Barriers and

Gaps hindering

data and

information

sharing

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Acronyms and Abbreviations

ICAT	Initiative for Climate Action Transparency
EPA	Environmental Protection Agency
ETF	Enhanced Transparency Framework
GHG	Greenhouse Gas
IWMC	Island Waste Management Centers
MCEP	Maldives Clean Environment Project
MEMP	Maldives Environmental Management Project
MoECCT	Ministry of Environment, Climate Change and Technology
MoH	Ministry of Health
MoT	Ministry of Tourism
MVR	Measuring, Reporting and Verification
NBS	National Bureau of Statistics
RWMF	Regional Waste Management Facilities
SAP	Strategic Action Plan
UNEP CCC	United Nations Environment Programme Copenhagen Climate Centre
UNFCCC	United Nations Framework Convention on Climate Change
UNOPS	United Nations Office for Project Services
URA	Utility Regulatory Authority
WAMCO	Waste Management Corporation
WB	World Bank

1 Introduction

Initiative for Climate Action Transparency (ICAT) is a project implemented by the Ministry of Environment, Climate Change and Technology (MoECCT) in partnership with United Nations Environment Programme Copenhagen Climate Centre (UNEP CCC) and United Nations Office for Project Services (UNOPS). The aim of this initiative is to strengthen national institutions to meet enhanced transparency requirements of the Paris Agreement. MoECCT is working to enhance the Measuring, Reporting and Verification (MRV) system to meet the Enhanced Transparency Framework (ETF) of the Paris Agreement. Accordingly, Maldives have periodically submitted relevant reports including Greenhouse Gas (GHG) inventory to the United Nations Framework Convention on Climate Change (UNFCCC); for instance, three inventories were submitted under the First and Second National Communications, in 2001 and 2016 respectively and the first BUR which was submitted in 2019.

At sectoral level, mitigation action in the Maldives is focused on three main sectors: Energy, Waste, and Transport. Under this project, more focus is given improving the MRV processes of the waste sector. It specifically focusses on enhancing the data collection and data management procedures and methods. This is essential since emissions from waste have been identified as a key category in all the national inventories.

The MoECCT is mandated as the key entity to improve the emissions estimates. It is also the authority to report climate actions under the ETF of the Paris Agreement. Nationwide, significant changes are being brought under the waste management sector. Waste management and data collection are carried out at several levels, regional and local levels. The data and information collected need to cater to the requirements under the ETF to increase the transparency for climate actions. A strategy or a road map is required for creating the best enabling environment for

continuous data reporting and data sharing in the waste sector to support improving the transparency reporting process.

The aim of this report is to prepare barriers and gaps hindering data and information sharing. In this regard, this report is divided into four chapters.

- First chapter (**Introduction**) provides an overview of the report, along with setting overall aim of the report.
- Second chapter (**Background)** highlights on current or existing waste management practices in the Maldives. This chapter further sheds light on the challenges associated with such data collection.
- Third chapter (**Barriers for data sharing and use**) discusses the main obstacles or challenges associated for collection and management of waste data.
- Fourth chapter (**conclusion**) provides an overall summary of the report and strategic way forward beyond the project.

2 Background

Management of waste has become one of the most pressing environmental issues in Maldives. The growing population with growing economic industries produces increased and diverse amounts of waste. The issue has become more critical due to the country's unique geographical and environmental characteristics. The Maldives is an archipelago of islands located in the Indian Ocean, known for its stunning beaches, clear waters, and rich marine biodiversity. However, the country faces significant challenges in managing its waste due to its small land area, limited resources, and vulnerability to climate change.

To cater for this growing waste, the government has always been taking measures to manage the waste. Island Waste Management Centers (IWMC) and Regional Waste Management Facilities (RWMF) have been established.

2.1 National waste management centers

The following provides a general summary of the waste management efforts.

2.1.1 Waste management centers on islands

The traditional means of managing the waste in outer islands is to designate a 'waste dump' area on the island. Usually, this area is designated far from the population centers as much as possible if the space allows. These areas are usually close to the coastline and waste is open burned (Stefano 2015). As a result, some waste gets ended up on the shore and eventually into the lagoon contributing to ocean litter. In the late 90's, construction of designated places for waste management (island waste management centers) with some form of segregation began with the public infrastructure development program (ERC, 2008). However, these centers are poorly managed or under designed for islands with larger populations resulting in eventually filling up the sites and mal-functioning of the waste centers (Peterson, 2013). Currently many Island Councils do conduct their own methods of waste management. In some islands, waste is segregated at the

households and collection vehicles by the island council collects these on a regular basis with a fee. However, there limited to no records or statistics of the data is collected nor archived.

As managing the waste was given the highest priority, less to no focus was placed on collecting information on the waste production, handling, managing and disposal data.

2.1.2 Thilafushi regional waste management facility

Thilafushi has been a long operating regional waste collection facility where the management has undergone several changes. Thilafushi construction began in 1992 with the reclamation of the lagoon. It has been the main national waste collection center ever since, which receives tons of waste every day from greater Malé, resorts and islands. Waste to Thilafushi is delivered by barges and vessels or dhoni. Waste from Malé is transported via barges with trucks loaded with mixed waste. Waste from resorts and islands is brought via dhoni. Waste received at Thilafushi gets recorded by tonnage of the vessel based on the carrying capacity of the vessel. Even if the vessel is fully loaded or half loaded, it is recorded at a constant tonnage. This gives rise to over and underestimation of the waste generation. Some waste segregation effort is carried at Thilafushi manually, where it is minimally sorted for glass, plastic, metal, sawdust and some hazardous waste such as lead acid batteries. There is no data recording mechanism or data records of segregated waste although total amount of waste by vessel carrying capacity gets recorded for billing and commercial purposes. With many changes in the operation management of Thilafushi, the current operations and management is handled by Waste Management Corporation (WAMCO) which is also a state-owned company.

A major upgrade is undergoing at Thilafushi for the installation of a waste to energy plant with an incinerator. This will also upgrade other associated infrastructure and service management. A weighing bridge is recently installed where the waste carrying trucks carrying a special ID would be weighed to estimate the bulk amount

of waste coming into Thilafushi. A sorting line is also planned to be constructed to sort and segregate the waste. It is also planned to have a data recording system once these structures are in place.

2.1.3   Vandhoo regional waste management facility

Another regional waste management facility was established at Raa atoll Vandhoo under the Maldives Environmental Management Project (MEMP) which began in 2008 and concluded in June 2016. A significant focus was given to collecting and managing waste at this regional facility. However, there is no data collection at Vandhoo facility at the time of this report. Vandhoo is soon to be equipped with a waste sorter, which will start the data segregation and recording efforts. Vandhoo operations and management has now been assigned to WAMCO.

2.1.4   Southern regional waste management facilities

RWMF are also established at Fuvamulah City Waste Management Center, S. Hulhumeedhoo Waste Management Center, and the S. Hithadhoo Waste Transfer Station. These centers are also managed by WAMCO. Information and data about the waste stream and volume of waste is poorly managed.

A waste to energy facility is under construction at Addu City. A waste sort line is also planned to be installed which will improve the efforts towards waste segregation and data collection. Currently, the volume of waste is recorded by the carrying capacity of the vehicle or the vessel with no information about the segregated waste.

2.2 Data collection and waste management

As mentioned above, the first and the highest priority was given to managing the waste since it has increasingly become a national issue. Less focus was given to collecting data on waste. However, it is to be noted that, gradually the importance of waste data was realized and there are considerable efforts undertaken to collect data.

2.2.1 Data collection effort under the MCEP

A significant improvement to the data collection effort was made under the Maldives Clean Environment Project (MCEP) which is a follow-up project from the MEMP funded by the World Bank (WB). MCEP supports improvements in solid waste management in zone 4 and 5 comprising of 43 islands in Meemu, Faafau, Dhaalu, Thaa and Laamu Atoll. Waste data collection and monitoring is a key aspect of the project. The open-source data collection, analysis and monitoring platform known as the KOBOTOOLBOX (www.kobotoolbox.org) is used for data collection and monitoring. The tool has the capability to create, customize and manage data collection forms, which can be used on tablets and smart phones. It also comes with data analysis, visualization, storage and sharing features making it an ideal tool for data collection in islands and monitoring for regulatory authorities.

Under the MCEP, a regional assessment for data collection, monitoring and improvement of the RWMF (in R. Vandhoo) was conducted in Zone 2 which includes Noonu, Raa, Baa and Lhaviyani atoll. There are 45 islands in Zone 2 where waste management centers are established. MCEP provided weighing scales, crushers, compactors and other equipment to these 45 islands for operation of island waste management centers. A pilot data collection program was undertaken on six islands (N. Magoodhoo, N. Velidhoo, R. Hulhudhufaaru, R. Ungoofaaru, B. Kinolhas, B. Maalhos) of these 45 islands. These six islands were selected based the best waste management practices they have and source segregation at household level was one of these features. The survey was conducted from July to August 2020 during the COVID pandemic and posed many challenges to achieve the intended results. A waste data collection platform was created using the KOBOTOOLBOX, training to staff at waste management centers was provided on how to use the forms and uploading the information to the KOBOTOOLBOX database. During the pilot survey, data was collected every day. The questions collected qualitative and quantitative data about the facility features and data about waste stream, volume and frequency.

The following are some of the key issues identified by the survey.

- Data collection and updating of the data to the portal was not the most adequate as there are no dedicated staff within the council or service provider in the islands
- Some data is not accounted for since there waste is not segregated to the required categories such as hazardous waste
- Quality control measures in data entry forms were not in place (e.g. allowance of characters in places where only numbers are allowed, entry of extremely high or ambiguous values)
- Limited or lack of understanding about the terminology on segregated waste categories
- The amount of time staff has to spend on weighing the segregated data from the time of waste arrival at the center until end of their work hours. Usually, waste is collected in the afternoon and have to work late hours to weigh the waste.

2.2.2 Data collection by WAMCO

WAMCO is given the mandate to manage the waste in greater Malé, R. Vandhoo RWMF, Fuvamulah City Waste Management Center, S. Hulhumeedhoo Waste Management Center, and the S. Hithadhoo Waste Transfer Station. They provide waste collection services from residentials and businesses in these areas and dispose of the waste at the respective regional facilities. With the recent implementation of the Waste Management Act (24/2022), WAMCO collects segregated waste from residentials and businesses. However, due to limitations in collecting vehicles, the segregated waste gets mixed before it is carried to the disposal site. The volume of waste coming into the facilities is recorded as per the carrying capacity of the vehicles and vessels.

WAMCO has a data collection platform for resorts. According to the tourism regulations, resorts have to segregate the waste before the waste is disposed from the resorts. They do not have to keep a record of the waste generated at the resorts. Resorts usually dispose of the waste via third party vessels. WAMCO provides a

portal to the resort to enter the volume of waste that gets delivered to Thilafushi or waste management centers (currently Thilafushi takes waste from resorts). However, this does not include segregated information and the data is collected for WAMCO business use for billing.

2.2.3 National Bureau of Statistics

The National Bureau of Statistics (NBS) is also mandated to collect national data about waste generation. NBS reports waste statistics for the national and international requirements. NBS (2021) also reported that collection of waste statistics has been challenging due to lack or unavailability of waste data. NBS (2021) compiled the national waste accounts for 2018 and 2019 concluding that the waste data was inadequate to make policy decisions. NBS also identified the capacity building needs of various institutions for data collection, archiving and analysis. NBS sources the existing data from the current data collection systems and from respective authorities.

2.2.4 Data collection arrangements

The importance of waste data has always been recognized although less propriety was given to collecting the data. On various occasions, waste audits have been conducted on a need basis. However, the data collection was very specific for the need and the data is usually not shared or easily available. The importance of data was felt more with the need for construction of RWMF. Lack of waste data posed challenges in identifying requirement for sizing the areas for waste collection bays, segregation bays and most importantly for assessing the management fees to establish business management models.

To address this issue of waste data collection and management, it has been mentioned in policies related to waste. The current policy (MEE, 2015) states; "*conduct and develop a national database and establish methods for information collection, collation, access, and dissemination to ensure its comprehensiveness and public availability, conduct comprehensive waste audits across all islands to identify*

volume of different waste streams and to formulate reduction targets. Develop a national database and establish methods for information collection, collation, access, and dissemination to ensure its comprehensiveness and public availability."

The main stakeholders who collect waste data is MoECCT, waste management providers such as WAMCO and enforcement agencies including Environmental Protection Agency (EPA) and Utility Regulatory Authority (URA) to some extent. However, this is not on a regular basis and mostly on need basis such as to establish waste management facilities. In addition, NBS have been reporting some form of waste statistics depending on how the waste related data is provided to them from these stakeholders. A waste diagnostic study was conducted (UNOPS, 2020) to understand the current arrangement for how NBS obtains data through different stakeholders. Figure 1, shows the current waste data collection arrangement that is practiced through different stakeholders. Regular data collection is not practiced by the stakeholders due to various reasons as discussed in the subsequent chapters of this report.
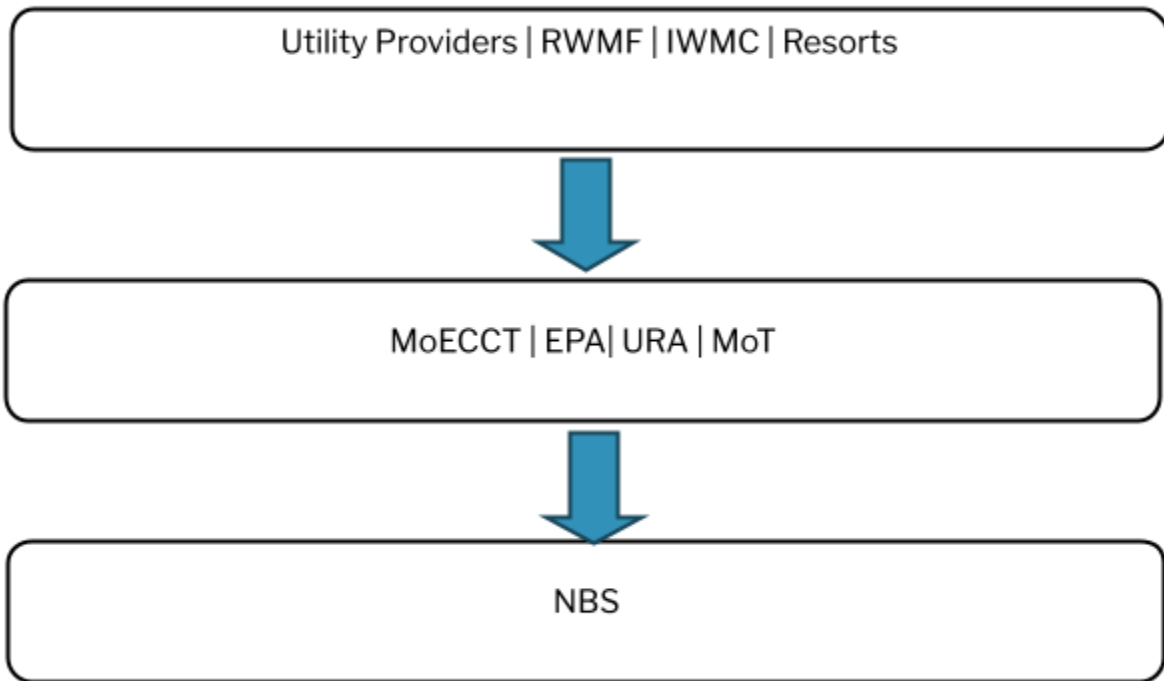
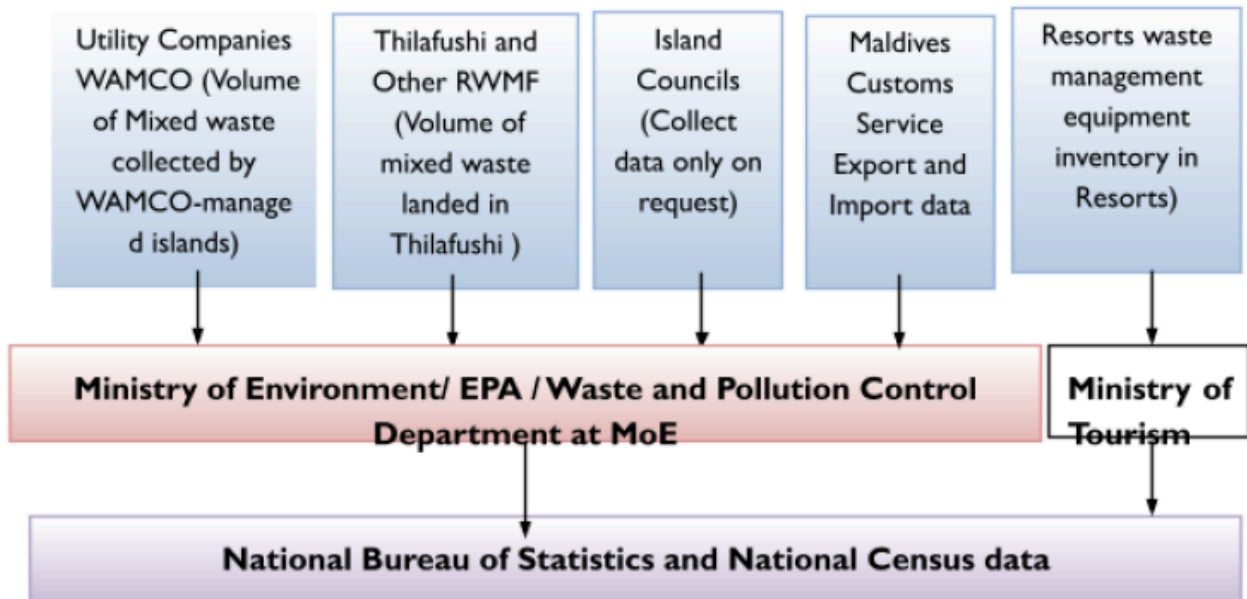*Figure 1 Data collection and flow of waste management sector (adopted UNOPS 2020).*

Figure 2 Data collection and flow of waste management sector (adopted from Diagnostic Study, UNOPS 2020).

3 Barriers and gaps for data sharing and use

As explained in the background, managing of waste is among the priority environmental issues currently. Less priority is given on collecting data and information on waste generation, how much goes into recycling, and how much and type of waste (waste streams) goes into open burning, controlled burning and recycling. There is no systematic data collection procedure and waste information is collected on a very ad-hoc basis and usually for an institutions specific need and is not collected on regular basis (NBS, 2018, 2020). Moreover, waste generation data is barely collected in the private sector including the tourism sector.

This chapter will look at the barriers and gaps identified. In addition to the policy and legislative barriers, a series of individual stakeholders' consultation and a workshop was also held to collect information of barriers and gaps.

3.1 Stakeholder workshop on barriers and gaps hindering data and information sharing

Individual consultations were undertaken with stakeholders to identify their roles and responsibilities in waste management and specifically on waste data collection, archiving, sharing and reporting. In addition, a workshop with all stakeholders was also conducted on 13th June 2023 to share the collective issues, barriers, potential solutions, and avenues for collaboration.

Findings of the individual stakeholder consultations were presented to further discuss and include any additional barriers and gaps they can identify. For the discussions to be focused and strategic, stakeholders were put forward with the following questions:

- Are there any additional gaps that need to be included?
- In a scenario where finance is readily available can we address these gaps? If not, what are the main challenges?
- How can these gaps be bridged?

A summary of the discussions from the workshop is below:

- Participants highlighted that one of the significant barriers for sharing and collection of data is due to lack of collaboration between major key stakeholders. There are underutilized administrative staff within some Island Councils. Their mandates could be revised to oversee some functions related to waste management on the islands.
- There are islands with good waste management practices and lessons need to be learnt from these islands to identify the gaps associated with data collection and sharing.
- There is need to consult with informal private parties such as Parley Maldives, Secure Bag and other NGOs that deals with the waste export in the Maldives. These companies operated under the company act which is lead by Ministry of Economic Development. They do keep their own waste collected data mostly recyclable items. However, there is no means to get this data from them.
- It was also discussed that the quality of data will improve with overall increase in training and awareness on importance and use of data for planning and development needs.
- Participants also appreciate that there is an increased awareness of the importance of data. There are two major developments related to waste, where waste-to-energy plants are installed in two different locations. They highlight that data is important for development, assessment of feasibility, operation and maintenance of such projects.
- A simple data collection mechanism needs to be installed to ensure that there are fewer mistakes and data bias. Currently KoboTool was developed with assistance from World Bank funded project. This tool was demonstrated in the workshop by Maldives Clean Environment Project staff.
- There is a general understanding that, since this tool is already developed and tested, training for use of this tool is needed by other stakeholders, especially

for WAMCO and other service providers since they currently do not have a proper data collection software.

Barriers	Underlying causes	Solutions
Waste data collection and management is handled by several institutions such as MoECCT, EPA, URA, Island Councils and utilities including WAMCO	Institutions are given with conflicting and overlapping mandates	● Improve coordination between stakeholders through regular engagements. ● Discuss and identify the gaps among the stakeholder over the overlapping mandates for collection and management of data. ● Establish the guidelines and regulations under the Acts
Lack of guidlines and regulations under the Acts (waste Act, URA Act) on waste data collection and dissemination	Lack of human and financial resources Lack of technical expertise	● Prepare recommendations/roadmap for improving overlapping of mandates over waste data collection, management and sharing among the stakeholders in line with the Waste Management Act 24/2022. ● Training and capacity building for preparation of guidelines and regulations

Lack of proper established waste data collection mechanism at island and regional levels	Human resource and financial and technical capacity constraints at institutions	- Prepare and standardize waste data collection mechanism at the island though formulation of 'Waste Audit Forms". - Use experience from the previous data collection efforts. - Designate or identify waste focal points at respective island council and their respective counterpart at MoECCT/EPA/URA. - Provide capacity building and awareness to the island and regional focal points at the islands on how to collection, analyze waste data collection at source, transportation, and disposal.
Lack of proper equipment at the islands waste management facilities for data sorting, segregation and weighing	Due to limited finance provided during construction of waste management facilities, some equipment for data sorting and segregation are not provided.	- Prepare business plan for the operation of the waste management facilities to ensure sustainability - Provide capacity building and awareness to collect and manage waste data
Human resources available at the waste collection or waste management facilities are limited. Segregation and sorting of waste takes considerable amount of time. Within limited amount of HR resources,	Due to limited finance available, human resources are not increased. A significant importance is given to waste collection and disposal.	Adopt and prepare the Standard Operating Procedures and business plan

sorting and segregation becomes difficult or is limited. Lack of training provided to the staff at the waste management facilities on segregation and data handling Lack of trained staff at ministry, URA, EPA, WAMCO and other related institutions on data collection, handling and analysis Lacks a proper mechanism to share data among the stakeholders especially between facility managers and national policy and regulatory authorities.	Therefore, less significance is given to train staff on waste segregation and data handling. Waste is not segregated at a larger scale and hence there was a lesser need to train people on data collection and analysis. Economy of scale is not met at islands due to small sized economy to implement a waste collection mechanism	to sustainability operate waste management facilities. ● Provide equipment's and necessary tools for data collection including weighing machines. ● Conduct training and capacity building activities within MoECCT/EPA/URA and at councils.
Data collection platforms such as KOBOTOOLBOX has been designed. However, the software needs to be further enhanced with feedback from users. The current data entry forms needs to be improved with measures for error and quality control for data entry.	The toolbox underwent only one pilot run. The feedback from the pilot needs to be incorporated and tested again. Quality and error checks were not implemented since this was the very first pilot for such a data collection effort.	● Raise awareness about the toolbox among the stakeholders to promote the use of the toolbox for data collection. ● Enhance the toolbox based on feedback ● Training needs to be provided to relevant people on use and maintenance of the toolbox

3.2 Policy

There was no waste Act until recently in 2022. Several polices and strategies were established under different government administration, to manage the waste. All these strategies and policies were placed under the auspices of Environmental Protection and Preservation Act (Law No, 4/93). The need for a waste Act was felt due to the growing demand for waste management and for proper regulation.

The analysis identified four major policy barriers/gaps associated with, waste data collection and sharing. They are;

1. Legal
2. Implementation
3. Knowledge

3.2.1 Legal

Maldives adopted a Waste Management Act (24/2022) in 2022, which remains as the primary legal vehicle that governs the sector. The aim of this Act is to provide guidance towards the implementation of sustainable waste management practices within uninhabited islands and industrial islands. The Act has a dedicated chapter on waste management related data (Chapter 12). It highlights the importance of data and identifies the role of agencies, ministry, and service providers for provision of collection and supply of such data. The mandate to the MoECCT for formulation of the guidelines or procedures for collection of waste management data is mentioned in the Act. At the time of this assessment, Ministry is undertaking work to prepare associated regulations that is required to fully operationalize the act, and works are ongoing to formulate legal mechanism through a regulation for collection and management of waste data. Therefore, the main legal barrier for the Act to be enforced is due to lack of these regulations.

3.2.2 Implementation

The Strategic Action Plan 2019 – 2023 (SAP) is the main policy document the current administration is implementing. Waste is identified as an important sector within SAP, however greater focus is given on the management of waste with a less focus on data collection. Stakeholder discussion indicated that there are gaps or barriers such as lack of adequate financial resources and capacity within the existing institutions for implementation of such policies. In addition, they also highlighted there are other barriers such as acquisition of land necessary for construction of the waste management facility. Land scarcity has always been an issue and has to compete with other development sectors to get the land. In addition, poor land use planning in the islands has led to relocation of the waste management centers, which led to waste of financial resources.

3.2.3 Knowledge

Due to many actors within the sector, the knowledge or information that is collected within the process is often lost or held with different stakeholders. There is no knowledge depositary or data collection mechanism that allows data collection, with standard methodologies. There are no policies written or formal setup to collect waste related data. The current practice for collection and management of these knowledge is practiced in an ad-hoc or need basis manner. This has resulted in accumulation of data that is often difficult to compare since they are collected using varying methods and different frequencies. For example, during the stakeholder discussion it was found that waste audits that were performed till date cannot be compared against each other due to lack of uniformity in data collection methodologies. This has led to unreliable results and difficulty in making decisions based on this.

3.3 Institutional

The current institutional setup for waste management practices clustered into three major grouping, they are (a) service providers, (b) regulators, (c) policy makers.

The **service provider** collects waste on the ground in accordance with set guidelines and procedures advised by the regulators and policy making authorities. A service provider can only operate within island or area with an operating license issued by a regulator. For example, WAMCO collects waste from Malé, and other sites based on the operating license issued by Utility Regulatory Authority (URA).

The **regulators** in this case are URA and EPA. URA is mandated to issue permit for operation of service providers, while EPA assess on the environmental compliance associated with waste management issue.

The **policy makers**, includes MoEECT and other sectorial ministries that provide overall policy and direction for the sector. For example, the Ministry of Tourism (MoT) will provide and set policy direction for all aspects of resort facility including waste management operation. Resorts will put in measures in their waste management facilities practices including data collection (if required) in accordance to the policy from MoT. Figure below shows a schematic of how the institutional arrangement is for policy and regulation implementation.
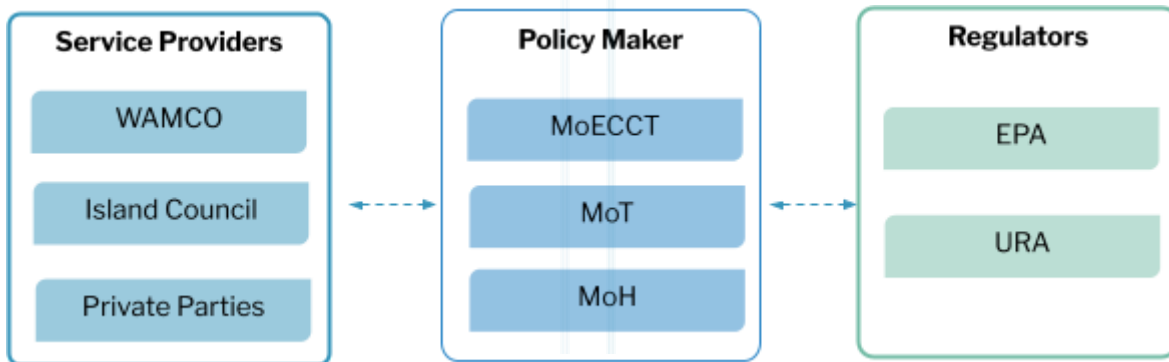

Figure 3 Existing Waste data collection mechanism occur on need/demand basis

There are several institutional barriers that hinder sharing and collecting waste management data. They include the following as explained below:

- Mandate overlaps
- Lack of adopted protocols for data collection

- Disjointed operation of institutions
- Lack of technical expertise

3.3.1 Mandate overlaps

The Maldivian Constitution (2008), vest powers on the President to decide and define the mandates of the Ministry. Additionally, the constitution also allows the Parliament to establish institutions, hence establishing general roles and responsibilities of these institutions. For example, the mandate of MoECCT is decided by the President, while roles and responsibilities of the URA is given under the URA Act (26/2020) . This has resulted in overlaps of mandates within these institutions.

Enforcement of data collection and sharing remains a critical gap, within the existing policy. Even though Waste Management Act 24/2022 identifies roles and responsibilities, there is a lack of understanding among the key stakeholders on who is responsible for enforcing or managing these data. Conflicting mandates are seen in other regulations such as URA regulations and EPA. Both the authorities have mandates to collect waste data. Under the URA Act, Chapter 2 of the act gives a very broad mandate to URA on collecting statistics of the service providers. In addition, under the waste Act (chapter 12) also specifies that the waste service providers should provide statistics to MoECCT. Chapter 12 also mentions that regulation and guidelines on data collection and statistics need to be established. Therefore, the main barrier is that these guidelines are not yet established and therefore there is no guidance for the service providers to collect waste data.

3.3.2 Lack of adopted protocols for data collection

Despite organizations' tasks to prepare and have standardized formats or methodologies for collection of data, at the time of this report there is no available standard or protocols for data collection. However, it is important to note that under the ICAT project, waste data collection methodologies and protocols were formulated, which is not formally endorsed.

Nevertheless, different institutions collect data on their individual need which is often difficult to compare (Table 1). For example, there are several waste audits that were undertaken in different parts of the country. However it is to be noted that these audits were not carried out under any standard data collection protocols or guidelines. They have different methodologies for data collection, different ways of population sampling and categorizing data. Therefore, it's difficult to make meaningful analysis or interpretation.

Table 1 Waste Audits and their respective audits that were undertaken in the Maldives

Year	Author	Scope/description	Geographical location
2007/2008	ERC	Waste Audit for composition in percentage households, guesthouse	Malé City
2010	MEE	Maldives Environment Management Project Social Assessment for Solid Waste Management	
2011	MEE	Feasibility Study North Province Regional Waste Management Facility	
2013	Zahid	Waste Audit in Aa. Thoddoo and Th. Veymandoo	Aa. Thoddoo and Th. Veymandoo
2015	MoT	Solid Waste Management Assessment	Tourism Sector
2016	MEE	ADB Zone III Feasibility Study	Kaafu, Vaavu, Alif Alif, Alif Dhaalu
2017	MEE	Zone 1 EIAs	
2019	Aboobakur and Samarakoon	General waste audit for Kulhudhufushhi	Hdh. Kulhudhufusshi

3.3.3 Disjointed operation of institutions

Overlap of mandates and varying need for data collection have resulted in fragmentation within the institutions and across the sector. For example, the requirement of waste data by Climate Change Department is different in contrast to the reasons for wasta data collection by Waste and Pollution Department, which are

two sister departments within the MoECCT. This, has resulted in duplicate efforts and waste of resources. Hence one of the critical gaps within the institutional arrangements is the lack of coordination within the same organization and silo operations of many stakeholders.

3.3.4 Lack of technical expertise

All the stakeholders indicated that there is lack of availability of technical expertise within the respective institutions to perform their respective mandates. Several reasons associated with the lack of availability of these expertise ranges from low wages offered to high set of skills and technical expertise. Additionally, stakeholders indicated that competing resources among the other institutions and private sector have also resulted in draining of capacity, resulting in difficulty in capacity retention.

3.4 Financial and economics of operation

Maldives has a small economy with limited resources and a small population. Proportionally, a large amount of waste is generated by this population. However, the waste management infrastructure and resources are limited, which makes data collection and analysis more challenging. A significant portion of the budget goes to manage the waste. This includes construction of waste management centers on the islands and provision of associated equipment. Finance is usually not provided by the state funds for collection mechanisms. Finance for development and improvement of waste management centers have also been provided by donors and through multi-lateral development banks as grants and loans. Given the importance of managing waste, these assistances also mostly focus on managing the waste although efforts for waste data have been made through these projects.

Operation of a waste management system can be a challenging task. A general waste management system would minimally include, waste generation, construction of infrastructure, collection mechanism, segregation, waste transfer (from island centers to regional), treatment, recycling, composting, disposal, training and awareness, policies and regulations, data collection and analysis. Operation of such a

system would require diligent planning, considerable amount of finance and human resources. Business models with economical and financial viability is needed to be in place for a sustainable system to meet the economies of scale. However, this has been a challenging issue for the operators. Some of the islands have waste collection systems based on a minimal fee from households and businesses. But to keep it sustained, a significant portion of the finance is subsidized from the Island Council budget. Therefore, no focus is given to collecting data as this will cause an extra stress on the budget. The largest waste operator, WAMCO, serving a larger population also finds it challenging to meet the operational costs. The cost of operation is high compared to the income which is based on the user fee structure. However, with recent enhancement of their infrastructure, they are putting emphasis on data collection as an integral part of their operation.

Discussions with MoECCT mentioned that this year they have introduced a new policy to obtain finance for waste management. Proceeds from the local Green Tax through the Maldives Green Fund will be earmarked to enhance the waste management system. Priority will be given to establish waste management centers on the island where centers are not yet established. Funds would also be used to obtain the required equipment for these centers. A considerable amount is also planned to be used to establish the regional waste management centers as they will be the main hubs for waste collection from the island waste management centers and centrally managed. This will also include provision of equipment and collector vessels to these facilities. It is also important to note that resources from this fund will also be used to establish data collection mechanism and provide training.

3.5 Geographic isolation

In Maldives, the geographic disbursement is a challenge for overall development. The geographic disbursed nature makes it very challenging and costly when it comes to practical implementation of any regulation or policy. Similarly, this poses a challenge in waste management as well. The island has its own waste management centers and the waste keeps on piling over time. Expanding the waste management

centers to accommodate this waste is not an option due to the small size of the islands. However, these piles have to be removed or disposed of at regional waste management centers which are still yet to be constructed in some of the regions. In atolls where the regional facilities are present, this waste does not get collected on a regular basis by the regional facilities. Due to the expensive cost of travelling, this has been challenging. The regional waste facilities do not keep a proper record of the waste, especially the stream of waste in type and quantity segregated.

3.6 Data collection and information management

Through the literature and stakeholders consultations, it was found that, data about waste generation is not collected in a proper manner. With the enacting of the waste law, the households were asked to segregate the waste, and this was collected by WAMCO. However, due to limitations in the collection vehicles and facilities of WAMCO, the segregation effort did not proceed well. This hindered the basic effort to collect data and information about segregated waste.

The importance of waste data has always been recognized although less propriety was given to collecting the data. On various occasions, waste audits have been conducted on a need basis. However, the data collection was very specific for the need and the data is usually not shared or easily available. The importance of data was felt more with the need for construction of regional waste management centers. Lack of waste data posed challenges in identifying requirement for sizing the areas for waste collection bays, segregation bays and most importantly for assessing the management fees to establish management models.

4 Conclusion

Waste management has been a significant and one of the most priority issues for Maldives. Growth in the population and the growing economy, especially with

booming tourism and other economic sectors generate considerable amounts of waste.

Several efforts have been made to manage this increase of waste. Island waste management centers and regional waste management facilities have also been established. A state-owned company, WAMCO, was also established to manage waste on larger islands, while on other islands, the Island Councils were given the mandate to manage waste. Due to the importance of managing waste, less effort was made to collect and manage data related to waste. This report looked at the barriers and gaps that exist in waste data collection. The report considered the barriers in the legislation, institutional and financial. A series of stakeholder consultations were conducted and results were validated.

Among the barriers identified, it was found that one of the overarching barriers is the lack of a strong legislative process to enforce waste related service providers to collect and manage waste data. Although the Waste Act was enacted recently, there are many underlying regulations that need to be in place for the Act to be fully implemented. Stakeholders identified that the lack of technical expertise in the institutions has delayed the formulation of guidelines. Another barrier identified was the mandate overlaps among the institutions. This has led to confusion and delays among the institutions in data collection. There are no standard procedures and protocols to follow in data collection and waste audits. This resulted in poor data, non-comparative and coherent results for decision making. One other important barrier identified was the diseconomies of scale in operation of waste management centers. A user-fee based system, subsidized by the government, is currently in place to sustain the waste management system. This has led to little or no focus to collect data. In addition, there are no equipment and trained staff in the waste management facilities for data collection and analysis.

The consultation process revealed that there were efforts for data collection. Waste audits were conducted for different requirements. Since there are no standard

protocols to follow, the audits were conducted using different methods. Under the Maldives Clean Environment Project, a pilot data collection effort was made with a more robust and standard procedures. The KOBOTOOLBOX was customized with data collection forms for data collection and archiving. However, data collection has not continued due to lack of human resources and equipment at the collection facilities.

As a first priority, it is recommended to complete the guidelines under the Waste Management Act. This will define clear roles, mandates and give the definitive power for the implementing agencies for data collection and archiving. This will also help to reduce the mandate overlaps. In addition, waste data collection guidelines also needs to be established under the Act. It is recommended to use the experience from the previous data collection efforts while establishing the guidelines. The current business and operation plans of the waste collection facilities also needs to be revisited to allocate funds for equipment for waste sorting, data collection, capacity building and training for staff.

It was discussed in the stakeholders meeting that KOBOTOOLBOX could be a way forward for collection and archiving. It is recommended to promote this tool to waste facilities and Island Council since the toolbox has already being customized for the local situation. Building up on this tool can reduce the effort that needs to be put in, rather than starting from scratch to build new databases. However, it is important to give the necessary training on customization, use and analysis of the results using this toolbox. The toolbox also comes with the data archiving space and this is recommended as a start.

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