage Bags:** Purchase designated waste bags at stores. The price of these bags includes the fee for waste collection services.
2. **Disposal:** Place waste in the purchased designated bags and take them to the designated collection point from the home.
3. **Collection:** Waste collection vehicles collect the designated bags (waste in any other bags will not be collected and will be considered illegal dumping).
4. **Fee Collection:** Revenue from the sale of garbage bags is used to fund the operation of waste collection services.

This system indirectly collects collection fees through the purchase of garbage bags. Additionally, specifying different types of designated bags for recyclable waste, residual waste, and other categories, as well as adjusting the size and price of the bags, can create incentives for waste separation and reduction. To address concerns that designated plastic bags contribute to marine plastic pollution, future measures may include using plant-based plastics or paper bags. The photo on the right shows designated garbage bags, demonstrating that they come in various sizes. As the amount collected differs based on the size of the bags, this serves as an incentive for reducing waste.



Source: JICA Survey Team

Figure 8-2 Collection of Waste Collection Serviced Fee through Designated Garbage Bag

(2) Institutional Setup for Promotion of Recycling

In Timor-Leste, companies like Caltech are engaged in recycling packaging materials such as plastics and glass; however, the market is small, unstable, and requires financial support to promote recycling. Considering this background, the introduction of an Extended Producer Responsibility (EPR) system aims to strengthen the measures against market fluctuations and provide incentives for simplifying packaging.

Upon implementation, it is necessary to establish a legal framework and set up a recycling association with members including Dili Municipality, producers, importers, and recycling companies. The EPR system requires producers and importers to bear the costs of recycling and collection, holding them accountable for the entire lifecycle of their products, especially post-use collection, reuse, and recycling.

Under this system, manufacturers and importers are obligated to manage waste from their products and provide incentives to support the processes from collection to recycling.

8.3 Waste Discharge, Collection and Transportation

Issues regarding collection and transportation considering the promotion of recycling and proposed countermeasures are shown in Table 8-4.

Table 8-4 Issues and Countermeasures regarding Waste Discharge, Collection and Transportation

Itemized Issues	Recommended Countermeasure
Necessity of expansion of collection and transportation service not only in the urban area but also in the rural area in Dili Municipality	Consideration of provision of self-disposal procedure and/or expansion of collection and transportation services for the rural area
Currently, introduced collection system is mixed and commingled collection system, which is not suitable for 3R promotion	Consideration of separate collection
	Collection by setting collection box for recyclable waste at shop, school, church or community, etc.
	Consideration of collection of recyclable waste for business establishment based on a contract
	Consideration of deposit system for collection of recyclable waste

Source: JICA Survey Team

(1) Provision of Self-disposal Procedure and/or Expansion of Collection and Transportation Service for the Rural Area

Currently, in areas like Hera and Metinaro, waste collection and transportation services are not provided, resulting in households disposing of their waste within their own premises or in nearby open spaces. With the expected increase in waste due to population growth and urbanization, there will be a need for new collection and transportation services in the future. Because of sparsely populated areas, daily collection is likely to be difficult. Therefore, it is proposed to process biodegradable food waste through composting for self-disposal while expanding collection and transportation services for other types of waste. Due to the sparse population and the time required for collection, door-to-door collection is considered difficult. As an alternative, it is proposed to set up collection stations at locations like markets, churches, and schools. Below are photos of collection stations and home composting in the rural areas, as examples from Japan.



Source: Nippon Koei Co., Ltd.

Figure 8-3 Waste Collection and Self-disposal in the Rural Area in Japan

(2) Considering Collection System Toward the Promotion of 3Rs

Regarding collection methods to promote the 3Rs (Reduce, Reuse, Recycle), key considerations include how to separate recyclable waste during collection, ensure it is collected without contamination, and gather recyclables in a segregated state. For separate collection, the Dili Municipality is responsible for separating and collecting waste by each type, such as recyclables and other waste. However, in the case of Dili Municipality, a new mixed collection system has been introduced under a seven-year contract with private operators, which means implementing separate collection will take time.

Alternatively, setting up collection bins specifically for recyclables at locations like shops, schools, churches, and communities requires that recycling companies independently collect these materials, along with monitoring at the collection points. This approach would require cooperation from the locations where collection points are established, such as shops and schools.

On the other hand, if a deposit system is introduced, it is expected to increase the volume of recyclables collected at the collection points and improve the quality of recyclables. However, this system would take time to design and would require the understanding and cooperation of producers and retailers involved in providing refunds. Gaining their support could also be time-consuming. Therefore, starting with sectors, where associations with producers and retailers already exist could be a practical approach.

Based on the above considerations, the following comparisons are made for recyclable waste collection methods.

Table 8-5 Comparison of Collection Method of Recyclable Waste

Collection Method	Explanation of Method	Advantage	Challenge
Separate Collection	The Dili Municipality will provide collection vehicles for each waste category and conduct the collection. There are two methods such as : collecting each category of waste on designated days of the week, and using collection vehicles with compartmented hoppers for each waste category.	It is possible to be conducted by municipality with their plan.	The cooperation from residents in waste separation at the source is essential, and continuous environmental education and public awareness campaigns are necessary.
Station Collection	The collection bins for recyclables are installed at a certain station such as shops, schools, churches, and community centers, from which recycling companies will directly collect the materials.	Monitoring at the collection sites is necessary, but it is relatively possible to collect waste without much contamination..	Since recycling companies collect directly from the sorting bins, it is necessary to take the time for collection process.
Deposit System	A system in which producers and retailers collaborate, allowing consumers to return used containers and packaging waste in exchange for a refund.	An increase in the amount of collected waste and an improvement in the quality of recyclable materials are expected.	System design and the understanding and cooperation of producers and retailers are essential.

Source: JICA Survey Team

As for priorities, since the new mixed collection and transport system with a seven-year contract is already in operation, it is difficult to make immediate changes to separate collection. Similarly, implementing a deposit refund system will require time for system design and gaining the understanding of producers and retailers. Therefore, in the short term, implementing station collection is practical, while in the medium to long term, advancing towards separate collection and the introduction of the deposit refund system would be a realistic and effective approach for Dili Municipality.

8.4 Waste Reduction, Minimization, and Recycling

Some issues regarding recycling market and its development and recommended countermeasures are shown in Table 8-6.

Table 8-6 Issues and Countermeasures regarding Waste Reduction, Minimization and Recycling

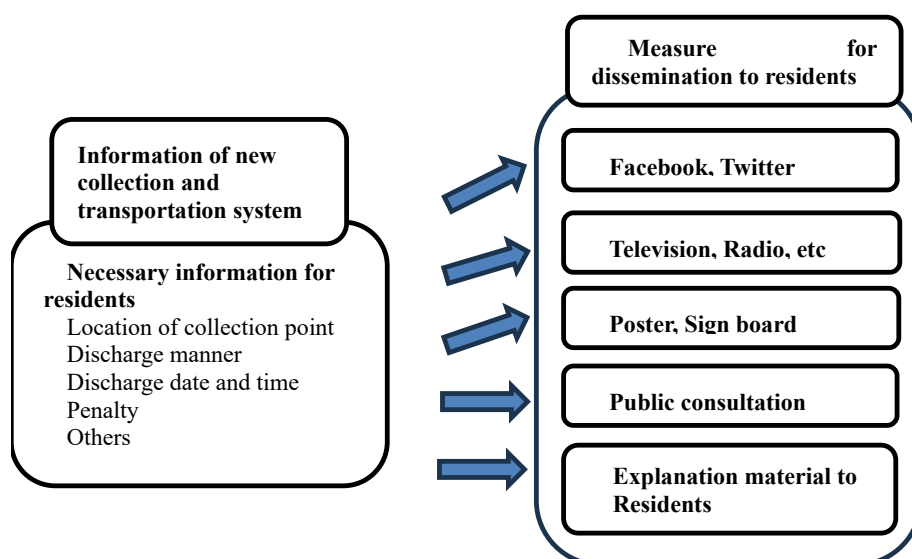
Issues	Recommended Countermeasure
Public awareness activities regarding waste management and/or keep clean environment are not enough for suitable waste discharge toward recycling and promotion of waste minimization	It is necessary to conduct environmental education and public awareness raising through some establishments such as school, community, regional facilities, shop, tourism facilities, etc. Environmental education and public awareness raising through mass communication tools such as X (previously Twitter), Facebook, web page, etc, are important.
In small island nations, although the volume of recyclable waste is less, current recycling efforts are insufficient, with inadequate recycling of used paper and cardboard, as well as waste plastics and glass, relative to their generation.	As for paper waste or plastic one, considering current discharge amount and future market, it will be necessary to consider export to overseas and/or improvement of existing recycling technology.

Source: JICA Survey Team

(1) Public Awareness and Environmental Education

As mentioned before, environmental education is being conducted in schools and communities, but it is irregular and lacks consistency and the residents could not understand them considerably and the output could not be sufficient. For example, a new collection and transportation system was established and started in the end of August, but most residents are unaware of the changes. Although the changes were announced through TV and other media a few months ago, the results of the resident awareness survey, as shown in “3.9 Current Awareness of Residents Regarding Waste Management,” indicate that some residents do not watch TV, suggesting the need for communication through multiple channels. If the system starts later than initially planned, further announcements are also necessary.

In the plan, location maps of waste collection points have been created, but if residents are not informed about the locations, disposal methods, and disposal times, it could lead to scattered waste and prolonged waste accumulation at the collection points. In waste management, it is essential to clearly communicate residents’ responsibilities (what they need to do), but currently, there is a lack of communication regarding the collection and transportation system, discharged locations, and methods.



Source: JICA Survey Team

Figure 8-4 Example of Information to be Disseminated for Public Awareness and Measures

On the other hand, while promoting separation for 3R (Reduce, Reuse, Recycle) is necessary, educating residents without a fully developed system that explains how the separated waste is collected, recycled, or processed may lead to a lack of understanding among residents, hindering future awareness activities. Therefore, it is crucial to carefully consider this aspect and conduct awareness activities through various media, with clear communication of the objectives, activities, responsibilities, and expected outcomes.

(2) Development of Recycling Business

Currently, there are recycling companies handling plastic waste, such as Caltech, and some metal recycling companies. However, there are no companies that recycle cardboard, paper, or glass. As shown in Chapter 4, considering the projected future volume of recyclable waste, the development of the recycling business will become a critical issue. Below are some examples of potential recycling initiatives for paper waste, plastic waste, and glass waste that could be promoted in Timor-Leste.

1) Used Paper Recycling

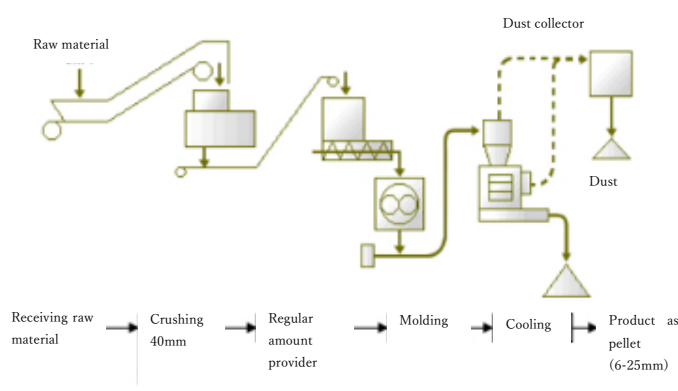
(i) Recycling of Used Paper

Used paper can be transformed into recycled paper from pulping process in paper mill, and it is challenging in countries without established paper companies. The population in Timor-Leste is less and there is less possibility of the development of paper mill industry. Therefore it is advisable to package the recycled paper and export it to neighbouring countries.

(ii) Production of Refuse Paper & Plastic Fuel (RPF)

Compared with Refuse Derived Fuel (RDF), Refuse Paper & Plastic Fuel (RPF) contains less moisture and less organic matter, making it less prone to decay and eliminating the need for drying processes and additives used in RDF.

Due to its relatively simple manufacturing process, it is possible to produce low-cost, stable-quality fuel. The typical production process is shown in Figure 8-5. In case of the existence of contamination, it is necessary to sorting process in previous process.



Source : National Institute for Environmental Studies

Figure 8-5 Process of RPF

2) Recycle of Used Glass

As for used glass, Caltech is advancing recycling efforts, and since the challenges lie more in collection than in recycling technology, Caltech buys recyclable or municipalities make financial support for collection. Furthermore, implementation of station collection is supported. It is desirable to promote businesses utilizing these technologies in the short to medium term. The options of countermeasures of glass recycling are show in Table 8-7.

Table 8-7 Options of Glass Recycle

Recycling Option	Measure	Advantage	Issue
Recycled Glass	Crushed glass can be reused in the production of new glass products, such as bottles and window glass, enabling savings in raw materials and energy.	High recycling rate and improvement of product quality.	Color sorting of glass and removal of contaminants are necessary, requiring capital investment in equipment.
Construction Material	Crushed glass can be used as an aggregate substitute for sand in concrete and asphalt.	Cost reduction through raw material substitution and waste reduction.	Crushing equipment is required, and managing the strength of glass and mixing ratios is essential.
Utilization as Fiber Glass	Finely crushed glass can be processed into fibers and used as insulation or building materials.	High insulation performance and durability.	Advanced processing technology and equipment are needed.
Materials for Ornaments and Crafts	Glass can be used to create ornaments and crafts, presenting new business opportunities, especially in regions with a thriving handicraft industry.	Low initial cost and contribution to activate local economy.	Product quality control and market development are necessary.

Source: JICA Survey Team

3) Recycle of Plastic

(i) Utilization of Existing Recycle Technology

Regarding plastics, Caltech is advancing recycling efforts and it is desirable to promote businesses that utilize these technologies as the primary challenges to improve the quality of these products and develop markets in short and middle term. Additionally, alternative treatment options, such as using plastics as fuel in cement factories or converting them into RPF, can be considered. As for cement use, currently, in Timor-Leste, there is a cement company, but cement raw material such as clinker is imported from China. Therefore, the main process where waste plastic could be used as fuel, the kiln stage, is conducted overseas, making it unfeasible for local use in Timor-Leste.

(ii) Consideration of New Recycling Technologies

i) Use of Plastics as Raw Materials for RPF

The proportion of wastepaper and waste plastics in the production of RPF varies depending on the manufacturing purpose and the required fuel characteristics, but the general ranges are as follows:

- Waste paper ratio: about 50% to 80%
- Waste plastic ratio: about 20% to 50%

The specific ratio is adjusted according to the desired calorific value, low ash content, moldability, and the specifications of the end users. To increase the calorific value, the proportion of waste plastic is increased, while to reduce ash content, the proportion of wastepaper is increased. Thus, combining the recycling of used paper described before, future recycling into RPF can be considered.

ii) Use in Asphalt Pavements

In the future, as Timor-Leste undergoes road development, there will be a demand for asphalt pavement. By using additives made from chemically processed waste PET bottles, it is possible to enhance the durability of asphalt and shorten construction time. However, this technology presents challenges, such as the difficulty of uniformly mixing plastics with asphalt, the need for relatively high-cost equipment and technology, and

increased costs, necessitating long-term consideration.

8.5 Countermeasure for Waste Discharged in the Waterbody

As described in Chapter 5, there are issues concerning waste discharged in the waterbody such as rivers and sea. It is necessary to monitor the hotspot in the rivers and marine waste in the sea. After the identification of hotspots, it is necessary to collect the waste in the waterbody. The recommended countermeasures are show as follows.

Table 8-8 Issues and Countermeasures regarding Collection of Discharged Waste in Waterbody

Issues	Recommended Countermeasure
Waste is scattered in public spaces such as waste collection points, roads, drainage channels, rivers, and coastal areas. Therefore, monitoring is necessary to improve the current waste scattering situation.	As for waste monitoring, the use of remote surveillance systems such as drones and cameras, as well as monitoring programs involving local residents, can be effective. By utilizing the collected data, it becomes possible to identify areas prone to scattering waste and prioritize cleaning and other countermeasures.
With the current technological capabilities in Timor-Leste, it is difficult to collect waste that has flowed from the drainage and rivers into the sea.	Measures to prevent waste from flowing into drainages and rivers are effective. Although there are instances where waste that has entered the sea is captured through surface cleaning, the costs and technical requirements have difficulties to implement in the short term, necessitating middle or long-term consideration.

Source: JICA Survey Team

(1) Monitoring of Waste

The images taken with smartphone cameras can be used to identify the type of waste and create distribution maps to conduct waste monitoring. This approach allows for the monitoring of litter along the coastlines and in the rivers, making it possible to making maps to identify the hotspots and the cause of waste scattering could be clarified to consider the countermeasures.

	
Taking the photo of waste on the pavement	Grasp waste scattering locations and significant area by mapping

Source: Pirika, Inc.

Figure 8-6 Monitoring of Solid Waste and an Example of Mapping

(2) Collection of Waste Discharged in the Rivers and Marine Area

1) Countermeasure for discharged waste in the rivers

Oil fences, capture nets, and mesh fittings are installed in the rivers to capture debris. Depending on the conditions such as water flow speed and river width, it may be challenging to capture debris effectively due to the design and specifications of the oil fences and nets. Therefore, careful consideration is required before installation. In practice, similar installations have been made in small drainage channels in Timor-Leste, where waste collection from drainage channels has been carried out. The following photos show examples of these installations.



Source: JICA Survey Team

Figure 8-7 Example of Waste Discharged into the Rivers

2) Collection of waste in marine area

By utilizing marine cleaning vessels, floating plastics and other debris can be efficiently collected, contributing to the preservation of landscapes and the improvement of fishing environments, particularly in tourist and fishing areas. However, the introduction of marine cleaning vessels involves relatively high initial costs as well as operation and maintenance costs. This could become challenges in terms of funding and maintenance in economically developing regions, such as Timor-Leste. The photos show examples of marine cleaning vessel utilization.

	
<p>Collection Situation of Marine Plastic Debris (No.1)</p>	<p>Collection Situation of Marine Plastic Debris (No.2)</p>
	
<p>Container Filled with Marine Debris</p>	<p>Unloading of the Dust Collection Container by Crane</p>

Source: Solid Waste Management Department in Kota Kinabalu Municipality (Top photos); Nippon Koei (Bottom photos)

Figure 8-8 Example of Collection of Floating Debris by Marine Cleaning Vessel

8.6 Prioritization and Timeline of the Countermeasures

Based on the current waste management situation, the countermeasures were prioritized according to their feasibility. Measures that can be achieved relatively promptly are classified as "Short Term," requiring immediate attention. On the other hand, measures that are of lower priority, premature, or require a long-term perspective due to their time-consuming nature are classified as "Long Term." A chronological comparison is shown in the following Table.

Table 8-9 Proposed Timeline and Priority of Each Countermeasure

Items of necessary Activities for the Future	Detail Items of necessary Activities for the Future	Priority/Nece ssary Time	1st yr	2nd yr	3rd yr	4th yr	5th yr	6th yr	7th yr	8th yr	9th yr	10th yr
			Short Term			Middle Term			Long Term			
Establishment of Legal System of Circular Economy	Eatablishment of Law regarding Circular Economy	Middle Term										
	Esbalishment of by-law regarding each type of waste discharged in business establishment	Long Term										
	Establishment of by law regarding container and package waste	Long Term										
Strategy and planning regarding marine plastic waste and solid waste management	Formulation of National Solid Waste Management Strategy	Short Term										
	Formulation of National Solid Waste Management Plan	Middle Term										
	Formulation of Solid Waste Management Marter Plan in Dili Municipality	Short Term										
Improvement of financial system	Establishment of collection of tipping fee for waste disposal at Tibar Landfill Site	Short Term										
	Establishment of waste collection charge system from business establishment	Middle Term										
	Establishment of waste collection charge system from households	Long Term										
Expansion of waste collection and transportation service in rural area (Hera or Metirao) in Dili municipality	There is no collection in rural area and the expansion of the collection service is important	Middle Term										
Improvement of systems and establishment of collection systems for the resource utilization of plastic waste	Introduction of suitable collection system of recyclable waste such as deposit system, separate collection, collection at designated points	Middle Term										
Introduction of Recycling Technology and consideration of market development for end users and recycling technologies	Recycling of construction material from glass and plastic	Middle Term										
	Recycling of plastic to RPF	Middle or Long Term										
Implementation of monitoring and management utilizing DX (Digital Transformation)	Implementation of monitoring and management utilizing DX (Digital Transformation)	Short Term										
Consideration of technologies for marine waste collection	Marine waste cleaning and collection vessels like the Kure Daiya) and other Japanese technologies.	Middle Term										

Source: JICA Survey Team

8.7 Possibility of Utilizing Japanese Companies' Technologies

Regarding the proposed countermeasures outlined in Table 8-9, the potential for utilizing Japanese companies' technologies has been examined. The implementation of "legal development, strategy, and planning for waste management towards a circular society" and "efforts for institutional development" will primarily be carried out by entities such as the MSA, MTE, and Dili Municipality of Timor-Leste. Additionally, it is desirable for Dili Municipality and the MTE to independently implement measures related to "waste collection and transportation" and "waste reduction and recycling," as well as "raising public awareness and environmental education," with the support of technical cooperation from experts.

On the other hand, the practical technologies for recycling activities require the expertise of private enterprises, providing opportunities to utilize the technologies and experience accumulated by Japanese companies. Areas where the application of Japanese companies' technologies may be considered include "promotion of recycling business", "monitoring of waste" and "collection of waste discharged into marine area and river". Below are candidate examples of potential applications of Japanese technologies.

(1) Implementation of Recycling Business

As outlined in Chapter 8, there is significant demand for recycling materials such as waste plastics, used paper, and glass. Among these, waste plastics and glass are already being handled by Caltech, but the recycling of used paper is a key area where Japanese technology is particularly needed. At the same time, the recycling demand for plastics is expected to increase due to the fact that Caltech alone is not able to fully address the recycling needs and because of the anticipated growth in future waste amount. Therefore, the following sections present projects for producing fluff fuel and RPF from waste plastics and used paper as well as projects that utilize waste plastics for asphalt paving.

1) Production of Fluff Fuel or RPF from Waste Plastics and Used Paper

The following outlines a project that utilizes Japanese technology for the production of fluff fuel or RPF from waste plastics and used paper, which can then be used as fuel.

Table 8-10 Summary of Project to Produce Fluff Fuel or RPF from Waste Plastic and Used Paper

Project Name	Production of Fluff Fuel or RPF from Waste Plastic and Used Paper
Objective	Reducing the final disposal amount of waste plastics, and lowering dependence on fossil fuels by used paper, utilizing waste as fuel to recover thermal energy will contribute to reducing environmental impact.
Activity	Plastics and waste paper collected through collection points and separate collection are processed into RPF or fluff fuel at processing plants, and the processed fuel is exported to other countries such as Indonesia, where boiler facilities are available.
Name of Technology/Name of Company	Guun Co., Ltd. (http://www.guun.co.jp/service/product.html) Japan Waste Tokai Co., Ltd. (https://japanwaste.jp/jwt/service/rpf/) Tobukaihatsu Inc. (https://www.tobukaihatsu.jp/rpf/)
Stakeholders of this Project	<ul style="list-style-type: none"> ● Recycling Company ● Dili Municipality ● User of Fuel (Power Station or Factory in Indonesia, Australia or New Zealand)
Image of Business Model	

Challenges/Points to be Considered	<ul style="list-style-type: none"> ● Stable supply of waste plastics through separate collection and station collection ● Need for proper sorting and removal of contaminants before the manufacturing process of RPF and fluff fuel ● Standardization of technology to obtain fuel with stable quality ● Since the end users are overseas, it is necessary to comply with export/import regulations and ensure stable markets for sales
	
http://www.guun.co.jp/service/global.html	

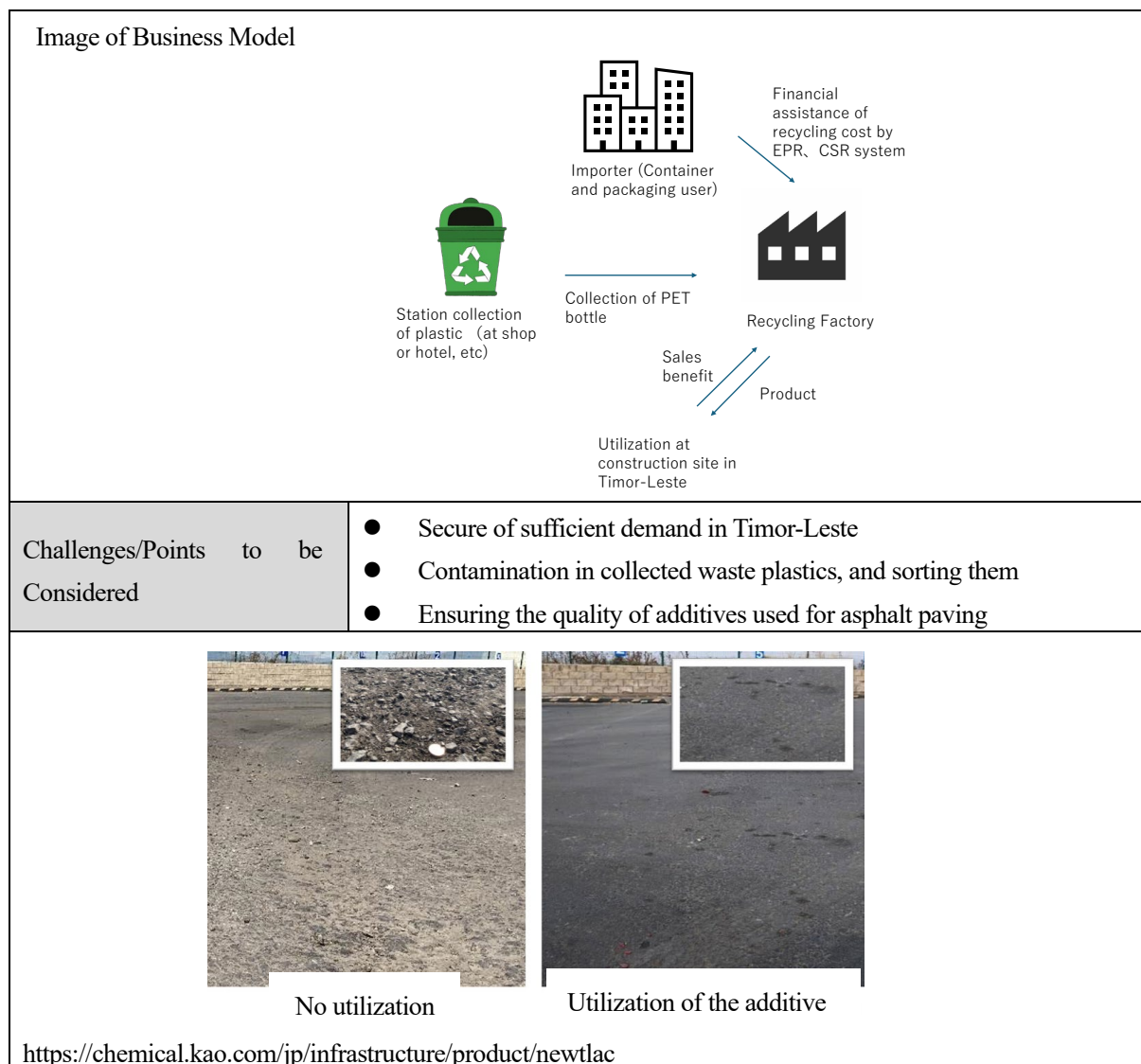
Source : JICA Survey Team

2) Utilization of waste plastic in asphalt pavement

The utilization of waste plastic in asphalt paving is a technology with proven results in Japan, where additives made from waste plastic can be applied to asphalt pavement. Below is an overview of a project utilizing Japanese technology that employs waste plastic as an additive to improve the durability of asphalt pavements.

Table 8-11 Summary of Project to Utilize Waste Plastic in Asphalt Pavement

Project Name	Utilization of Waste Plastic in Asphalt Pavement
Objective	To improve the durability of asphalt pavement through utilization of waste plastic
Activity	Waste plastic is collected through station collection (or separate collection), processed into additives for asphalt paving, and used as an additive in asphalt roads.
Name of Technology/Name of Company	High durable asphalt modifier made from waste PET (New TLAC 5000) https://chemical.kao.com/global/infrastructure/product/newtlac/
Stakeholders of this Project	<ul style="list-style-type: none"> ● Dili Municipality (Preparation of collection points and awareness raising) ● Recyclers : Collection of used PET bottle and recycling ● Importer (Producer) : Collection of waste plastic and financial assistance by importers of the product with containers and packaging ● Construction Company : Utilization of the Product



Source : JICA Survey Team

(2) Monitoring of Waste

As indicated in Section 8.5(1), there is a need to utilize waste monitoring to address litter in Dili City, including monitoring of rivers and coastal areas. This includes identifying hotspots, cleaning litter, and designating waste collection points in river and coastal regions.

Among the technologies available in Japan, the "Takanome Walking Version" service by Pirika, Ltd. is beneficial. Takanome is a service that visualizes local illegal dumping and litter situations. By using smartphones and AI for image analysis, it can provide analytical results in the form of litter scattering maps. By sharing the analytical data with Dili municipality, MSA, MTE, and other relevant agencies, it can help optimize cleaning budget allocations and verify the effectiveness of measures against waste discharge, and guide cleanup crews to areas severely affected by waste.

It is anticipated that Dili Municipality and relevant ministries will bear the costs of the system's usage. However, it is also desirable to secure funding from stakeholders benefiting from the beautification of the city, such as existing hotel association. It is also expected that actual photographic work using smartphones will involve not only staff from Dili City and MTA but also personnel from NGOs and other private

organizations. Below is an outline of the waste monitoring project utilizing the above digital technology.

Table 8-12 Summary of Waste Monitoring Project Utilizing Digital Technology

Project Name	Waste Monitoring Project by Utilizing Digital Technology
Objective	To visualize waste and illegal dumping in mapping form
Activity	Image analysis using smart phones and AI will reflect the analysis results on the waste distribution map. The stakeholders use the analysis data to optimize the allocation of cleaning budgets, verify the effectiveness of waste spillage countermeasures, and request collection and cleaning staffs to work in areas where littering is serious.
Name of Technology/Name of Company	Takanome (Pirika, Inc. https://corp.pirika.org/)
Stakeholders of this Project	<ul style="list-style-type: none"> ● Dili Municipality ● MTE ● Tourism sector ● NGOs
Image of Business Model	
Challenges/Points to be Considered	<ul style="list-style-type: none"> ● The stakeholders need to discuss how to use the collected data. ● Training for the photo operators is necessary. ● The stakeholders need to cover labor cost and internet charge.

Source: Pirika, Inc.

Source : JICA Survey Team

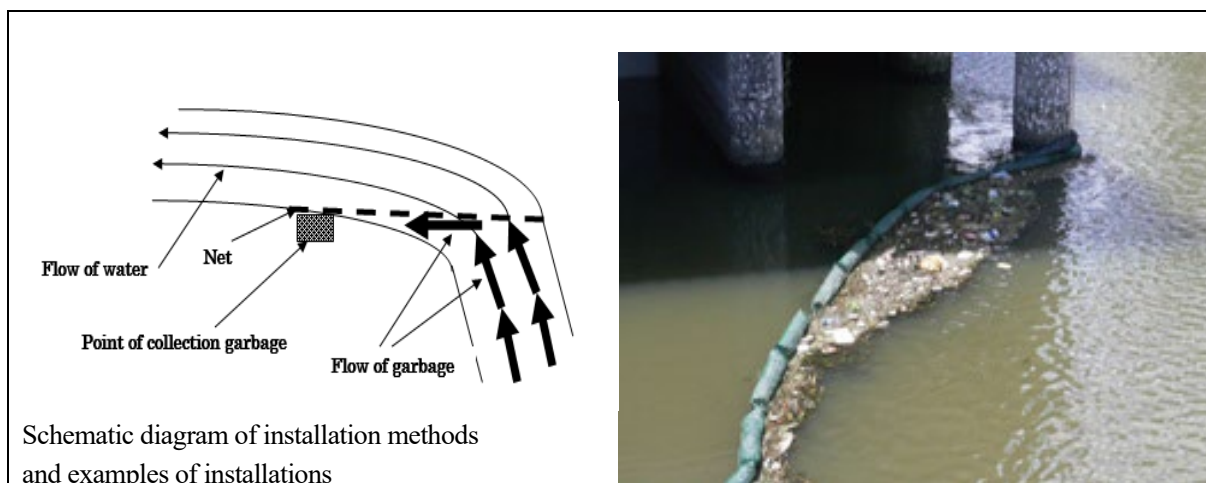
(3) Collection of Waste Discharged into Rivers and Marine Areas.

1) Collection of Waste Discharged into Rivers

The collection of waste that has flowed into rivers can be achieved through the use of nets, wire mesh, etc. The company shown as below has the experience of this method in Japan. It is also necessary to consider the methods for offloading, transporting, and processing or disposing of the collected waste, as well as measures to address increased river flow velocity and volume during heavy rainfall. Below is an outline of the waste collection project in rivers.

Table 8-13 Summary of the Project of Collection of Waste Discharged into Rivers

Project Name	Collection of waste discharged into the river
Objective	<ul style="list-style-type: none"> ● Monitoring the waste flowing into rivers and waterways ● Preventing waste from flowing into marine areas
Activity	<ul style="list-style-type: none"> ● Install nets or wire mesh at multiple locations in rivers and waterways. ● Regularly monitor the amount and characteristics of waste at the net/mesh installation sites. ● Use the monitoring results to raise awareness among local residents.
Name of Technology/Name of Company	Net to collect waste discharged into the river (example : OK net fence, https://www.maedakosen.jp/products/542/)
Stakeholders of this Project	<ul style="list-style-type: none"> ● Dili municipality ● Residents in each village ● Private company or entity contracted by Dili municipality
Image of Business Model	<p>The diagram illustrates the business model for waste collection in rivers. On the left, a building icon represents the 'Japanese company'. An arrow labeled 'Sales of Net for collection of waste discharged into rivers' points to a central diagram of the net system. The net system includes a 'main rope' attached to the 'riverbed', a 'chain as weight' hanging into the water, and an 'extension rope' along the bottom. 'Water flow' is indicated by a blue arrow pointing left. The net is labeled 'net'. On the right, a building icon represents 'Dili Municipality/ Suku (village)'. An arrow labeled 'Waste collection and monitoring' points from the net system to an icon representing 'Residents/Entity'.</p>
Challenges/Points to be Considered	<ul style="list-style-type: none"> ● Consideration of how to handle the collected waste. ● Requirement of the training to monitor the amount and characteristics of the collected waste. ● Measures for damage to nets and wire mesh, and for when river water levels increase.



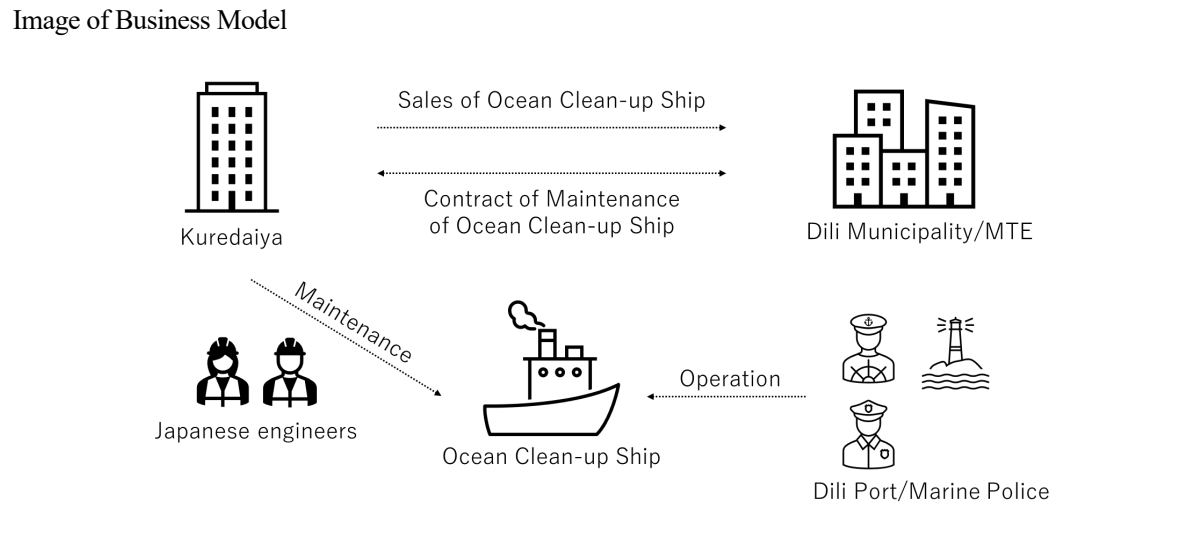
Source : JICA Survey Team

2) Collection of Waste Discharged into Marine Areas

For the collection of marine debris, the use of sea surface cleaning vessels is a option. There is a company in Japan, with experience in operating such vessels, and they are considering expanding internationally. On the other hand, it is necessary to select methods for offloading, transporting, and processing or disposing of the collected waste that is suited to the actual conditions in Timor-Leste. Below is an outline of the marine debris collection project mentioned above.

Table 8-14 Summary of the Project of Collection of Waste Discharged into Marine Area

Project Name	Collection of waste discharged into the ocean
Objective	To prevent impacts on biodiversity, tourism, vessels, fisheries, etc. by collecting marine waste
Activity	Ocean Clean-up Ship is used to collect plastic and other waste discharged into the ocean. Collected waste needs to be properly separated and managed.
Name of Technology/Name of Company	Ocean Clean-up Ship (Kuredaiya http://www.kuredaiya.co.jp/)
Stakeholders of this Project	<ul style="list-style-type: none"> ● Dili Municipality ● MTE ● Dili Port ● Marine Police



- | | |
|--|--|
| <p>Challenges/Points to be Considered</p> | <ul style="list-style-type: none"> ● The stakeholders need to discuss the procedure to manage the collected waste. ● Training for operation of the Ocean Clean-up Ship is necessary. ● The stakeholders need to expense the operation cost of the Ship. |
|--|--|



Source: Kuredaiya <http://www.kuredaiya.co.jp/>

Source : JICA Survey Team

9 Consideration of Necessary Supporting Scheme for the Countermeasures

As for the recommended countermeasures described in Chapter 8, the JICA Survey Team focused on those requiring support from the Japanese side. As a result, improvements on legal and waste management systems, which take time and can be supported individually, should be addressed through the dispatch of a long-term expert. As for the establishment of integrated systems and project implementation related to collection, recycling, and processing, technical cooperation projects are recommended. For projects involving specific facilities or equipment where private sector engagement can be effectively utilized, it is advisable to use schemes such as the JICA Private Sector Partnership or Grassroots Grant Aid. The JICA Survey Team outlined the support schemes for implementing the proposed countermeasures and provided an overview of the potential schemes below.

9.1 Technical Cooperation Project Regarding 3R

Background

In Timor-Leste, marine plastic waste from land and sea areas has become a serious issue, requiring urgent action. Currently, the Dili Municipality is advancing measures for waste collection, transport, and final disposal through a contract with a Chinese company. However, within limited resources, promoting the 3Rs is essential in order to improve the overall SWM including for marine plastic waste..

Although there are local recycling companies, the amount of waste collected is insufficient, and the market is not fully developed. Therefore, further promotion of the 3Rs is necessary, and it is crucial to implement sustainable 3R projects to support these efforts.

Project Purpose

The purpose of the project is to promote the recycling of recyclable waste, including plastic waste, and consequently contribute to reducing marine plastic waste.

Outputs

Outcome 1: Strengthening Organizational Structure, Finance, and Systems

The organizational structure, financial aspects, and institutional systems related to waste management are strengthened, supporting the realization of the Extended Producer Responsibility (EPR) concepts as outlined in the Basic Waste Management Law. This also includes establishing the foundation for promoting plastic waste recycling.

Outcome 2: Strengthening Monitoring Systems at the Emission Sources

Monitoring systems at the sources of plastic waste emissions is strengthened by utilizing Information and Communications Technology (ICT) to collect and analyze data, enabling the implementation of appropriate measures.

Outcome 3: Promoting Waste Reduction and Recycling through Environmental Education and Public Awareness

The separation of recyclable waste at its sources through environmental education and public awareness activities is promoted. This aims to raise public awareness, leading to more effective waste reduction and recycling.

Outcome 4: Improving Collection Systems through Pilot Projects

Through Pilot Projects, the improvement of collection systems in no coverage areas and of the collection of recyclable waste are enhanced. In the Project, the collection rate increase and collection system of recyclable waste in the future is considered.

Outcome 5: Expanding Recycling Markets and Improving Technology to Enhance Quality and Quantity

The amount and quality of recycled waste is improved through market expansion and advancement in recycling technology.

9.2 Support through Private Sector Partnership

In the Japanese technologies described in subsection 8.7, the projects which could be effective under the JICA Private Sector Partnership Scheme are shown as follows.

(1) Recycling Technology

As mentioned in Chapter 8, recycling technologies include RPF and fluff fuel production and utilization for asphalt pavement from plastic and used paper. However, it takes time to develop the utilization for asphalt pavement in developing countries because of lack of the experience there. Below are examples of proposed support through private sector partnership:

- Manufacturing RPF or fluff fuel from waste plastics and paper and utilizing it as a heat source.

Several companies in Japan possess these related technologies except Guun Co., Ltd, and it could be possible to make the proposal for commercialization by utilizing such technologies.

(2) Monitoring and Collection of Plastic Waste in Water Bodies

As described in Chapter 8, technologies for monitoring and collecting plastic waste in rivers, coastlines, and marine areas include identifying waste scattering locations through monitoring with smartphones and AI, collecting waste plastics from rivers using mesh and nets, and using marine cleaning vessels for collection in ocean areas. Below are examples of support through private sector partnership utilizing the Japanese companies:

- Monitoring the distribution of plastic waste using image capture with smartphones and AI analysis.
- Collecting waste in the rivers after identifying locations of scattered waste.
- Collecting waste in marine areas using marine cleaning vessels.

9.3 Assistance by Long-term Expert

(1) Support for the Formulation of Basic Laws and Regulations

Objective: To establish a legal framework for a circular society and to promote sustainable resource use

Activities:

- To analyze and evaluate existing laws and regulations, and subsequently propose legislation that aligns with local needs.
- To introduce international best practices and advanced case studies, and provide support for improving the legal system based on these insights.
- To facilitate discussions and coordination with relevant agencies and stakeholders, supporting the development of effective legal and regulatory frameworks.

(2) Design and Implementation Support for Fee Collection Systems

Objective: To introduce a fee collection system that reduces waste generation and promotes resource

circulation, thereby decreasing environmental impact.

Activities:

- To evaluate the current fee collection systems and propose improvements such as designated garbage bag schemes
- To provide support for designing systems that enhance the transparency and efficiency of fee collection, and develop guidelines for implementation.
- To assist with public awareness and outreach efforts to ensure community and business engagement and better understanding of the fee collection system.

(3) System Design and Implementation Support for Extended Producer Responsibility (EPR)

Objective: To introduce the EPR system that holds producers accountable for the disposal and recycling of their products, promoting sustainable product design and waste reduction.

Activities:

- To support the formulation of laws and regulations related to EPR and provide advice on system design.
- To facilitate the establishment of a multi-stakeholder council and support the formation of a recycling association to build the EPR system.
- To promote collaboration with businesses to encourage the design of recyclable products and the development of collection systems.
- To support the establishment of monitoring and evaluation frameworks to ensure the effectiveness of the EPR system.

Through these supporting activities, dispatch of a long-term JICA expert aims to contribute to the establishment of the legal and institutional framework for a sustainable circular society in Timor-Leste, reducing the burden of waste and promoting efficient resource utilization.

Appendices

Appendix-1 Meeting Record

Date & Time	Friday, May 17, 2024 10:00-11:20
Venue	Dili Municipality
Participant	Dili Municipality: Mr. Jose Francisco, Mr. Ubaldo S. S. de Sousa, Mr. Domingos Soriano, Mr. Zacarias M. de Araujo JICA: Mr. Sho Matsumura, Mr. Takaaki Shiraishi, Mr. Jose Ricardo Da Costa Gomes JST: Naganuma, Nakayama, Abilio

Meeting Memo:

- Following everyone's self-introduction, the survey team explained the outline of the survey.

Legal system

- Decree Law no. 2/2017 is provided for waste disposal.
- Mr. Ricky will share the website where you can view the laws of Timor-Leste to the survey team.

Collection and transportation

- Waste collection and transportation are outsourced to a Chinese company and are collected seven days a week. Separate collection is not carried out.
- The amount collected is about 250 tons per day. The amount of collected waste is increasing and it's now close to about 300 tons.
- There are 460 collection points, and it is planned to increase them to 1,166.
- The JICA Survey Team requested to share a map of the collection points from Dili City.

Tibar disposal site

- It is measured by taking a sample of a truck and measuring it on a truck scale.
Data is available from August 2022 to the present.
- Access to the disposal site is permitted to about 45 waste pickers.
They are supposed to wear safety vests.
- Dili City wants to extend the life of the disposal site.
Dili City requested JICA to support the recycling industry at the disposal site in order to extend the life of the disposal site.

Materials

Survey summary, questionnaire



Date & Time	Friday, May 17, 2024 14:30-15:30
Venue	Hospital Nacional Guido Valadares (HNGV)
Participant	HNGV: Ms. Armenia Pereira JST: Naganuma, Nakayama, Abilio

Meeting Memo:

- Waste in the hospital is separated into three types of waste such as; general waste, medical waste, and sharp material (needles, ampoules, etc.).
- Regarding medical waste, the national hospital has formulated a manual and shared it to other medical facilities.
The are three types of waste collecting containers: blue bin is for general waste, yellow bin is for medical waste, red bin is for sharp.
In 2019, they took a training course by the WHO in Macau, and created a manual based on that content.
- The amount of medical waste discharged is measured and recorded daily.
- Medical waste and sharp material are incinerated in an incinerator on site. The incinerated ash is transported to the Tibar disposal site.
- Two incinerators, large and small, were in operation, but one was broken and one small one is now in operation.
- The operating cost of the incinerator is 600 to 700 liters of fuel in three months.

Materials

Survey summary, questionnaire



Medical waste incineration facility

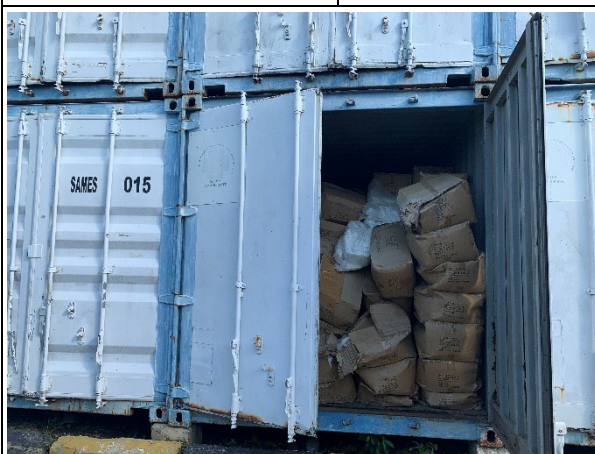
Date & Time	Tuesday, May 21, 2024 15:00-16:30
Venue	National Institute of Farmacy and Medical Product (INFPM)
Participant	INFPM: Mr. Brigido de Deus (Executive Director), Mr. Rogerio (Department chief of Administration) JICA: Mr. Sho Matsumura, Mr. Takaaki Shiraishi JST: Nakayama, Abilio

Meeting Memo:

- INFPM has three bases: Dili, Ainaro and Naiara.
- The management of inventory for medicines and medical devices, and includes the collection expired items from each medical institution are reported to the Ministry of Health.
- Previously, expired drugs were disposed at Tibar disposal site, but in 2023, the management company of Tibar became a foreign-affiliated company due to a tender, and medical waste was no longer accepted.
- Currently, a hole of about 20m has been dug and reclaimed on land owned by the city of Dili in Metinaro.
- The amount to be discarded amounts to \$1 million/year. Due to the corona crisis, too many donations have been collected, and many of the PPE for COVID has expired.
- Once a year, it takes three to four days to dispose of 40-50 trucks.
- The disposal cost is 4,000-5,000 USD.
- Sharp waste such as syringes and ampoules are pressed with heavy machinery, destroyed, and then landfilled.
- General waste was once collected by the city, but now it is collected by a cleaning company as part of the service.
- There is an incinerator procured with the support of UNICEF, but it is not in use because there is no place to place it.
- The problem is that there is no place to incinerate or dispose of medical waste.
- Regarding the SOP, it will be shared later.
- Pharmaceuticals and medical devices are imported from Australia, Indonesia, India, etc.

Materials

Survey summary, questionnaire



Containers of medical products to be discarded



Unused incinerator


Date & Time	Friday, May 24, 2024 14:00-15:00
Venue	CEIA
Participant	MTE: Mr. Carlos Conceição (Director, Directorate of Pollution Control), Mr. Arlindo Silveira (Chief, Directorate of Pollution Control), Ms. Eliza Luisa Savita Pereira (Director, CEIA), Ms. Arisa Minoru (JOCV) JICA: Mr. Sho Matsumura, Mr. Takaaki Shiraishi, Mr. Jose Ricardo Da Costa Gomes JST: Higashinakagawa, Nakayama, Abilio

Summary of Discussion:

- Following everyone's self-introduction, the JICA Survey Team explained the outline of the survey.
- Data from the Tibar disposal site is held by the city of Dili or the "Port of China" company.
- At the Tibar disposal site, there are waste pickers that collect aluminum and metal. They have the knowledge of sorting what can be exported and what cannot be exported, and they can obtain a certain amount of recycling through investigation. Plastic is not collected because there is no seller.
- Efforts are being made to collect data on the amount of plastic from communities and commercial facilities, and there are data on four municipalities other than Dili. However, it is estimated as the amount of waste from the amount of PET bottles sold. Data will be sent at a later date.
- The zero-plastic policy that created in the previous administration will be replaced the new zero-plastic waste policy in the new administration, but the details are yet to be determined.
- Other environmental laws than Decree law for solid waste management are as follows: No. 02/2017 and Decree-Law No. 37/2020 of 23 September regarding plastic waste prevention include Decree Law No. 5/2011 Environmental Licensing, Decree Law 26/2012 Environmental Management, Decree Law No. 30/2012 Fluorocarbons Control Law, and Decree Law No. 6/2020 stipulates environmental crimes. These laws are described on the website. There are no laws and regulations related to industrial waste and hazardous waste.
- Environmental standards are currently being developed.
Although standards have been established, there is a problem with monitoring to confirm compliance with those standards because there are not enough equipment in the laboratory.

Materials	Survey summary, questionnaire
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Date & Time	May 29, 2024 (Wed) 15:00-16:00
Venue	Ministry of Health
Participant	MoH: Ms. Terlinda da Conceição Barros, DV (General Director of Hospital Service), Ms. Izilda JICA: Mr. Sho Matsumura JST: Higashinakagawa, Nakayama, Abilio
<p>Summary of Discussion:</p> <ul style="list-style-type: none"> ● The participants were introduced, and an overview of the survey was explained. ● Decree Law No. 51/2023 sets out the responsibilities of the Ministry of Health (the Decree is available on the website). ● The Ministry of Health does not manage data on the amount of medical waste. ● The National Hospital has an incinerator with a capacity of 60 kg. The hospital waste is not disposed at Tibar. ● The National Hospital and four Community Health Centers have incinerators. There are no health posts or private medical institutions. In the future, they are considering introducing autoclaves with the support of UNICEF, rather than incinerators. ● The task of the Ministry of Health is to draft laws and regulations. It is supported by the WHO and UNICEF. ● Although there are no laws and regulations related to medical waste, there is a possibility that it will be developed with the support of the WHO and UNICEF in the future. ● The National Hospital has a SOP on medical waste. ● Many cases occur at the Tibar disposal site, and there are concerns about damage to health. Previously, skin tests were conducted on residents in the area. Sharp waste is dangerous. ● The National Institute of Public Health in Timor-Leste: INSPTL (having environmental testing equipment), INFPM, emergency centers, and national hospitals are under the umbrella of the Ministry of Health. 	
Materials	Survey summary, questionnaire
	

Date & Time	June 7 th (Fri), 2024 15:00~16:00
Venue	KOICA
Participants	Deputy Director: Kwangsoo An JST: Higashinakagawa, Abilio

Meeting Memo:

- 2 years ago, KOICA considered the landfill development in Tibar Landfill Site. In that time, experts from Korea came for the survey. However, ADB supported the landfill development and collection transportation system. Then, KOICA did not consider the infrastructure development regarding SWM.
- The expert proposed sorting facility near Tibar landfill site.
- Previously, there is a recycling dealer which handle used iron for selling recycling market to export it.
- The project with Mercy Corp has been implemented about the collection of recyclable waste, especially plastic waste. However, the cost of production is more than twice or three times than the product produced from normal construction material. Therefore, it is not sustainable for private market.
- USAID and EU support plastic solution alliance to promote recycling (see: [PA00ZN6Z.pdf \(usaid.gov\)](#))
- UNDP implemented project of separate discharge of recyclable waste in villages with public awareness and environmental education activities.
- In previous government, they promote Zero plastic policy, but current government promote environmental education for school.
- NGO in Netherland introduced the collection equipment of marine litter from sea in Indonesia.

Material	Questionnaire
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Tyles made by Recycled Plastic

Date & Time	June 18 th (Tue), 2024 15:00~15:45
Venue	UNDP
Participants	UNDP: Ms. Felisberta Moniz da Silva (Assistant Resident Representative, Head of Climate Change and Environment Program Unit) Mr. Expedito Beloelo (Project Manager) JICA: Mr. Sho Matsumura JST: Higashinakagawa
<p>Meeting Memo:</p> <ul style="list-style-type: none"> ● UNDP has conducted some projects related to solid waste management and marine plastic litter. ● For example, UNDP conducted community-based upcycling and recycling projects in four Suco such as Motael, Colmera, Caicoli, and Campo Alor before, called as the Recycling Pilot Promotion (RPP) Project. ● UNDP supported youth group and Hasatil with MSA in the project. ● The RPP has been implemented between May 2019 and December 2021. The project aims to create recycling-based jobs and livelihood through sustainable solid waste management and integrated recycling facility. ● In inter-country level, there is Arafura and Timor Seas Ecosystem Approach (ATSEA) Program. ATSEA Program is a regional partnership involving four countries including Indonesia, Timor-Leste and Papua New Guinea by the support of Australian Government in order to collectively manage high marine and fisheries resources in Arafura and Timor Seas. ● Currently, there is no other projects related to solid waste management and marine plastic litter in Timor-Leste, conducted by UNDP. 	
Material	Questionnaire

Date & Time	June 27 th (Thurs), 2024 09:30~10:30
Venue	MSA SEATOU Office
Participants	MSA SEATOU: Ms. Emilina Soares JICA: Mr. Sho Matsumura, Mr. Jose Ricardo Da Costa Gomes JST: Higashinakagawa, Nakayama, Teofilo
<p>Meeting Memo:</p> <ul style="list-style-type: none"> ● Regarding the recycling activities in Dili, there are only composing and cutting trees. However the detail information should be from Dili Municipality. ● The central government is only support to create the policy and regulation about the solid waste management (SWM) and recycling. For the action should be conducted by Dili Municipality. ● The central government found very difficult in terms of community approach and their awareness toward waste management and environment. ● Regarding to people's traits in Timor-Leste, if they do something that get profit or beneficial for their own selves. If not, they do not conduct anything. ● The government implemented the dump for different categories of waste in the public area but the dumps were taking by the local community and brought to their house. ● For all the activities that regarding the SWM in terms of schedule, collecting, and transporting, the central government handover private sector due to the limited resources. ● Regarding to the regulation and punishment of the SWM an illegal dump due to Timorese economic conditions that became obstacle to government to action of applying the regulation and punishment. ● Regarding to the commercial organization, they responsible for their own collecting and transporting system to the landfill Tibar. ● The central government plans to charge the commercial organization in they would use the waste collector from public servant. ● Regarding the current situation and the government has not receive any revenue only spend general state budget and the government has plan to charge the collecting and transporting system to get profit. ● The landfill will be projected for 20-50 years, if there is recycling support. ● At the moment the government really needs the recycling company to support in SWM in Dili urgently. ● Regarding to the communities participation, the communities keen to cooperate with the government if the government apply punishment and incentive. ● Regarding the interrelation of ministerial the SEATOU has not discuss yet with the MTE about the waste issue, but they have a good relationship. ● The central government emphasizes that the study and the survey should be align the Timor-Leste situation. ● Regarding to the pilot project of SWM and recycling survey is focus on rising community awareness toward the waste management and environment. ● Regarding the capacity building of SWM this year the JICA will conduct training in Vanuatu 	

which is focus on “Dispose Site Management” and inquire the SEATOU to delegate their two staffs that have a good knowledge at English language. Next year, JICA will conduct training regarding waste in Japan and give opportunity to the SEATOU to participate in the occasion.

Material

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Meeting with MSA

Date & Time	August 7 th (Tue), 2024 15:00~15:45
Venue	Dili Municipality Office
Participants	Dili Municipality: Natalino Soares JST: Higashinakagawa, Nakayama, Naganuma, Teofilo
<p>Meeting Memo:</p> <ul style="list-style-type: none"> ● Regarding the incoming waste data Mr. Natto tried to send all of accumulated information from January to July through the window transfer but it is not complete. The Municipality will send missing data to complete the weighing bridge data of June and July. ● There are five different companies that contracted by Dili Municipality to do waste collection around the City. There are the following names of the five companies: GSA, Nelces, Felifra, Jacrilo, and Labilay. ● There are some of private and public companies that transport directly their waste to the Tibar Landfill site. ● Regarding the data in June, there is not including the private and public waste transportation to Tibar Landfill. ● Regarding the new transportation and collection system plan, they can not to provide this kind of information. ● New Landfill drawing of the Tibar Landfill the Dili Municipality will provide the data. ● Regarding the technical assistance of construction from international consultant and ADB to Dili Municipality, the contract has terminated in May this year. ● The company that used to work as a consultant for the for the Tibar Landfill construction in Dili are China Harbour Engineering company. Currently, The China Harbour Engineering working on the collection and transportation. ● The Dili Municipality asking support from JICA to assist them in the Tibar Landfill construction in future. ● Regarding the recyclable waste, there no composing but only segregation and sorting the recyclable waste. ● For the green waste, there are sorting and composting to fertilizer. There are two machines that support the process. ● Currently, the Tibar Landfill there is no waste separation facility, and waste pickers separate manually. 	
Material	-

Date & Time	August 9 th (Fri), 2024 15:30~16:45
Venue	FAO Office
Participants	FAO: Ms. Kyu, Ms. Joana JST: Higashinakagawa, Nakayama, Teofilo
Meeting Memo: <ul style="list-style-type: none"> ● The JICA Survey Team presents about the role and scope regarding the survey on solid waste management in Dili especially to the marine plastic reduction. ● Regarding the food waste, JICA Survey Team will consider, most of the food waste derives from the household's waste. Most of the food waste in Timor-Leste mostly people for feed the domestic animals such as: pigs, dogs, chickens, and cats. ● The FAO focuses on Green Jobs for the rural youths. 	
Material	-

Date & Time	August 13 th (Tue), 2024 15:00~15:45
Venue	Conservation International (CI) Office
Participants	CI: Mr. Amish, Mr. Angelmo JST: Higashinakagawa, Nakayama, Teofilo
<p>Meeting Memo:</p> <ul style="list-style-type: none"> ● Regarding the presence of the CI in Timor-Leste have been started in 2009. ● CI Timor-Leste has two main programs both of Marine and Cadastral that spread along the territory of Timor-Leste. ● Community Conservation and CI also do the beach cleaning activities. ● Specially in Dili Municipality, the CI does not work directly with any solid waste management. ● The CI established community-based group toward protect Marine environment. ● The activities of CI mostly outside the Dili. ● Waste disposal to the ocean clearly affects to the animals under sea, kill some of special species and cause thriving of the coral reef. ● Regarding the waste management issue, the CI's staff share based on their personal experience. ● Regarding the awareness campaign, mostly CI conduct this activity in the schools. ● Atauro is one of beautiful island but full of plastic waste. The plastic waste that found in the Atauro beach come from the other area. In the other Atauro itself has no waste collection system at the moment. ● Fishing net and used cloth waste also has a negative impact toward the marine biodiversity. 	
Material	-

Date & Time	August 14 th (Wed), 2024 10:00~11:00
Venue	JICA Office
Participants	MSA: General Director, Legal Adviser, Ms. Emiliana JICA: Mr. Jose Ricardo Da Costa Gomes JST: Higashinakagawa, Nakayama, Teofilo
<p>Meeting Memo:</p> <ul style="list-style-type: none"> ● The form that include in MSA data is a component of waste management authorization to collect waste. ● The Tibar Landfill capacity will be full within the next 10 years. However, if the recycling industry established in the country and the capacity of the Landfill would be till 30 years. ● The Tibar Landfill has a new drawing related to Green Waste Composing. About the waste segregation might have to be conducted at different place, such as waste collection points. ● The JICA's survey and future prospect will be helpful for the government politics on marine plastic reducing. ● From MSA side, they want to know how Japan conducts the solid waste management. Especially, MSA has concern on methodology that Japan uses to increase people's awareness regarding the waste management. ● MSA wants to JICA's Survey Team to proceed with another presentation regarding the methodology and mechanism that Japan use for the for handling waste management and raising human awareness toward the waste and environment. 	
Material	-

Date & Time	Thursday, August 15, 2024 10:00-10:30
Venue	Ministry of Tourism and Environment
Attendees	MTE: Ms. Ivânia Ross Ximenes Gonçalves JST: Higashinakagawa, Nakayama, Teo
	<ul style="list-style-type: none"> ● MTE works with Mercy Corps, communities, for sales of plastic-recycled products. ● Sometimes they do exhibition of the products. ● They also work with Caltech. ● To tackle tourists who dispose waste on beach, they conduct campaigns with Department of Environment. ● There is no environmental tax. ● There are some marine plastic issues according to divers or fishermen. ● There are cultural tourism, religious tourism and nature tourism. MTE promotes community-based tourism to offer traditional food and accommodation for tourists. ● There is a list of the activities on the website of Ministry of Finance. ● There are Tourism Association and Hotel Association as related associations for awareness raising for solid waste management. ● Port Dili, Marine Police, Quarantine and Clue Ship patrol for 3 or 4 times a year so that waste is not disposed in the ocean.
Material	Plastic Upcycling Recycling Timor-Leste – Product Catalog July 2023 (from MTE)
	 <p>The image shows a product catalog cover on the left and several examples of upcycled plastic products on the right. The catalog cover features the text 'PLASTIC UPCYCLING RECYCLING TIMOR-LESTE' and 'Product Catalog July 2023'. It includes logos for the European Union, KOICA (Korea International Cooperation Agency), and MERCY CORPS. The examples on the right include: 1) Yellow plastic earrings from the Tiwemen business group. 2) A colorful plastic bag from the Tars Nadudin business group. 3) A yellow plastic flower product from the Huso Youth Group business group, made from oil containers.</p>

Appendix-2 Waste Amount and Composition Survey

Waste Amount and Composition Survey (WACS)

Work procedure of WACS for Dili Municipality

JICA Survey Team

Objective of WACS

- The objective of WACS is to obtain basic data about the waste, such as waste generation rate (kg/person/day), bulk density (kg/litre), physical composition to grasp the waste stream in Dili municipality.
- Such basic data are essential for proper solid waste management planning for future.

Contents of Work

1. Site selection
2. Selection of households
3. Interview Survey
4. WACS
 1. Data to be obtained
 2. Number of samples
 3. Work flow
5. Reporting

1. Site selection

- The sampling targets are to be selected with different economic status, population density, etc
- The following data shall be collected
 - Name of the village
 - Number of people for each income level (high, middle and low)
 - Number of restaurants, hotels, shops, institutions (school), hospital to be considered as the main waste generation source.

2. Selection of households

This work shall be conducted by the surveyors with support of JAT.

- 100 households, 10 hotels, 10 restaurants, 10 shops, 10 institutions (including school) and 10 hospitals shall be selected in Dili Municipality.
- Households, hotels, restaurants, shops, institutions and hospitals shall be informed about the following:
 - Objective of the survey
 - Schedule of the survey
 - How to prepare waste samples
 - Only waste generated in each day has to be submitted as sample.
 - If there are sanitary items such as diapers, such waste has to be sorted separately from the general waste.
 - Necessary number of bags for sampling with stacker to identify the sample has to be delivered to the households.

3. Interview Survey

This work shall be conducted by the Surveyors. However, it may be carried out at the same time when the samples are collected. The following page shows a main contents of questionnaire for this work.

Questionnaire (draft)

1) Number of family members:

- How many family members are living in this household?
- How many persons are usually living or working in your house, such as maid and driver?

2) Waste collection service:

- Do you obtain collection service?
- How often do you have this service?
- Who collects your discharging waste?

3) Self disposal

- Do you burn your waste in your backyard?
- Do you bury your waste in your backyard?
- Do you dump your waste to vacant area, rivers, etc.?

4) Recycle

- Do you separate recyclable materials?
- Do you use organic waste for making compost?

4. Waste Amount and Composition Survey

4.1 Data to be obtained

■ The following data shall be obtained:

- a. Waste generation rate (kg/person or staff number/day)
- b. Bulk density (kg/litre)
- c. Physical composition (wet-base)

4.2 Number of samples

- The waste amount survey shall be conducted for seven (7) consecutive days after the complete collection of waste at first day . The waste composition survey shall be carried out by the samples collected in 1st day, 3th day and 4th day.

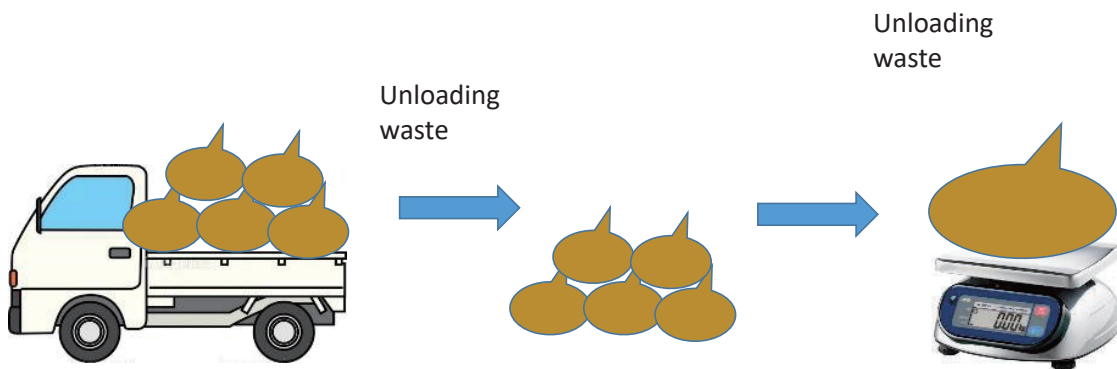
Number of Samples for waste amount survey

Target	Waste Generation Source	Waste Disposal Amount
Duration	Continuous seven (7) days including Saturday and Sunday	Continuous seven (7) days including Saturday and Sunday
Survey area	Dili City	Tibar Landfill Site
Number of Sample	One hundred (100) households to be selected in the city center and the suburban areas	
	Ten (10) restaurants	
	Ten (10) hotels	
	Ten (10) shops or markets	
	Ten (10) institutions (offices or schools)	
	Ten (10) hospital	

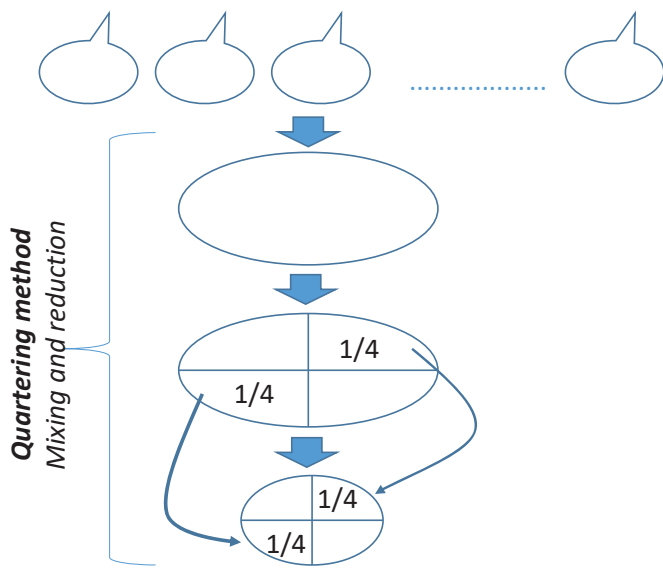
Number of Samples for waste composition survey

Item	Description
Duration	Three (3) days including Saturday and Sunday
Number of Sample	Six (6) sample of waste discharged from households to be selected for city center and suburban areas
	One (1) sample of waste discharged from restaurants
	One (1) sample of waste discharged from hotels
	One (1) sample of waste discharged from shops or markets
	One (1) sample of waste discharged from institutions (offices or schools)
	One (1) sample of waste discharged from hospital
	Six (6) sample of waste in Tibar landfill site

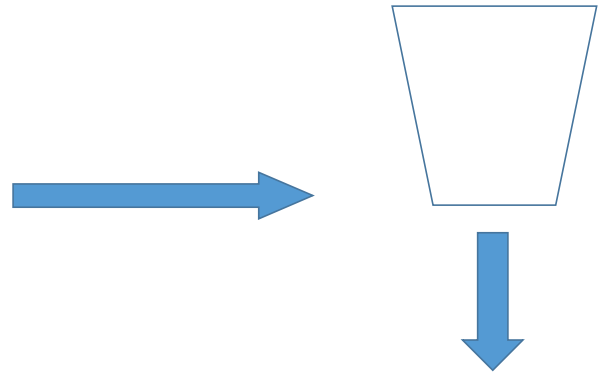
Waste Amount Survey (Measurement)



Waste Composition Survey (Physical composition wet-base)



Bulk density about 30 litres



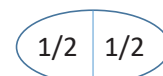
Waste Composition Survey (Bulk density and physical composition wet-base)



Physical composition (wet-base) 15 categories



Mixing and dividing into halves



Calculation method

$$[\text{Bulk Density}] = [\text{Waste (wet base)}] / [\text{Volume}]$$

$$[\text{Physical Composition (wet-base)}] = [\text{Each categorized waste (wet base)}] / [\text{Waste (wet-base)}]$$

Instruction for Solid Waste Amount and Composition Survey to Residents/Business Establishment

1. Purpose of this survey

The Data Collection Survey on Solid Waste Management in Dili Municipality toward Reducing Marine Plastic in Timor-Leste (the Survey) is being conducted. To identify the waste stream from waste generation to final disposal, recycling or waste scattering, waste amount and composition survey at waste generation source will be conducted. The survey is sampling survey at each generation source.

2. Procedure

Solid waste sampling for the survey will be continued. This will include 1 day for preliminary survey (collection of all the waste) and 7 consecutive days for actual survey. The procedure is as follows;

(1) Waste Packing

You shall be provided with bags for waste collection as following picture. After all waste is put into the plastic bags, you should tie with strings.

(2) Storage of Packed Waste

All the waste that you have generated for one target day must be kept in your house or yard for pick-up by survey collectors only. Please do not discharge the waste along the road or other waste collection points where solid waste is collected by government truck.

(3) Waste Collection

We will collect the plastic bags from xxx to xxx a.m.



(4) Sampling Number

Item	Description
Duration of the survey	Continuous seven (7) days including two (2) weekends June
Survey area	Dili Municipality
Number of Sample	100 households
	10 restaurants
	10 hotels
	10 shops or markets
	10 institutions (offices and/or schools)
	10 hospitals

For any inquiries or clarifications, please contact or text to xxx.

Thank you very much for your cooperation.

Explanation to Driver (as an Example)

- Please Start from the collection at **xx am** to the target sampling points to collect the waste
- Please meet with one collector (see below information) in Dili Municipality before **xx** am.
- Please go to each household with collectors from **xx am** to **xx am** to collect the waste
- Collector will pick up the waste from each household, hotel, restaurant, shop and institution/school and hospital.
- Please drive the vehicle and the collector will collect all the target household, hotel, restaurant, shop and school.
- After finishing the collection around **xx am**, please transport the waste to the workshop area in **xxx**

Name of Collector : xxxx xxxx
 Mobile number of collector : xxx xxxx

Name of collector of waste and the mobile number should be described.

Dili Municipality
 Name of Contact Person : xxxx xxxx
 Mobile number of collector : xxx xxxx

Name of contact person of Dili Municipality and the mobile number should be described.

List of target residents, shops and schools for waste collection

Name, address and telephone number of target residents, schools and shops for the survey should be described.

(1) Residents

No.	Name	Address	Telephone number
1	xxxx xxxx	xxxxxx	xxxxxx
2	xxxx xxxx	xxxxxx	xxxxxx
3	xxxx xxxx	xxxxxx	xxxxxx

(2) Shop






No.	Name of Shop	Address	Telephone number
1	xxxx xxxx	xxxxxx	xxxxxx
2	xxxx xxxx	xxxxxx	xxxxxx
3	xxxx xxxx	xxxxxx	xxxxxx

(3) School






No.	Name of School	Address	Telephone number
1	xxxx xxxx	xxxxxx	xxxxxx
2	xxxx xxxx	xxxxxx	xxxxxx
3	xxxx xxxx	xxxxxx	xxxxxx

To be continued for the other business establishment

Necessary Equipment and Material (Example)

Name	Number	Remark / Picture
Truck for waste collection (around 2 ton) with drivers (Rental 8 days)	3~5	
Scale (0 to 2 kg, accuracy 1 g)	1~2	
Scale (0 to 30 kg, accuracy 100 g)	1~2	
Large Container	Around 40 L	
Bucket for separation of waste during waste composition survey (As same as separation item number) (Φ 20cm x 20 cm)	13 (for each physical composition)	



Attachment 3

Name	Number	Remark / Picture
Bucket for separation of waste during waste composition survey (As same as separation item number) (Φ 20cm x 10 cm)	13 (for each physical composition)	
Plastic sheet	4 sheets (5 m x 5 m)	
Shovel (Big)	2	
Shovel (middle)	2	
Broom	4	

Attachment 3

Name	Number	Remark / Picture
Hoe	2	
Dust tray for waste collected by broom	4	
Glove	10	
Mask	10~20	
Scissors/ cutting tools for waste	3	
Scissor for sealing tape	2-3	

Attachment 3

Name	Number	Remark / Picture
Transparent plastic bag (for sampling collection)	Around 2500 - pieces	
Transparent sealing tape (for sealing paper with sign)	10 set	

Survey Questionnaire for Residents (Example)

1. Introduction:

This waste amount and composition survey is implemented to identify the situation of waste generation at each generation source in Dili Municipality. To create the plan, information of target household is needed to grasp the current situation of solid waste management in the region. Your responses will be used for this purpose only. Please respond to the questions as accurately as you can. Thank you very much for your cooperation.

2. Household Details

1. Name of the head of the household:.....
2. Address:.....
3. Telephone number:.....
4. Educational qualifications of the head of the household:.....
(a) Illiterate (b) Primary Schooling (c) Secondary Schooling (d) College or higher
5. Number of people in your family:.....
6. Please describe monthly income level (high income, middle income, low income).....

3. Waste Management

7. Do you agree on the fact that if waste is not properly disposed of, it can pollute the environment?
(a) Yes (b) No

If your answer is yes to the question above, kindly identify the cause/reasons for some of these problems. (Select All That Apply)

(a) There is no bin available to dispose of garbage
(b) There is no proper collection of garbage by collection service providers
(c) Waste is disposed of anywhere such as drains and roadways which creates a nuisance within the community
(d) Collection fees are too expensive
8. Do you dispose of your waste by yourself or discharged for collection service?
(a) Disposed of my waste by myself (b) discharged for collection service
9. If you select (a) in Question No. 9, how do you dispose of your waste?
(a) dumping in my backyard (b) burning in my backyard, (c) composting in my backyard, (d) others
(please specify:)
10. If you select (b) in Question No. 9, how do you discharge your waste?
(a) Discharge in the collection point by plastic Bag (b) Discharge in the collection point by metal or plastic drum, (c) others (please specify:)

Attachment 4

11. How often do you discharge/dispose of your household waste?
(a) Every day (b) Once every two days (c) once every three days (d) Once a week (e) Once every two weeks
12. Is the current frequency of collection service enough?
(a) Yes (b) No
13. How much are you currently paying on garbage collection per month?USD
14. How much can you pay on garbage collection per month, if waste collection system is improved?
.....USD
15. Do you currently separate different types of waste at your home, such as metal cans, glass bottles, etc.?
(a) Yes (b) No
16. If you are told by your collection service provider to separate your waste in the future, would you comply?
(a) Yes (b) No

5. Awareness for Solid Waste Management within the Community:

17. Do you think that the media has raised your awareness of water, sanitation, and solid waste management?
(a) Yes (b) No
18. If YES, which media do you think has raised your awareness of water, sanitation, and solid waste management?
(a) Radio (b) Television (c) Newspaper (d) Social media

End of Questionnaire

Survey Questionnaire for Hotel

1. Introduction:

This waste amount and composition survey is implemented to identify the situation of waste generation at each generation source in Dili Municipality. To create the plan, information of target household is needed to grasp the current situation of solid waste management in the region. Your responses will be used for this purpose only. Please respond to the questions as accurately as you can. Thank you very much for your cooperation.

2. Hotel Details

1. Name of the hotel:.....
2. Name of the responsible person in the hotel:.....
3. Address:.....
4. Telephone number:.....
5. Number of staff:.....
6. Number of customer
7. Number of room

End of Questionnaire

Survey Questionnaire for Restaurant

1. Introduction:

This waste amount and composition survey is implemented to identify the situation of waste generation at each generation source in Dili Municipality. To create the plan, information of target household is needed to grasp the current situation of solid waste management in the region. Your responses will be used for this purpose only. Please respond to the questions as accurately as you can. Thank you very much for your cooperation.

2. Hotel Details

1. Name of the restaurant:.....
2. Name of the responsible person in the restaurant:.....
3. Address:.....
4. Telephone number:.....
5. Number of staff:.....
6. Number of customer
7. Number of table

End of Questionnaire

Survey Questionnaire for Shop

1. Introduction:

This waste amount and composition survey is implemented to identify the situation of waste generation at each generation source in Dili Municipality. To create the plan, information of target household is needed to grasp the current situation of solid waste management in the region. Your responses will be used for this purpose only. Please respond to the questions as accurately as you can. Thank you very much for your cooperation.

2. Hotel Details

1. Name of the shop:.....
2. Name of the responsible person in the shop:.....
3. Address:.....
4. Telephone number:.....
5. Number of staff:.....
6. Type of goods handled in the shop

End of Questionnaire

Survey Questionnaire for Institution

1. Introduction:

This waste amount and composition survey is implemented to identify the situation of waste generation at each generation source in Dili Municipality. To create the plan, information of target household is needed to grasp the current situation of solid waste management in the region. Your responses will be used for this purpose only. Please respond to the questions as accurately as you can. Thank you very much for your cooperation.

2. Hotel Details

1. Name of the institution (government organization / school):.....
2. Name of the responsible person in the institution :.....
3. Address:.....
4. Telephone number:.....
5. Number of staff:.....
6. Number of student

End of Questionnaire

Survey Questionnaire for Hospital

1. Introduction:

This waste amount and composition survey is implemented to identify the situation of waste generation at each generation source in Dili Municipality. To create the plan, information of target household is needed to grasp the current situation of solid waste management in the region. Your responses will be used for this purpose only. Please respond to the questions as accurately as you can. Thank you very much for your cooperation.

2. Hotel Details

1. Name of the hospital.....
2. Name of the responsible person in the hospital:.....
3. Address:.....
4. Telephone number:.....
5. Number of staff:.....
6. Number of patient.....
7. Number of bed

End of Questionnaire

Raw Data of Waste Amount Survey for Household

Waste amount from Household [kg] (No.1)

CODE	BEBONUK	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Number of family	waste generation per capita
HH1	Lino da Costa	9.7	3.3	2	3.6	5.9	6.7	1.8	7	0.67
HH2	Joao Zacarias	4	1.7	1.6	0	4.4	0.9	7.5	7	0.41
HH3	Aureia da Silva	1.1	6.1	0.5	3.8	2.8	2.2	3	5	0.56
HH4	Sabino Eusebio da Costa	6.8	10	18.4	12.1	10.7	11.8	17.4	6	2.08
HH5	Fernando Moreis	13	9.6	0	6.8	0	14.6	9.5	14	0.55
HH6	Manuel Pereira	22.3	8.1	6.1	11.8	0	3.9	0	5	1.49
HH7	Agustinho da Cruz	2.3	8	0.9	2.4	0.6	1.6	3	5	0.54
HH8	Reinaldo Alves	4.9	7.8	1.3	0	3.7	5.4	2.8	4	0.93
HH9	Nuno Belo Freitas	8.4	4.6	3.4	5.2	7.8	3.3	0	6	0.78
HH10	Jose Filomeno	4.9	9.2	9.3	9.4	0	8.1	9.7	3	2.41
HH11	Antonio Leto	6.5	1.2	2.6	1	2.3	1.2	1.3	9	0.26
HH12	Norberto da Silva	3.5	1.3	5.8	2.1	1.1	0	0	5	0.39
HH13	Manuela da Costa Pereira	5.9	17.8	4.4	10.9	1.6	0	0	7	0.83
HH14	Feliciano da Silva Cruz	5.9	2.5	2.4	8.2	5.3	10.9	4.4	6	0.94
HH15	Johny Wibawa	2	1.2	0.8	3.4	1.3	1.3	1.1	3	0.53
HH16	Cecilia de Carvalho	1.3	15.5	1.9	12.6	1.2	12.4	4.3	6	1.17
HH17	Julio da Costa	2.9	2.1	0.7	0.9	0.9	1.7	0.6	5	0.28

CODE	BECORA	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Number of family	waste generation per capita
HH18	Maria Oliveira	11.4	2.5	4.7	2.6	5.2	0	5.7	5	0.92
HH19	Moises Pinheiro	6.9	4.7	13.1	7.4	13.4	3.2	5.8	8	0.97
HH20	Izac Goncalves	8.8	6.7	3.7	6.9	6.3	3.4	16.2	4	1.86
HH21	Pedro dos Reis	2.1	1.9	15.3	5.1	0	5.3	8	3	1.80
HH22	Jose Mendes	9.7	3.6	3.3	7.6	0	40.3	4.9	5	1.98
HH23	Ela Baros	8.2	6	7.3	7.9	3.7	19.9	5.9	8	1.05
HH24	Santiago Soares	5.3	5.3	4.1	4.4	4.6	9	2.4	5	1.00
HH25	Joanico da Costa Dato	7.9	3.3	6.4	9.8	0	3.1	6.1	5	1.05
HH26	Matias Pinheiro	7.9	1.5	1.6	3.4	4.6	2	6.9	6	0.66
HH27	Agustinho Ximenes	9	3.8	5.8	3.4	7.3	2.7	15.3	10	0.68
HH28	Agustinho Suni	3.2	12	7.6	3.4	7.4	3.5	12.4	9	0.79
HH29	Tomas Mesquita	2.1	2.1	1.3	10	7.9	0.9	23.7	7	0.98
HH30	Jaimito Ferreira da Silva	17.5	8.5	4.3	5.8	4.3	4.2	2	8	0.83
HH31	Jeronimo da Costa	3.9	6	9.4	0.6	0	2.7	18.1	6	0.97
HH32	Aderito Frederico	5.4	3.9	4.2	0	3.3	3.3	10.4	8	0.54
HH33	Sonia Santana	7.1	1.1	10.7	3	0.4	0	8.1	7	0.62
HH34	Ivonia Soares da Costa Lopes	11.3	1.6	2.5	0	1.4	2.8	1.3	5	0.60

Waste amount from Household [kg] (No.2)

CODE	COMORO	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Number of family	waste generation per capita
HH35	Fortunato Marcal	2	3.5	5.5	1.4	0	23.6	12.8	8	0.87
HH36	Maria Aida Marcal	9.3	5.1	1.1	6.8	0	5.4	6.7	5	0.98
HH37	Maria Sarmiento	3.3	2.9	3.9	0	1.5	0	8.8	5	0.58
HH38	Jose Antonio	4	1.6	3.9	0	2.1	2.8	3.5	12	0.21
HH39	Marta Alves	12.6	4.7	6.1	0	7.9	1.6	0.7	9	0.53
HH40	Helio de Conceicao	6.5	2	3.5	0	7.6	3.4	1.4	7	0.50
HH41	Ezenio Soares	3.6	2.3	3.2	1.2	4.1	1.4	1.9	14	0.18
HH42	George Soares	4	3.5	3.4	6	8.1	8	0.7	5	0.96
HH43	Lino Pereira da Cruz	7.3	0.6	3.7	1.3	1.3	3.9	1.1	9	0.30
HH44	Domingos Gomes	3	1.3	4.6	3.3	1.8	0	3.4	10	0.25
HH45	Eveliza de Jesus da Costa	9.5	1	0.4	1.1	2.1	1.5	0	12	0.19
HH46	Juvinal Xavier	6.8	0.5	4.2	1.8	4.6	18.6	0	10	0.52
HH47	Carlota Soares	1.8	1	6.9	2.8	3.5	5.3	1.4	6	0.54
HH48	Jeka Soares	8.3	3	2.1	5.6	1.4	1.4	3	7	0.51
HH49	Adao Tilman	5.1	1.3	1.9	7.7	2.3	3.3	2.7	5	0.69
HH50	Abel do Ceu	7.5	1.9	5.6	1.7	0	3	9.4	20	0.21
HH51	Antonio da Luz	1.9	4.1	2.2	0	6.1	3.9	8.2	11	0.34

CODE	MADOHI	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Number of family	waste generation per capita
HH52	Bernardino de Cristo Ferreira	3.9	3.4	4.4	8.5	3.6	5.9	2	12	0.38
HH53	Fonsiano Fatima	11.1	4.6	8.1	4.5	9.1	4.4	3.8	14	0.47
HH54	Porficio Bonifacio dos Reis	6.2	5.7	6.2	1.7	3.8	1.7	1.1	10	0.38
HH55	Martinha dos Reis	1.3	3	5	2.2	1.8	1.5	2	5	0.48
HH56	Francisco da C. Andrade	10.3	4.1	3.9	5.4	3.3	3.9	1.3	12	0.38
HH57	Augusto da Silva	12.3	5	11.7	4.1	10.3	0	7.8	8	0.91
HH58	Umbelina Freitas	6.8	3	8.4	4.3	9.1	4	2.3	4	1.35
HH59	Mauricio Amaral da Silva	7	4.7	3.5	2.2	1.9	1.9	1.9	8	0.41
HH60	Domingas Pereira	12.8	1.3	1.5	0.9	1.3	2.1	2.6	6	0.54
HH61	Filomino Soares	5.7	5.2	7.3	2.6	4	1.8	1.2	9	0.44
HH62	Manuel Maia	24.5	4	11.2	7.8	5.2	1.6	7.5	6	1.47
HH63	Rosito da Silva	11.9	6.9	3.4	2.1	5.4	0.9	1.6	10	0.46
HH64	Laurindo Sarmiento	3.7	9.8	1.8	7.3	5.2	0	2.4	6	0.72
HH65	Jose Marcal Tavares	5.4	7.6	6	2.5	5.3	1.3	2.7	5	0.88
HH66	Domingos Moniz Noronha	3.4	4	4	2.6	0.7	1.1	1.4	7	0.35
HH67	Felisberto dos Santos	2.4	7.9	1.5	4.5	1.7	0.3	2.4	9	0.33
HH68	Armindo Ximenes	8.2	3.2	3	9.2	3.7	7.4	3.3	7	0.78

Waste amount from Household [kg] (No.3)

CODE	MOTAEL	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Number of family	waste generation per capita
HH69	Auria Fatima de Jesus	2.7	0.5	7.8	1.1	1.3	4.3	1.3	5	0.54
HH70	Francisca da Silva Pereira	2.2	2.5	2.4	2.9	5.6	0.4	3.3	7	0.39
HH71	Maria da Luz Carvalho	5.6	2.7	1.1	1.8	2.2	0.3	1.9	5	0.45
HH72	Afonso Manuel	5.4	3.5	6.8	4.6	5.4	1.3	6.1	6	0.79
HH73	Maria Ximenes	1.5	13	2	5.3	1.9	0.6	1.3	7	0.52
HH74	Marquita Soares da Cruz	1.3	1.1	1	4.6	3.4	1.7	2.1	12	0.18
HH75	Honorio Henrique Xavier	1.8	2.6	6.7	1.8	0.7	3	4.5	8	0.38
HH76	Gerovasu J. da Costa Viegas	2.1	3.2	5.8	2.2	2.1	5.7	5.7	3	1.28
HH77	Euclides Jose da Costa Monteiro	3.9	1.5	3.5	4.9	2.5	2.6	1.9	7	0.42
HH78	Celitia Maria Ximenes Goncalves	2.9	0.5	9.4	1.6	5.7	5.7	13.4	7	0.80
HH79	Nuno Duarte Ximenes Soares Pinto	4.9	9	4.3	1.3	2.9	3.3	1.7	5	0.78
HH80	Cipriano Madeira Pinto	3.7	4	3.4	2.3	5.6	5.5	4.1	9	0.45
HH81	Martinho Camoes	2.3	10	1.5	8.2	1.7	2	5.7	8	0.56
HH82	Nicolau Hornai	4.3	7.2	1.6	3.4	1.9	8	5.2	6	0.75
HH83	Eusebio da Costa Brito	2.5	7.9	12	7.8	4.4	8.7	8.3	18	0.41
HH84	Vitor Hugo Maia Lopes	1.4	1	3	1.9	1.7	1.4	9.8	4	0.72
HH85	Joventiano Pinto Sarmiento	5.6	4	2.5	3.3	3.7	3.2	4.2	5	0.76

CODE	MANLEU-ANA	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Number of family	waste generation per capita
HH86	Natalino Araujo	7	11.8	5.4	1.1	5.7	21.9	0	15	0.50
HH87	Arcanjo da Conceicao	6.2	2.4	2.3	20.2	6.7	19.9	4.7	5	1.78
HH88	Nicodemos Maria Amaral	10.6	4.6	22	2.4	4.6	2.3	7.2	7	1.10
HH89	Evarista Moreira	14.7	7	10.1	5.6	15.6	0	1.5	12	0.65
HH90	Helena Co'u	10.9	3.4	20	2.4	0	0	4.9	6	0.99
HH91	Jose Soares	11.1	16.5	7	4.2	7.7	7.1	22.9	9	1.21
HH92	Lucia de Araujo Faria	28.2	12.5	17.3	0	7.3	0	14.5	7	1.63
HH93	Pedro Sarmiento	2.4	1.3	6.3	7.4	9.4	1.6	4.3	4	1.17
HH94	Vicente Vas	17.7	10	4.1	4.6	3.9	2.7	2.8	7	0.93
HH95	Maria Soares Borges	12.2	8	12	4.5	0	0	4.4	8	0.73
HH96	Damiana Ina Beda	3.6	4.1	6.6	7.5	0	0	4.5	6	0.63
HH97	Crispina Jose dos Reis	1.9	1	24.2	0	1.6	0	4.8	7	0.68
HH98	Donevia Paulina Mendonca	3.7	2	8.4	0	1.1	4.3	0	5	0.56
HH99	Martinho Soares	5.6	4	1.3	9.1	8.7	0	3.1	1	4.54
HH100	Yestepanus Laka	3.2	0	9.7	5.4	13.6	3.5	0	4	1.26
HH101	Faustina Martins Alves	3.9	7.3	4.7	4.1	0	4.1	0.7	5	0.71

No.	Incom Level	Total monthly household income / person [US\$/person]	Waste generation [kg/person/day]
1	Low income	11.1	0.45
2	Low income	11.1	0.41
3	Low income	12.5	0.21
4	Low income	14.3	0.18
5	Low income	16.7	0.65
6	Low income	20.0	0.38
7	Low income	22.2	1.21
8	Low income	23.0	1.05
9	Low income	25.0	0.38
10	Low income	25.0	0.38
11	Low income	25.0	0.91
12	Low income	28.3	2.08
13	Low income	28.6	0.41
14	Low income	28.6	0.55
15	Low income	28.6	0.47
16	Low income	28.6	0.78
17	Low income	30.0	0.52
18	Low income	31.3	1.05
19	Low income	33.3	0.53
20	Low income	33.3	0.54
21	Low income	33.3	0.75
22	Low income	33.3	0.99
23	Low income	35.0	0.46
24	Low income	35.7	0.39
25	Low income	37.5	0.93
26	Low income	37.5	0.73
27	Low income	39.3	0.51
28	Low income	40.0	1.49
29	Low income	40.0	0.54
30	Low income	40.0	1.80
31	Low income	40.0	0.69
32	Low income	40.0	0.54
33	Low income	40.0	0.50
34	Middle income	41.7	0.21
35	Middle income	42.9	1.10
36	Middle income	43.3	2.41
37	Middle income	44.4	0.30
38	Middle income	48.9	0.26
39	Middle income	50.0	0.92
40	Middle income	50.0	0.97

No.	Incom Level	Total monthly household income / person [US\$/person]	Waste generation [kg/person/day]
41	Middle income	50.0	0.88
42	Middle income	50.0	0.71
43	Middle income	52.5	1.86
44	Middle income	54.0	0.56
45	Middle income	55.6	0.79
46	Middle income	56.3	0.83
47	Middle income	57.1	0.62
48	Middle income	58.3	0.72
49	Middle income	62.5	0.97
50	Middle income	62.5	0.19
51	Middle income	62.5	1.35
52	Middle income	62.5	0.41
53	Middle income	62.5	0.18
54	Middle income	66.7	0.44
55	Middle income	66.7	0.63
56	Middle income	68.2	0.34
57	Middle income	70.0	0.96
58	Middle income	71.4	0.67
59	Middle income	71.4	0.50
60	Middle income	71.4	0.52
61	Middle income	71.4	0.80
62	Middle income	71.4	0.93
63	Middle income	71.4	0.68
64	Middle income	72.2	0.33
65	Middle income	75.0	0.54
66	Middle income	80.0	1.00
67	Middle income	80.0	0.98
68	High income	83.3	0.78
69	High income	85.7	0.35
70	High income	87.5	1.26
71	High income	92.9	0.98
72	High income	100.0	1.17
73	High income	100.0	0.28
74	High income	100.0	1.98
75	High income	100.0	0.66
76	High income	100.0	0.58
77	High income	100.0	0.25
78	High income	100.0	0.45
79	High income	100.0	0.79
80	High income	100.0	0.78

No.	Incom Level	Total monthly household income / person [US\$/person]	Waste generation [kg/person/day]
81	High income	114.3	0.83
82	High income	114.3	0.42
83	High income	120.0	0.68
84	High income	120.0	0.48
85	High income	120.0	0.56
86	High income	125.0	0.87
87	High income	125.0	0.38
88	High income	125.0	0.56
89	High income	125.0	1.17
90	High income	133.3	0.54
91	High income	133.3	1.47
92	High income	133.3	1.28
93	High income	137.5	0.72
94	High income	140.0	0.39
95	High income	160.0	0.76
96	High income	166.7	0.53
97	High income	180.0	4.54
98	High income	200.0	0.94
99	High income	240.0	0.60
100	High income	320.0	1.78

Raw Data of Waste Amount Survey
for
Business Establishment

Waste amount from Restaurant[kg]

Restaurant	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Average
Kampung Alor	5	13.4	9.8	9.9	13.1	12.6	16.7	11.5
Uma Saudavel	4.3	11.3	3.9	7.1	9.1	2.6	4.7	6.1
Black Box	6	5.2	9.1	6.7	6.1	2.3	9	6.3
Osteria	3.9	7.8	1.9	7	7.1	0	3.3	4.4
Kitchen Art	4.6	7.8	4.2	7.2	7.6	4.4	6.8	6.1
Castaways	2.4	5.2	11.4	1.4	3.3	7.6	0	4.5
Peace Coffee	24.2	4.7	8.2	13.4	17	0	14.1	11.7
Mas Bro	4.9	25.9	4.1	1.4	34.7	18.1	2.1	13.0
Fatuhada	0.9	4.1	3.7	3	9.6	5	2.2	4.1
Starco	15.5	3.9	14.9	11.8	11.8	0.9	18.1	11.0
Average								7.9

Waste amount from Shop[kg]

Shop	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Average
Becora Kios	2.9	8.6	4	10.5	5.5	3.8	5.3	5.8
Lita Sotre	30.9	41.4	2.6	4.2	4.6	2.1	2.8	12.7
Lecidere Fruit	67.4	66.9	27.8	7.9	24	7.7	23.1	32.1
Silk Print	22.9	1.1	11.6	10.2	0	3.5	31.1	11.5
Basic	8.3	2.2	5.7	7.6	10.1	8.2	6.6	7.0
Comoro Kios	2.6	2.5	1.2	5.1	1	1.1	1.6	2.2
Vinod Patel	8.5	13.2	23.4	7.4	26.7	18.7	10.5	15.5
Centro	0.427	0.8	1.8	1.7	0	1.1	1.1	1.0
DiliMart	10.4	3.7	1.5	10.2	2.7	3.2	1.6	4.8
Duckings	38.9	6.6	10.1	11.7	11.8	13.2	16.8	15.6
Average								10.8

Waste amount from Institution [kg]

Institute	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Average
CODIVA	1	5.7	1.5	0	0	0	3.6	1.7
Sacrojes	23.5	46.6	31.9	20.1	0	39.3	37.5	28.4
12 de Novembru	11.6	13.4	2	5.1	0	0.8	7.4	5.8
Permatil	2.6	3.6	0.6	0.6	0	4.8	0.5	1.8
HAK	14.7	16.9	4.9	0	0	8.3	1	6.5
EBC Farol	20.4	4.5	10.3	11.9	0	35.9	20.7	14.8
ANLA	4.2	5.5	4.7	0	0	2.7	2.5	2.8
PNTL	22.3	70.2	33.5	0	0	37.8	14.6	25.5
Sao Pedro	20.3	12.7	21.2	19.4	0	17.7	15.3	15.2
Mercy Corps	5.8	4.2	10.5	0			9.5	4.3
Average	-	-	-	-	-	-	-	10.8

Waste amount from Clinic [kg]

Clinic	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Average
Moris Foun	3.9	1.9	2.2	2.4	1.8	1.8	1.4	2.2
Crista Rei Becora	26.3	11.1	11.9	0	0	3.1	1.8	7.7
DMC Lecidere	10.6	18.3	3	14.7	19.6	10.1	36.1	16.1
Foho Osan Mean	2.6	4.2	7	4.6	1.8	2.1	1.8	3.4
Kura Hau	2.1	1.5	0.9	0	0.6	0	3.3	1.2
Nain Feto	15.8	13.6	13.9	8.9	16.6	15	5.3	12.7
Vera Cruz	46.3	11.5	71.9	3.6	45	6.3	12.1	28.1
Comoro	3.3	9.1	7.5	11.5	11.8	9.4	0	7.5
Cindranita	8.8	8.7	8.5	8.6	5.5	0	13.1	7.6
Stamford	30.6	7.4	9.2	7.3	3.4	3.6	3.6	9.3
Average	-	-	-	-	-	-	-	9.6

Waste amount from Hotel [kg]

Hotel	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Average
Esplanada	36.8	7.5	21.3	30.5	32.7	34.1	32.8	28.0
Plaza	37	16.3	31.1	14.2	44	37.2	11.2	27.3
Luz Clarita	2.9	21.6	7.6	11.4	9.7	0	4.6	8.3
Vila Verde	0.144	1.6	4.3	0	0	0	22.6	4.1
Audian	0.5	0.6	6.4	0.7	0	0.5	4.5	1.9
Arbiru	5.6	4.6	9.6	2.1	2	11.5	7.4	6.1
Hotel Timor	31	36.2	37.2	53.1	61.8	40.4	71.2	47.3
Ramelau	23	46.2	8	0	0	14.8	0	13.1
Beach Garden	22	0	6.1	0.5	13.8	1	1.5	6.4
Golgota	51.8	20.5	57.3	40.1	39.6	32.7	51.8	42.0
Average	-	-	-	-	-	-	-	18.4

Waste Amount Data at Tibar Landfill Site

No	Date	Rubbish Source												Garbage Trucks entering the site	Weight of incoming garbage					
		GSA		Neices		Felifra		Jacrilo		Labilay		Private/company				Institution		From other		
		Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons			
1	2024/1/2	20	25.33	29	44.12	13	19.42	8	13.68	9	18.02	9	5.33	2	1.15			90	127.05	
2	2024/1/4	24	57.56	23	53.87	15	36.41	17	41.08	8	19.43	14	22.79	7	12.09			108	243.23	
3	2024/1/6	23	51.17	26	61.5	16	37.15	15	34.93	6	14.76	36	47.78	5	8.66			127	255.95	
4	2024/1/7	17	40.1	22	53.38	11	26.57	10	24.35	7	17.22	12	16.14	1	1.86			80	179.62	
5	2024/1/8	22	48.46	27	58.3	18	37.64	17	38.13	9	21.16	21	29.22	7	10.23			121	243.14	
6	2024/1/10	23	46.37	19	41.82	16	33.66	14	25.18	8	18.53	31	46.41	18	22.39	4	8.36	133	234.36	
7	2024/1/13	22	51.17	27	61.01	14	34.93	15	35.67	8	19.43	19	24.46	3	4.84	1	1.97	109	231.51	
8	2024/1/14	18	42.31	19	45.51	11	26.81	13	30.01	8	18.45	8	12.67	1	1.86			78	177.62	
9	2024/1/15	22	50.68	29	65.93	19	41.82	14	32.47	9	21.4	23	35.77	7	9	1	1.97	124	257.07	
10	2024/1/16	22	51.17	24	56.09	17	39.11	16	36.41	7	16.48	21	33.22	6	9.49	1	2.21	114	241.97	
11	2024/1/17	21	50.92	25	57.32	13	30.26	15	34.44	8	19.19	26	39.64	5	7.63	1	1.97	114	239.4	
12	2024/1/18	22	33.1	26	47.23	18	25.08	15	25	8	21.56	18	17.54	2	0.95	1	2.49	110	170.46	
13	2024/1/19	22	30.88	26	40.58	16	25.27	18	33.03	8	17.77	22	18.26	15	9.89	1	2.21	128	175.68	
14	2024/1/20	22	34.38	24	36.12	14	23.72	13	22.12	8	17.28	23	19.17	3	4.86			107	157.65	
15	2024/1/23	21	35.78	25	43.19	17	25.69	16	29.51	8	14.57	23	18.44	5	3.39	1	1.14	116	170.57	
16	2024/1/24	22	33.48	27	38.56	16	19.94	17	24.17	8	15.56	22	23.55	4	4.06	1	2.94	117	159.32	
17	2024/1/25	21	43.85	25	45.15	9	20.14	14	29.61	8	17.44	5	5.14	4	5.14	4	4.12	90	166.47	
18	2024/1/26	18	41.08	23	54.45	15	33.95	15	33.21	10	23.12	22	27.07	8	11.16	1	2.46	112	224.04	
19	2024/1/27	20	30.27	24	42.59	18	31.34	12	15.84	9	20.26	6	3.22	3	2.79			92	146.31	
20	2024/1/28	16	25.15	19	31.33	12	18.86	12	17.53	7	14.11	6	3.58	1	1			73	111.56	
21	2024/1/29	20	29.47	27	42.97	21	28.42	14	26.16	9	20.39	9	14.07	10	12.48	3	3.71	113	173.96	
22	2024/1/30	22	29.57	25	38.74	16	36.85	12	21.4	7	11.49	8	8.03	4	4.55	3	4.88	97	150.63	
23	2024/1/31	23	23.55	23	23.86	18	19.12	13	13.74	8	13.31	11	9.09	4	5.06	3	3.71	103	107.73	
TOTAL																		2456	4345.3	
																		Average/Day		188.9261

No	Date	Rubish Source										Garbage Trucks entrin the site	Weight of incoming garbage						
		GSA		Nelces		Felifra		Jacrilo		Labilay				Private/company		Institution		From other	
		Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons			Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons
1	2024/2/1	23	29.96	25	31.19	14	15.34	14	14.37	6	9.05	9	10.85	3	2.2	1	1.37	95	114.33
2	2024/2/2	19	21.6	24	29.27	15	19.86	12	19.59	7	12.16	12	7.18	13	12.44	2	2.62	104	124.72
3	2024/2/3	22	22.3	24	28.46	12	17.29	12	14.73	7	12.01	18	19.51	3	3.09	1	1.01	99	118.4
4	2024/2/4	17	21.17	20	25.55	10	13.08	13	16.41	7	9.21	9	5.04	1	0.93			77	91.39
5	2024/2/5	21	25.01	25	32.62	18	20.95	16	16.89	8	11.47	14	11.73	4	7.87	3	3.18	109	129.72
6	2024/2/6	20	33.3	25	38.77	15	24.53	12	20.79	8	17.31	14	13.95	5	4.32	3	4.5	102	157.47
7	2024/2/7	20	25.4	26	30.41	15	18.97	12	16.69	8	13.54	16	17.2	5	4.75	2	2.3	104	129.26
8	2024/2/8	20	28.08	24	37.2	13	23.16	13	21.69	8	12.01	11	8.84	5	6.39	2	1.91	96	139.28
9	2024/2/9	21	29.97	25	37.24	15	22.66	14	25.68	8	16.79	11	13.16	7	8.55	3	4.77	104	158.82
10	2024/2/10	14	18.87	24	27.74	14	18.93	15	18.98	7	9.64	15	15.58	7	6.51	1	0.74	97	116.99
11	2024/2/11	10	14.26	21	27.72	10	15.55	12	18.31	7	12.79	12	10.51	1	1.56			73	100.7
12	2024/2/12	13	19.55	25	36.8	21	26.93	13	16.69	10	14.73	10	15.45	5	7.42	3	2.11	100	139.68
13	2024/2/13	13	27.77	26	39.71	16	21.43	12	21.5	9	16.7	11	6.8	5	7.5	2	3.17	94	144.58
14	2024/2/14	16	17.95	25	30.56	15	21.19	10	12.12	7	12.67	12	13.65	1	0.94			86	109.08
15	2024/2/15	23	27.53	26	34.94	23	26.53	11	14.42	7	7.42	14	12.17	5	6.52	3	3.69	112	133.22
16	2024/2/16	22	24.59	27	30.01	14	17.73	18	23.98	8	13.78	21	25.2	7	8.51	3	2.68	120	146.48
17	2024/2/17	20	23.09	24	29.43	12	15.71	13	17.45	9	12.43	21	22.87	3	2.51	2	2.49	104	125.98
18	2024/2/18	18	21.7	21	22.86	9	13.21	12	16.89	7	11.55	12	11.43	1	0.52			80	98.16
19	2024/2/19	23	28.36	26	33.34	17	19.45	16	19.81	9	15.18	12	12.79	5	6.08	2	2.27	110	137.28
20	2024/2/20	22	26.93	25	31.41	18	18.17	17	23.08	8	14.28	6	5.82	8	6.65	3	2.36	107	128.7
21	2024/2/21	26	30.48	25	29.12	19	19.29	11	11.56	7	12.55	12	16.07	5	6.1	3	2.3	108	127.47
22	2024/2/22	22	25.13	25	34.46	15	21.33	14	21.85	7	10.55	10	11.5	5	7.23	1	1.57	99	133.62
23	2024/2/23	24	27.92	23	25.53	14	16.76	13	14.95	10	13.14	13	10.9	11	8.14	3	3.78	111	121.12
24	2024/2/24	23	24.82	23	25.71	12	14.92	14	16.53	8	8.21	16	13.39	3	3.4	1	1.3	100	108.28
25	2024/2/25	16	19.4	22	24.92	9	12.59	11	13.53	7	9.09	8	7.44	3	4.25			76	91.22
26	2024/2/26	22	25.23	25	26.93	18	19.1	14	16.97	8	11.8	10	12.55	8	5.7	3	2.03	108	120.31
27	2024/2/27	21	25.75	30	45.14	15	18.21	22	42.95	8	12.37	15	15.24	5	8.66	3	2.72	119	171.04
28	2024/2/28	19	23.91	24	29.5	16	18.75	10	12.5	8	12.71	11	14.35	4	4.91	3	2.64	95	119.27
29	2024/2/29	21	24.19	27	29.16	16	16.69	13	16.45	7	6.93	11	12.43	3	3.63	3	2.75	101	112.23
Total																	2890	3648.8	
																	Average/Day		125.8207

No	Date	Rubbish Source												Garbage Trucks enterin the site (Total Quantity of vehicles)	Weight of incoming garbage (tons)					
		GSA		Nelces		Felifra		Jacrilo		Lablily		Private/company				Institution		From other Municipal		
		Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	
1	2024/3/1	21	23.07	23	26.85	12	13.15	14	15.21	9	10.97	50	44.33	10	9.14	3	2.79	142	142.72	
2	2024/3/2	21	25.98	25	31.91	13	16.24	11	11.93	7	10.27	46	33.54	4	4.08	1	0.97	128	133.95	
3	2024/3/3	26	36.61	11	14.24	9	10.83	11	12.52	7	9.98	29	20.79	0	0	0	0	93	104.97	
4	2024/3/4	22	26.8	26	36.03	13	15.45	18	19.72	8	14.02	43	33.61	10	6.31	3	2.8	143	151.94	
5	2024/3/5	21	23.36	25	30.47	16	18.52	15	18.73	8	11.83	30	25.19	6	5.36	2	2.54	123	133.46	
6	2024/3/6	21	27.44	26	30.56	13	16.18	16	22.31	8	14.33	50	46.93	6	4.71	2	2.12	142	162.46	
7	2024/3/7	22	25.03	24	26.7	14	16.29	15	19.44	9	13.53	46	44.69	5	4.98	1	0.74	136	150.66	
8	2024/3/8	27	27.58	26	35.07	16	20.01	16	18.79	8	12.46	65	62.02	3	3.14	2	2.45	163	179.07	
9	2024/3/9	21	23.5	22	25.15	12	13.75	14	17.03	7	9.66	46	51.497	4	4.27	1	1.09	127	144.86	
10	2024/3/10	15	19.77	20	28.6	9	11.58	12	17.59	7	10.82	37	23.63	1	0.89	0	0	101	112.88	
11	2024/3/11	23	29.58	25	32.2	17	18.76	13	15.74	9	13.52	64	47.78	5	3.49	2	2.38	158	161.07	
12	2024/3/12	18	20.76	20	25.78	14	19.39	15	16.13	8	9.69	56	59.93	5	6.5	1	0.92	137	158.18	
13	2024/3/13	21	41.82	24	50.92	12	27.31	13	29.77	6	14.51	33	42.33	4	5.77	2	2.46	115	212.43	
14	2024/3/14	15	32.23	22	42.8	15	32.23	11	23.37	7	15.74	49	55.78	4	5.21	2	4.67	125	207.36	
15	2024/3/15	20	44.28	26	53.87	16	35.92	10	20.16	9	21.16	54	49.5	8	10.65	2	3.2	145	235.54	
16	2024/3/16	20	23.06	27	32.58	14	16.71	12	15.87	7	9.07	50	32.57	4	3.44	1	0.73	135	133.30	
17	2024/3/17	17	20.82	20	21.96	9	11.22	10	12.89	8	11.09	27	19.44	1	1.19	0	0	92	98.61	
18	2024/3/18	24	26	27	30.47	18	19.55	18	21.31	10	12.34	45	37.02	5	5.81	2	0.99	149	152.50	
19	2024/3/19	21	20.3	26	29.09	15	14.46	15	17.83	7	10.61	44	31.47	6	4.76	2	2.34	136	128.52	
20	2024/3/20	20	20.97	26	27.77	18	20.85	16	19.02	8	7.97	54	45.95	6	4.44	1	0.76	149	146.97	
21	2024/3/21	21	23.92	26	28.61	13	14.79	14	17.21	9	10.67	44	32.15	5	4.86	1	0.82	133	132.21	
22	2024/3/22	21	22.94	27	30.06	15	15.47	16	16.8	11	16.2	51	40.28	9	7.22	1	0.93	151	148.97	
23	2024/3/23	18	21.64	23	25.45	14	18.14	12	15.68	7	9.43	61	50.25	3	2.93	0	0	138	143.52	
24	2024/3/24	14	18.79	20	22.56	11	14.66	11	16.8	7	9.47	14	11.86	1	1.03	0	0	78	95.17	
25	2024/3/25	21	24.92	27	29.68	15	16.25	15	17.63	9	10.43	46	31.79	6	5.52	2	2	141	136.22	
26	2024/3/26	19	22.09	26	29.56	16	20.52	18	23.35	11	14.05	45	35.53	4	3.09	3	3.11	142	148.19	
27	2024/3/27	21	21.37	28	30.42	13	12.91	15	17.51	7	8.05	50	32.42	5	2.98	3	2.96	142	125.66	
28	2024/3/28	20	24.16	26	29.45	13	16.87	15	20.15	8	10.99	30	19.51	2	1.91	2	2.34	116	123.04	
29	2024/3/29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
30	2024/3/30	19	24.65	27	34.61	14	18.03	13	18.69	10	13.33	31	18.5	0	0	0	0	114	127.81	
31	2024/3/31	17	22.45	20	23.34	11	14.47	10	13.87	7	9.29	17	8.2	1	0.98	0	0	83	92.60	
		Total																	3877	4324.84
																			average per day	139.51

No	Date	Rubbish Source																		Garbage Trucks entrin the site (Total Quantity of vehicles)	Weight of incoming garbage (tons)
		GSA		Nelces		Felifra		Jacrilo		Lablaly		Private/company		Institution		From other					
		Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons		
1	2024/4/1	36	39.45	41	46.42	23	26.94	34	44.45	30	33.71	50	44.33	29	19.94	5	4.83	248	255.24		
2	2024/4/2	33	35.5	41	41.84	18	21.21	28	33.07	21	24.34	38	25.51	7	6.62	1	1.04	187	188.09		
3	2024/4/3	36	39.64	42	48.66	19	19.16	30	37.73	19	25.35	39	21.6	7	9.74	1	1	193	201.88		
4	2024/4/4	39	39.44	40	43.21	22	24.62	24	27.89	17	22.56	34	20.97	7	9.99	1	1.34	184	188.68		
5	2024/4/5	38	30.87	38	35.27	25	27.67	26	26.52	17	19.4	49	30.52	13	11.64	2	2.22	208	181.89		
6	2024/4/6	36	35	43	42.37	20	20.99	23	22.42	16	17.56	57	29.68	5	1.73	1	0.89	201	169.75		
7	2024/4/7	31	21.88	34	32.19	12	12.97	22	20.2	15	13.18	28	13.14	1	0.94			143	114.5		
8	2024/4/8	41	29.17	45	40.13	20	18.78	24	22.9	17	16.24	33	19.85	7	5.45	2	1.36	189	152.52		
9	2024/4/9	48	35.7	40	33.74	23	19.69	24	19.32	17	13.41	43	29.03	7	5.23	2	2.02	204	156.12		
10	2024/4/10	47	33.91	44	34.63	19	18.02	25	21.51	16	12.59	32	15.6	1	1.07	2	1.78	186	137.33		
11	2024/4/11	44	30.23	44	40.9	21	20.47	22	19.52	17	17.4	38	23.63	6	7.81	1	0.83	193	159.96		
12	2024/4/12	43	32.88	47	39.39	14	12.35	31	26.64	17	16.02	54	69.62	11	6.5	1	1.13	218	203.4		
13	2024/4/13	41	30.57	45	35.55	16	15.44	26	24.34	16	15.32	62	30.52	2	1.63			208	153.37		
14	2024/4/14	31	21.12	34	27.59	13	13.31	21	19.18	15	13.57	25	7.41	1	0.49			140	102.67		
15	2024/4/15	47	59.44	45	63.78	17	29.64	28	40.91	15	24.66	30	30.58	8	8.94	1	1.47	191	257.95		
16	2024/4/16	50	48.4	43	49.9	10	16.88	31	39.93	17	25.68	32	23.7	5	2.8	3	4.85	191	207.29		
17	2024/4/17	53	59.22	46	55.87	18	27.8	25	36.38	16	24.76	47	36.83	4	3.38	4	7.77	213	244.24		
18	2024/4/18	48	46.99	46	51.9	16	22.62	24	30.15	18	27.01	32	27.17	7	5.52	4	7.94	195	211.36		
19	2024/4/19	49	44.73	41	44.55	20	30.52	21	25.97	16	21	64	63.55	8	5.7	3	5.14	222	236.02		
20	2024/4/20	41	44.2	39	36.59	14	22.86	26	34.98	15	21.25	43	27.08	1	0.9	1	0.85	180	187.86		
21	2024/4/21	38	40.22	33	39.28	11	18.31	20	29.56	15	22.09	35	26.56	1	0.86			153	176.88		
22	2024/4/22	48	55.46	46	51.27	18	23.37	24	33.93	16	24.22	47	43.8	4	4.32	4	4.97	207	236.37		
23	2024/4/23	48	55.17	46	55.1	13	17.81	21	30.43	14	20.4	40	20.36	8	4.93	4	4.38	194	204.2		
24	2024/4/24	46	33.43	44	33.94	20	23.87	21	22.79	18	24.54	33	21.65	4	2.64	3	2.28	189	162.86		
25	2024/4/25	46	50.21	42	44.7	24	26.73	21	24.19	15	20.07	47	43.75	1	0.98	3	4.53	199	210.63		
26	2024/4/26	43	46.42	43	49.02	16	21.87	23	28.19	17	24.31	59	36.76	11	7.27	3	2.13	215	213.84		
27	2024/4/27	42	39.68	37	41.31	17	24.76	23	24.46	17	21.52	50	30.37	1	1.16	2	2.74	189	183.26		
28	2024/4/28	30	31.34	32	40	16	21.01	20	24.44	16	18.87	24	12.76	1	1.16			139	149.58		
29	2024/4/29	46	41.4	41	50.64	21	25.06	24	33.64	18	23.35	59	47.39	9	9	2	2.6	220	230.48		
30	2024/4/30	43	39.78	38	42.9	19	22.68	24	29.99	17	22.38	46	36.3	8	6.27	2	1.66	197	200.3		
Total																		5796	5678.52		
																		average per day	189.3		

No	Date	Rubbish Source												Garbage Trucks entrin the site (Total Quantity of vehicles)	Weight of incoming garbage (tons)				
		Felifra (Vera Cruz)		GSA (Dom Aleixo)		Jacriolo (Nain Feto)		Labilay		Nelces (Dom Aleixo)		Private/company				Institution		From other Municipal	
		Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons			Qty trcks/Ret	Tons	Qty trcks/Ret	Tons
1	5/1	21	26.3	43	40.78	21	26.23	14	18.61	43	46.75	19	9.68	1	0.9			162	169.25
2	5/2	25	27.93	43	42.82	23	27.87	17	20.28	45	51.18	39	35.88	6	6.82	1	1.57	199	212.78
3	5/3	21	24.89	43	40.7	21	27.11	17	22.92	42	44.04	54	37.62	13	7.27	4	5.27	215	204.55
4	5/4	21	25.03	39	37.28	21	26.25	18	20.25	40	37.21	51	26.13	13	6.84	1	1.12	204	178.99
5	5/5	16	20.1	27	24.49	20	22.92	17	17.32	32	37.8	20	8.85	1	1.06			133	132.54
6	5/6	22	25.85	39	39.49	21	25.86	17	23.23	39	40.84	41	38.85	5	4.72	3	4.26	187	198.84
7	5/7	20	26.74	42	47.37	25	30.17	17	24.12	40	50.98	37	27.55	7	6.26	4	3.66	192	213.19
8	5/8	19	28.67	40	44.81	21	26.96	16	20.92	38	47.84	37	33.75	6	5.06	3	3.6	180	208.01
9	5/9	20	26.89	43	49.3	20	31.3	15	23.13	41	52.74	40	34.86	6	6.07			185	224.29
10	5/10	20	25.85	46	48.69	22	30.32	16	20.71	40	47.48	39	36.79	9	6.75	4	5.38	196	216.59
11	5/11	20	24.59	41	46.01	22	29.32	16	20.97	40	46.76	39	31.15	3	3.64	2	2.05	183	202.44
12	5/12	16	19.74	33	34.87	24	33.29	16	19.47	35	44.2	22	16.28	1	0.95			147	168.8
13	5/13	21	27.57	48	51.66	23	31.15	15	20.19	43	49.42	41	34.92	7	5.29	4	4.06	202	220.2
14	5/14	22	27.4	42	44.77	20	27.33	17	23.5	40	48.87	33	31.35	6	6.26	2	2.69	182	209.48
15	5/15	21	27.75	44	46.85	20	26.85	18	25.27	41	45.86	38	34.5	6	8.09	3	2.67	191	215.17
16	5/16	18	22.67	39	42.57	20	27.14	16	21.67	42	43.31	35	31.32	4	3.62	1	1.2	175	192.3
17	5/17	19	22.95	43	43.91	23	28.4	17	21.97	44	49.92	41	28.95	7	5.51	4	5.05	198	201.61
18	5/18	19	23.23	36	37.06	23	28.2	13	15.17	41	47.12	48	34.67	2	2.39			182	187.84
19	5/19	16	20.2	33	37.07	20	25.69	16	19.29	32	41.6	28	16.05	1	1.19			146	161.09
20	5/20	20	23.44	33	31.98	20	23.09	16	19.2	43	47.31	20	11.46	1	1			153	157.48
21	5/21	20	23.71	43	39.09	21	23.13	17	22.23	43	46.16	40	36.24	7	5.82	2	2.15	193	196.38
22	5/22	22	29.08	43	43.01	23	26.62	16	18.86	39	44.19	39	25.73	8	7.46	2	2.32	192	194.95
23	5/23	22	26.64	43	43.25	22	27.85	16	21.03	42	40.89	37	27.99	5	4.78	2	1.65	189	192.43
24	5/24	21	24.43	44	44.38	20	25.28	18	21.17	45	45.58	36	22.58	16	9.49	4	3.49	204	192.91
25	5/25	19	22.75	38	37.31	20	22.26	15	17.39	43	43.22	43	31.83	1	0.42	1	0.81	180	175.18
26	5/26	17	18.99	33	33.99	18	21.48	15	18.04	31	36.33	28	15.84	1	1.38			143	146.05
27	5/27	24	29.04	39	39.79	21	26.18	18	23.51	46	54.98	38	34.86	4	3.27	3	2.69	193	211.63
28	5/28	21	25.22	40	40.4	21	25.74	15	19.77	42	49.54	44	31.13	5	4.48	3	2.67	191	196.28
29	5/29	21	25.32	41	40.82	22	25.91	15	18.21	43	47.09	46	42.16	7	6.39	3	3.93	198	205.9
30	5/30	17	20.48	38	39.44	21	25.52	15	18.3	40	42.07	38	18.47	1	0.8	1	0.74	171	165.08
31	5/31	18	22.78	40	39.99	23	28.32	15	19.55	42	49.37	39	32.36	12	8.22	1	0.84	190	200.59
Total			766.2		1274		833.7		636.3		1421		879.8				63.9	Average per day	192.0

Rubbish Source															Garbage Trucks enter the site (Total)	Weight of incoming garbage			
No	Date	GSA		Nelces		Felifra		Jacrillo		Lablilay		Private/company		Institution		From other			
		Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons	Qty trcks/Ret	Tons
1	2024/6/1	39	42.22	40	44.01	17	21.97	19	23.24	16	22.11	60	50.17	1	1	1	1.61	193	204.72
2	2024/6/2	29	37.76	31	36.43	17	19.9	19	23.24	15	20.06	19	15.22	1	0.78	1	0.78	131	153.39
3	2024/6/3	39	40.21	39	44.47	26	28.96	23	28.65	16	21.02	47	32.46	6	4.06	3	3.41	199	199.83
4	2024/6/4	43	44.73	35	40.27	25	30.42	21	25.31	15	20.88	33	23.58	8	5.81	4	4.06	184	191
5	2024/6/5	41	45.85	36	41.38	21	25.98	20	25.42	15	23.05	34	28.11	7	4.45	3	3.45	177	194.24
6	2024/6/6	10	41.89	39	42.55	16	19.1	20	22.8	15	19.19	26	19.7	5	4.22	1	0.91	132	169.45
7	2024/6/7	41	45.53	40	54.82	17	21.59	24	30.26	16	21.81	47	35.66	13	7.01	3	3.25	201	216.68
8	2024/6/8	36	44.44	39	56.4	16	22.32	20	28.4	15	22.49	41	27.07	9	7.75	1	1.45	177	208.87
9	2024/6/9	30	35.47	34	42.92	11	14.97	19	25.46	15	19.25	25	16.14	1	0.77	1	0.77	135	154.98
10	2024/6/10	38	40.93	41	51.4	18	21.35	24	31.99	16	23.45	42	35.33	7	8.05	3	3.72	189	212.5
11	2024/6/11	37	39.43	40	51.81	19	25.13	20	27	15	21.07	32	25.94	4	3.98	3	3.76	170	194.36
12	2024/6/12	38	40.85	40	45.52	18	22.92	20	26.67	16	23.04	45	43.09	7	6.59	3	2.86	187	208.68
13	2024/6/13	38	41.4	41	46.34	18	21.73	20	24.66	15	20.53	34	23.64	6	6.47	1	1.02	173	184.77
14	2024/6/14	40	40.49	36	40.11	22	26.61	22	27.99	16	20.78	53	42.9	10	7.66	3	3.47	202	206.54
15	2024/6/15	35	33.89	38	40.61	18	22.33	21	26.14	15	19.52	22	14.2	2	1.98	1	1.31	151	158.67
16	2024/6/16	32	32.68	31	37.23	15	16.25	21	26.44	15	17.51	40	26.01	1	1.31	1	1.31	156	157.43
17	2024/6/17	40	41.49	41	45.94	21	23.91	21	26.75	15	19.68	30	16.19	1	0.93	2	2.15	171	174.89
18	2024/6/18	41	43.15	38	43.84	21	25.53	21	26.94	15	20.21	32	25.68	5	4.36	2	2.13	175	189.71
19	2024/6/19	40	41.62	39	46.17	21	24.97	21	26.98	15	18.2	39	24.91	5	4.59	3	3.24	183	187.44
20	2024/6/20	41	41.66	40	43.95	19	24.27	20	26.94	14	20.33	30	22.25	6	5.44	2	2.26	172	184.84
21	2024/6/21	36	37.72	36	41.86	13	15.41	21	27.25	16	20.57	50	29.89	12	7	3	3.06	187	179.7
22	2024/6/22	38	39.59	39	45.29	19	22.92	19	24.14	15	21.5	55	31.56	1	0.92	2	2.22	188	185.92
23	2024/6/23	30	32.82	34	36.92	15	18.01	19	23.82	15	20.02	34	20.46	1	0.92	2	2.22	147	152.05
24	2024/6/24	43	47.54	40	49.61	20	24.42	22	26.49	15	19.67	36	25.96	6	5.38	3	3.23	185	199.07
25	2024/6/25	40	43.57	42	46.14	17	20.3	21	24.06	16	20.97	38	27.55	10	14.32	3	3.81	187	196.91
26	2024/6/26	39	37.95	38	36.26	18	22.69	21	26.08	15	17.54	45	29	9	1.92	5	5.65	190	171.44
27	2024/6/27	36	58.15	39	42.78	15	18.02	20	24.84	14	18.93	16	14.37	8	16.03	1	1.07	148	193.12
28	2024/6/28	38	40.38	35	41.95	17	19.84	19	27.22	17	22.43	46	47.37	1	1.07	3	3.46	176	200.26
29	2024/6/29	33	33.91	47	53.33	14	19.02	20	24.68	14	17.27	25	13.99	1	0.88	1	0.88	154	163.08
30	2024/6/30	30	32.18	34	39.44	12	18.13	20	24.88	14	17.27	28	16.79	1	0.79	1	0.79	139	149.48
Total															5159	5544.02			
															Average/Day		184.800667		

Rubish Source															Garbage Trucks entering the site	Weight of incoming garbage (tons)			
No	Date	GSA		Nelces		Feifra		Jacrilo		Lablaly		Private/company		Institution		From other			
		Qty trucks/Ret	Tons	Qty trucks/Ret	Tons	Qty trucks/Ret	Tons	Qty trucks/Ret	Tons	Qty trucks/Ret	Tons	Qty trucks/Ret	Tons	Qty trucks/Ret	Tons	Qty trucks/Ret	Tons		
1	2024/7/1	42	45.3	40	48.29	16	21.4	22	29.56	20	25.9	31	25.84	4	3.84		175	200.13	
2	2024/7/2	41	43.07	37	41.46	16	20.1	21	26.19	16	21.45	37	24.94	4	2.85	3	175	180.06	
3	2024/7/3	44	44.5	41	49.72	19	21.58	19	23.07	15	27.63	30	23.83	7	7.41	4	179	197.74	
4	2024/7/4	45	43.83	42	42.5	22	26.79	19	21.41	19	16.56	37	22.03	6	4.69	2	192	177.81	
5	2024/7/5	47	45.34	47	55.37	24	28.55	22	26.74	20	23.34	56	64.39	8	6.05	3	227	249.78	
6	2024/7/6	43	44.58	48	46.62	19	20.28	22	25.79	18	21.73	53	50.54	1	0.85	1	205	210.39	
7	2024/7/7	38	42.5	40	49.14	16	16.94	22	25.41	15	19.34	35	17.2	1	0.7		167	171.23	
8	2024/7/8	48	54.03	50	55.98	21	25.63	25	30.24	19	25.05	50	35.08	6	5.31	3	222	231.32	
9	2024/7/9	38	31.54	40	39.13	16	19.18	22	27.65	15	18.06	35	23.94	1	0.66	1	168	160.16	
10	2024/7/10	46	46.07	52	56.63	22	23.94	27	30.86	19	23.54	45	36.98	6	5.43	3	220	223.45	
11	2024/7/11	47	44.52	51	55.83	21	22.49	23	25.47	21	24.73	40	34.95	7	1.32	1	211	209.31	
12	2024/7/12	49	47.17	49	51.68	20	23.04	24	30.09	19	24.59	57	41.24	11	4.96	3	232	222.77	
13	2024/7/13	48	38.39	48	46.39	19	21.39	21	25.85	18	19.47	49	27.69	1	0.76	1	205	179.94	
14	2024/7/14	41	31.83	41	39.15	14	14.72	19	23.88	16	18.66	28	16.8	1	0.84		160	145.88	
15	2024/7/15	50	51.26	50	52.87	21	26.46	24	30.21	19	24.24	45	33.6	5	7.28	4	218	225.92	
16	2024/7/16	49	41.26	50	45.69	23	20.74	24	26.79	30	30.52	34	20.63	6	4.7	3	219	190.33	
17	2024/7/17	50	43.4	51	56.67	21	24.21	25	30.67	29	44.53	39	25.52	5	3.85	3	223	228.85	
18	2024/7/18	48	46.99	51	52.78	23	26.4	23	29.9	18	23.79	45	33.61	6	4.54	1	215	218.01	
19	2024/7/19	46	43.75	52	51.28	26	28.74	24	28.63	24	27.78	43	36.62	11	7.15	4	230	223.95	
20	2024/7/20	43	41.09	48	54.12	18	21.04	21	27.62	19	24.48	47	31.87	2	1.68	1	199	201.9	
21	2024/7/21	39	35.53	40	32.46	16	12.05	20	18.24	18	13.08	33	20.22	1	0.56		167	132.14	
22	2024/7/22	44	39.25	48	42.34	24	25.88	24	28.05	20	21.86	41	36.03	7	5.28	3	211	198.69	
23	2024/7/23	49	49.96	50	51.18	21	22.69	25	28.31	20	23.78	52	40.12	6	5.79	2	225	221.83	
24	2024/7/24	47	46.88	49	49.55	27	30.09	24	30.04	19	22.54	42	33.3	5	4.16	2	215	216.56	
25	2024/7/25	47	42.36	51	48.65	25	26.94	24	27.74	19	21.88	44	29.26	4	2.67	1	215	199.5	
Total																	5075	5017.65	
																	Average/Day		200.706

Physical Composition and Bulk Density

ROUND 1

	HIGH INCOME (BEBONUK & MOTAEL)	MEDIUM INCOME (COMORO & MANLEU-ANA)	LOW INCOME (BECORA & MADOHI)	Shops and Markets	Institutions	Clinics	Hotel	Restaurant
Paper/cardboard	0.66	1.272	0.571	3.194	2.191	2.012	2.227	2.983
Glass	0.353	0.059	0.584	0.115	0.025	0	0.233	1.613
Plastic (hard)	0.538	0.047	0.506	0.38	0.875	0.113	0.584	0.444
Plastic (laminated)	0.561	0.398	0.98	0.097	0.259	0.114	0.134	0.351
Plastic (non- recyclable such as PVC, etc)	0.127	0.309	0.367	0.162	0.049	0.028	0.542	0.176
Aluminum	0.243	0.046	0.095	0.02	0.187	0.026	0.011	0.02
Other Metal	0.041	0.066	0.09	0	0	0	0.031	0.321
Food waste	1.114	0.958	2.491	0.558	0.488	0.143	0.806	7.836
Green/Garden waste	1.138	0.441	0.977	0.049	0.436	2.027	0.905	0.023
Builders Waste	0.443	0.46	0.339	0	0.02	0.088	0	0.058
Soil and Dirt	1.209	1.863	4.01	0.063	0.374	0.367	0	0
Hazardous Waste	0.338	0.442	0.689	0	0.085	0.728	0.191	0.546
Miscellaneous	1.463	2.848	0.956	0	0.043	0	0.082	0.476
Total 30LITRES	3.299	4.228	4.921	2.3	2.6	2.6	3.2	7.85
	0.11	0.14	0.16	0.08	0.09	0.09	0.11	0.26

ROUND 2

	HIGH INCOME (BEBONUK & MOTAEL)	MEDIUM INCOME (COMORO & MANLEU-ANA)	LOW INCOME (BECORA & MADOHI)	Shops and Markets	Institutions	Clinics	Hotel	Restaurant
Paper/cardboard	0.597	0.99	0.867	2.499	1.302	1.587	0.694	1.529
Glass	0.157	0	0	0	0	0	0	2.026
Plastic (hard)	0.208	0.124	0.47	0.174	0.587	0.195	0.245	0.56
Plastic (laminated)	0.689	0.28	0.352	0.023	0.089	0.043	0.18	0.077
Plastic (non- recyclable such as PVC, etc)	0.038	0.274	0.39	0.176	0.317	0.87	0.004	0.056
Aluminum	0	0.031	0.017	0	0.006	0	0.035	0.117
Other Metal	0.087	0.2	0.26	0	0.027	0	0	0
Food waste	0.432	1.813	1.728	0.147	0.483	0.206	0.083	2.657
Green/Garden waste	1.023	1.08	0.747	0	0	0.029	0.088	0.046
Builders Waste	0.043	0	0.206	0	0.037	0	0	0
Soil and Dirt	0.137	0.692	3.517	0.038	0.042	0	0	0
Hazardous Waste	0.037	0.056	0.911	0.303	0.325	0.989	0.015	0.021
Miscellaneous	0.48	0.528	1.569	0.073	0.061	0.072	0.076	0.069
Total 30LITRES	2.5	2.9	7.6	1.3	1.7	2.2	1.6	6.3
	0.08	0.10	0.25	0.04	0.06	0.07	0.05	0.21

ROUND 3

	HIGH INCOME (BEBONUK & MOTAEL)	MEDIUM INCOME (COMORO & MANLEU-ANA)	LOW INCOME (BECORA & MADOH)	Shops and Markets	Institutions	Clinics	Hotel	Restaurant
Paper/cardboard	0.233	1.175	0.313	0.714	0.744	0.68	2.082	1.358
Glass	0	0.242	0.071	0.291	0	0	0.5	0
Plastic (hard)	0.172	0.229	0.081	0.205	0.228	0.209	0.669	0.226
Plastic (laminated)	0.209	0.152	0.11	0.1	0.071	0.025	0.07	0.376
Plastic (non- recyclable such as PVC, etc)	0.171	0.119	0.101	0.257	0.097	0.239	0.192	0.47
Aluminum	0.007	0.039	0.037	0.063	0	0	0.006	0
Other Metal	0.196	0.213	0.174	0.044	0.056	0	0.203	0.318
Food waste	1.379	0.6	0.386	0.11	0.18	0.464	2.403	4.2
Green/Garden waste	1.627	1.418	0.877	0.054	0.566	0.258	0.4	0.037
Builders Waste	0.264	0.44	0.182	0.028	0.077	0.136	0	0
Soil and Dirt	0.551	2.311	0.592	0.114	0.038	0.102	0	0
Hazardous Waste	0.057	0.302	0.21	0	0	0.092	0.052	0
Miscellaneous	0.503	0.668	1.658	0.074	0.082	0.166	0.13	0.05
Total 30LITRES	4.8	7.1	5.3	2.2	2.1	2.3	3.7	7.1
	0.16	0.24	0.18	0.07	0.07	0.08	0.12	0.24

Total

	Household (Bebonuk & Motael)	Household (Comoro & Manleu-ana)	Household (Becora & Madohi)	Shops and Markets	Institutions	Clinics	Hotel	Restaurant
Total								
Paper/cardboard	1.49	3.437	1.751	6.407	4.237	4.279	5.003	5.87
Glass	0.51	0.301	0.655	0.406	0.025	0	0.733	3.639
Plastic (hard)	0.918	0.4	1.057	0.759	1.69	0.517	1.498	1.23
Plastic (laminated)	1.459	0.83	1.442	0.22	0.419	0.182	0.384	0.804
Plastic (non- recyclable such as PVC, etc)	0.336	0.702	0.858	0.595	0.463	1.137	0.738	0.702
Aluminum	0.25	0.116	0.149	0.083	0.193	0.026	0.052	0.137
Other Metal	0.324	0.479	0.524	0.044	0.083	0	0.234	0.639
Food waste	2.925	3.371	4.605	8.15	1.151	0.813	3.292	14.693
Green/Garden waste	3.788	2.939	2.601	0.103	1.002	2.314	1.393	0.106
Builders Waste	0.75	0.9	0.727	0.028	0.134	0.224	0	0.058
Soil and Dirt	1.897	4.866	8.119	0.215	0.454	0.469	0	0
Hazardous Waste	0.432	0.8	1.81	0.303	0.41	1.809	0.258	0.567
Miscellaneous	2.446	4.044	4.183	0.147	0.186	0.238	0.288	0.595
Total 30LITRES	10.599	14.228	17.821	5.8	6.4	7.1	8.5	21.25
	0.12	0.16	0.20	0.06	0.07	0.08	0.09	0.24

Item of Physical compos Shops and Markets									
	Household (amount)	Household_rate(%)	Paper/cardboard	63.3%	Institutions	40.6%	Clinics	Hotel	Restaurant
Total									
Paper/cardboard	6.678	9.7	Paper/cardboard	63.3%		40.6%	35.6%	36.1%	20.2%
Glass	1.466	2.1	Glass	4.0%		0.2%	0.0%	5.3%	12.5%
Plastic (hard)	2.375	3.4	Plastic (hard)	7.5%		16.2%	4.3%	10.8%	4.2%
Plastic (laminated)	3.731	5.4	Plastic (laminated)	2.2%		4.0%	1.5%	2.8%	2.8%
Plastic (non-recyclable such as PVC, etc)	1.896	2.7	Plastic (non-recyclable s	5.9%		4.4%	9.5%	5.3%	2.4%
Aluminum	0.515	0.7	Aluminum	0.8%		1.8%	0.2%	0.4%	0.5%
Other Metal	1.327	1.9	Other Metal	0.4%		0.8%	0.0%	1.7%	2.2%
Food waste	10.901	15.8	Food waste	8.0%		11.0%	6.8%	23.7%	50.6%
Green/Garden waste	9.328	13.5	Green/Garden waste	1.0%		9.6%	19.3%	10.0%	0.4%
Builders Waste	2.377	3.4	Builders Waste	0.3%		1.3%	1.9%	0.0%	0.2%
Soil and Dirt	14.882	21.5	Soil and Dirt	2.1%		4.3%	3.9%	0.0%	0.0%
Hazardous Waste	3.042	4.4	Hazardous Waste	3.0%		3.9%	15.1%	1.9%	2.0%
Miscellaneous	10.673	15.4	Miscellaneous	1.5%		1.8%	2.0%	2.1%	2.0%

	Landfill No.1	Landfill No.2	Landfill No. Landfill No.4	Landfill No.5	Landfill No.6
Paper/cardboard	1.658	1.081	1.876	0.823	1.3
Glass	0.2	0.245	0.037	0.034	0
Plastic (hard)	0.428	0.353	0.283	0.264	0.279
Plastic (laminated)	0.351	0.237	0.505	0.303	0.153
Plastic (non-recyclable such as PVC, etc)	0.573	0.388	0.491	0.4	0.283
Aluminum	0.03	0.028	0	0	0.052
Other Metal	0.105	0.019	0.115	0	0.129
Food waste	0.893	0.341	0.774	0.125	0.117
Green/Garden waste	1.112	3.062	1.838	1.478	1.014
Builders Waste	0.143	0.008	0.241	0.249	0.187
Soil and Dirt	0.484	0.557	1.017	0.842	0.344
Hazardous Waste	0.4	0.046	0.62	0.165	0.468
Miscellaneous	0.304	1.575	0.997	1.341	1.546
Total 30LITRES	3	3.6	4.1	4	3.6
	0.10	0.12	0.17	0.13	0.12

	Landfill No.1	Landfill No.2	Landfill No. Landfill No.4	Landfill No.5	Landfill No.6
Paper/cardboard	1.001	0.949	1.055	1.434	4.258
Glass	0.04	0.024	0.026	0.002	0.075
Plastic (hard)	0.597	0.153	0.265	0.317	0.27
Plastic (laminated)	0.283	0.233	0.175	0.201	0.527
Plastic (non-recyclable such as PVC, etc)	0.706	0.574	0.365	0.191	1.32
Aluminum	0	0	0.005	0.051	0.05
Other Metal	0	0	0.112	0	0
Food waste	0.655	0.102	0.623	0.536	1.45
Green/Garden waste	2.265	2.437	1.395	1.373	1.914
Builders Waste	0.396	0.232	0.127	0.018	0.407
Soil and Dirt	1.048	0.686	0.63	0.255	1.009
Hazardous Waste	0.35	0.415	0.885	0.479	0.262
Miscellaneous	0.871	1.078	1.135	0.413	0.879
Total 30LITRES	5.7	5.5	5.8	3.4	5.4
	0.19	0.18	0.19	0.11	0.18

	Landfill No.1	Landfill No.2	Landfill No. Landfill No.4	Landfill No.5	Landfill No.6
Paper/cardboard	2.107	1.014	0.918	1.566	2.323
Glass	0.057	0.041	0	0.057	0
Plastic (hard)	0.314	0.356	0.663	0.457	0.377
Plastic (laminated)	0.165	0.198	0.158	0.239	0.208
Plastic (non-recyclable such as PVC, etc)	0.45	0.303	0.649	0.544	0.429
Aluminum	0.006	0	0.05	0	0
Other Metal	0.122	0	0	0	0.013
Food waste	0.624	0.387	0.099	1.412	0.508
Green/Garden waste	1.696	2.077	1.436	1.399	1.413
Builders Waste	0.886	0.297	0.42	0.396	0.391
Soil and Dirt	1.202	0.332	0.719	0.296	0.154
Hazardous Waste	0.995	0.225	0.498	0.359	0.056
Miscellaneous	0.94	0.979	0.973	1.098	0.39
Total 30LITRES	6.4	3.7	4	5.5	3.4
	0.21	0.12	0.13	0.18	0.11

	Landfill No.1	Landfill No.2	Landfill No.3	Landfill No.4	Landfill No.5	Landfill No.6	Average of Landfill
Paper/cardboard	4.766	3.044	5.445	4.497	4.085	7.881	4.953
Glass	0.297	0.31	0.051	0.12	0.147	0.075	0.167
Plastic (hard)	1.339	0.862	1.357	0.771	1.038	0.926	1.049
Plastic (laminated)	0.799	0.668	0.604	0.88	0.743	0.888	0.764
Plastic (non-recyclable such as PVC, etc)	1.729	1.265	1.546	1.4	1.125	2.032	1.516
Aluminum	0.036	0.028	0.05	0.005	0.091	0.102	0.052
Other Metal	0.227	0.019	0.089	0.227	0	0.142	0.117
Food waste	2.172	0.83	2.583	1.836	2.073	2.075	1.928
Green/Garden waste	5.073	7.576	4.669	4.593	4.25	4.341	5.084
Builders Waste	1.425	0.537	0.567	0.991	0.663	0.985	0.861
Soil and Dirt	2.734	1.575	1.798	1.951	1.835	1.507	1.900
Hazardous Waste	1.745	0.686	1.387	1.875	1.192	0.786	1.279
Miscellaneous	2.115	3.632	1.852	2.418	2.852	2.815	2.614
							Average of Landfill
Total 30LITRES	15.1	12.8	11.6	14.2	12.9	12.4	79
	0.17	0.14	0.13	0.16	0.14	0.14	0.15

	Landfill No.1	Landfill No.2	Landfill No.3	Landfill No.4	Landfill No.5	Landfill No.6	Average	Max	Min
Paper/cardboard	19.5%	14.5%	24.8%	20.9%	20.3%	32.1%	22.0%	32.1%	14.5%
Glass	1.2%	1.5%	0.2%	0.6%	0.7%	0.3%	0.8%	1.5%	0.2%
Plastic	5.5%	4.1%	6.2%	3.6%	5.2%	3.8%	4.7%	6.2%	3.6%
PVC plastic	3.3%	3.2%	2.7%	4.1%	3.7%	3.6%	3.4%	4.1%	2.7%
other plastic	7.1%	6.0%	7.0%	6.5%	5.6%	8.3%	6.7%	8.3%	5.6%
Aluminum	0.1%	0.1%	0.2%	0.0%	0.5%	0.4%	0.2%	0.5%	0.0%
Other Metal	0.9%	0.1%	0.4%	1.1%	0.0%	0.6%	0.5%	1.1%	0.0%
Food waste	8.9%	3.9%	11.7%	8.5%	10.3%	8.5%	8.6%	11.7%	3.9%
Green/Garden waste	20.7%	36.0%	21.2%	21.3%	21.2%	17.7%	23.0%	36.0%	17.7%
Builders Waste	5.8%	2.6%	2.6%	4.6%	3.3%	4.0%	3.8%	5.8%	2.6%
Soil and Dirt	11.2%	7.5%	8.2%	9.0%	9.1%	6.1%	8.5%	11.2%	6.1%
Hazardous Waste	7.1%	3.3%	6.3%	8.7%	5.9%	3.2%	5.8%	8.7%	3.2%
Miscellaneous	8.6%	17.3%	8.4%	11.2%	14.2%	11.5%	11.9%	17.3%	8.4%

Appendix-3 Recycling Survey

Recycling (Recyclable Waste Dealers)

This survey is implemented to identify the situation of recycling in Dili Municipality. To create the plan, information from recyclers is needed to grasp the current situation of recycling in the region. Your responses will be used for this purpose only. Please respond to the questions as accurately as you can. Thank you very much for your cooperation.

I give my consent to participate in this interview

- Yes
 No

Respondent name

Position of respondent

Company name

Number of employees

Average recycling sales amount per month (USD)

Business address

Business phone number

BUYING/PROCURING PAPER OR CARDBOARD

Do you buy/procure Paper or Cardboard?

- Yes
 No

Who sells or gives you the paper or cardboard?

- Other recyclable waste dealer (company)
 Community groups
 Waste pickers
 Other

If 'other', please specify

If 'community group' please give names and locations of each group

If 'company' please give names and locations of each company

What type of Paper or Cardboard do you buy?

- Cardboard
- White paper
- Other

If 'other', please specify

How much do you pay per kilogram? (provide price range eg. \$1 - \$3 per kilogram)

USD

How many kilograms (average) of Paper or Cardboard do you buy per month?

In months when there is limited volume of waste, how many kilograms of Paper or Cardboard might you buy in that month (monthly minimum)?

In months when there is a high volume of waste, how many kilograms of Paper or cardboard might you buy in that month (monthly maximum)?

On average, how long do you store the Paper or Cardboard before selling it?

months, or weeks, or days

Do you treat the Recyclable Paper or Cardboard?

- Yes
- No

How do you treat the Recyclable Paper or Cardboard?

- Washing
- Separating
- Crushing
- Melting
- Molding
- Flaking
- Cooling
- Other

If 'other' please specify

BUYING/PROCURING PLASTIC

Do you buy/procure plastic?

- Yes
- No

Who sells or gives you the plastic?

- Other recyclable waste dealer (company)
- Community groups
- Waste pickers
- Other

If 'other' please specify

If 'community group' please give names and locations of each group

If 'company' please give names and locations of each company

What type of plastic do you buy?

- Plastic bottles
- PVC
- Other

If 'other' please specify

How much do you pay per kilogram? (provide price range eg. \$1 - \$3 per kilogram)

USD

How many kilograms (average) of Plastic do you buy per month?

In months when there is limited volume of waste, how many kilograms of Plastic might you buy in that month (monthly minimum)?

In months when there is a high volume of waste, how many kilograms of Plastic might you buy in that month (monthly maximum)?

On average, how long do you store the Plastic before selling it?

Months, or weeks, or days

Do you treat the Recyclable Plastic?

Yes

No

How do you treat the Recyclable Plastic?

Washing

Separating

Crushing

Melting

Molding

Flaking

Cooling

Other

If 'other' please specify

BUYING/PROCURING GLASS

Do you buy/procure glass?

Yes

No

Who sells or gives you the glass?

- Other recyclable waste dealer (company)
- Community groups
- Waste pickers
- Other

If 'other' please specify

If 'community group' please give names and locations of each group

If 'company' please give names and locations of each company

What type of glass do you buy?

- Transparent glass bottle
- Coloured glass bottle
- Other

If 'other', please specify

How much do you pay per kilogram? (provide price range eg. \$1 - \$3 per kilogram)

How many kilograms (average) of Glass do you buy per month?

In months when there is limited volume of waste, how many kilograms of Glass might you buy in that month (monthly minimum)?

In months when there is a high volume of waste, how many kilograms of Glass might you buy in that month (monthly maximum)?

On average, how long do you store the Glass before selling it?

months, or weeks, or days

Do you treat the Recyclable Glass?

- Yes
- No

How do you treat the Recyclable Glass?

- Washing
- Separating
- Crushing
- Melting
- Molding
- Flaking
- Cooling
- Other

If 'other' please specify

BUYING/PROCURING OTHER METAL

Do you buy/procure metal?

- Yes
- No

Who sells or gives you the metal?

- Other recyclable waste dealer (company)
- Community groups
- Waste pickers
- Other

If 'other' please specify

If 'community group' please give names and locations of each group

If 'company' please give names and locations of each company

What type of metal do you buy?

- Aluminium
- Steel
- Other

If 'other' please specify

How much do you pay per kilogram? (provide price range eg. \$1 - \$3 per kilogram)

USD

How many kilograms (average) of Metal do you buy per month?

In months when there is limited volume of waste, how many kilograms of Metal might you buy in that month (monthly minimum)?

In months when there is a high volume of waste, how many kilograms of Metal might you buy in that month (monthly maximum)?

On average, how long do you store the Metal before selling it?

months, or weeks, or days

Do you treat the Recyclable Metal?

Yes

No

How do you treat the Recyclable Metal?

Washing

Separating

Crushing

Melting

Molding

Flaking

Cooling

Other

If 'other' please specify

BUYING/PROCURING ALUMINIUM

Do you buy/procure aluminium?

Yes

No

Who sells or gives you the aluminium?

- Other recyclable waste dealer (company)
- Community groups
- Waste pickers
- Other

If 'other' please specify

If 'community group' please give names and locations of each group

If 'company' please give names and locations of each company

What type of aluminium do you buy?

- Aluminium
- Steel
- Other

If 'other' please specify

How much do you pay per kilogram? (provide price range eg. \$1 - \$3 per kilogram)

USD

How many kilograms (average) of Aluminium do you buy per month?

In months when there is limited volume of waste, how many kilograms of Aluminium might you buy in that month (monthly minimum)?

In months when there is a high volume of waste, how many kilograms of Aluminium might you buy in that month (monthly maximum)?

On average, how long do you store the Aluminium before selling it?

months, or weeks, or days

Do you treat the Recyclable Aluminium?

- Yes
- No

How do you treat the Recyclable Aluminium?

- Washing
- Separating
- Crushing
- Melting
- Molding
- Flaking
- Cooling
- Other

If 'other' please specify

BUYING/PROCURING OTHER WASTE

1

Do you buy/procure other types of waste?

- Yes
- No

What other type of waste do you buy (repeat for each type of 'other waste')

Who sells or gives you this waste?

- Other recyclable waste dealer (company)
- Community groups
- Waste pickers
- Other

If 'other' please specify

If 'community group' please give names and locations of each group

If 'company' please give names and locations of each company

How much do you pay per kilogram? (provide price range eg. \$1 - \$3 per kilogram)

USD

How many kilograms (average) of this waste do you buy per month?

In months when there is limited volume of waste, how many kilograms of this type of waste might you buy in that month (monthly minimum)?

In months when there is a high volume of waste, how many kilograms of this type of waste might you buy in that month (monthly maximum)?

On average, how long do you store the waste before selling it?

months, or weeks, or days

Do you treat this other type of waste?

Yes

No

How do you treat this waste?

Washing

Separating

Crushing

Melting

Molding

Flaking

Cooling

Other

* If 'other' please specify

Are you aware of any competitors also buying the same type of recyclable waste?

Yes

No

COMPETITORS ALSO BUYING WASTE

1

Name of competitor business/group

eg. Besi Tua (Dili)

Location of competitor business/group

Types of recyclable waste that they buy or procure

- Paper or Cardboard
- Glass
- Plastic
- Metal
- Other

TYPE OF RECYCLING COMPANY

What type of recyclable products do you sell?

- Recyclable waste
- Final products from recyclable waste (eg. sandals from tyres; art from PVC)

SELLING FINAL PRODUCTS

Please list the different products that you sell (eg. sandals from tyres; artworks from PVC plastic)

What is your average monthly sales amount?

USD

What is your monthly sales amount for a low income month?

USD

What is your monthly sales amount for a high income month?

USD

Approximately what percentage % of the material do you use for the final product?

How do you dispose of the material that you DON'T use to create the final product?

- Give to recycling company or group
- Put in public waste collection point
- Take to Tibar landfill
- Manage our waste ourselves (eg. burning or burying in backyard)
- Other

If 'other' please specify

SELLING RECYCLABLE WASTE

1

What type of waste do you sell? (repeat for each waste type)

eg. paper & cardboard/glass/plastic/metal/other

What are the names and locations of your buyers?

eg. Besi Tua (Dili); Caltech (Singapore), etc

How much do they pay per kilogram? (provide a range in USD)

USD

How many kilograms (average) do you sell per month?

Thinking about a very low performing month, how many kilograms might you sell in that month (monthly minimum)?

Thinking about a very high performing month, how many kilograms might you sell in that month (monthly maximum)?

Are you aware of any competitors to your business (selling similar products)?

Yes

No

BUSINESS COMPETITORS

1

Competitor (business/group) name

eg. Besi Tua (Dili); Caltech (Singapore), etc

Competitor (business/group) location

What types of recyclable products or material do they sell?

BUSINESS CHALLENGES

What are the major challenges in your business?

- Need For Separation of Waste at Source
- Unstable Price When Selling
- Too Many Competitors When Selling
- Unstable Supply of Recyclable Waste
- Too Many Businesses Buying Recyclable Waste
- Other

If 'other' please specify

Please explain in more detail (if necessary)

PHOTOS OF PROCESS

Take photo of treatment process

[Click here to upload file. \(< 5MB\)](#)

Recycling (Recyclable Waste Dealers)

Peskiza ida ne'e implementa hodi identifika situasaun resiklajen lixu iha Munisipiu Dili. Atu kria planu ne'e, presiza informasaun husi grupu ka ema ne'ebe halo resiklajen hodi kompriende kona-ba situasaun resiklajen real iha rejiaun ne'e. Ita-boot nia resposta sira sei utiliza de'it ba ida-ne'e. Favór ida hatan pergunta sira-ne'e ho loloos. Obrigadu barak ba ita-nia kooperasaun.

Hau fo hau nia konsentimentu hodi partisipa iha entrevista ida ne'e

Sim

Lae

Naran respondente

Pozisaun husi respondente

Naran kompanhia

Total trabalhador (numeru)

Montante media/pelumenus husi resiklajen fa'an kada fulan hira? (USD)

Fatin kompanhia

Numeru telefone kompanhia

SOSA/HETAN SURAT TAHAN KA KAIXA

Ita-boot sira sosa ka hetan surat-tahan ka kaixa?

Sim

Lae

Se mak faan ka fo surat-tahan ka kaixa ba ita-boot sira?

Kompanhia resiklajen seluk

Grupu komunidadade sira

Ema ne'ebe hili lixu

Seluk

Se 'seluk' favor espesifika

Se 'grupu komunidadade' favor fo grupu ida-idak nia naran no servisu fatin (ex. Hadomi Ambiente, Dili)

Se 'kompanhia' favor fo kompanhia ida-idak nia naran no servisu fatin (ex. Besi Tua (Dili); RELOKA (Dili))

Tipu surat-tahan ka kaixa saida mak ita boot sira sosa?

- Kaixa
- Surat tahan mutin
- Seluk

Se 'seluk' favor espesifika

Ita-boot sira selu hira ba kada kilograma? (Eskalaun ka presu bainbain ex. \$1-\$3 kada kilograma)

USD

Kada fulan, ita-boot sira sosa kilograma husi surat-tahan ka kaixa hira (fulan normal)?

Dalaruma volume lixu surat-tahan ka kaixa karik menus liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (minimu)

Dalaruma volume lixu surat-tahan ka kaixa karik barak liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (maximu)

To'o bainhira mak ita rai lixu surat-tahan ka kaixa sira ne'e molok/antes fa'an?

fulan, ka semana, ka lora

Ita-boot sira trata/organiza surat tahan ka kaixa ne'ebe bele halo resiklajen?

- Sim
- Lae

Oinsa ita-boot sira trata/organiza resiklajen ba surat tahan ka kaixa?

- Fase
- Halo separasaun
- Pres/hanehan/aperta
- Halo nabem
- Cetak
- Harahun
- Halo malirin
- Seluk

Se 'seluk' favor espesifika

SOSA/HETAN PLASTIKU

Ita-boot sira sosa ka hetan plastiku?

- Sim
- Lae

Se mak faan ka fo plastiku ba ita-boot sira?

- Kompanhia resiklajen seluk
- Grupu komunidadade sira
- Ema ne'ebe hili lixu
- Seluk

Se 'seluk' favor espesifika

Se 'grupu komunidadade' favor fo grupu ida-idak nia naran no servisu fatin (ex. Hadomi Ambiente, Dili)

Se 'kompanhia' favor fo kompanhia ida-idak nia naran no servisu fatin (ex. Besi Tua (Dili); RELOKA (Dili))

Tipu plastiku saida mak ita boot sira sosa?

- Plastiku (agua)
- Plastiku PVC
- Seluk

Se 'seluk' favor espesifika

Ita-boot sira selu hira ba kada kilograma? (Fo eskalaun ka presu bainbain ex. \$1 - \$3 kada kilograma)

USD

Kada fulan, ita-boot sira sosa kilograma husi plastiku hira (fulan normal)?

Dalaruma volume lixu plastiku karik menus liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (minimu)

Dalaruma volume lixu plastiku karik barak liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (maximu)

To'o bainhira mak ita rai lixu plastiku sira ne'e molok/antes fa'an?

Fulan, ka semana, ka loron

Ita-boot sira trata/organiza plastiku ne'ebe bele halo resiklajen?

Sim

Lae

Oinsa ita-boot sira trata/organiza resiklajen ba plastiku?

Fase

Halo separasaun

Pres/hanehan/aperta

Halo naben

Cetak

Harahun

Halo malirin

Seluk

Se 'seluk' favor espesifika

SOSA/HETAN BOTIR VIDRU

Ita-boot sira sosa ka hetan botir vidru?

Sim

Lae

Se mak faan ka fo botir vidru ba ita-boot sira?

- Kompanhia resiklajen seluk
- Grupu komunidadade sira
- Ema ne'ebe hili lixu
- Seluk

Se 'seluk' favor espesifika

Se 'grupu komunidadade' favor fo grupu ida-idak nia naran no servisu fatin (ex. Hadomi Ambiente, Dili)

Se 'kompanhia' favor fo kompanhia ida-idak nia naran no servisu fatin (ex. Besi Tua (Dili); RELOKA (Dili))

Tipu botir vidru saida mak ita boot sira sosa?

- Botir vidru transparente
- Botir vidru ho kor
- Seluk

Se 'seluk' favor espesifika

Ita-boot sira selu hira ba kada kilograma? (Fo eskalaun ka presu bainbain ex. \$1 - \$3 kada kilograma)

Kada fulan, ita-boot sira sosa kilograma husi botir vidru hira (fulan normal)?

Dalaruma volume lixu botir vidru karik menus liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (minimu)

Dalaruma volume lixu botir vidru karik barak liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (maximu)

To'o bainhira mak ita rai botir vidru sira ne'e molok/antes fa'an?

Fulan, ka semana, ka loron

Ita-boot sira trata/organiza botir vidru ne'ebe bele halo resiklajen?

- Sim
- Lae

Oinsa ita-boot sira trata/organiza resiklajen ba botir vidru?

- Fase
- Halo separasaun
- Pres/hanehan/aperta
- Halo nabem
- Cetak
- Harahun
- Halo malirin
- Seluk

Se 'seluk' favor espesifika

-

Ita-boot sira sosa ka hetan besi metal ka aluminium?

- Sim
- Lae

Se mak faan ka fo besi metal ka aluminium ba ita-boot sira?

- Kompanhia resiklajen seluk
- Grupu komidade sira
- Ema ne'ebe hili lixu
- Seluk

Se 'seluk' favor espesifika

Se 'grupu komidade' favor fo grupu ida-idak nia naran no servisu fatin (ex. Hadomi Ambiente, Dili)

Se 'kompanhia' favor fo kompanhia ida-idak nia naran no servisu fatin (ex. Besi Tua (Dili); RELOKA (Dili))

Tipu besi metal/aluminium saida mak ita boot sira sosa?

- Besi aluminium
- Besi metal/besi seluk
- Seluk

Se 'seluk' favor espesifika

Ita-boot sira selu hira ba kada kilograma? (Fo eskalaun ka presu bainbain ex. \$1 - \$3 kada kilograma)

USD

Kada fulan, ita-boot sira sosa kilograma husi besi metal ka aluminium hira (fulan normal)?

Dalaruma volume lixu besi metal ka aluminium karik menus liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (minimu)

Dalaruma volume lixu besi metal ka aluminium karik barak liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (maximu)

To'o bainhira mak ita rai lixu besi metal ka aluminium sira ne'e molok/antes fa'an?

Fulan, ka semana, ka loron

Ita-boot sira trata/organiza besi metal ka aluminium ne'ebe bele halo resiklajen?

Sim

Lae

Oinsa ita-boot sira trata/organiza resiklajen ba besi metal ka aluminium?

Fase

Halo separasaun

Pres/hanehan/aperta

Halo nabem

Cetak

Harahun

Halo malirin

Seluk

Se 'seluk' favor espesifika

SOSA/REKOLLA BESI ALUMINIUM

Ita-boot sira sosa ka rekolla aluminium?

Sim

Lae

Se mak faan ka fo aluminium ba ita-boot sira?

- Kompanhia resiklajen seluk
- Grupu komunidadade sira
- Ema ne'ebe hili lixu
- Seluk

Se 'seluk' favor espesifika

Se 'grupu komunidadade' favor fo grupu ida-idak nia naran no servisu fatin (ex. Hadomi Ambiente, Dili)

Se 'kompanhia' favor fo kompanhia ida-idak nia naran no servisu fatin (ex. Besi Tua (Dili); RELOKA (Dili))

Tipu besi aluminium saida mak ita boot sira sosa?

- Besi aluminium
- Besi metal/besi seluk
- Seluk

Se 'seluk' favor espesifika

Ita-boot sira selu hira ba kada kilograma? (Fo eskalaun ka presu bainbain ex. \$1 - \$3 kada kilograma)

USD

Kada fulan, ita-boot sira sosa kilograma husi besi aluminium hira (fulan normal)?

Dalaruma volume lixu besi aluminium karik menus liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (minimu)

Dalaruma volume lixu besi aluminium karik barak liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (maximu)

To'o bainhira mak ita rai lixu besi aluminium sira ne'e molok/antes fa'an?

Fulan, ka semana, ka loron

Ita-boot sira trata/organiza besi aluminium ne'ebe bele halo resiklajen?

- Sim
- Lae

Oinsa ita-boot sira trata/organiza resiklajen ba besi aluminium?

- Fase
- Halo separasaun
- Pres/hanehan/aperta
- Halo nabem
- Cetak
- Harahun
- Halo malirin
- Seluk

Se 'seluk' favor espesifika

SOSA/HETAN LIXU SELUK

1

Ita-boot sira sosa ka hetan lixu seluk?

- Sim
- Lae

Tipu lixu resiklajen seluk saida mak ita boot sira sosa?

Se mak faan ka fo lixu seluk ne'e ba ita-boot sira?

- Kompanhia resiklajen seluk
- Grupu komunidadade sira
- Ema ne'ebe hili lixu
- Seluk

Se 'seluk' favor espesifika

Se 'grupu komunidadade' favor fo grupu ida-idak nia naran no servisu fatin (ex. Hadomi Ambiente, Dili)

Se 'kompanhia' favor fo kompanhia ida-idak nia naran no servisu fatin (ex. Besi Tua (Dili); RELOKA (Dili))

Ita-boot sira selu hira ba kada kilograma? (Fo eskalaun ka presu bainbain ex. \$1 - \$3 kada kilograma)

USD

Kada fulan, ita-boot sira sosa kilograma husi lixu seluk ne'e hira (fulan normal)?

Dalaruma volume lixu seluk ne'e karik menus liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (minimu)

Dalaruma volume lixu seluk ne'e karik barak liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira sosa? (maximu)

To'o bainhira mak ita rai lixu seluk sira ne'e molok/antes fa'an?

Fulan, ka semana, ka loron

Ita-boot sira trata/organiza lixu seluk ne'e hodi halo resiklajen?

Sim

Lae

Oinsa ita-boot sira trata/organiza resiklajen ba lixu seluk ne'e?

Fase

Halo separasaun

Pres/hanehan/aperta

Halo nabem

Cetak

Harahun

Halo malirin

Seluk

* Se 'seluk' favor espesifika

Ita hatene se iha kompetitor ne'ebe sosa lixu resiklajen ne'ebe hanesan?

Sim

Lae

KOMPETITOR SIRA NE'EBE SOSA TIPU LIXU HANESAN

1

Naran kompetitor negosiu/grupu (ne'ebe sosa tipu lixu hanesan)

Fatin kompetitor negosiu/grupu (ne'ebe sosa tipu lixu hanesan)

Tipu material resiklajen ne'ebe kompetitor sira sosa

- Surat tahan ka kaixa
- Botir vidru
- Plastiku
- Besi metal/besi seluk
- Seluk

TIPU NEGOSIU RESIKLAJEN

Tipu produ tu resiklajen saida mak ita-boot sira fa'an?

- Lixu resiklajen
- Produ tu final husi lixu resiklajen (ex. sanelus husi roda; arte husi PVC)

FAAN PRODUTU HUSI LIXU RESIKLAJEN

Favor mesiona/fo hatene produ tu husi lix resiklajen oioin ne'ebe ita boot sira fa'an (ex. sanelus husi roda; arte husi plastiku PVC)

Mais ou menos ita-boot sira nia rendimentu husi produ tu resiklajen kada fulan hira (fulan normal)?

USD

Dala ruma iha fulan balun rendimentu ladun diak. Mais ou menos ita-boot sira nia rendimentu husi produ tu resiklajen kada fulan ne'ebe ladun diak hira? (minimu)

USD

Dala ruma iha fulan balun rendimentu diak los. Mais ou menos ita-boot sira nia rendimentu husi produ tu resiklajen kada fulan ne'ebe diak los hira? (maximu)

USD

Mais ou menus persentajen (%) hira husi lixu ka materias mak ita-boot sira uza hodi halo produ tu final?

Ita boot sira jere materias ne'ebe LA uza hodi kria produ tu final oinsa?

- Fo ba kompanhia ka grupu resiklajen
- Tau iha fatin lixu publiku
- Lori ba Tibar
- Jere ami nia lixu rasik (ex. sunu ka soe iha uma kutuk)
- Seluk

FAAN LIXU RESIKLAJEN

1

Tipu lixu saida mak ita-boot sira fa'an? (Repete ba kada tipu lixu)

Naran no fatin husi negosiu/grupu ne'ebé sosa husi ita-boot sira?

Ita-boot sira fa'an \$ hira ba kada kilograma? (Fo eskalaun ka presu bainbain ex. \$1 - \$3 kada kilograma)

USD

Kada fulan, ita-boot sira fa'an kilograma hira? (fulan normal)

Dalaruma volume lixu resiklajen ne'e karik menus liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira fa'an? (minimu)

Dalaruma volume lixu resiklajen ne'e karik barak liu iha fulan balun. Iha sa fulan no mais ou menus kilograma hira mak ita-boot sira fa'an? (maximu)

Ita hatene se iha kompetitor ba iha ita nia negosiu (ne'ebe fa'an produktu ka material hanesan)?

Sim

Lae

KOMPETITOR NE'EBE FA'AN PRODUTU KA MATERIAL HANESAN

1

Kompetitor (negosiu/grupu) nia naran (ne'ebe fa'an produktu ka material hanesan)

Kompetitor (negosiu/grupu) nia fatin (ne'ebe fa'an produktu ka material hanesan)

Tipu produktu resiklajen ka material saida mak ita-nia kompetitor sira fa'an?

DEZAFIUS/DIFIKULDADE NEGOSIU

Dezafiu boot saida mak ita hasoru iha ita-nia negosiu?

- Presiza halo separasaun husi fonte lixu sira
- Presu ne'ebe la estavel wainhira fa'an
- Kompetitor barak liu wainhira fa'an
- Fornesimentu ne'ebe la estavel ba lixu resiklajen
- Kompanhia barak liu mak sosa sasan sira ne'ebe hau presiza hodi halo resiklajen
- Seluk

Se 'seluk' favor espesifika

Favor esplika ho detallu (se aplikavel)

FOTOGRAFIA SIRA HUSI PROESU TRATAMENTU/ORGANIZA

1

Hasai fotografia husi prosesu tratamentu/organiza lixu seluk

Click here to upload file. (< 5MB)

_index	Company name	Number of employees	Average recycling sales amount per month (USD)	Business address	Do you buy/procure Paper or Cardboard?	Who sells or gives you the paper or cardboard?	Who sells or gives you the paper or cardboard?/Other recyclable waste dealer (company)	Who sells or gives you the paper or cardboard?/Community groups	Who sells or gives you the paper or cardboard?/Waste pickers	Who sells or gives you the paper or cardboard?/Other	If 'other', please specify
1	Scrap HPC	12	32000	Bebonuk	No						
2	ALCONCIS	12	17000	Tasi Tolu	No						
3	Gersa Bele Bele	4	10000	Tibar	No						
4	Bintang Fajar	12	0	TIBAR	No						
5	Caltech	34		Lecidere and Comoro	Yes	Other Waste pickers	0	0	1	1	Companies participating in Caltech's waste collection service, including Portuguese school (milk cartons),Cafe Lut, Mini Mart,and others
6	Besi Tua	8	20000	Farol	No						

_index	If 'community group' please give names and locations of each group	If 'company' please give names and locations of each company	What type of Paper or Cardboard do you buy?	What type of Paper or Cardboard do you buy? /Cardboard	What type of Paper or Cardboard do you buy? /White paper	What type of Paper or Cardboard do you buy? /Other	If 'other', please specify	How much do you pay per kilogram? (provide price range eg. \$1 – \$3 per kilogram)	How many kilograms (average) of Paper or Cardboard do you buy per month?	In months when there is limited volume of waste, how many kilograms of Paper or Cardboard might you buy in that month (monthly minimum)?	In months when there is a high volume of waste, how many kilograms of Paper or cardboard might you buy in that month (monthly maximum)?
1											
2											
3											
4											
5			Cardboard White paper Other	1	1	1	1 Wet paper and cardboard	USD0	255kg in June 2024	Fairly consistent	Fairly consistent
6											

_index	On average, how long do you store the Paper or Cardboard before selling it?	Do you treat the Recyclable Paper or Cardboard?	How do you treat the Recyclable Paper or Cardboard?	How do you treat the Recyclable Paper or Cardboard?/Washing	How do you treat the Recyclable Paper or Cardboard?/Separating	How do you treat the Recyclable Paper or Cardboard?/Crushing	How do you treat the Recyclable Paper or Cardboard?/Melting	How do you treat the Recyclable Paper or Cardboard?/Molding	How do you treat the Recyclable Paper or Cardboard?/Flaking	How do you treat the Recyclable Paper or Cardboard?/Cooling	How do you treat the Recyclable Paper or Cardboard?/Other
1											
2											
3	0										
4											
5		Yes	Separating Melting Flaking Cooling Other	0	1	0	1	1	1	1	1
6											

_index	If 'other' please specify	Do you buy/procure plastic?	Who sells or gives you the plastic?	Who sells or gives you the plastic?/Other recyclable waste dealer (company)	Who sells or gives you the plastic?/Community groups	Who sells or gives you the plastic?/Waste pickers	Who sells or gives you the plastic?/Other	If 'other' please specify	If 'community group' please give names and locations of each group	If 'company' please give names and locations of each company	What type of plastic do you buy?
1		No									
2		No									
3		Yes	Waste pickers	0	0	1	0				Plastic bottles
4		No									
5	Together with plastic and glass for boards and pavers	Yes	Community groups Waste pickers Other	0	1	1	1	Companies participating in Caltech waste collection service	Hadomi Ambiente and Reloka		Plastic bottles PVC
6		No									

_index	What type of plastic do you buy?/Plastic bottles	What type of plastic do you buy?/PVC	What type of plastic do you buy?/Other	If 'other' please specify	How much do you pay per kilogram? (provide price range eg. \$1 – \$3 per kilogram)	How many kilograms (average) of Plastic do you buy per month?	In months when there is limited volume of waste, how many kilograms of Plastic might you buy in that month (monthly minimum)?	In months when there is a high volume of waste, how many kilograms of Plastic might you buy in that month (monthly maximum)?	On average, how long do you store the Plastic before selling it?	Do you treat the Recyclable Plastic?	How do you treat the Recyclable Plastic?
1											
2											
3	1	0	0		USD 0.02 cent	1 Ton	700 Kilo	1 Ton	Semana 1	No	
4											
5	1	1	0		USD0	25.5 tonnes in June 2024	Unsure	Unsure	1 day	Yes	Separating Melting Molding Flaking Cooling
6											

_index	How do you treat the Recyclable Plastic?:/Washing	How do you treat the Recyclable Plastic?:/Separating	How do you treat the Recyclable Plastic?:/Crushing	How do you treat the Recyclable Plastic?:/Melting	How do you treat the Recyclable Plastic?:/Molding	How do you treat the Recyclable Plastic?:/Flaking	How do you treat the Recyclable Plastic?:/Cooling	How do you treat the Recyclable Plastic?:/Other	If other' please specify	Do you buy/procure glass?	Who sells or gives you the glass?
1										No	
2										No	
3										No	
4										No	
5	0	1	0	1	1	1	1	0		Yes	Waste pickers Other
6										No	

_index	Who sells or gives you the glass?/Other recyclable waste dealer (company)	Who sells or gives you the glass?/Community groups	Who sells or gives you the glass?/Waste pickers	Who sells or gives you the glass?/Other	If 'other' please specify	If 'community group' please give names and locations of each group	If 'company' please give names and locations of each company	What type of glass do you buy?	What type of glass do you buy?/Transparent glass bottle	What type of glass do you buy?/Coloured glass bottle	What type of glass do you buy?/Other
1											
2											
3											
4											
5	0	0	1	1	1 Companies participating in caltech waste collection			Transparent glass bottle Coloured glass bottle	1	1	0
6											

_index	If 'other', please specify	How much do you pay per kilogram? (provide price range eg. \$1 – \$3 per kilogram)	How many kilograms (average) of Glass do you buy per month?	In months when there is limited volume of waste, how many kilograms of Glass might you buy in that month (monthly minimum)?	In months when there is a high volume of waste, how many kilograms of Glass might you buy in that month (monthly maximum)?	On average, how long do you store the Glass before selling it?	Do you treat the Recyclable Glass?	How do you treat the Recyclable Glass?	How do you treat the Recyclable Glass?/Washing	How do you treat the Recyclable Glass?/Separating	How do you treat the Recyclable Glass?/Crushing
1											
2											
3											
4											
5		0	9.5 tonnes in July	Unsure	Unsure	1 day	Yes	Separating Melting Molding Flaking Cooling	0	1	0
6											

_index	How do you treat the Recyclable Glass?/Melting	How do you treat the Recyclable Glass?/Molding	How do you treat the Recyclable Glass?/Flaking	How do you treat the Recyclable Glass?/Cooling	How do you treat the Recyclable Glass?/Other	If 'other' please specify	Do you buy/procure metal?	Who sells or gives you the metal?	Who sells or gives you the metal?/Other recyclable waste dealer (company)	Who sells or gives you the metal?/Community groups	Who sells or gives you the metal?/Waste pickers
1							Yes	Waste pickers Other	1	0	1
2							Yes	Waste pickers Other	0	0	1
3							Yes	Waste pickers	0	0	1
4							Yes	Other	0	0	0
5	1	1	1	1	0		Yes	Waste pickers Other	0	0	1
6							Yes	Waste pickers Other	0	0	1

_index	Who sells or gives you the metal?/Other	If 'other' please specify	If 'community group' please give names and locations of each group	If 'company' please give names and locations of each company	What type of metal do you buy?	What type of metal do you buy?/Aluminium	What type of metal do you buy?/Steel	What type of metal do you buy?/Other	If 'other' please specify	How much do you pay per kilogram? (provide price range eg. \$1 – \$3 per kilogram)	How many kilograms (average) of Metal do you buy per month?
1	1	Husi Munisipiu		Kompanhia Tibar	Steel	0	1	0		USD 0.05	80 ton
2	1	Husi Munisipiu			Steel	0	1	0		USD 00.3 to 0.05	Konteiner 5 kada konteiner 20 ton
3	0				Steel	0	1	0		USD0 .0.10	25 ton kada fulan 2 (foin mak komesa la'o faili)
4	1	Kareta At no Fatin Konstrusaun iha			Steel	0	1	0		USD 0.05 to 0.10	2000 T on
5	1	Caltech waste collection			Steel	0	1	0		USD0	??
6	1	Community selling eg. Broken down cars			Steel	0	1	0		USD0.03 to 0.04 per kg	1.5 ton

_index	In months when there is limited volume of waste, how many kilograms of Metal might you buy in that month (monthly minimum)?	In months when there is a high volume of waste, how many kilograms of Metal might you buy in that month (monthly maximum)?	On average, how long do you store the Metal before selling it?	Do you treat the Recyclable Metal?	How do you treat the Recyclable Metal?	How do you treat the Recyclable Metal?/Washing	How do you treat the Recyclable Metal?/Separating	How do you treat the Recyclable Metal?/Crushing	How do you treat the Recyclable Metal?/Melting	How do you treat the Recyclable Metal?/Molding	How do you treat the Recyclable Metal?/Flaking
1	50 ton	80 ton	Fulan 1	Yes	Crushing	0	0	1	0	0	0
2	Konteiner 2	Konteiner 5	Fulan 1	Yes	Crushing	0	0	1	0	0	0
3	25 Ton kada fulan 2	25 Ton kada fulan 2	Fulan 2	Yes	Crushing	0	0	1	0	0	0
4	0	2000 Ton	Rai durante tinan 12 resin	No							
5	?	?	1skip bin 1 month	No							
6	1 ton	2 ton	Up to one month	No							

_index	How do you treat the Recyclable Metal?//Cooling	How do you treat the Recyclable Metal?//Other	If 'other' please specify	Do you buy/procure aluminium?	Who sells or gives you the aluminium?	Who sells or gives you the aluminium?//Other recyclable waste dealer (company)	Who sells or gives you the aluminium?//Community groups	Who sells or gives you the aluminium?//Waste pickers	Who sells or gives you the aluminium?//Other	If 'other' please specify	If 'community group' please give names and locations of each group
1	0	0		Yes	Waste pickers Other recyclable waste	1	0	1	1	Husi Munisipiu	
2	0	0		Yes	Waste pickers Other	0	0	1	1	Husi Munisipiu	
3	0	0		Yes	Waste pickers	0	0	1	0		
4				Yes	Other	0	0	0	1	Munispiu Sira	
5				Yes	Waste pickers Other	0	0	1	1	Caltech waste service	
6				Yes	Waste pickers Other	0	0	1	1	Ordinary community members	

_index	If 'company' please give names and locations of each company	What type of aluminium do you buy?	What type of aluminium do you buy?/Aluminium	What type of aluminium do you buy?/Steel	What type of aluminium do you buy?/Other	If 'other' please specify	How much do you pay per kilogram? (provide price range eg. \$1 – \$3 per kilogram)	How many kilograms (average) of Aluminium do you buy per month?	In months when there is limited volume of waste, how many kilograms of Aluminium might you buy in that month (monthly minimum)?	In months when there is a high volume of waste, how many kilograms of Aluminium might you buy in that month (monthly maximum)?	On average, how long do you store the Aluminium before selling it?
1	Besi Tua Palapaso	Aluminium	1	0	0	0	USD 0.75	4 ton	3 Ton	4 Ton	Fulan 1
2		Aluminium	1	0	0	0	USD 0.25 to 0.50	Konteiner 2	0	Konteiner 2	Fulan 1
3		Aluminium	1	0	0	0	USD0.75	500kg	500kg	500kg	Fulan 2
4		Aluminium	1	0	0	0	USD 0.70 to 0.80	2500 ton	0	2500 ton	Rai deit tinan 12 resin
5		Aluminium	1	0	0	0	USD0	2 skip bins per year	Unsure	Unsure	Up to 6 months (when skip is full)
6		Aluminium	1	0	0	0	USD0.80 per kg	8 ton	6 ton	10 ton	Up to one month

_index	Do you treat the Recyclable Aluminium?	How do you treat the Recyclable Aluminium?	How do you treat the Recyclable Aluminium?/Washing	How do you treat the Recyclable Aluminium?/Separating	How do you treat the Recyclable Aluminium?/Crushing	How do you treat the Recyclable Aluminium?/Melting	How do you treat the Recyclable Aluminium?/Flaking	How do you treat the Recyclable Aluminium?/Cooling	How do you treat the Recyclable Aluminium?/Other	If 'other' please specify
1	Yes	Crushing	0	0	1	0	0	0	0	
2	Yes	Crushing	0	0	1	0	0	0	0	
3	Yes	Crushing	0	0	1	0	0	0	0	
4	No									
5	Yes	Crushing	0	0	1	0	0	0	0	
6	Yes	Crushing	0	0	1	0	0	0	0	

_index	Do you buy/procure other types of waste?	What other type of waste do you buy (repeat for each type of 'other waste')	Who sells or gives you this waste?	Who sells or gives you this waste?/Other recyclable waste dealer (company)	Who sells or gives you this waste?/Community groups	Who sells or gives you this waste?/Waste pickers	Who sells or gives you this waste?/Other	If 'other' please specify	If 'community group' please give names and locations of each group	If 'company' please give names and locations of each company	How much do you pay per kilogram? (provide price range eg. \$1 – \$3 per kilogram)
1	Yes	Bataria Kareta No Motor	Other	0	0	0	1	Husi Bengkel			USD 0.50
2	No										
3	No										
4	No										
5	Yes	Electronic waste	Other recyclable waste dealer (company)	1	0	0	0			Blue Orca (New Zealand),partners with Samsung for \$3 per kg	USD0
6	Yes	Batteries	Waste pickers Other	0	0	1	1	Community members selling old items			USD0.40 per kg

_index	How many kilograms (average) of this waste do you buy per month?	In months when there is limited volume of waste, how many kilograms of this type of waste might you buy in that month (monthly minimum)?	In months when there is a high volume of waste, how many kilograms of this type of waste might you buy in that month (monthly maximum)?	On average, how long do you store the waste before selling it?	Do you treat this other type of waste?	Do you buy/procure other types of waste?	What other type of waste do you buy (repeat for each type of 'other waste')	Who sells or gives you this waste?	Who sells or gives you this recyclable waste? (company dealer)	Who sells or gives you this waste? (Community groups)	Who sells or gives you this waste? (Waste pickers)
1	bataria 25. rai hamutuk iha konteiner ho besi.	bataria 20. rai hamutuk iha konteiner ho besi.	bataria 25. rai hamutuk iha konteiner ho besi.	Fulan 1	No	Yes	Bataria Kareta No Motor	Other	0	0	0
2						No					
3						No					
4						No					
5	Not yet sent	Unsure	Unsure	Unsure	No	Yes	Electronic waste	Other recyclable waste dealer (company)	1	0	0
6	10 ton	6 ton	12 ton	Up to one month	No	Yes	Batteries	Waste pickers Other	0	0	1

_index	Who sells or gives you this waste?/Other	If 'other' please specify	If 'community group' please give names and locations of each group	If 'company' please give names and locations of each company	How much do you pay per kilogram? (provide price range eg. \$1 – \$3 per kilogram)	How many kilograms (average) of this waste do you buy per month?	In months when there is limited volume of waste, how many kilograms of this type of waste might you buy in that month (monthly minimum)?	In months when there is a high volume of waste, how many kilograms of this type of waste might you buy in that month (monthly maximum)?	On average, how long do you store the waste before selling it?	Do you treat this other type of waste?	Are you aware of any competitors also buying the same type of recyclable waste?
1		1 Husi Bengkel			USD 0.50	bataria 25, rai hamutuk iha konteiner ho besi	bataria 20, rai hamutuk iha konteiner ho besi	bataria 25, rai hamutuk iha konteiner ho besi	Fulan 1	No	Yes
2											Yes
3											No
4											No
5		0		Blue Orca (New Zealand);partners with Samsung for \$3 per Kg	USD0	Not yet sent	Unsure	Unsure	Unsure	No	No
6		1 Community members selling old items			USD0.40 per kg	10 ton	6 ton	12 ton	Up to one month	No	Yes

_index	What type of recyclable products do you sell?	What type of recyclable products do you sell?/Recyclable waste	What type of recyclable products do you sell?/Final products from recyclable waste (eg. sandals from tyres; art from PVC)	Please list the different products that you sell (eg. sandals from tyres; artworks from PVC plastic)	What is your average monthly sales amount?	What is your monthly sales amount for a low income month?	What is your monthly sales amount for a high income month?	Approximately what percentage of the material do you use for the final product?	How do you dispose of the material that you DON'T use to create the final product?/Give to recycling company or group	How do you dispose of the material that you DON'T use to create the final product?/Put in public waste collection point
1	Recyclable waste	1	0							
2	Recyclable waste	1	0							
3	Recyclable waste	1	0							
4	Recyclable waste	1	0							
5	Recyclable waste from recyclable waste (eg. sandals from tyres; art from PVC)	1	1	Boards and pavers	USD?	USD?	USD?	100%		
6	Recyclable waste	1	0							

_index	How do you dispose of the material that you DON'T use to create the final product?/Take to Tibar landfill	How do you dispose of the material that you DON'T use to create the final product?/Manage our waste ourselves (eg. burning or burying in backyard)	How do you dispose of the material that you DON'T use to create the final product?/Other	If 'other' please specify	Are you aware of any competitors to your business (selling similar products)?	What are the major challenges in your business?	What are the major challenges in your business?/Need For Separation of Waste at Source	What are the major challenges in your business?/Unstable Price When Selling	What are the major challenges in your business?/Too Many Competitors When Selling	What are the major challenges in your business?/Unstable Supply of Recyclable Waste	What are the major challenges in your business?/Too Many Businesses Buying Recyclable Waste
1					No	Unstable Price When Selling Too Many Businesses	0	1	0	0	1
2					Yes	Unstable Price When Selling Unstable Supply	0	1	0	1	0
3					No	Unstable Supply of Recyclable Waste Unstable	0	1	0	1	0
4					No	Need For Separation of Waste at Source	1	0	0	0	0
5					Yes	Unstable Supply of Recyclable Waste Other	0	0	0	1	0
6					No	Unstable Price When Selling Unstable Supply	0	1	0	1	0

_index	What are the major challenges in your business?/Other	If 'other' please specify	Please explain in more detail (if necessary)	How much do you pay per kilogram of Paper or Cardboard? (provide a range in USD)	Thinking about a very low performing month, how many kilograms of Paper or Cardboard might you buy in that month (monthly minimum)?	Thinking about a very high performing month, how many kilograms of Paper or Cardboard might you buy in that month (monthly maximum)?	How much do you pay per kilogram of Glass? (provide a range in USD)	Take a photo of the treatment process	Take a photo of the treatment process_URL	Thinking about a very low performing month, how many kilograms of Plastic might you buy in that month (monthly minimum)?	How much do you pay per kilogram of Plastic? (provide a range in USD)
1	0										
2	1	Fatin atu Rai Lixu...									
3	1	Modal La sufsiente									
4	0										
5	1	High operating costs. High electricity costs as EDTL is unreliable and must use a generator. Business in Timor is high risk. New but less durable products slightly cheaper ^{cheaper} need ^{need}									
6	1	Price when selling is very low									

_index	Thinking about a very high performing month, how many kilograms of Plastic might you buy in that month (monthly maximum)?	Take photo of treatment process	Take photo of treatment process_URL	How much do you pay per kilogram of Metal? (provide a range in USD)	Thinking about a very low performing month, how many kilograms of Glass might you buy in that month (monthly minimum)?	Thinking about a very high performing month, how many kilograms of Glass might you buy in that month (monthly maximum)?	Name of Competitor (Other Businesses Selling Waste to your Client)	Take photo of treatment process	Take photo of treatment process_URL	Where are Competitors Selling to? (Location of your Client)	Types of Recyclable Material That Competitors Sell to your Client
1											
2											
3											
4											
5											
6											

_index	Types of Recyclable Material That Competitors Sell to your Client/Paper or Cardboard	Types of Recyclable Material That Competitors Sell to your Client/Glass	Types of Recyclable Material That Competitors Sell to your Client/Plastic	Types of Recyclable Material That Competitors Sell to your Client/Metal	Types of Recyclable Material That Competitors Sell to your Client/Other	Please explain	Please explain	Please explain	Please explain	Please explain	Thinking about a very low performing month, how many kilograms of Metal might you buy in that month (monthly minimum)?
1											
2											
3											
4											
5											
6											

_index	Thinking about a very high performing month, how many kilograms of Metal might you buy in that month (monthly maximum)?	Please list the different products that you sell	Take photo of treatment process	Take photo of treatment process_URL	What are the names and locations of your competitors also buying the same type of recyclable waste?	Types of Recyclable Material That Competitors Are Buying	Types of Recyclable Material That Competitors Are Buying/Paper or Cardboard	Types of Recyclable Material That Competitors Are Buying/Glass	Types of Recyclable Material That Competitors Are Buying/Plastic	Types of Recyclable Material That Competitors Are Buying/Metal	Types of Recyclable Material That Competitors Are Buying/Other
1											
2											
3											
4											
5											
6											

_index	If 'other' please specify	Please provide the names and locations of your competitors	What types of recyclable products or material do your competitors sell?	_submission_time
1				2024-07-09
2				2024-07-10
3				2024-07-10
4				2024-07-10
5				2024-07-18
6				2024-07-18

_parent.index	Name of competitor business/group	Location of competitor business/group	Types of recyclable waste that they buy or procure	Types of recyclable waste that they buy or procure/Paper or Cardboard	Types of recyclable waste that they buy or procure/Glass	Types of recyclable waste that they buy or procure/Plastic	Types of recyclable waste that they buy or procure/Metal	Types of recyclable waste that they buy or procure/Other	_submission_sub mission_time
1	Besi Tua Palapaso	Palapaso	Metal	0	0	0	1	0	2024-07-09
1	Tibar	Tibar	Metal	0	0	0	1	0	2024-07-09
2	Besi Tua palapaso no HPC Srap Metal	Palapaso no Bebonuk	Metal	0	0	0	1	0	2024-07-10
6	Company in Tibar, HPC in Dili	Dili	Metal	0	0	0	1	0	2024-07-18

_parent_index	What type of waste do you sell? (repeat for each waste type)	What are the names and locations of your buyers?	How much do they pay per kilogram? (provide a range in USD)	How many kilograms (average) do you sell per month?	Thinking about a very low performing month, how many kilograms might you sell in that month (monthly minimum)?	Thinking about a very high performing month, how many kilograms might you sell in that month (monthly maximum)?	Thinking about a very low performing month, how many kilograms might you sell in that month (monthly minimum)?	Thinking about a very high performing month, how many kilograms do they buy from you per month?	Thinking about a very high performing month, how many kilograms might you sell in that month (monthly maximum)?	_submission_sub_mission_time
1	Besi	Singapura Chong Ci Ti Electrical Trading	USD kada Konteiner 4 hetan 25000	Konteiner 4 no kada konteiner ida hetan 17 ton	0	4 Konteiner				2024-07-09
1	Aluminium	Singapura	USD kontener 2 Folim 80000	Kontener 2	1 konteiner	2 konteiner				2024-07-09
1	Bataria	Singapura	0.5 ton 8000	bataria 25, bataria ida 8-10kg	bataria 20	bataria 25				2024-07-09
2	Besi	Malasya no Singapura	USD 0.08	Konteiner 7	Konteiner 3	Konteiner 7				2024-07-10
2	Aluminium	Malasya no Singapura	USD 0.60 to 0.70 cent	Konteiner 2	Konteiner 1	Konteiner 2				2024-07-10
3	Besi	Malasya dalaruma ba Singapura depende ba Folin kompanya lokal	USD 0.25	25 ton kada fulan 2	25 ton kada fulan 2	25 ton				2024-07-10
3	Aluminium		USD 0.7	500kg kada fulan 2	500 kada fulan 2	500				2024-07-10
3	Plastiku	CALTECH	USD 0.10	180 Kilo	0	180 Kilo				2024-07-10
4	Besi Metal no Aluminium Maibe Sedauk Fan tamba observa hela presu	Planu Fan ba Indonesia, Singapura no Malasya	USD sedauk Fan no Sedauk hatene presu nebe diak	Sedauk Fan	0	0				2024-07-10
5	Aluminium	Besi tua, Dili, HPC Scrap Metal, Dili, Miggy, Tasi Toli.	USD0.50	2 skip bins per year	Unsure	Unsure				2024-07-18
5	Other metal	Besi tua, Dili, HPC Scrap Metal, Dili, Miggy, Dili.	USD0.05 – \$0.07 per kg. New dealer Likamco paying up to 0.10	1 skip bin	Unsure	Unsure				2024-07-18
5	Electronic waste	Blue Orca New Zealand	USD3	Not yet begun						2024-07-18
6	Metal, aluminium and batteries together in one container	Surubaya, Indonesia	The boss does not share this info	6 containers (2 types: unpressed 10-15 containers per year; pressed 5 containers per month)	Never less than 2 containers	Never more than 10 containers				2024-07-18

_parent_index	Competitor (business/group) name	Competitor (business/group) location	What types of recyclable products or material do they sell?	_submission_sub mission_time
2	SCRAP METAL HPC	Bebonuk	Besi no Aluminium	2024-07-10
5	Those selling regular pavers or boards, using concrete or plywood, slightly less in price but also less durable	Dili	New products pavers and plywood	2024-07-18

Community Groups Recycling

Respondent name

Respondent position in group

Name of community group

Number of members in community group

Group address

Respondent phone number

TYPES OF RECYCLED WASTE/PRODUCTS

1

What type of waste does your group collect? (Repeat for each type of waste collected)

Approximately how many bags of this waste does your group collect each month?

Approximately how many kilograms are in each bag?

What type of recycled items does your group sell? (eg. plastic bottles; sandals)

Who do you sell to?

Where is the buyer located? (Municipality)

Dili Municipality

How much income does your group make each month?

- \$0 - \$50 per month
- \$51 - \$100 per month
- \$101 - \$500 per month
- \$501 - \$1000 per month
- More than \$1000 per month

PHOTOS OF RECYCLED ITEMS BEING SOLD

If you sell final products from recycled materials, take a photo of recycled items for sale

[Click here to upload file. \(< 5MB\)](#)

MOTIVATION

Why did you start this recycling group?

- Campaign by donor or NGO
- Asked by a recycling business to do this work
- Thinking about the environment
- Earn an income
- Other

If 'other' please specify

What is the name of the donor or NGO?

What is the name of the business?

What are the difficulties or challenges in doing waste segregation and recycling?

- The price is not good
- The amount of recyclable waste is not high enough
- It takes a long time to segregate recyclable waste
- Community members mix waste even if I ask them to segregate the recyclable waste
- People do not want to buy the recycled items
- Other

How long do you take to segregate waste per 1 bag of recyclable waste

How do you give instructions to community members on waste segregation (eg. verbal, noticeboard, training)?

If 'other', please specify

Community Groups Recycling

Naran Respondente

Pozisaun iha grupu

Naran husi grupu

Total membru iha grupu (Numeru)

Lokalizaun grupu (fatin grupu)

Numeru telefone husi respondente

TIPU SASAAN RESIKLAJEN

1

Lixu tipu saida mak ita hili ba rekolla? (repete ba kada tipu lixu ne'ebe rekolla)

Kada fulan, mais ou menus pasta/lixuiru plastiku hira mak ita-boot sira nia grupu rekolla?

Kada pasta/lixuiru plastiku kilograma hira?

Tipu sasaan resiklajen mak ita boot sira nia grupu fa'an? (ex. agua; sanelus)

Ita fa'an ba se?

Kliente nia fatin iha ne'ebe? (Munisipiu)

Dili Municipality

Mais ou menus, rendimentu hira mak ita-boot sira nia grupu bele hetan?

- \$0 - \$50 kada fulan
- \$51 - \$100 kada fulan
- \$101 - \$500 kada fulan
- \$501 - \$1000 kada fulan
- More than \$1000 kada fulan

FOTOGRAFIA HUSI SASAAN RESIKLAJEN NE'EBE FA'AN

Se ita fa'an produtu final husi materias resiklajen, hasa'e foto husi sasaan resiklajen ne'ebe fa'an

Click here to upload file. (< 5MB)

MOTIVU

Tamba sa mak ita-boot sira harii grupu resiklajen ne'e?

- Halo promosaun husi duador ka NGO
- Husu husi negósiantes/business resiklajen sira atu halo servisu ne'e
- Hanoin kona-ba ambiente
- Hetan rendimentu
- Seluk tan

Se "seluk" favor espesifika

Duador ka NGO naran sa?

Negósiantes/business ne'e naran saida?

Saida mak desafiu ka obstaklu boot sira wainhira halo separasaun ba lixu resiklajen?

- La folin
- Volume resiklajen menus liu
- Foti tempu kleur hodi halo separasaun ba lixu resiklajen
- Membru komunidadade sira tau tipu lixu hamutuk, soke hau husu sira atu halo separasaun ba lixu resiklajen
- Ema lakohi hola sasaan resiklajen sira
- Seluk

Ita boot sira foti oras hira hodi halo separasaun kada pasta/lixeiru plastiku husi lixu resiklajen?

Ita-boot sira fo instrusaun oinsa ba membru komunidadade kona ba separasaun ba lixu (ex. liafuan, tau notisia, formasaun)?

Se 'seluk', favor espesifiku

_index	Name of community group	Number of members in community group	Group address	If you sell final recycled products from materials, take a photo of recycled items for sale	If you sell final recycled products from materials, take a photo of recycled items for sale URL	Why did you start this recycling group?	Why did you start this recycling group?/Campaign by donor or NGO	Why did you start this recycling group?/Asked by a recycling business to do this work	Why did you start this recycling group?/Thinking about the environment	Why did you start this recycling group?/Earn an income	Why did you start this recycling group?/Other
1	CETL	7	Hera			Thinking about the environment	0	0	1	0	0
2	RELOKA	7	Palapaso			Other	0	0	0	0	1
3	Tiwoman	5	Metiaut			Campaign by donor or NGO	1	0	0	1	0
4	WHWR	5	Kampung Merdeka			Earn an income	0	0	1	1	0
5	Sedauk iha	6	Hudi Laran			Other	0	0	1	0	1
6	Grupo Kreativo Juventude KJTL	23	Fatuhada			Earn an income	0	0	0	1	0
7	La iha naran grupo, sira organiza malu hodi recolha lixu	5	Zero 4 marconi			Thinking about the environment	0	1	1	1	0
8	ENVAC	30	Laiha fatin fixu			Thinking about the environment	0	0	1	1	0
9	Juventude Servi Komunitade	8	La fiksi			Thinking about the environment	0	0	1	1	0

_index	If 'other' please specify	What is the name of the donor or NGO?	What is the name of the business?	What are the difficulties or challenges in doing waste segregation and recycling?	What are the difficulties or challenges in doing waste segregation and recycling?/The price is not good	What are the difficulties or challenges in doing waste segregation and recycling?/The amount of recyclable waste is not high enough	What are the difficulties or challenges in doing waste segregation and recycling?/It takes a long time to segregate recyclable waste	What are the difficulties or challenges in doing waste segregation and recycling?/Community members even if I ask them to segregate the recyclable waste	What are the difficulties or challenges in doing waste segregation and recycling?/Other	What are the difficulties or challenges in doing waste segregation and recycling?/People do not want to buy the recycled items	How long do you take to segregate waste per 1 bag of recyclable waste
1				The price is not good	1	0	0	0	0	0	
2	Ajuda difiñsia Sira			The price is not good The amount of recyclable waste is not high enough People do not want to buy the recycled items	1	1	0	0	0	1	
3		UNDP		The amount of recyclable waste is not high Other	0	1	0	0	1	0	
4				The amount of recyclable waste is not high enough Community members mix waste even if I ask them to segregate the recyclable waste	0	1	0	1	0	0	
5	Hakarak Fo korajen ba Komuidade Konaba Ambiente			Community members mix waste even if I ask them to segregate the recyclable waste	0	0	0	1	0	0	
6				The amount of recyclable waste is not high Other	0	1	0	0	1	0	
7			Caltech	Community members mix waste even if I ask them to segregate the recyclable waste	0	0	0	1	0	0	
8				People do not want to buy the recycled items	0	0	0	0	0	1	
9				People do not want to buy the recycled items Other	0	0	0	0	1	1	

_index	How do you give instructions to community members on waste segregation (eg. verbal, noticeboard, training)?	If other, please specify	_submission_time
1			2024-07-09
2			2024-07-09
3		Merkadoria difisil oituan	2024-07-09
4	Fo Konsensia ba Komuidade Sira konaba Soe Lixu		2024-07-10
5	Fo konsesisa ba komuidade sira oinsa Soe Lixu		2024-07-10
6		Ekipamentus Menuus	2024-07-10
7	Fo koragem ba komuidade		2024-07-11
8			2024-07-17
9		Lalha fatin grupu nian neebe fiksu	2024-07-17

_parent_index	What type of waste does your group collect? (Repeat for each type of waste collected)	Approximately how many bags of this waste does your group collect each month?	Approximately how many kilograms are in each bag?	Who do you sell to?	Where is the buyer located? (Municipality)	How much income does your group make each month?	What type of waste do you sell?	Take a photo of the type of waste	Take a photo of the type of waste_URL	How many bags (average) does your group sell per month?
1	Plastiku Agua no nia matan	Karon 20	5	Komunidade	Dili Municipality	\$101 – \$500 per month				
1	PVC	20	2	Komunidade	Dili Municipality	\$51 – \$100 per month				
2	Botir	Botir 10	3	NGO no ema entranjeiro	Dili Municipality	\$101 – \$500 per month				
3	Plastik	50 pcs	0.3	Bringkus rasik, no balu hatama Loja	Dili Municipality	\$101 – \$500 per month				
3	Baner	Baner 1	Medida 2x3 Meter	Komunidade no Iha Ioja	Dili Municipality	\$51 – \$100 per month				
4	Plastiku Aqua	1 Jumbo	60	Grupo Fan deit Lixu plastik ba Caltech	Dili Municipality	\$0 – \$50 per month				
4	Botir	Karon 7	20	Fan Lixu ba Caltech	Dili Municipality	\$0 – \$50 per month				
5	Plastik Aqua..PVC	Jumbo 1	70	Fan ba Caltech	Dili Municipality	\$0 – \$50 per month				
6	Plastiku Aqua, Oji fatin	Karon 5	10	Komunidade	Dili Municipality	\$501 – \$1000 per month				
7	Plastik	6 jumbo	22	Caltech	Dili Municipality	\$0 – \$50 per month				
8	Plastic	1	0.5	komunidade	Dili Municipality	\$0 – \$50 per month				
9	Plastik	1	0.5	Sinelus, ai funan, kadeira no meza	Dili Municipality	\$0 – \$50 per month				

_parent_index	How much do you earn per bag (provide range in USD)	Do you know how many kilograms are in each bag? (optional)	Who do you sell to? Where is the buyer located? (Municipality or Posto)	_submission_sub_mission_time
1				2024-07-09
1				2024-07-09
2				2024-07-09
3				2024-07-09
3				2024-07-09
4				2024-07-10
4				2024-07-10
5				2024-07-10
6				2024-07-10
7				2024-07-11
8				2024-07-17
9				2024-07-17

Waste Pickers Recycling

This survey is implemented to identify the situation of recycling in Dili Municipality. To create the plan, information from recyclers is needed to grasp the current situation of recycling in the region. Your responses will be used for this purpose only. Please respond to the questions as accurately as you can. Thank you very much for your cooperation.

I give my consent to participate in this interview

- Yes
 No

Respondent name

Address

Number of family members

Monthly household income

TYPES AND AMOUNTS OF WASTE

1

* **What type of waste do you select to sell?**

Take a photo of the type of waste

Click here to upload file. (< 5MB)

* **How many bags (average) do you sell per month?**

* **How much do you earn per bag (provide range in USD)**

Do you know how many kilograms are in each bag? (optional)

Who do you sell to? Where is the buyer located? (Municipality or Posto)

CHALLENGES

What challenges do you have in your work?

- Price of recyclable waste is too low
- Price of recyclable waste is fluctuating
- Harsh working environment
- Difficult to find the type of waste that people want to buy
- Health problems due to working environment
- Other

If 'other' please specify

Do you wish to explain further about these challenges?

Waste Pickers Recycling

Peskiza ida ne'e implementa hodi identifika situasaun resiklajen lixu iha Munisipiu Dili. Atu kria planu ne'e, presiza informasaun husi grupu ka ema ne'ebe halo resiklajen hodi kompriende kona-ba situasaun resiklajen real iha rejiaun ne'e. Ita-boot nia resposta sira sei utiliza de'it ba ida-ne'e. Favór ida hatan pergunta sira-ne'e ho loloos. Obrigadu barak ba ita-nia kooperasaun.

Hau fo hau nia konsentimentu atu partisipa iha entrevista ida ne'e

Sim

Lae

Naran Respondente

Hela fatin

Total membru familia (Numeru)

Rendimentu mensal uma-kain \$

TIPU NO VOLUME HUSI LIXU

1

* **Lixu tipu saida mak ita hili ba fa'an?**

Hasai fotografia husi tipu lixu

Click here to upload file. (< 5MB)

* **Kada fulan pelumenus ita konsege fa'an pasta/lixuiru plastiku hira?**

* **Kada pasta/lixuiru plastiku ida ita hetan osan hira?**

Kada pasta/lixuiru plastiku kilograma hira?

Ita fa'an ba se? No iha ne'ebe? (Munisipiu/postu)

DEZAFIUS/DIFIKULDADE

Dezafiu saida mak ita hasoru iha servisu ne'e?

- Folin husi lixu ne'ebe kiik/tun liu
- Folin husi lixu ne'ebe la estavel
- Servisu todan/terus liu
- Susar/difikuldade atu hetan tipu lixu ne'ebe ema hakarak atu sosa
- Problema saúde tanba ambiente servisu
- Seluk tan

Se "seluk" favor espesifika

Ita hakarak atu haklean kona-ba dezafiu sira ne'e?

_index	Address	Number of family members	Monthly household income	What challenges do you have in your work?	What challenges do you have in your work?/Price of recyclable waste is too low	What challenges do you have in your work?/Price of recyclable waste is fluctuating	What challenges do you have in your work?/Harsh working environment	What challenges do you have in your work?/Difficult to find the type of waste that people want to buy	What challenges do you have in your work?/Health problems due to working environment	What challenges do you have in your work?/Other	If 'other' please specify	Do you wish to explain further about these challenges?
1	Tasi tolu	5	200	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment	1	1	1	0	0	0		
2	Tasitolu	9	300	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Health problems due to working environment Difficult to find the type of waste that people want to buy	1	1	1	1	1	0		
3	Tasitolu	6	80	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Health problems due to working environment	1	1	1	0	1	0		
4	Tasitolu	8	700	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Health problems due to working environment	1	1	1	0	1	0		
5	Tasitolu	2	50	Price of recyclable waste is too low Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy	1	1	0	1	1	0		

_index	Address	Number of family members	Monthly household income	What challenges do you have in your work?	What challenges do you have in your work?/Price of recyclable waste is too low	What challenges do you have in your work?/Price of recyclable waste is fluctuating	What challenges do you have in your working environment	What challenges do you have in your work?/Harsh working environment	What challenges do you have in your work?/Difficult to find the type of waste that people want to buy	What challenges do you have in your work?/Health problems due to working environment	What challenges do you have in your work?/Other	If 'other' please specify	Do you wish to explain further about these challenges?
6	Tasitolu	8	100	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Difficult to find the type of waste that people want to buy	1	1	1	1	1	0	0		
7	Tasitolu	6	240	Price of recyclable waste is too low Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy	1	1	0	0	1	0	0		
8	Tasitolu	3	100	Price of recyclable waste is too low Harsh working environment Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy	1	1	1	1	1	0	0		
9	Tasitolu	8	230	Price of recyclable waste is too low Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy Health problems due to working environment	1	1	0	0	1	1	0		

_index	Address	Number of family members	Monthly household income	What challenges do you have in your work?	What challenges do you have in your work?/Price of recyclable waste is too low	What challenges do you have in your work?/Price of recyclable waste is fluctuating	What challenges do you have in your working environment	What challenges do you have in your work?/Difficult to find the type of waste that people want to buy	What challenges do you have in your work?/Health problems due to working environment	What challenges do you have in your work?/Other	If 'other' please specify	Do you wish to explain further about these challenges?
10	Tibar	11	110	Price of recyclable waste is too low Difficult to find the type of waste that people want to buy Harsh working environment Price of recyclable waste is fluctuating	1	1	1	1	0	0		
11	Tasi tolu	6	150	Harsh working environment Price of recyclable waste is too low Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy	1	1	1	1	0	0		
12	Tasi tolu	9	80	Price of recyclable waste is fluctuating Harsh working environment Price of recyclable waste is too low Difficult to find the type of waste that people want to buy	1	1	1	1	0	0		
13	Tasi tolu	6	100	Price of recyclable waste is fluctuating Harsh working environment Price of recyclable waste is too low Difficult to find the type of waste that people want to buy	1	1	1	1	0	0		

_index	Address	Number of family members	Monthly household income	What challenges do you have in your work?	What challenges do you have in your work?/Price of recyclable waste is too low	What challenges do you have in your work?/Price of recyclable waste is fluctuating	What challenges do you have in your work?/Harsh working environment	What challenges do you have in your work?/Difficult to find the type of waste that people want to buy	What challenges do you have in your work?/Health problems due to working environment	What challenges do you have in your work?/Other	If 'other' please specify	Do you wish to explain further about these challenges?
14	Tasi tolu	9	100	Price of recyclable waste is fluctuating Harsh working environment Price of recyclable waste is too low Difficult to find the type of waste that people want to buy	1	1	1	1	0	0		
15	Tibar	5	100	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Difficult to find the type of waste that people want to buy Health problems due to working environment	1	1	1	1	1	0		
16	Tasi Tolu	7	200	Price of recyclable waste is too low Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy Health problems due to working environment	1	1	0	1	1	0		
17	Tibar	5	90	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Difficult to find the type of waste that people want to buy	1	1	1	1	0	0		

_index	Address	Number of family members	Monthly household income	What challenges do you have in your work?	What challenges do you have in your work?/Price of recyclable waste is too low	What challenges do you have in your work?/Price of recyclable waste is fluctuating	What challenges do you have in your work?/Harsh working environment	What challenges do you have in your work?/Difficult to find the type of waste that people want to buy	What challenges do you have in your work?/Health problems due to working environment	What challenges do you have in your work?/Other	If 'other' please specify	Do you wish to explain further about these challenges?
18	Tasi Tolu	9	90	Price of recyclable waste is too low Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy	1	1	0	1	0	0		
19	Tasi Tolu	3	100	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Difficult to find the type of waste that people want to buy	1	1	1	1	0	0		
20	Tasi Tolu	2	80	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Difficult to find the type of waste that people want to buy	1	1	1	1	0	0		
21	Tibar	10	100	Price of recyclable waste is fluctuating Harsh working environment Price of recyclable waste is too low	1	1	1	0	0	0		
22	Tibar	7	80	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment	1	1	1	0	0	0		

_index	Address	Number of family members	Monthly household income	What challenges do you have in your work?	What challenges do you have in your work?/Price of recyclable waste is too low	What challenges do you have in your work?/Price of recyclable waste is fluctuating	What challenges do you have in your work?/Harsh working environment	What challenges do you have in your work?/Difficult to find the type of waste that people want to buy	What challenges do you have in your work?/Health problems due to working environment	What challenges do you have in your work?/Other	If 'other' please specify	Do you wish to explain further about these challenges?
23	Tibar	2	60	Price of recyclable waste is too low Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy Harsh working environment	1	1	1	1	0	0		
24	Tibar	11	200	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Difficult to find the type of waste that people want to buy	1	1	1	1	0	0		
25	Tibar	5	90	Price of recyclable waste is fluctuating Price of recyclable waste is too low Difficult to find the type of waste that people want to buy	1	1	0	1	0	0		
26	Tasitolu	6	205	Difficult to find the type of waste that people want to buy Price of recyclable waste is fluctuating Price of recyclable waste is too low Harsh working environment	1	1	1	1	0	0		

_index	Address	Number of family members	Monthly household income	What challenges do you have in your work?	What challenges do you have in your work?/Price of recyclable waste is too low	What challenges do you have in your work?/Price of recyclable waste is fluctuating	What challenges do you have in your work?/Harsh working environment	What challenges do you have in your work?/Difficult to find the type of waste that people want to buy	What challenges do you have in your work?/Health problems due to working environment	What challenges do you have in your work?/Other	If 'other' please specify	Do you wish to explain further about these challenges?
27	Tibar	6	60	Price of recyclable waste is too low Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy Health problems due to working environment	1	1	0	1	1	0		
28	Tibar	9	120	Price of recyclable waste is too low Price of recyclable waste is fluctuating Difficult to find the type of waste that people want to buy	1	1	0	1	0	0		
29	Tibar	7	40	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Difficult to find the type of waste that people want to buy Health problems due to working environment	1	1	1	1	1	0		
30	Tibar	7	70	Price of recyclable waste is too low Price of recyclable waste is fluctuating Harsh working environment Difficult to find the type of waste that people want to buy	1	1	1	1	0	0		

_parent_index	What type of waste do you select to sell?	How many bags (average) do you sell per month?	How much do you earn per bag (provide range in USD)	Do you know how many kilograms are in each bag? (optional)	Who do you sell to? Where is the buyer located? (Municipality or Posto)	_submission_sub mission_time
1	Plastik,	4	36	80	Kompanha Manleu,Dili	2024-07-09
1	Besi	3	72	90	Kompanha Manleuana ,Dili	2024-07-09
1	Aluminium	5	60	100	Dili	2024-07-09
1	Besi Metal	5	80	100	Dili	2024-07-09
2	plastik	10	45.00	100	Kompaia iha beduku,Dili	2024-07-09
2	Besi	3	24.00	300	Dili	2024-07-09
2	Aluminium	10	300	500	Dili	2024-07-09
2	Lata metal	5	4	50	Dili	2024-07-09
3	Plastik	10	58.50	130	Dili	2024-07-09
3	Besi	20	24.00	300	Dili	2024-07-09
3	Aluminium	5	60.00	100	Dili	2024-07-09
4	Besi tua	5	48.00	600	Kompanha manleuana, Dili	2024-07-09
4	Plastik	10	40.5	90	Pantai kelapa ,Dili	2024-07-09
4	Aluminium	10	24.00	40	Dili	2024-07-09
5	Besi,	10	8.8	110	Tibar ,Dili	2024-07-09
5	Plastik	10	54.00	120	Dili	2024-07-09
6	Aluminium	3	30	70	Comoro ,Dili	2024-07-09
7	Besi	4	20	5.5	Pantai kelapa,Dili	2024-07-09
7	Aluminium	4	40	50	Comoro,Dili	2024-07-09
8	Besi	3	25.00	50	Comoro,Dili	2024-07-09
8	Aluminium	4	160	200	Pantai kelapa	2024-07-09
9	Besi	3	15.00	30	Pantai kelapa	2024-07-09
9	Aluminium	4	44.00	80	Comoro,Dili	2024-07-09
10	Besi metal	2	72	90	Jacinto,tibar	2024-07-09
10	Aluminium	1	4.8	8	Jacinto,tibar	2024-07-09
10	Botir	1	5	3	Jacinto,tibar	2024-07-09
11	Aluminium	1	6	10	Bebonuk	2024-07-09
11	Besi	2	8	100	Bebonuk	2024-07-09
12	Besi	3	20	250	Bebonuk	2024-07-09
12	Plastik	1	18	40	Bebonuk	2024-07-09
12	Aluminium	3	6	10	Bebonuk	2024-07-09
13	Plastik	3	31.5	70	Pantai kelapa	2024-07-09
13	Aluminium	1	18	30	Pantai kelapa	2024-07-09
13	Botir	1	5	25	Tibar	2024-07-09
14	Plastik	2	40.5	90	Bebonuk	2024-07-09
14	Besi metal	1	24	300	Bebonuk	2024-07-09
15	Metal	1	12	150	Kompania Husi Bebonuk	2024-07-09
15	PVC	2	6	2	Compania Husi Dili	2024-07-09
15	Plastiku	1	29	65	Compania ida Husi Manleu	2024-07-09
16	Besi	1	24	300	Compania Husi Comoro	2024-07-09
16	Plastiku	1	45	100	Compania Husi Dili	2024-07-09
16	Aluminium	3	12	20	Compania Comoro	2024-07-09
17	Besi	1	7	90	Compania Bebonuk	2024-07-09

_parent_index	What type of waste do you select to sell?	How many bags (average) do you sell per month?	How much do you earn per bag (provide range in USD)	Do you know how many kilograms are in each bag? (optional)	Who do you sell to? Where is the buyer located? (Municipality or Posto)	_submission_sub mission_time
17	Plastiku	136		80	Compania Comoro	2024-07-09
18	Plastiku	127		60	Compania husi Comoro	2024-07-09
18	Metal	18		100	Compania Pantai Kelapa	2024-07-09
18	Aluminium	122		50	Compania Husi Dili	2024-07-09
19	Plastiku	18		100	Compania Manleu Beduku	2024-07-09
19	Besi	131.5		70	Compania Bebonuk	2024-07-09
19	Akuminium	122		50	Compania Comoro	2024-07-09
20	Besi	18		100	Compania Bebonuk	2024-07-09
20	Plastiku	131		70	Compania Bebonuk	2024-07-09
20	Aluminium	218		30	Compania Bebonuk	2024-07-09
21	Plastik	340.5		90	Pantai kelapa	2024-07-11
22	Plastik	27		16	Pantai kelapa	2024-07-11
23	Besi	46		80	Besi tua palapasu	2024-07-11
23	Plastiku	320		60	Galtech	2024-07-11
24	Besi	58		100	Besi Tua Palapaso	2024-07-11
24	Plastik	531		70	Galtech	2024-07-11
25	Besi	89		120	Besi Tua Palapaso	2024-07-11
26	Plastik	490		200	Pantai kelapa	2024-07-11
26	Besi	33.2		40	Pantai kelapa,Dili	2024-07-11
27	Aluminium	4240		400	Pantai kelapa	2024-07-11
27	Besi	43.2		40	Pantai kelapa	2024-07-11
28	Besi	412		150	Pantai kelapa	2024-07-11
28	Aluminium	4120		200	Pantai kelapa	2024-07-11
28	Plastik	445		100	Comoro	2024-07-11
29	Plastik	245		100	Comoro	2024-07-11
29	Besi	316		200	Comoro	2024-07-11
30	Besi	312		150	Comoro	2024-07-11
30	Plastik	463.00		140	Comoro	2024-07-11
30	Aluminium	221		35	Comoro	2024-07-11

Appendix-4 Photos

● Meetings with Relevant Organizations



Meeting with Dili Municipality



Meeting with National Hospital



Meeting with
Ministry of Tourism and Environment



Meeting with Ministry of Health

● Field Work and Observation (1)



Factory of Caltech



Waste collected by Beach Cleaning
Activity

● Field Work and Observation (2)



Waste Collection Spot



Waste Scattered in a Vacant Area



PET Bottles in a Waterway



Trash Box and Scattered Waste in the Park



Tibar Landfill Site (1)



Tibar Landfill Site (2)

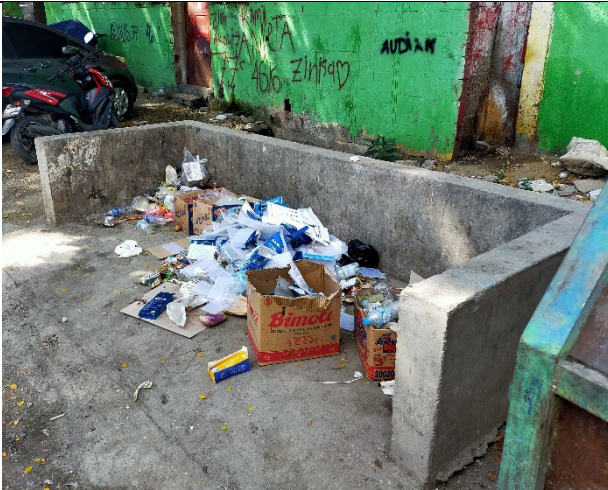
● Field Work and Observation (3)



Waste Collection Activity by Existing Waste Collection Vehicle (Dump Truck)



Waste Collection Activity by Newly Procured Waste Collection Vehicle (Compactor Vehicle)



Waste Disposal Condition at Collection Point before Introducing Newly Procured Waste Container



Improved Waste Collection Point with Introducing Newly Procured Waste Containers



Waste Collection Activity with Newly Introduced Waste Collection Vehicle (Compactor Vehicle) No.1



Waste Collection Activity with Newly Introduced Waste Collection Vehicle (Compactor Vehicle) No.2

● Field Work and Observation (4)



Containers for the New Waste Collection System



Compactors and Trucks for the New Waste Collection System



Clean up Campaign at World Ocean Day



Upcycling exhibited at World Ocean Day

● Waste Amount and Composition Survey (1)



Interview with the Sampling Household for Waste Amount and Composition Survey



Sample Collection for Waste Amount and Composition Survey (1)

● Waste Amount and Composition Survey (2)



Sample collection for Waste Among and Composition Survey (2)



Sample Collection at Tibar Landfill Site for Waste Among and Composition Survey



Preparation for the Measurement for Waste Among and Composition Survey



Measurement of a Sample for Waste Among and Composition Survey



Sampling by Quartering Method for Waste Among and Composition Survey



Measurement of Bulk Density for Waste Among and Composition Survey

● Recycling Survey



Metals Collected for Recycling at Recycle Company



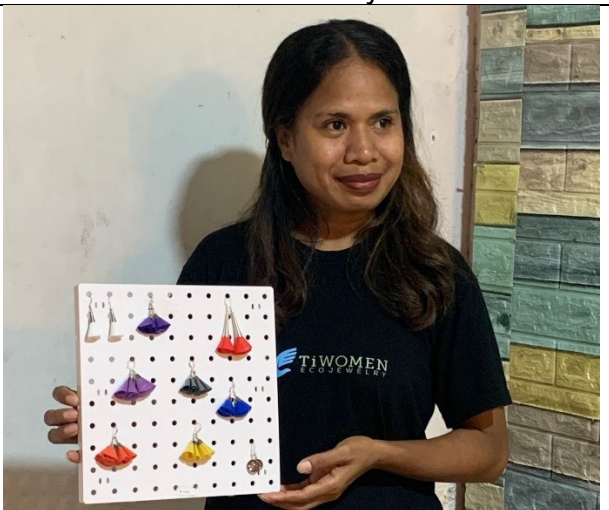
Batteries Collected by Recycle Company



Interview with Local NGO "Reloka", Working for Recycling with Local Community



Interview with Local Recycling Company "Caltech", Working for Local Recycling Activity



Example of Recycled Products: Pierces Made by Dumped Plastic by Recycling Organizations "Tiwoman"



Example of Recycled Products: Poches Made by Dumped Banners by Recycling Organizations "Tiwoman"

Appendix-5 Decree Law No.26/2012

(Tentative English Translated Version)



DEMOCRATIC REPUBLIC OF TIMOR-LESTE

DECREE LAW NO 26/2012 OF 4 JULY 2012

ENVIRONMENT BASIC LAW

[ENVIRONMENTAL FRAMEWORK LAW]

Explanatory Memorandum

Bearing in mind that the need to conserve and protect the environment is a duty incumbent upon all States, the 4th Constitutional Government recognises the importance of creating an environmental legal system setting out the principles and rules governing environmental conservation and protection, the sustainable use of natural resources and environmental management from an overall and integrated perspective which protects the fundamental rights of the citizens of Timor-Leste.

In an expanding free market economy, the environment and natural resources represent an important source of wealth and the basis for economic growth and the survival of communities. However, both require balanced and sustainable management so that citizens can be afforded a higher and better quality of life within a framework of sustainable development.

The right to a clean and healthy environment is a universally recognised human right and, as such, the constitution of the Democratic Republic of Timor-Leste regards environmental protection from a dual perspective: as a core responsibility of the State and also as a fundamental right of all citizens.

Therefore, Article 6 of the Constitution of the Republic establishes that one of the key objectives of the State is to protect the environment and preserve natural resources. Article 61, which reiterates this objective and specifies that the state shall undertake to defend and safeguard the environment, recognises, furthermore, the right of all citizens to a humane, healthy and ecologically-balanced environment while also specifying the duty of everyone to preserve and protect the environment for the benefit of future generations. Likewise, Article 139 emphasizes the need for exploitation of natural resources be made in order to maintain ecological balance and prevent destruction of ecosystems.

At the international level, Timor-Leste has already ratified a series of international conventions, such as the United Nations Framework Convention on Climate Change and the Kyoto Protocol, the International Convention to Combat Desertification, the Convention on Biological Diversity and the Vienna Convention for the Protection of the Ozone Layer and respective Montreal Protocol. It is therefore recognized that the State has a responsibility to implement the commitments stemming from these international instruments.

The approval of the Environmental Basic Law therefore sets out the necessary legal framework to satisfy the constitutional imperative to protect both the environment and the international responsibilities assumed by the State.

Consultations were held with representatives of national and international environmental associations, national and international advisers and experts, relevant ministries, and various civil service employees and department heads, not to mention the process of regional public consultations held in conjunction.

Thus,

In the legislative authorization granted under Article 1. 0 and 2. Of Law no. 3/2012, January 13, 2012 and pursuant to the provisions of Article 96 of the Constitution, the Government decrees, become law, the following:

CHAPTER I General Provisions

Article 1 Definitions

For the purposes of interpreting and applying the present law, the following definitions have been adopted for the words and concepts used in the body of the text:

- a) Activity: any publicly or privately initiated action related to the exploitation or use of environmental components, application of technologies or productive processes, policies, legislative or regulatory acts, and plans or programmes that affect or may affect the environment.
- b) Environment: the set of physical, chemical and biological systems and their relations with economic, social and cultural factors, with direct or indirect, intermediate or immediate, effects on living beings and the quality of human life.
- c) Protected area: an area is specifically defined land, freshwater or sea dedicated to the protection and maintenance of biological diversity, ecosystem services and associated cultural resources, managed through legal or other effective means;
- d) Strategic environmental assessment: the preventative instrument of environmental policy, based on studies, consultations and environmental management and assessment instruments, whose goal is to aid decision making on the environmental viability and implementation of certain projects.
- e) Biodiversity: the diversity of living organisms of all origins, including, among others, those from land, marine and other aquatic ecosystems, as well as the complex ecologies to which they belong, comprising the diversity of ecosystems and the diversity within and between species.
- f) Environmental components: the various elements of the environment, including the air, water, soil, subsoil, living creatures, renewable and non-renewable natural resources and socio-economic conditions, whose interaction ensures their balance.
- g) Degradation or environmental damage: is the adverse change in the environmental conditions and includes, among others, pollution, desertification, erosion, deforestation, loss of biodiversity, reduction of species and reducing the quantity and quality of natural ecosystems and groundwater;
- h) Sustainable development: development based on effective environmental management which satisfies the needs of the present generation without compromising environmental balance and the possibility of future generations also satisfying their necessities .
- i) Ecosystem: a complex dynamic of plant, animal and micro-organism communities and their interaction with the non-living environment to create a functional unit.
- j) Erosion: the detachment of the surface layer of the soil by the natural action of the wind and water which can be exacerbated due to man's removal of vegetation.
- k) Environmental management: the planned, coordinated and targeted process for taking and implementing decisions to regulate man's interaction with the natural environment in order to ensure the sustainable use of environmental components, due protection of threatened or endangered species and their habitats and the sustainable development of the economy.
- l) Habitat: any place or location which provides the climatic, physical and feeding conditions for the reproduction and development of organisms and their populations.
- m) Vulnerable groups: including women, youth, people with disabilities, displaced, ethnic and religious minorities and people living on subsistence agriculture and fishing;

- n) Habitat: any place or location in which organisms or population naturally are able to shelter, food and breeding;
- o) Environmental impact: set of positive and negative changes in the environment, within social and environmental parameters, comprising people and their economic and social structures, air, water, fauna, flora or their habitats, in a certain period of time and area, resulting from the implementation of a project, compared with the situation in this period and place if the project had not been implemented.
- p) Land use planning: the integrated process of organising the biophysical sphere so as to use and transform the land to match its capacities, vocation and the continuance of the values of biological balance and geological stability from the perspective of maintaining and increasing its ability to support life.
- q) Environmental emissions standards: the set of rules setting out the maximum amount of a certain pollutant that may be discharged from a single fixed or moving source.
- r) Environmental quality standards: the rules setting out the maximum admissible levels of pollutant concentrations allowed for environmental components.
- s) Pollution: the direct or indirect introduction of substances, vibrations, light, heat or noise into environmental components due to human activity liable to harm human health or environmental quality, cause deterioration or damage to material assets, or compromise or affect the use and enjoyment and other legitimate uses of the environment.
- t) Genetic resources: includes any material of plant, animal or micro-organism origin or other origin which contains functional units of heredity of actual or potential value.
- u) Natural resources: includes all living and non-living components that comprise the ecosystem.
- v) Non-renewable natural resources: includes all living and non-living components that comprise the ecosystem that are finite in character and cannot regenerate on a relevant timescale in human terms.
- w) Repair, rehabilitation and/or restoration of environmental degradation or damage: includes any activity which re-establishes the environmental conditions existing prior to the verification of degradation or damage to the environmental components.
- x) Waste: includes any effluent, substance and/or material object deemed to be of no use, superfluous and/or of no value created through human, industrial or commercial activity and which needs to be eliminated or destroyed.
- y) Hazardous waste: waste which due to its inflammable, explosive, corrosive, toxic, infectious, radioactive, or other quality is dangerous to human health or the environment.
- z) Environmental services: are ecosystem functions that create and provide benefits to humans and the ecosystems themselves, including kidnapping, storage and processing of greenhouse gases, the generation, filtering and water protection, biodiversity protection and the natural beauty
- aa) Polluting substances: any gas or waste, including those of a dangerous kind, that may alter the natural characteristics or qualities of the environment either temporarily or irreversibly, interfere in its normal conservation or evolution or have any other harmful effect.
- bb) Tara Bandu: an integral custom of Timor-Leste culture which regulates man's relationship with his surrounding environment.
- cc) Sustainable use: the use of environmental components in a harmonious and efficient way to satisfy the needs of the current generation without compromising environmental balance and the possibility of future generations satisfying their necessities.

Article 2

Purpose

The present law sets out the framework for environmental policy and the guiding principles for the conservation and protection of the environment and for the preservation and sustainable use of natural resources in order to promote the quality of life of the country's citizens.

Article 3

Scope

1. The present law and other environmental legislation are applicable to the whole of the national territory of Timor-Leste, namely the land surface, inland waters, territorial sea, air space above the territorial sea, as well as its bed and sub soil, and the Exclusive Economic Zone (EEZ).
2. The present law applies to national, international or stateless persons, whether natural or legal, who are, live or work in Timor-Leste, including public bodies.

Article 4 **Aims**

It is incumbent upon the state in ensuring a healthy and ecologically balanced environment that affords health and well-being to its people and in preserving and ensuring the sustainable use of natural resources to set out and implement an environmental policy, legislation, programmes, plans and projects whose aims are the following:

- a) To reduce environmental pressures at each stage of the life-cycle of natural resources, decouple the use of these resources from economic growth and increase efficiency, safeguarding the capacity for renewal and good environmental status and respecting the principle of inter-generational solidarity, ensuring correct land use planning and the protection of the landscape;
- b) To improve the environmental performance of public and private bodies including the strengthening of institutional structures required for the implementation of this law and the development of coordination and cooperation between public and private entities;
- c) To ensure the existence and effectiveness of environmental assessment mechanisms for policies, plans, programmes, projects and decisions liable to have significant effects on the environment;
- d) The creation of knowledge and awareness among the population about the importance and value of biodiversity, environmental components and the need for sustainable use.

Article 5 **Guiding principles**

The setting out and implementation of the environmental policy, the present law and other environmental legislation, programmes, plans and projects shall comply with the following guiding principles:

- a) Sovereignty principle: within the limits of its jurisdiction, the Democratic Republic of Timor-Leste has sovereignty over the use of its natural resources and the responsibility to ensure that activities under its jurisdiction or control do not harm the environment of other countries or areas located outside the limits of its jurisdiction.
- b) Principle of inter-generational solidarity: the environment shall be protected and improved for the benefit of current and future generations.
- c) Prevention principle: programmes, plans or projects that impact on the environment shall anticipate, prevent, reduce or eliminate the causes leading to rectification of the effects that are liable to alter the quality of the environment.
- d) Precautionary principle: the absence of absolute scientific certainty concerning the existence of a risk of serious or irreversible damage to the environment shall not be used as a motive for delaying the adoption of effective measures to prevent or minimize alterations in environmental quality.
- e) Participatory principle: the different social groups shall be engaged in the environmental decision-making processes and in the formulation and implementation of environmental policy and legislation, both via the collective organs in which they are represented and through public consultation on specific projects that interfere with their interests or the environmental balance;
- f) Polluter pays principle: the cost of measures to prevent, combat, reduce and compensate activities that can have a negative impact on the state of the environment shall be borne by the polluter;
- g) International cooperation principle: establishes the search for coordinated solutions with other states, international organisations, non-governmental bodies and the private sector for cross-border environmental problems and the preservation and use of national or cross-border natural resources and for compliance with the aims of regularly ratified international conventions or agreements;
- h) Integration principle: environmental policy must be integrated into other sectoral policies so that in its design and implementation, are taken into account the requirements of conservation and environmental protection, preservation and sustainable use of natural resources.

- i) Principle of seeking the most appropriate level of action: it implies that the implementation of environmental policy measures take into account the most appropriate level of action, be it international, national, regional, local or sectoral.

Article 6
Rights of national citizens

1. All citizens are entitled to participate in the conservation and protection of the environment, either in an individual capacity or through an association.
2. By law, all citizens are entitled to access environmental information without prejudice to the rights of legally protected third parties.
3. Everyone is guaranteed the right of access to participation in procedures for environmental decision-making that have significant environmental effects.
4. All citizens are entitled to environmental education with a view to ensuring their effective participation in conserving and protecting the environment.
5. Any citizen who deems that the terms of the present law or any environmental legislation or regulation has been infringed or is at risk of being infringed is entitled to petition the courts, under the general terms of the law, to stop the causes of the said infringement and to secure the respective compensation, irrespective of having suffered or eventually suffering any damages or having a personal interest in the matter.
6. The rights provided for in this article shall also apply to legal persons after due adaptation.
7. The State must ensure the implementation of rights under the law especially for vulnerable groups.

Article 7
Duties of national citizens

1. All citizens are obliged to conserve, protect and improve the environment and to ensure the preservation and sustainable use of natural resources for present and future generations.
2. All citizens are obliged to participate in environmental decision-making mechanisms and processes.
3. All citizens are obliged to conserve, protect and improve the quality of the air, water, sea, soil and subsoil and biodiversity in order to foster sustainable development and a better quality of life.
4. All citizens who have knowledge of activities, actions or omissions that constitute a threat to the environment and infringements to the present law or any environmental protection legislation or rule must inform the competent legal authorities.
5. The duties provided for in the present Article apply to legal persons after due adaptation.

Article 8
Tara Bandu

1. The State recognises the importance of *Tara Bandu* as an integral custom of Timor-Leste culture and as a traditional mechanism for regulating the relationship between man and his environment.
2. *Tara Bandu* may be applied in accordance with the rituals instituted by local common law which are intended to conserve and promote the environment and the sustainable preservation and use of natural resources, as long as it is compatible with the aims and principles established herein.
3. If *Tara Bandu* is applied, under the present Article, the State shall ensure the area in question is effectively protected.

CHAPTER II
Governing Bodies

Article 9
State body

The state body responsible for the environment shall, under the integration principle, establish a central institutional structure responsible for coordinating policies, programmes, plans and projects that have significant effects on the environment with other central, district or local public bodies.

Article 10
Collaboration

1. Public bodies which through the exercise of their duties develop legislation, programmes, plans or projects that may have significant effects on the environment shall take the provisions of the present law into account.
2. The public bodies provided for in the preceding paragraph are obliged to collaborate and cooperate with the state body responsible for the environment with respect to implementing environmental policy so as to ensure it is applied in a cohesive and uniform manner.
3. The state body responsible for environmental matters shall promote the coordination and planning of public development policies at the central, district and local levels in order to ensure that they are compatible with environmental policy.

Article 11
Community authorities

1. Subject to the preceding article, the State shall encourage community authorities to participate in environmental conservation and protection and the preservation and sustainable use of natural resources and to engage in decision-making and environmental activities.
2. The competences of the community authorities referred to in the preceding paragraph are set out in separate legislation.

Article 12
Local communities

1. The State recognises the importance of local community participation, either acting alone or in conjunction with non-governmental organisations, in defining, implementing and monitoring environmental policy and in environmental decision-making.
2. Local community participation referred to above is pursued through public consultation, in accordance with the law.
3. Subject to the preceding paragraph, the State shall create the necessary structures and channels of communication for the participation of local communities in environmental decision-making processes, for the sharing and exchanging of information on setting out and implementing environmental policy and legislation and for the monitoring of activities with environmental impact.

CHAPTER III
Instruments and Relations with other Sectors

Section I
Instruments

Article 13
Strategic environmental assessment

1. The State, before consenting to any policy, legislation, programme, plan or project that could potentially impact on the environment, shall conduct a strategic environmental assessment identifying, describing and assessing any significant effects on the environment and ensuring the integration of environmental concerns into the decision-making procedure.
2. Strategic environmental assessment is preventative in nature and must ensure that any policy, legislation, programme, plan or project liable to have significant effects on the environment avoids, minimises or compensates said effects and is equipped with mechanisms to monitor the assessment of the state of the surrounding environment.
3. The assessment provided for in the present Article is aimed particularly at the agricultural, forestry, fisheries, energy, industrial, transport, waste and water management, telecommunications, tourism, spatial planning and soil and subsoil use sectors.

Article 14

Environmental standards

1. The State shall issue and publish environmental quality standards for the following environmental components:
 - a) Water;
 - b) Sea;
 - c) Air;
 - d) Soil and subsoil;
2. The State shall issue and publish emissions and environmental discharge standards for the environmental components referred to above, as well as for admissible light, vibration and noise levels, applicable to all of the country or to specific areas for certain processes, industries, sectors or products.
3. The law sets out the mechanisms for inspecting compliance with environmental quality and emissions standards in the aim of achieving integrated pollution control, under the provisions of the present law.

Article 15

Environmental assessment and licensing

1. The implementation of any programme, plan or project under the responsibility or initiative of a public or private institution that may affect the environment, national territory, the quality of life and health of the country's citizens or environmental components is prohibited by law if it fails to comply with the environmental assessment and licensing system and has not been issued with a respective licence.
2. For the purposes of the preceding paragraph, the law has established the environmental assessment and licensing system applicable to public or private programmes, plans and projects which, by their type, size, impact, scale, characteristics or location, affect the environment, national territory, the quality of life and health of the country's citizens and environmental components.
3. The environmental assessment and licensing system shall, among other aspects, make provision for:
 - a) The procedures for technical analyses of the programmes, plans and projects proposed;
 - b) The guiding principles for the decision-making processes;
 - c) The procedures for public consultation and participation in the decision-making processes;
4. The law sets out the mechanisms for monitoring the implementation of the programmes, plans or projects subject to the environmental assessment and licensing system during the various stages of construction, completion and dismantling.

Article 16

Environmental monitoring

1. It is incumbent upon the State to create a transparent, comprehensive and decentralised system of environmental monitoring that can implement integrated pollution control, assess the quality of environmental components, the state of use of natural resources and environmental impacts caused by economic activities, and gather the information necessary to comply with the present law.
2. The monitoring process provided for in point 1 includes the following:
 - a) Periodic collection and analysis of air, surface water, ground water, sea water, soil and subsoil samples;
 - b) Periodic reviews of the management of all types of waste and its impact on the environment;
 - c) Periodic reviews of the management of all types of waste and its impact on the environment¹;
 - d) Identification of cross-border environmental impacts on the country.
 - e) The disclosure of the results of environmental monitoring.
3. Responsibility for environmental monitoring falls upon the State, subject to the possibility of intervention by independent outside entities, pursuant to the law.

¹ Note that Paragraph (c) is a repeat of Paragraph (b). This is how it appears in the original Portuguese version, and is repeated here to preserve the numbering of the subsequent paragraphs.

Section II
Relationship with other Sectors

Article 17
Mainstreaming² and integration

Implementation of the environmental policy shall be integrated into other sectoral public policies, namely agriculture, forestry, fisheries, energy, industrial, transport, waste and water management, telecommunications, tourism, land use planning, and soil and subsoil use policies.

Article 18
Land use planning

1. It is incumbent upon the State to ensure that the national territory is organised and used appropriately and harmoniously, from the perspective of its development, in order to ensure and promote the principles and aims of environmental policy with a view to sustainable economic, social and cultural development.
2. Land use planning and management shall consider the specific needs of residential areas, namely the creation of basic infrastructure for sanitation, rubbish and toxic waste treatment, water treatment, noise pollution, light and vibration control, and preservation of green areas.
3. Planning and building in industrial and commercial areas shall take into account their specific environmental needs, ensuring compliance with environmental rules covering the control of pollution, noise, water and air, light and vibration, particularly with regard to the burning of industrial, agricultural and domestic fuels.
4. Land-use development and planning of inland areas shall consider the need for integrated management of water resources bearing in mind the potential impacts these may have on coastal areas.
5. Spatial planning should take into account the particular needs of the marine coast and marine ecosystems.

Article 19
Energy and industry

1. The implementation of environmental, energy and industrial should be so compatible and complementary in order to promote the use of sustainable energy sources and renewable resources, energy efficiency and encouraging environmentally sustainable economic activities and generate value.
2. It is incumbent upon the State to set out and implement an alternative energy strategy that can ensure national energy security and whose purpose is to:
 - a) Produce, promote and encourage the use of clean technologies and alternative energy from renewable natural resources;
 - b) Conduct research into appropriate technology for energy efficiency in urban and rural areas;
 - c) Introduce a phased increase in the amount of alternative energies in the total energy mix;
 - d) International cooperation and investment in the production and use of alternative energy sources.
3. The rules on the promotion, use and distribution of alternative energies shall be integrated into the national strategy for the energy sector and national development and poverty reduction plans.

Article 20
Agriculture, forestry and fisheries

Environmental, agriculture, forestry and fisheries policies shall be implemented in a compatible and complementary way to encourage the development of economic activities, resources, rural areas and the sea, as well as the sustainable use of natural resources, namely the soil, water and sea.

² Transversalidade

Article 21

Tourism

Environmental and tourism policies shall be implemented in a compatible and complementary way to promote the use of natural heritage as a source of wealth, enhancement and preservation through the promotion of environmentally sustainable tourism practices.

CHAPTER IV

Protection, Conservation and Sustainable Use of Environmental Components

Article 22

Protection, conservation and sustainable use

1. The State shall promote the protection, conservation and sustainable use of environmental components for the benefit of all citizens through the implementation of policies, legislation, programmes, plans and projects necessary for their sustainability and regeneration.
2. The law sets out the rules for the protection, conservation and sustainable use of environmental components, bearing in mind their particular characteristics and integration into the surrounding social, economic and cultural environment.
3. Subject to the polluter pays principle and the relevant environmental liability, the State shall promote the repair of the different environmental components affected by pollution or contaminants to ensure their preservation, with a view to their sustainable use.

Article 23

Air

It is incumbent upon the State to create the necessary mechanisms to protect, maintain and improve air quality, within the quality and environmental emissions standards set out, and to adopt integrated control measures for atmospheric pollution and the production, use, import and export of ozone-depleting substances, in the aim of preventing and reducing the harmful effects of air pollution on human health and environmental components.

Article 24

Surface and ground water

The State shall protect, conserve and improve the quantity and quality of surface and ground water and promote sustainable use of water resources by adopting an integrated water management plan that includes:

- a) Access and sharing of water resources by the different users;
- b) Management of the water basins;
- c) Regulation of well openings;
- d) Regulation of water use for agricultural, industrial and mining activities;
- e) Prevention of pollution and contamination of water resources;
- f) Creation of incentives to harvest rainwater and other water conservation measures;
- g) Construction of dams and diversions of water for any purpose;
- h) The participation of the local community and particularly vulnerable groups in water management;
- i) Conflict resolution mechanisms.

Article 25

Coastal areas

1. The State shall ensure integrated management of coastal areas as a basis for the conservation, protection and sustainable use of sea resources, ecosystems and marine species.
2. The establishment of an integrated management plan for coastal areas shall take into account the limits of natural processes and the long-term balance of environmental, economic, social, cultural and recreational components, including:
 - a) Control and prevention of pollution and the discharge of waste from land or maritime sources;
 - b) Regulation of fisheries and aquaculture activities;
 - c) The measures necessary for adaptation to climate change;

- d) Measures to respond to natural disasters;..
 - e) Measures to promote ecotourism.
3. The use of explosives, poisons or any other toxic substance is strictly prohibited during the use of marine ecosystems and species.

Article 26

Soil and subsoil

1. It falls to the State, by setting out and implementing an integrated policy, to ensure the conservation, protection, sustainable use and rehabilitation of the soil and subsoil to prevent its degradation, erosion and contamination and to ensure its productive capacity.
2. The State shall foster the implementation of measures which promote the adoption of alternatives to the use of pesticides in farming.
3. The State shall implement the necessary prevention and repair measures to impede and minimise the effects of soil and subsoil erosion to ensure its productive capacity.
4. The establishment of an integrated soil and subsoil management plan shall take into account:
 - a) The prevention and reduction of land degradation;
 - b) The rehabilitation of partially degraded land;
 - c) The recovery of degraded land.
5. The integrated soil and subsoil management plan shall be set out and implemented in a way which is compatible and complementary with the land use planning policy and the sectoral plans, namely, agriculture, forestry, tourism, industry, transport, and waste and water management.

Article 27

Biodiversity conservation

1. It is incumbent upon the State to set out and implement a biodiversity conservation strategy that ensures:
 - a) In-situ and ex-situ protection and conservation of ecosystems and species and their habitats;
 - b) The reproduction of threatened and endangered species in particular, in quality and quantity;
 - c) The rehabilitation and restoration of degraded habitats and ecosystems and the recovery of threatened and endangered species;
 - d) The creation and maintenance of a national system of protected areas that ensures the ecological coherence of the territory and the continued survival of species and ecosystems;
 - e) Access to and equal sharing of the benefits resulting from the sustainable use of genetic resources and from traditional knowledge.
2. All necessary measures shall be taken to ensure appropriate development, handling, transport, use, release and internal or cross-border transfers of any type of genetically modified living organism so as to prevent and minimise risks to biological diversity and human health.

Article 28

Species and ecosystems

1. The State shall ensure the conservation, protection and sustainable use of land, coastal, marine, wetland and other aquatic species and ecosystems and their components by adopting measures aimed specifically at:
 - a) Maintaining and regenerating species by recovering damaged habitats and ecosystems;
 - b) Controlling the threats to exotic and invasive species and the activities and use of substances liable to degrade or harm species and their habitats;
 - c) Controlling the use of substances liable to degrade or harm species and their habitats.
 - d) The maintenance of environmental services.
2. Land, coastal, wetland and other aquatic species and ecosystems which are threatened or endangered, or which due to their genetic potential, size, age, rarity, or scientific and cultural value require special protection, are subject to specific legislation.
3. Also framed by specific legislation are:
 - a) The domestic and international trade in endemic and endangered species;
 - b) Appropriate measures for conserving wetlands and their ecosystems;
 - c) Appropriate measures for conserving and protecting estuaries;

- d) Appropriate measures for conserving and protecting mangroves and underlying ecosystems;
- e) Appropriate measures for conserving and protecting coral, coral reefs and underlying ecosystems.

Article 29

Environmental heritage

The State shall promote the adoption of policies, programmes, plans and projects intended to avoid degradation and permanent measures to safeguard, enhance and preserve environmental heritage, in particular natural, cultural, historical and landscape heritage, ensuring appropriate community involvement.

Article 30

Mining industry

1. The special legislation applicable to the mining industry does not preclude the application of the present law to the activities provided in it.
2. Subject to the special legislation, the mining of non-renewable natural resources shall be conducted sustainably in specifically designated areas and in accordance with other requirements provided for by law.
3. The law, taking into account the size and volume of mining, lays out measures to minimise and mitigate the direct and aggregate impact of mining activities on the environment, particularly:
 - a) Integrated management and monitoring of mining activities to ensure legal compliance;
 - b) Adoption of obligatory environmental measures in natural resource mining contracts;
 - c) Setting of quality and environmental emissions standards for all stages of the mining process, especially the final stage;
 - d) Establishment of environmental management plans for all stages of the mining process, especially the final stage;
 - e) Minimisation of environmental impact wherever mining activities are conducted near a protected area;
 - f) Measures intended to respond to accidents during mining activities.

Article 31

Sand and gravel extraction

1. The special legislation applicable to sand and gravel extraction does not preclude the application of the present law to the activities provided in it.
2. Subject to the above, sand and gravel extraction from rivers, riverbanks, beaches or any other area may only take place in expressly designated areas and in compliance with the law, after a licence has been issued by the competent authorities and via payment of a fee, where applicable.
3. The costs of rehabilitating areas subject to environmental degradation or damage resulting from the sand or gravel extraction process are the responsibility of the extracting entity.

CHAPTER V

Pollution and Waste

Section I

Pollution

Article 32

Pollution control

1. The State shall ensure that appropriate measures are taken to avoid, minimise and reduce the occurrence of damage, environmental degradation and risks to public health, quiet, human well-being, environmental components and the sustainability of economic development caused by pollution.
2. The release, discharge or introduction of polluting substances in any way into the water, sea, air, soil or subsoil or any environmental component and their contamination is subject to quality and environmental emissions standards and other legislation in force, subject to the provisions of this law.
3. Human activities shall be pursued through use of the best techniques available and best environmental practices to ensure prevention of emissions and waste and the minimisation of their harmful effects.

4. The State shall promote measures to facilitate the adoption of alternatives to the use of fertilizers, pesticides and other agro-chemicals in agricultural production.

Article 33
Air pollution

1. The release of greenhouse gases and other polluting substances into the atmosphere shall be reduced, controlled and maintained within the limits of quality and environmental emissions standards and other legislation in force.
2. All installations, machinery, equipment, methods of transport, construction or any other activity which may affect air quality shall be equipped with filters and specific devices to reduce and neutralise polluting substances, in accordance with the law.
3. It is prohibited to import and produce controlled substances, in accordance with the terms of the Montreal Protocol on ozone depleting substances.

Article 34
Climate change

The State shall implement the measures necessary for climate change adaptation and mitigation in terms of reducing greenhouse gas emissions into the atmosphere and/or their removal by sinks and minimizing the negative effects of the impacts of climate change on biophysical and socioeconomic systems.

Article 35
Water pollution

1. The release or discharge of any polluting substance from land or sea into rivers, lakes, lagoons, underground waters, maritime waters or any water course or water storage area shall be reduced, controlled and kept within the limits established by quality and environmental emissions standards and other legislation in force.
2. It is the State's responsibility to create and maintain the means necessary to ensure the treatment and control of water pollution, including that from torrential rains.

Article 36
Noise and vibration pollution

Noise and vibration from domestic, commercial, industrial, construction and transport sources which have a negative effect on public health, quiet and human well-being and environmental components, above all in residential areas, shall be kept within the limits established by quality and environmental emissions standards and other legislation in force.

Article 37
Visual pollution

1. The existence of any type of light, whether fixed or intermittent, which due to its size, characteristics or location may disturb or adversely affect public health, quiet, human well-being, or environmental components, above all threatened or endangered species, shall be kept within the limits established by quality and environmental emissions standards and other legislation in force.
2. It is the State's responsibility to create and maintain the means necessary to control visual pollution resulting from economic activities, in particular from advertising or other activities that are harmful to the landscape.

Article 38
Dangerous chemicals

The importing of dangerous chemicals is subject to the State's prior and informed consent, in accordance with the terms to be established by law.

Section II
Waste

Article 39

Solid waste management

1. The law sets out the mechanisms governing the collection, transportation, storage, processing, reduction, re-use and recycling of solid waste, subject to the provisions of the present Article.
2. It is the responsibility of public bodies to collect, transport, store, process, reduce, re-use and recycle solid waste from domestic and commercial sources.
3. The collection, transportation, storage, processing, reduction, re-use and recycling of solid waste from hospital, industrial, construction or any other source not provided for in the preceding paragraph is the responsibility of its producer, in accordance with the terms of the law.
4. It is the responsibility of every citizen to ensure that solid waste is deposited in the designated places.
5. The necessary means and mechanisms shall be created to ensure the use of solid waste as a source of alternative energy production.

Article 40

Landfills

1. It is the State's responsibility to create and maintain sanitary landfills as sites specifically designed for the controlled disposal, either above or below the natural surface, of waste produced by human activity, whether commercial or industrial, using appropriate technologies and methods so as to avoid the contamination of the water table and prevent negative impacts on public health, human well-being and environmental components and promote environmental sustainability.
2. Waste may only be discharged in specifically designated areas by the competent bodies and in the conditions provided for in the authorization granted, in accordance with the law.

Article 41

Waste water

1. The State shall create the necessary means and mechanisms to ensure the appropriate treatment of domestic, commercial and industrial waste water and sewage effluent, with a view to preserving the quality of fresh, surface, ground and sea water.
2. Any establishment or installation which evacuates waste water is obliged to ensure its purification, in accordance with the environmental rules established for that purpose.

Article 42

Hazardous waste

1. The importing of hazardous waste is prohibited.
2. The identification, control, production, transportation, storage, exports and use of hazardous waste is subject to special legislation.

CHAPTER VI

Financial Measures and Economic Instruments

Article 43

Budget

1. The environment, when drawing up State plans and the budget, shall be considered a national priority.
2. The general State budget approved annually shall make provision for specific and adequate budgetary appropriations for activities to conserve and protect the environment, as well as to finance the costs of environmental recovery and rehabilitation stemming from natural catastrophes and emergencies.

Article 44

Environmental fund

An environmental fund may be created by law managed jointly by the government department responsible for the environment and the government department responsible for finance to fund the activities of management, conservation and environmental protection.

Article 45

Charges

Besides the charges provided for in the environmental licensing process, specific levies may be created by law for the provision of services provided by the environment.

Article 46

Economic instruments

1. The State shall ensure that adequate measures are taken to:
 - a) Determine the economic value of the country's environmental components and, based on this, determine the appropriate fines and compensation for environmental degradation and for the national environmental accounting system;
 - b) Create a national environmental accounting system incorporating the assessment of environmental components and the effect of their depreciation on GDP;
 - c) Promote investment in environmentally sustainable services available and produced in Timor-Leste using sustainable environmental technologies;
 - d) Promote investment in the development and use of alternative clean technologies and energy from renewable sources;
 - e) Develop a carbon and emissions trading system and other market mechanisms to enable national industries to participate in the mechanisms created by international agreements and ratified by Timor-Leste.

Article 47

Access and distribution of benefits

The law provides for equal access and distribution of the material and non-material benefits stemming from the use and sustainable exploitation of environmental components and natural resources for communities located in the area where they are exploited.

CHAPTER VII

Environmental Information and Education

Article 48

Environmental information system

1. The State shall create an environmental information system on the state of the environmental components, natural resource exploitation and identification of the programmes, plans and projects which may have a significant impact on public health and human well-being, the environmental components and ecological sustainability.
2. The environmental information system provided for in the preceding paragraph aims to facilitate the ordering, access, distribution and sharing of environmental information, and to promote environmental education and citizen participation in decision-making processes and the conservation and protection of the environment and natural resources.
3. The environmental information system shall be administered by a public body with competences for compiling, handling, ordering and divulging relevant environmental information in a way which is clear and accessible to the general public.
4. Other public or private bodies which in performing their functions provide services or develop environment-related programmes, plans and projects are obliged to collaborate with and provide relevant information to the body referred to in the preceding paragraph, subject to the legally safeguarded rights of third parties.

Article 49

Access to environmental information

1. Systematic environmental information, pursuant to the preceding Article, or any other relevant information shall be freely accessible to the general public in the official languages, subject to any confidentiality rules, under the legal provisions in force.

2. For the purposes of the preceding paragraph, the law sets out the mechanisms ensuring public availability and consultation of sufficient information on the programmes, plans or projects subject to environmental licensing and strategic environmental assessment to enable environmentally substantiated decisions to be taken.

Article 50

Environmental reports

1. Public bodies which develop programmes, plans or projects that have significant effects on the environment shall submit an annual report on these to the ministry responsible for the environment.
2. The ministry responsible for the environment shall submit an annual report to the council of ministers on the state of the environment based on the reports referred to in the preceding paragraph.
3. The reports provided for in the preceding paragraph shall be published for consultation in the official languages.

Article 51

Environmental education and training

1. Citizens shall be given environmental education and training as a strategic factor in the sustainable development of the country via the introduction of materials on environmental conservation and protection in the formal and non-formal education systems and through media channels.
2. The environmental education and training programmes shall be drawn up jointly by the ministries responsible for education, vocational training and the environment.

Article 52

Civic education

Permanent civic education on the environment shall be provided, via successive campaigns targeted at civil society in general and public employees in particular, to raise knowledge and awareness of the need to conserve and protect the environment and preserve and make sustainable use of natural resources.

Article 53

Scientific and technological research

The State shall encourage, promote and finance scientific and technological studies and research aimed at optimising, conserving, protecting and ensuring the sustainability of environmental components, biodiversity and natural resources and at preventing environmental degradation or damage.

CHAPTER VIII

Inspections, Emergency Situations, Civil Liability Insurance and Guarantees

Section I

Supervision and emergency situations

Article 54

Implementation and inspections

1. The State shall create the necessary means and mechanisms to implement the present law and to establish a decentralised system of environmental inspections, subject to the provisions herein.
2. Environmental inspections may be conducted at any time, whenever there is an indication that environmental legislation may have been infringed.
3. Public bodies, citizens and legal persons are subject to the obligation to collaborate with the bodies responsible for environmental inspections in accordance with the law.
4. The public body responsible for environmental inspections may, wherever the infringement of environmental legislation is at stake, issue general guidelines regarding compliance with the law and order the offender to cease polluting activities, clean up or rehabilitate the site subject to damage or environmental degradation or issue any other orders deemed appropriate to return it to its original state.

5. Any attempt to interfere with environmental inspections, provision of false information or non-compliance with the guidelines and orders provided for in the preceding paragraph shall result in an administrative or criminal penalty in accordance with the law.

Article 55

Public participation in environmental inspections

1. For the purposes of paragraph 3 of the preceding Article, the State shall promote the participation of public bodies, citizens and legal persons in implementing this law and in conducting environmental inspections by creating mechanisms for the reporting of suspected infringements of environmental legislation.
2. For the purposes of the preceding paragraph, the law shall establish a decentralised and transparent system for reporting environmental violations which ensures that they are registered and that the competent services are able to respond rapidly.

Article 56

Emergencies

1. The State shall create an integrated system to prevent and respond to environmental emergencies caused by human activities or natural disasters that cause damage, an imminent risk of damage or a very significant danger of serious irreparable damage to the environment.
2. The provisions of the preceding paragraph do not absolve the bodies responsible for activities that cause potential damage, an imminent risk of damage or a very significant danger of serious irreparable damage to the environment from maintaining a system for responding to environmental emergencies.
3. The environmental management and decommissioning plans obligatory by law shall include provisions for the prevention of incidents and response to emergency situations so as to avoid the occurrence of damage, an imminent risk of damage or a very significant danger of serious irreparable damage to the environment.
4. Whoever suspects or detects an environmental emergency situation must report it to the public bodies to ensure public safety and to avoid the occurrence of damage, an imminent risk of damage or a very significant danger of serious irreparable damage to the environment.
5. Temporary environmental measures for specific emergency situations may be approved to help rehabilitate affected areas, avoid damage, an imminent risk of damage or a very significant danger of serious irreparable damage to the environment, or degradation, and to restore ecosystems and species.
6. The State shall provide other States which might be affected by an emergency situation that occurs within the territorial jurisdiction of Timor-Leste with sufficient warning.

Section II

Civil Liability Insurance and Guarantee

Article 57

Civil liability insurance

1. Whoever implements programmes, plans or projects involving risks of damage, an imminent risk of damage or a very significant danger of serious irreparable damage to the environment must be covered by civil liability insurance.
2. The obligation in the preceding paragraph is applicable to the programmes, plans or projects subject to the environmental assessment and licensing regime, in accordance with the law.

Article 58

Guarantee³

1. The programmes, plans or projects subject to the environmental assessment and licensing regime may require a security to be lodged to cover any negative impacts on the environment, including environmental disasters which may occur during the building, implementation or dismantling period.

³ Garantia

2. The security lodged under the present Article shall be returned once the activity has ceased, as long as no negative impacts on the environment have been verified.
3. The terms for the provision of the security provided for in the present Article are established by law.

CHAPTER IX
Liability and Judicial Oversight

Section I
Liability

Article 59
Administrative liability

1. Violations of the present law are deemed punishable by an administrative fine, the maximum and minimum limits of which are defined by law in accordance with the seriousness of the infringement.
2. Administrative liability is independent of any civil or criminal liability that may arise in accordance with the law.
3. If conduct is punishable both as a crime and an administrative offence, the offender shall always be punished according to the former, subject to any additional penalties provided for the offence.
4. Negligence and attempted damage are always punishable.
5. The State shall develop general guidelines and directives to assess environmental damage for the purposes of establishing an offender's liability.

Article 60
Objective liability

1. Wherever an actor has damaged the environment, compensation shall be provided, irrespective of guilt.
2. Assessment of the seriousness of the damage and the establishment of the amount of compensation to be paid is the responsibility of the courts, under the general terms of the law, subject to the provisions of Article 60.5.

Article 61
Additional penalties

1. The violation of the present law and other environmental legislation may result in the application of the following additional penalties subject to the provisions of the following Article:
 - a) Disqualification from engaging in a profession or activity;
 - b) Revoking of licences or permission to engage in an activity;
 - c) Seizure, loss or removal to the State of material or equipment used or produced during the infringement;
 - d) Loss of right to a subsidy awarded by a public body or service;
 - e) Loss of tax benefits, credit benefits and lines of financing from credit establishments already enjoyed;
 - f) Reimbursement of the State of an amount equal to the market value of the natural resources used in violation of the provisions of environmental legislation and of the environmental degradation or damage caused, plus interest;

Article 62
Repair, rehabilitation and compensation

1. Whoever, in violation of the legal and regulatory provisions in force, causes damage to one or more environmental components, is obliged to return it to its original state, subject to Article 59.
2. Wherever the obligation referred to in the preceding paragraph is not voluntarily complied with, the competent authority may undertake the demolition, construction and other work necessary to rehabilitate it and return it to its original state prior to the infringement at the offender's expense.
3. If it is not possible to return it to its original state or it is not possible to adopt other measures in the aim of doing so, the offender is obliged to pay compensation, under the general terms of the law.

4. The compensation provided for in the preceding paragraph shall be allocated equitably to the local communities affected.

Section II Judicial Oversight

Article 63 Judicial Oversight

1. The public prosecutor's office is responsible, before the relevant courts, for protecting the environment and ensuring that the present law and other environmental legislation are implemented and complied with.
2. Any natural or legal person who feels that their rights are threatened or have been harmed is legitimately entitled to bring the case before the courts to request that the said threatening or harmful conduct be stopped and the relevant compensation be paid, under the general terms of the law.
3. The legitimacy of any person, or association, foundation and local community, to propose and intervene in principal and protective proceedings to safeguard the environment is also recognised, irrespective of personal interest in the matter.
4. All members of the interested public are legitimately entitled to question the procedural or substantive legality of the decisions, actions or omissions of public bodies.
5. The right to bring a matter before the courts provided for in the present Article may be exercised directly and without the need for prior administrative review.

Article 64 Alternative dispute settlement

1. It is incumbent upon the State to develop alternative environmental dispute settlement procedures, such as arbitration, conciliation and mediation, and to create the mechanisms and means necessary to ensure their use, subject to the provisions in the preceding Article.
2. Local communities may use the local recognised institutions and mechanisms for alternative settlement of environmental disputes, subject to the aims and principles set out in the present law.
3. Environmental dispute settlement does not apply in the case of environmental crimes.
4. The provisions in the preceding paragraphs shall not jeopardise the right to bring a case to the competent courts of the Democratic Republic of Timor-Leste, in accordance with the law.

CHAPTER X Final and Temporary Provisions

Article 65 International cooperation

It is incumbent upon the State, in line with the principle of international cooperation and the terms of the general principles of international law, to cooperate with other States in the shared management of cross-border environmental components and risks and in compliance with the aims of regularly ratified international conventions and agreements.

Article 66 International conventions and agreements

The regulation of the present law and the approval of environmental legislation shall take account of international conventions and agreements regularly ratified by Timor-Leste.

Article 67 Environmental quality standards

Until environmental quality standards have been established by domestic law, the standards endorsed by the World Health Organisation shall apply.

Article 68 Environmental auditing

1. All the programmes, plans and projects implemented by public or private entities, which on the date this law came into effect were underway and which had not applied environmental protection measures, resulting in damage, an imminent risk of damage or a very significant danger of serious irreparable damage to the environment, shall be subject to an environmental audit.
2. Audits performed under the terms of the preceding paragraph which confirm the existence of damage to the environmental components shall identify the necessary rehabilitation measures and establish a long-term management plan.
3. The audit process is initiated by the ministry responsible for the environment either automatically or upon request.
4. Environmental audits shall be performed by an independent entity and submitted to the ministry responsible for the environment.
5. Environmental audits are subject to public consultation in accordance with the system of environmental assessment and licensing, and their results should be made available for public consultation.
6. The costs stemming from the repair of environmental damage identified by an audit are the responsibility of those who caused it.
7. The results of an audit are independent of any possible civil, administrative or criminal liability and compliance with other obligations provided for by law.

Article 69.

Revocation

All legislation which is contrary to that contained herein shall be deemed revoked.

Article 70

Additional legislation

The contents of the present law shall form the basis of additional legislation approved by the State.

Article 71

Entry into force

The present law shall come into effect on the day following its publication.

Approved by Council of the Ministers on 11 of April 2012.

Prime Minister,
Kay Rala Xanana Gusmão

The Minister of Economy and Development,
João Mendes Gonçalves

The President of the Republic,
Taur Matan Ruak